



VIVEKANANDHA
COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University-Chennai)

Approved by AICTE, New Delhi, Accredited by NAAC and NBA (Tier –I)

Elayampalayam, Tiruchengode – 637 205, Namakkal District, Tamilnadu.



CURRICULUM & SYLLABUS
FOR
B.E. COMPUTER SCIENCE AND ENGINEERING
REGULATION 2023
(After 18th BoS)

Curriculum and Syllabus (Semester I to VI)
(Applicable to the students admitted from the academic year 2023 - 2024 onwards)



**VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous)
Elayampalayam, Tiruchengode – 637205.**



**B.E. COMPUTER SCIENCE AND ENGINEERING
REGULATION – 2023**

COLLEGE VISION

To impart value based education in Engineering and Technology to empower young women to meet the societal exigency with a global outlook.

COLLEGE MISSION

- To provide holistic education through innovative teaching-learning practices
- To instill self confidence among rural students by supplementing with co-curricular and extra-curricular activities
- To inculcate the spirit of innovation through training, research and development
- To provide industrial exposure to meet the global challenges
- To create an environment for continual progress through lifelong learning

DEPARTMENT VISION

To empower women technocrats in the field of Computer Science and Engineering and prepare them for globalized high-tech society to orient them towards serving the dynamic needs of our nation.

DEPARTMENT MISSION

- To foster and strengthen the core competence of Computer Science by adopting innovative methods.
- To elevate the research, entrepreneurial and employability skills in women technocrats through quality education.
- To induce values of professional ethics and spirit of social commitment among the students.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1

Graduates will have successful careers with strong fundamental and technical skills in industry that meet the needs of Indian and multinational companies.

PEO 2

Graduates will become successful entrepreneurs with determination, development, self-reliance, leadership, ethic and moral values to exploit employability.

PEO 3

Graduates will pursue higher education and engage in lifelong learning to foster personal and organizational growth.

PROGRAMME OUTCOMES (POs):

Graduates of Computer Science and Engineering can able to:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigations of Complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Graduates of Computer Science and Engineering can able to

PSO1: Develop computational solution to complex real world problems with modern programming tools

PSO2: Demonstrate basic knowledge of computer applications and apply standard practices in developing feasible solutions for IT enabled services

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEO) WITH PROGRAMME OUTCOMES (PO)

	PROGRAMME OUTCOMES											
PEO	Po1	Po2	Po3	Po4	Po5	Po6	Po7	Po8	Po9	Po10	Po11	Po12
1	√	√	√	√	√					√		√
2	√				√	√	√	√	√	√	√	√
3					√	√	√	√		√		√

HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSES (HSMC)

S.NO	COURSE CODE	COURSE NAME	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	U23EN101	English For Communication	HSMC	3	3	0	0	3
2.	U23EN202	Professional Communication	HSMC	3	2	0	3	3
3.	U23TA101	தமிழர் மரபு / Heritage of Tamils	HSC	2	1	0	0	1
4.	U23TA202	தமிழரும் தொழில்நுட்பமும் / TAMILS AND TECHNOLOGY	HSC	2	1	0	0	1

BASIC SCIENCE COURSES (BSC)

S.NO	COURSE CODE	COURSE NAME	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	U23MA101	Matrices and Calculus	BSC	4	3	1	0	4
2.	U23PH101	Engineering Physics	BSC	3	3	0	0	3
3.	U23PH102	Physics Laboratory	BSC	4	0	0	2	1
4.	U23CH201	Engineering Chemistry	BSC	3	3	0	0	3
5.	U23MA202	Complex Analysis and Ordinary Differential Equations	BSC	4	3	1	0	4
6.	U23CH202	Chemistry Laboratory	BSC	4	0	0	2	1
7.	U23MA304	Discrete Mathematics	BSC	4	3	1	0	4
8.	U23MA405	Probability and Statistics	BSC	4	3	1	0	4

ENGINEERING SCIENCE COURSES (ESC)

S.NO	COURSE CODE	COURSE NAME	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	U23CS101	Programming for Problem Solving	ESC	3	3	0	0	3
2.	U23GE101	Engineering Graphics	ESC	5	2	0	3	3
3.	U23CS102	Programming for Problem Solving Laboratory	ESC	4	0	0	2	1
4.	U23EE201	Basic Electrical and Electronics Engineering [#]	ESC	3	3	0	0	3
5.	U23CS204	Object Oriented Programming	ESC	3	3	0	2	4
6.	U19CS203	Python Programming	ESC	4	2	0	2	3
7.	U23GE204	Engineering Practices Laboratory	ESC	4	0	0	3	1

PROFESSIONAL CORE COURSES (PCC)

S.NO	COURSE CODE	COURSE NAME	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	U23IT302	Data Structures	PCC	3	3	0	0	3
2.	U23IT404	Database Management Systems	PCC	3	3	0	0	3
3.	U23CS305	Computer Organization and Architecture	PCC	4	3	0	0	3
4.	U23CS306	Python Programming and Frameworks	PCC	5	3	0	2	4
5.	U23IT303	Data Structures Laboratory	PCC	4	0	0	2	1
6.	U23IT406	Database Management Systems Laboratory	PCC	4	0	0	2	1
7.	U23CS407	Theory of Computation	PCC	3	3	0	0	3
8.	U23CS408	Design and Analysis of Algorithms	PCC	3	3	0	0	3
9.	U23CS409	Web Technology	PCC	3	3	0	0	3

10.	U23CS410	Digital Principles and System Design	PCC	3	3	0	0	3
11.	U23CT407	Operating Systems	PCC	3	3	0	2	4
12.	U23CS411	Web Technology Laboratory	PCC	4	0	0	2	1
13.	U23IT512	Artificial Intelligence	PCC	3	3	0	0	3
14.	U23CS513	Compiler Design	PCC	3	3	0	0	3
15.	U23CS514	Microprocessor and Microcontroller	PCC	3	3	0	0	3
16.	U23CS512	Data Communication and Networks	PCC	3	3	0	2	4
17.	U23CS516	Microprocessor and Microcontroller Laboratory	PCC	4	0	0	2	1
18.	U23CS618	Cloud Computing	PCC	3	3	0	0	3
19.	U23CT616	Internet of Things	PCC	3	3	0	0	3
20.	U23CS619	Agile Methodologies	PCC	3	3	0	0	3
21.	U23IT616	Machine Learning Essentials	PCC	3	3	0	2	4
22.	U23CT620	Internet of Things Laboratory	PCC	4	0	0	2	1
23.	U23CS721	Cryptography and Network Security	PCC	3	3	0	0	3
24.	U23CS722	Professional Ethics and Human Values	PCC	3	3	0	0	3
25.	U23CS723	Cyber Security	PCC	3	0	0	2	1

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.NO	COURSE CODE	COURSE NAME	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	U23GE102	Design Thinking*	EEC	2	1	0	2	1
2.	U23CTCP1	Verbal, Quantitative Aptitude and Reasoning - I	EEC	3	2	0	0	1
3.	U23CTCP2	Personality Development	EEC	3	1	0	2	1
4.	U23ADL01	French	EEC	2	2	0	0	1
5.	U23ADL02	German	EEC	2	2	0	0	1
6.	U23ADL03	Japanese	EEC	2	2	0	0	1

Credit Distribution – R2023

S.No	Category	Credit Per Semester								Total Credits
		1	2	3	4	5	6	7	8	
1.	BSC	8	8	4	4					24
2.	ESC	7	8							15
3.	HSMC	4	4							8
4.	PCC			15	17	14	14	7		67
5.	PEC					3	3	9		15
6.	OEC					3	3	3		9
7.	EEC	1		2	1	1	1	3	10	19
8.	MC						1			1
9.	CTC				1	1	1			3
Total		20	20	21	23	22	23	22	10	161

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	B.E.	Programme Code		101	Regulation		2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester		I			
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA101	Matrices and Calculus*	BSC	3	1	0	4	40	60	100
U23EN101	English For Communication*	HSMC	3	0	0	3	40	60	100
U23PH101	Engineering Physics ^{\$}	BSC	3	0	0	3	40	60	100
U23CS101	Programming for Problem Solving*	ESC	3	0	0	3	40	60	100
U23TA101	தமிழர் மரபு / Heritage of Tamils*	HSMC	1	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23GE101	Engineering Graphics*	ESC	2	0	3	3	50	50	100
PRACTICAL INTEGRATED WITH THEORY									
U23GE102	Design Thinking*	EEC	1	0	2	1	50	50	100
PRACTICAL									
U23PH102	Physics Laboratory ^{\$}	BSC	0	0	2	1	60	40	100
U23CS102	Programming for Problem Solving Laboratory*	ESC	0	0	2	1	60	40	100
MANDATORY COURSES									
-	Induction Programme*	3 Weeks				0	-	-	-
U23MCFY1	Environmental Science and Engineering ^{\$}	MC	2	0	0	0	100	-	100
Total						20	520	480	1000

BSC - Basic Science Courses, ESC- Engineering Science Courses, MC-Mandatory courses, HSMC- Humanities and Social Sciences including management courses, EEC – Employability Enhancement courses, CA- Continuous Assessment, ESE - End Semester Examination.

*Common for all branches

^{\$} Common for AI & DS,BT,CSE,CST & IT

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	B.E.	Programme Code	101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester			II		
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA202	Complex Analysis and Ordinary Differential Equations*	BSC	3	1	0	4	40	60	100
U23CH201	Engineering Chemistry ^{\$}	BSC	3	0	0	3	40	60	100
U23EE201	Basic Electrical and Electronics Engineering [#]	ESC	3	0	0	3	40	60	100
U23TA202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology*	HSMC	1	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23CS204	Object Oriented Programming [@]	ESC	3	0	2	4	50	50	100
U23EN202	Professional Communication*	HSMC	2	0	3	3	50	50	100
PRACTICAL									
U23CH202	Chemistry Laboratory ^{\$}	BSC	0	0	2	1	60	40	100
U23GE204	Engineering Practices Laboratory*	ESC	0	0	3	1	60	40	100
MANDATORY COURSES									
U23MCFY2	Indian Constitution ^{\$}	MC	2	0	0	0	100	-	100
Total						20	480	420	900

BSC - Basic Science Courses, ESC- Engineering Science Courses, MC - Mandatory courses, HSMC- Humanities and Social Sciences including Management courses, CA- Continuous Assessment, ESE - End Semester Examination.

*Common for all branches

^{\$} Common for AI & DS,BT,CSE,CST & IT

[#]Common for AI & DS,BT,CSE,CST & IT

[@]Common for AI & DS,CSE,CST & IT

U23CS203 – Python Programming (EEE, ECE, BT, BME)

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Programme	B. E.	Programme Code	101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester			III		
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA304	Discrete Mathematics ^{\$}	BSC	3	1	0	4	40	60	100
U23IT302	Data Structures [#]	PCC	3	0	0	3	40	60	100
U23IT404	Database Management Systems ^{\$}	PCC	3	0	0	3	40	60	100
U23CS305	Computer Organization and Architecture ^{\$}	PCC	3	0	0	3	40	60	100
U23CTCP1	Verbal, Quantitative Aptitude and Reasoning* – I	EEC	2	0	0	1	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23CS306	Python Programming and Frameworks [@]	PCC	3	0	2	4	50	50	100
PRACTICAL									
U23IT303	Data Structures Laboratory [#]	PCC	0	0	2	1	60	40	100
U23IT406	Database Management Systems Laboratory ^{\$}	PCC	0	0	2	1	60	40	100
U23CTCP2	Personality Development*	EEC	1	0	2	1	60	40	100
Total						21	430	470	900

*Common for all branches

\$ Common for CSE, IT ,CST & AIDS

@ Common for CSE, IT

Common for CSE, IT, EEE, ECE, BME, CST,AIDS

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205									
Programme	B. E.	Programme Code	101	Regulation				2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester				IV		
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23MA405	Probability and Statistics ^{\$}	BSC	3	1	0	4	40	60	100	
U23CS407	Theory of Computation	PCC	3	0	0	3	40	60	100	
U23CS408	Design and Analysis of Algorithms*	PCC	3	0	0	3	40	60	100	
U23CS409	Web Technology	PCC	3	0	0	3	40	60	100	
U23CS410	Digital Principles and System Design	PCC	3	0	0	3	40	60	100	
	Additional Language	EEC	2	0	0	1	100	-	100	
THEORY INTEGRATED WITH PRACTICAL										
U23CT407	Operating Systems ^{\$}	PCC	3	0	2	4	50	50	100	
PRACTICAL										
U23CS411	Web Technology Laboratory	PCC	0	0	2	1	60	40	100	
CAREER TRACK COURSE										
	Career Track Course - I	CTC	2/0	0	0/2	1	40/60	60/40	100	
Total						23	450/470	450/430	900	

^{\$} Common for CSE, IT , CST & AIDS

* Common for CSE, IT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B. E.	Programme Code	101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester			V		
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23IT512	Artificial Intelligence*	PCC	3	0	0	3	40	60	100
U23CS513	Compiler Design	PCC	3	0	0	3	40	60	100
U23CS514	Microprocessor and Microcontroller*	PCC	3	0	0	3	40	60	100
	Professional Elective – I	PEC	3	0	0	3	40	60	100
	Open Elective -I	OEC	3	0	0	3	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23CS512	Data Communication and Networks*	PCC	3	0	2	4	50	50	100
PRACTICAL									
U23CS516	Microprocessor and Microcontroller Laboratory*	PCC	0	0	2	1	60	40	100
U23CS517	Mini Project – I	EEC	0	0	2	1	100	-	100
CAREER TRACK COURSE									
	Career Track Course - II	CTC	2/0	0	0/2	1	40/60	60/40	100
Total						22	500	500	1000

* Common for CSE, IT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B. E.	Programme Code	101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester			VI		
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23CS618	Cloud Computing	PCC	3	0	0	3	40	60	100
U23CT616	Internet of Things ^{\$}	PCC	3	0	0	3	40	60	100
U23CS619	Agile Methodologies	PCC	3	0	0	3	40	60	100
	Professional Elective – II	PEC	3	0	0	3	40	60	100
	Open Elective -II	OEC	3	0	0	3	40	60	100
THEORY INTEGRATED WITH PRACTICAL									
U23IT616	Machine Learning Essentials*	PCC	3	0	2	4	50	50	100
PRACTICAL									
U23CT620	Internet of Things Laboratory ^{\$}	PCC	0	0	2	1	60	40	100
U23CS620	Mini Project – II	EEC	0	0	2	1	100	-	100
CAREER TRACK COURSE									
	Career Track Course - III	CTC	2/0	0	0/2	1	40/60	60/40	100
MANDATORY COURSE									
U23CS621	Comprehensive Examination	MC	2	0	0	1	100	-	100
Total						23	500	500	1000

^{\$} Common for CSE, IT & CST

* Common for CSE, IT

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B. E.	Programme Code		101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester			VII			
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23CS721	Cryptography and Network Security	PCC	3	0	0	3	40	60	100	
U23CS722	Professional Ethics and Human Values	PCC	3	0	0	3	40	60	100	
	Professional Elective – III	PEC	3	0	0	3	40	60	100	
	Professional Elective – IV	PEC	3	0	0	3	40	60	100	
	Professional Elective – V	PEC	3	0	0	3	40	60	100	
	Open Elective –III	OEC	3	0	0	3	40	60	100	
PRACTICAL										
U23CS723	Cyber Security Laboratory	PCC	0	0	2	1	60	40	100	
U23CS724	Internship and Project Phase - I	EEC	0	0	6	3	60	40	100	
Total						22	360	440	800	

* Common for CSE, IT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										
Programme	B. E.	Programme Code			101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING				Semester			VIII			
CURRICULUM (Applicable to the students admitted from the academic year 2023 - 2024 onwards)											
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks				
			L	T	P	C	CA	ESE	Total		
THEORY											
U23CS826	Project Phase - II	EEC	0	0	20	10	60	40	100		
Total						10	60	40	100		

Total Credits: 161

PROFESSIONAL ELECTIVE COURSES(PEC) VERTICALS					
Vertical I Data Science	Vertical II Artificial Intelligence and Machine Learning	Vertical III Cyber Security	Vertical IV IoT & CLOUD	Vertical V Creative Media	Vertical VI Emerging Technologies
Data Visualization	Computer Vision	Information Security	Cloud Computing	Pattern Recognition	Robotic Process Automation
Data Warehousing and Data Mining	Knowledge Engineering	Cyber security	Distributed Systems	Image Processing	Quantum Computing
Big Data Analytics	Natural Language Processing	Malware Analysis	Smart Sensor Technologies	Multimedia and Animation	Cognitive Science
Exploratory Data Analytics	Reinforcement Learning	Cyber law and Ethics	Software Defined Networks	Game Theory	3D Printing and Design
Social Media Analytics	Neuro Fuzzy and Genetic Programming	Block chain Technology	Parallel Programming	Digital Marketing	Generative AI
Predictive Analytics	Knowledge Based Decision Support Systems	Social Network Security	Virtualization	AR and VR	5G Communication Networks
Image and Video Analytics	AI for Industrial Applications	Ethical Hacking	Edge and Fog Computing	Video Creation and Editing	MERN Stack Development
Recommender Systems	Healthcare Analysis	Security and Privacy in cloud	Amazon Web Services	Multimedia Data Compression and Storage	Optimization Techniques
Storage Technologies	Deep Learning	Digital Forensics	Industry 4.0	Visual Effects	Devops

Registration of Professional Elective Courses from Verticals: Professional Elective Courses are listed in groups called verticals that represent a particular area of specialisation / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V to VIII. The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also.

VERTICAL I- DATA SCIENCE

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E. / B.Tech.	Programme Code	101	Regulation				2023		
Department	COMPUTER SCIENCE AND ENGINEERING		Semester				-			
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23CSV11	Data Visualization	PEC	3	0	0	3	40	60	100	
U23CTV11	Data Warehousing and Data Mining#	PEC	3	0	0	3	40	60	100	
U23CTV12	Big Data Analytics#	PEC	3	0	0	3	40	60	100	
U23CTV13	Exploratory Data Analytics#	PEC	3	0	0	3	40	60	100	
U23CTV14	Social Media Analytics#	PEC	3	0	0	3	40	60	100	
U23CTV15	Predictive Analytics#	PEC	3	0	0	3	40	60	100	
U23CTV16	Image and Video Analytic#	PEC	3	0	0	3	40	60	100	
U23CTV17	Recommender Systems#	PEC	3	0	0	3	40	60	100	
U23CTV18	Storage Technologies#	PEC	3	0	0	3	40	60	100	

common to CSE,IT and CST

VERTICAL II - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E. / B.Tech.	Programme Code	101	Regulation				2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester				-		
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23CTV21	Computer Vision#	PEC	3	0	0	3	40	60	100	
U23CTV22	Knowledge Engineering#	PEC	3	0	0	3	40	60	100	
U23CTV23	Natural Language Processing#	PEC	3	0	0	3	40	60	100	
U23CTV24	Reinforcement Learning*	PEC	3	0	0	3	40	60	100	
U23CTV25	Neuro Fuzzy and Genetic Programming#	PEC	3	0	0	3	40	60	100	
U23CTV26	Knowledge Based Decision Support Systems#	PEC	3	0	0	3	40	60	100	
U23CTV27	AI for Industrial Applications#	PEC	3	0	0	3	40	60	100	
U23CTV28	Healthcare Analytics#	PEC	3	0	0	3	40	60	100	
U23ITV29	Deep Learning\$	PEC	3	0	0	3	40	60	100	

\$ common to CSE and IT

common to CSE,IT and CST

\$ common to CSE and CST

VERTICAL III - CYBER SECURITY

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E. / B.Tech.	Programme Code		101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester			-			
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23CSV31	Information Security#	PEC	3	0	0	3	40	60	100	
U23CSV32	Cyber security#	PEC	3	0	0	3	40	60	100	
U23CSV33	Malware Analysis\$	PEC	3	0	0	3	40	60	100	
U23CSV34	Cyber law and Ethics#	PEC	3	0	0	3	40	60	100	
U23CSV35	Block chain Technology#	PEC	3	0	0	3	40	60	100	
U23CSV36	Social Network Security\$	PEC	3	0	0	3	40	60	100	
U23CSV37	Ethical Hacking#	PEC	3	0	0	3	40	60	100	
U23CSV38	Security and Privacy in cloud#	PEC	3	0	0	3	40	60	100	
U23CSV39	Digital Forensics\$	PEC	3	0	0	3	40	60	100	

common to CSE,IT and CST

\$ common to CSE and CST

VERTICAL IV- IoT & CLOUD

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E. / B.Tech.	Programme Code		101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING			Semester			-			
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23ITV41	Cloud Computing#	PEC	3	0	0	3	40	60	100	
U23ITV42	Distributed Systems#	PEC	3	0	0	3	40	60	100	
U23ITV43	Smart Sensor Technologies#	PEC	3	0	0	3	40	60	100	
U23ITV44	Software Defined Networks#	PEC	3	0	0	3	40	60	100	
U23ITV45	Parallel Programming#	PEC	3	0	0	3	40	60	100	
U23ITV46	Virtualization#	PEC	3	0	0	3	40	60	100	
U23ITV47	Edge and Fog Computing#	PEC	3	0	0	3	40	60	100	
U23ITV48	Amazon Web Services#	PEC	3	0	0	3	40	60	100	
U23ITV49	Industry 4.0#	PEC	3	0	0	3	40	60	100	

common to CSE,IT and CST

VERTICAL V - CREATIVE MEDIA

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E. / B.Tech.	Programme Code	101	Regulation				2023		
Department	COMPUTER SCIENCE AND ENGINEERING		Semester				-			
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23ITV51	Pattern Recognition#	PEC	3	0	0	3	40	60	100	
U23ITV52	Image Processing#	PEC	3	0	0	3	40	60	100	
U23ITV53	Multimedia and Animation#	PEC	3	0	0	3	40	60	100	
U23ITV54	Game Theory#	PEC	3	0	0	3	40	60	100	
U23ITV55	Digital Marketing#	PEC	3	0	0	3	40	60	100	
U23ITV56	AR and VR#	PEC	3	0	0	3	40	60	100	
U23ITV57	Video Creation and Editing#	PEC	3	0	0	3	40	60	100	
U23ITV58	Multimedia Data Compression and Storage#	PEC	3	0	0	3	40	60	100	
U23ITV59	Visual Effects#	PEC	3	0	0	3	40	60	100	

common to CSE,IT and CST

VERTICAL VI - EMERGING TECHNOLOGIES

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	B.E. / B.Tech.	Programme Code	101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING		Semester			-			
CURRICULUM									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23CSV61	Robotic Process Automation#	PEC	3	0	0	3	40	60	100
U23CSV62	Quantum Computing#	PEC	3	0	0	3	40	60	100
U23CSV63	Cognitive Science#	PEC	3	0	0	3	40	60	100
U23CSV64	3D Printing and Design#	PEC	3	0	0	3	40	60	100
U23CSV65	Generative AI ^{\$}	PEC	3	0	0	3	40	60	100
U23CSV66	5G Communication Networks*	PEC	3	0	0	3	40	60	100
U23CSV67	MERN Stack Development [@]	PEC	3	0	0	3	40	60	100
U23CSV68	Optimization Techniques*	PEC	3	0	0	3	40	60	100
U23CSV69	Devops#	PEC	3	0	0	3	40	60	100

@ - Industry (GUVI) Recommended Professional Elective Course Common to CSE, IT & CST

#Common to CSE, IT & CST

*Common to CSE & CST

\$Common to CSE, IT

LIST OF MANDATORY COURSES

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
U23MCFY1	Environmental Science and Engineering	MC	2	0	0	0	100	-	100
U23MCFY2	Indian Constitution	MC	2	0	0	0	100	-	100
U23CS621	Comprehensive Course	MC	2	0	0	1	100	-	100

LIST OF ADDITIONAL CREDIT COURSES

1. NPTEL, Coursera Courses

LIST OF OPEN ELECTIVE COURSE (OEC) OFFERED TO OTHER DEPARTMENT

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
U23CSOE1	Fundamentals of OS	OEC	3	0	0	3	40	60	100
U23CSOE2	Web Designing	OEC	3	0	0	3	40	60	100
U23CSOE3	Multimedia and Animation Basics	OEC	3	0	0	3	40	60	100
U23CSOE4	Software Engineering	OEC	3	0	0	3	40	60	100
U23CSOE5	Mobile Application Development	OEC	3	0	0	3	40	60	100
U23CSOE6	Principles of cloud computing	OEC	3	0	0	3	40	60	100
U23CSOE7	Machine Learning with Python	OEC	3	0	0	3	40	60	100
U23CSOE8	Ethical Hacking	OEC	3	0	0	3	40	60	100
U23CSOE9	Open Source Software	OEC	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSE – ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code	Course Name	Periods / Week			Credits	Maximum Marks		
		L	T	P		CA	ESE	Total
U23EEOE1	Energy Conservation & Management	3	0	0	3	40	60	100
U23EEOE2	Electrical Safety	3	0	0	3	40	60	100
U23EEOE3	Wind and Solar Energy Systems	3	0	0	3	40	60	100
U23EEOE4	Introduction to Electric Vehicle	3	0	0	3	40	60	100
U23EEOE5	Environment Sustainability	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSE-
ELECTRONICS AND COMMUNICATION ENGINEERING

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
U23ECOE1	Principles of Communication	3	0	0	3	40	60	100
U23ECOE2	Basics of VLSI	3	0	0	3	40	60	100
U23ECOE3	Industry 4.0 & 5.0	3	0	0	3	40	60	100
U23ECOE4	Satellite Communication	3	0	0	3	40	60	100
U23ECOE5	4G and 5G Network	3	0	0	3	40	60	100
U23ECOE6	Robotic system and control	3	0	0	3	40	60	100
U23ECOE7	Industrial Electronics	3	0	0	3	40	60	100
U23ECOE8	Sensor and its Applications	3	0	0	3	40	60	100
U23ECOE9	Nano Electronics	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSE – INFORMATION TECHNOLOGY

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
U23ITOE1	IT Essentials	3	0	0	3	40	60	100
U23ITOE2	Machine Learning	3	0	0	3	40	60	100
U23ITOE3	Data Science and Analytics	3	0	0	3	40	60	100
U23ITOE4	Cyber Threats Intelligence	3	0	0	3	40	60	100
U23ITOE5	Offensive Security Essentials	3	0	0	3	40	60	100
U23ITOE6	Object Oriented Programming	3	0	0	3	40	60	100
U23ITOE7	Creative UX/UI Design	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSE –BIOTECHNOLOGY

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
U23BTOE1	Biology for Engineers	3	0	0	3	40	60	100
U23BTOE2	Food and Nutrition	3	0	0	3	40	60	100
U23BTOE3	Biosensors	3	0	0	3	40	60	100
U23BTOE4	Basics of Bioinformatics	3	0	0	3	40	60	100
U23BTOE5	Human Health and Nutritional Disorders	3	0	0	3	40	60	100
U23BTOE6	Biobusiness	3	0	0	3	40	60	100
U23BTOE7	Food Processing and Preservation Technology	3	0	0	3	40	60	100
U23BTOE8	Forensic Technology	3	0	0	3	40	60	100
U23BTOE9	Organic farming for sustainable agriculture	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSE – BIOMEDICAL ENGINEERING

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
U23BMOE1	Introduction to Medical Instrumentation	3	0	0	3	40	60	100
U23BMOE2	Telemedicine	3	0	0	3	40	60	100
U23BMOE3	Hospital Engineering and Information Systems	3	0	0	3	40	60	100
U23BMOE4	Advanced Medical Equipments	3	0	0	3	40	60	100
U23BMOE5	Virtual Instrumentation	3	0	0	3	40	60	100
U23BMOE6	Embedded Systems in Medical Applications	3	0	0	3	40	60	100
U23BMOE7	Hospital Management	3	0	0	3	40	60	100
U23BMOE8	Medical Informatics	3	0	0	3	40	60	100
U23BMOE9	Clinical Engineering	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSE – COMPUTER SCIENCE AND TECHNOLOGY

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
U23CTOE1	Fundamentals of Artificial Intelligence	3	0	0	3	40	60	100
U23CTOE2	Fundamentals of Information Security	3	0	0	3	40	60	100
U23CTOE3	Fundamentals of Data Science	3	0	0	3	40	60	100
U23CTOE4	Fundamentals of Machine Learning	3	0	0	3	40	60	100
U23CTOE5	Fundamentals of Data Visualization	3	0	0	3	40	60	100
U23CTOE6	Marketing Analytics	3	0	0	3	40	60	100

MINOR DEGREE VERTICALS OFFER TO OTHER DEPARTMENT

VERTICAL III - CYBER SECURITY

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	B.E.	Programme Code	101	Regulation			2023		
Department	COMPUTER SCIENCE AND ENGINEERING		Semester			-			
CURRICULUM									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23CSV31	Information Security	PEC	3	0	0	3	40	60	100
U23CSV32	Cyber security	PEC	3	0	0	3	40	60	100
U23CSV33	Malware Analysis	PEC	3	0	0	3	40	60	100
U23CSV34	Cyber law and Ethics	PEC	3	0	0	3	40	60	100
U23CSV35	Block chain Technology	PEC	3	0	0	3	40	60	100
U23CSV36	Social Network Security	PEC	3	0	0	3	40	60	100
U23CSV37	Ethical Hacking	PEC	3	0	0	3	40	60	100
U23CSV38	Security and Privacy in cloud	PEC	3	0	0	3	40	60	100
U23CSV39	Digital Forensics	PEC	3	0	0	3	40	60	100

MINOR DEGREE VERTICAL – ELECTRICAL AND ELECTRONICS ENGINEERING
VERTICALS – V: MINOR IN “ADVANCED ENERGY AND ELECTRONIC SYSTEM”

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E.	Programme Code	102	Regulation			2023		
Department	ELECTRICAL AND ELECTRONICS ENGINEERING		Semester				-		
CURRICULUM									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23EEV51	Energy Storage Systems	PEC	3	0	0	3	40	60	100
U23EEV52	VLSI Design	PEC	3	0	0	3	40	60	100
U23EEV53	Digital Signal Processing	PEC	3	0	0	3	40	60	100
U23EEV54	Energy Management and Auditing	PEC	3	0	0	3	40	60	100
U23EEV55	Utilization and Conservation of Electrical Energy	PEC	3	0	0	3	40	60	100
U23EEV56	Biomedical Instrumentation	PEC	3	0	0	3	40	60	100
U23EEV57	Online Course	PEC	3	0	0	3	40	60	100

MINOR DEGREE VERTICALS – ELECTRONICS AND COMMUNICATION ENGINEERING**VERTICALS – VII: ELECTRONICS ENGINEERING AND ADMINISTRATION SYSTEM**

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205							
Programme	B.E.	Programme Code	103	Regulation			2023		
Department	ELECTRONICS AND COMMUNICATION ENGINEERING		Semester			-			
CURRICULUM									
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23ECV71	Medical Electronics	PEC	3	0	0	3	40	60	100
U23ECV72	Management Quality and Ethical Values	PEC	3	0	0	3	40	60	100
U23ECV73	Remote Sensing	PEC	3	0	0	3	40	60	100
U23ECV74	Industry 4.0 & 5.0	PEC	3	0	0	3	40	60	100
U23ECV75	Automotive Electronics	PEC	3	0	0	3	40	60	100
U23ECV76	Soft Computing	PEC	3	0	0	3	40	60	100
U23ECV77	Principles of Public Administration	PEC	3	0	0	3	40	60	100
U23ECV78	PCB Design and Fabrication	PEC	3	0	0	3	40	60	100
U23ECV79	Rocketry and Space Mechanics	PEC	3	0	0	3	40	60	100

MINOR DEGREE VERTICALS IN INFORMATION TECHNOLOGY

VERTICAL - V IOT & CLOUD

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205									
Programme	B.TECH.	Programme Code		105		Regulation		2023		
Department	INFORMATION TECHNOLOGY			Semester			-			
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23ITV41	Cloud Computing	PEC	3	0	0	3	40	60	100	
U23ITV42	Distributed Systems	PEC	3	0	0	3	40	60	100	
U23ITV43	Smart Sensor Technologies	PEC	3	0	0	3	40	60	100	
U23ITV44	Software Defined Networks	PEC	3	0	0	3	40	60	100	
U23ITV45	Parallel Programming	PEC	3	0	0	3	40	60	100	
U23ITV46	Virtualization	PEC	3	0	0	3	40	60	100	
U23ITV47	Edge and Fog Computing	PEC	3	0	0	3	40	60	100	
U23ITV48	Amazon Web Services	PEC	3	0	0	3	40	60	100	

MINOR DEGREE VERTICALS IN BIOTECHNOLOGY

VERTICAL - V QUALITY AND REGULATORY AFFAIRS

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.TECH.	Programme Code		105		Regulation		2023		
Department	BIOTECHNOLOGY			Semester			-			
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23BTV51	Good Manufacturing Practices	PEC	3	0	0	3	40	60	100	
U23BTV52	Entrepreneurship & IPR	PEC	3	0	0	3	40	60	100	
U23BTV53	Audit and Regulatory Compliance	PEC	3	0	0	3	40	60	100	
U23BTV54	Supply Chain Management	PEC	3	0	0	3	40	60	100	
U23BTV55	QA and QC in Biotechnology	PEC	3	0	0	3	40	60	100	
U23BTV56	Industrial Biosafety	PEC	3	0	0	3	40	60	100	
U23BTV57	Product development and Technology transfer	PEC	3	0	0	3	40	60	100	
U23BTV58	Innovation and Design Thinking for Biotechnologists	PEC	3	0	0	3	40	60	100	
U23BTV59	Resource Management & Lean Start-up Management	PEC	3	0	0	3	40	60	100	

MINOR DEGREE VERTICALS BIOMEDICAL ENGINEERING
VERTICAL V - HEALTHCARE MANAGEMENT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E.	Programme Code	106		Regulation		2023		
Department	BIOMEDICAL ENGINEERING				Semester		-		
CURRICULUM									
Course Code	Course Name	Category	Hours / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
U23BMV51	Hospital Systems Management	3	0	0	3	40	60	100	100
U23BMV52	Database Management Systems	3	0	0	3	40	60	100	100
U23BMV53	Biomedical Engineering Entrepreneurship	3	0	0	3	40	60	100	100
U23BMV54	Energy Audit and Management for Hospitals	3	0	0	3	40	60	100	100
U23BMV55	Quality Assurance and Regulatory Aspects for Medical Devices	3	0	0	3	40	60	100	100
U23BMV56	Medical Ethics and Intellectual Property Rights	3	0	0	3	40	60	100	100
U23BMV57	Troubleshooting of Medical Devices	3	0	0	3	40	60	100	100
U23BMV58	Medical Waste management	3	0	0	3	40	60	100	100
U23BMV59	NPTEL/IEEE Online Course	3	0	0	3	40	60	100	100

MINOR DEGREE VERTICALS IN COMPUTER SCIENCE AND TECHNOLOGY**VERTICAL-I DATA SCIENCE**

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.TECH.	Programme Code		107	Regulation			2023		
Department	COMPUTER SCIENCE AND TECHNOLOGY			Semester			-			
CURRICULUM										
Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
THEORY										
U23CTV11	Data Warehousing and Data Mining	PEC	3	0	0	3	40	60	100	
U23CTV12	Big Data Analytics	PEC	3	0	0	3	40	60	100	
U23CTV13	Exploratory Data Analytics	PEC	3	0	0	3	40	60	100	
U23CTV14	Social Media Analytics	PEC	3	0	0	3	40	60	100	
U23CTV15	Predictive Analytics	PEC	3	0	0	3	40	60	100	
U23CTV16	Image and Video Analytics	PEC	3	0	0	3	40	60	100	
U23CTV17	Recommender Systems	PEC	3	0	0	3	40	60	100	
U23CTV18	Storage Technologies	PEC	3	0	0	3	40	60	100	
U23CTV19	Time Series Analysis and Forecasting	PEC	3	0	0	3	40	60	100	

LIST OF ADDITIONAL LANGUAGE COURSES

Sem	Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
				L	T	P		CA	ESE	Total
IV	U23ADL01	French	EEC	2	0	0	1	100	-	100
IV	U23ADL02	German	EEC	2	0	0	1	100	-	100
IV	U23ADL03	Japanese	EEC	2	0	0	1	100	-	100

LIST OF CAREER TRACKS COURSES

Career Track Courses										
Sem	Course Code	Course Name	Category	Periods/Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
Track 1 - Entrepreneurship										
IV	U23CTCE1	Entrepreneurial Mindset and Business Model Canvas	CTC	-	-	2	1	60	40	100
V	U23CTCE2	Product Innovation, Commercialization and Finance	CTC	2	-	-	1	40	60	100
VI	U23CTCE3	Intellectual Property Rights	CTC	2	-	-	1	40	60	100
Track 2 - Competitive Examination										
IV	U23CTCP3	Verbal , Quantitative Aptitude and Reasoning -II	CTC	2	-	-	1	40	60	100
V	U23CTCG1	History & Culture of India and Indian Geography	CTC	2	-	-	1	40	60	100
VI	U23CTCG2	Indian economy and Freedom struggle in India & Tamil Nadu	CTC	2	-	-	1	40	60	100
Track 3 - Higher Studies										
IV	U23CTCP3	Verbal, Quantitative Aptitude and Reasoning -II	CTC	2	-	-	1	40	60	100
V	U23CTCH1	Higher Studies in Abroad & India	CTC	2	-	-	1	40	60	100
VI	U23CTCH2	Social Networking for Higher Studies	CTC	2	-	-	1	40	60	100
Track 4 - Placement										
IV	U23CTCP3	Verbal , Quantitative Aptitude and Reasoning -II	CTC	2	-	-	1	40	60	100
V	U23CTCP4	Leveraging Arithmetic and Codes Snippet	CTC	2	-	-	1	40	60	100
VI	U23CTCP5	Integrated Reasoning and Pseudo Code	CTC	2	-	-	1	40	60	100

Semester-I

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205																																																																																																																																																										
Programme	B.E.	Programme Code				101	Regulation		2023																																																																																																																																																		
Department	COMPUTER SCIENCE AND ENGINEERING					Semester			I																																																																																																																																																		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks																																																																																																																																																					
		L	T	P	C	CA	ESE	Total																																																																																																																																																			
U23MA101	Matrices and Calculus	3	1	0	4	40	60	100																																																																																																																																																			
Course Objective	The Main Objective of the course is																																																																																																																																																										
	- To develop the use of matrix algebra techniques that is needed by engineers for practical applications. - To familiarize the students with differential calculus. - To familiarize the student with functions of several variables. This is needed in many branches of engineering. - To make the students understand various techniques of integration. - To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.																																																																																																																																																										
	At the end of the course the students will be able to							Knowledge level																																																																																																																																																			
	CO1: Use the matrix algebra methods for solving practical problems.							K3																																																																																																																																																			
	CO2: Apply differential calculus tools in solving various application problems.							K4																																																																																																																																																			
	CO3: Able to use differential calculus ideas on several variable functions.							K5																																																																																																																																																			
Course Outcome	CO4: Apply different methods of integration in solving practical problems.							K5																																																																																																																																																			
	CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.							K3																																																																																																																																																			
	Pre-requisites -																																																																																																																																																										
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Content of the syllabus			
Unit – I	MATRICES	Periods	9+3
Characteristic equation – Eigen values and Eigenvectors of a real matrix– Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem(excluding proof) – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms. Simple application in encoding message using 2×2 matrix.			
Unit - II	DIFFERENTIAL CALCULUS	Periods	9+3
Limit, Continuity, Differentiability, Rules of differentiation, Differentiation of various functions, Rolle's theorem(excluding proof), Mean value theorem(excluding proof), Taylor's theorem(excluding proof), Maxima and Minima. Applications: Newton's law of cooling – Heat flow problems.			
Unit – III	FUNCTIONS OF SEVERAL VARIABLES	Periods	9+3
Partial differentiation – Homogeneous functions and Euler's theorem(excluding proof) – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables(excluding proof) – Maxima and minima of functions of two variables. Applications: Lagrange's method of undetermined multipliers.			
Unit - IV	INTEGRAL CALCULUS	Periods	9+3
Definite and Indefinite Integrals- Methods of integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions -Reduction formula on $\int_0^{\frac{\pi}{2}} \cos^n x dx$, $\int_0^{\frac{\pi}{2}} \sin^n x dx$.			
Unit - V	MUTIPLE INTEGRALS	Periods	9+3
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.			
Total Periods			45+15=60
Text Books			
1.	Stewart, J. Calculus: Early Transcendentals (8 th Edition), Cengage Learning, 2015.		
2.	Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.		
References			
1.	Kreyszig E, Advanced Engineering Mathematics (10th Edition), John Wiley (2015).		
2.	Bali. N., Goyal. M. and Watkins. C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.		
3.	Thomas. G. B., Hass. J, and Weir. M.D, “Thomas Calculus “, 14th Edition, Pearson India, 2018.		
4.	Anton H, Calculus: Early Transcendentals, 10th Edition, Wiley (2016).		
5.	B V Ramana, Higher Engineering Mathematics, Tata McGraw Hill Education Pvt Ltd., New Delhi (2016)		
E-Resources			
1.	https://freevidelectures.com › All Courses › Calculus › UCLA		
2.	www.learnerstv.com /Free-engineering-Video-lectures		
3.	www.nptel.ac.in		

Content of the syllabus			
Unit – I		Periods	9
Listening -Introduction to Different Types of Listening, Listening to Casual Conversations, Speaking -Introduction to develop the Art of Speaking, Giving Self Introduction, Reading -Understanding the Basics of Reading Skills, Reading Instructions and Technical Manuals, Writing - Introduction to writing strategies, Writing Definitions, Focus on Language - -Technical terms (Jargon), Word Formation with Prefixes and Suffixes, Using Active Voice and Passive Voice, Basic sentence patterns, Tenses (past, present, perfect and continuous tenses).			
Unit – II		Periods	9
Listening - Listening to lectures, listening to description of equipment, Speaking - Strategies for Developing Conversational Skills, Short Conversations through Role Play Activities, Reading - Reading Comprehension, Reading e-mails, Reading Headlines, Predicting the Content, Writing - Paragraph writing, Essay writing, Note making, Writing Descriptions, Focus on Language -Collocations, One word substitution, Subject - verb agreement			
Unit – III		Periods	9
Listening - Listening to different kinds of interviews (Face - to - face, radio, TV and telephone interviews), Speaking -Describing an Object, Asking Questions, Participating in Discussions Reading - Intensive reading, Reading passages for gist. Writing - Writing short& lengthy e-mails with emphasis on Brevity, Clarity, Coherence and Cohesion), Focus on Language -Sequential Connectives, Impersonal Passive			
Unit – IV		Periods	9
Listening -Note Taking, Speaking - Improving Fluency through Narration. Reading -Reading passages for specific information- Phone messages, Reading and Transferring Information. Writing - Effective writing strategies, Informal writing, Writing a Memo, Focus on Language - Cause and Effect, Conditional Statements (if - clauses and types), Usage of Modal Verbs.			
Unit – V		Periods	9
Listening - Listening to understand Modulation, Listening to Welcome Speeches, Speaking - Delivering Welcome Address, Understanding Segmental and Supra-segmental Features-Practicing Stress, Pause and Intonation, Reading - Reading for a purpose, Reading Business Documents, Interpreting Charts and Graphs. Writing - Describing a Process. Focus on Language -Synonyms and Antonyms, Common Errors in English.			
Total Periods			45
Text Books			
1.	Faculty from the Department of English, English for Communication, Cengage Learning India Pvt. Ltd., 2025.		
References			
1.	Dr. Padma Ravindran, Poorvadevi, M. Y. Abdur Razack- English for life, English for work, students Book, Ebek language laboratory pvt ltd, 2021.		
2.	Dutt Rajeevan, Prakash. A Course in Communication Skill (Anna University, Coimbatore edition): Cambridge University Press India Pvt.Ltd, 2020.		
3.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient Blackswan Pvt, Ltd, 2020.		
4.	Technical English – I & II, Sona versity, Sona College of Technology, Salem, First Edition, 2022.		
5.	Meenakshmi Raman and Sangeeta Sharma- ‘Technical communication English Skills for Engineers; oxford University Press, 2024.		
E-Resources			
1.	http://www.sparknotes.com/lit/the-alchemist/summary.html		
2.	https://www.stephencovey.com/7habits/7habits.php		
3.	http://en.wikipedia.org/wiki/The_Seven_Habits_of_Highly_Effective_People		

Content of the syllabus			
Unit – I	PROPERTIES OF MATTER	Periods	9
Elasticity: Types of moduli of elasticity - Poisson’s ratio - Stress - Strain Diagram – uses - Hooke’s law. Young’s modulus: Uniform bending (qualitative) Experimental determination by non-uniform bending - Twisting couple on a wire – Application: I shape girders, Torsional pendulum. Viscosity: Co-efficient of viscosity - Poiseuilles' formula - Experimental determination – uses.			
Unit – II	ELECTRICAL PROPERTIES OF METALS	Periods	9
Classical theory: Classical free electron theory of metals- Expressions for electrical conductivity and Thermal Conductivity of metals – Wiedemann-Franz law (Qualitative) - Success and failures. Quantum theory: de Broglie’s hypothesis - Schrodinger’s time independent and time dependent wave equations - Fermi – Dirac Statistics - Density of energy states (Qualitative).			
Unit – III	CRYSTAL PHYSICS AND ULTRASONICS	Periods	9
Crystallography: Unit cell - Crystal systems - Bravais lattices- Lattice planes - Miller indices - Inter-planar spacing in cubic lattice- Calculation of number of atoms per unit cell - Atomic radius – Coordination number- Packing Factor for HCP structures - Crystal defects – point and line defects (qualitative). Ultrasonics: Introduction - Properties and Generation of Ultrasonics – Magnetostriction and Piezoelectric Oscillator methods – Applications: Sound Navigation and Ranging (SONAR), Non – Destructive Testing (NDT) and Sonogram.			
Unit - IV	SEMICONDUCTING & MODERN ENGINEERING MATERIALS	Periods	9
Semiconductors: Elemental and Compound semiconductors - Intrinsic carrier concentration – Density of electrons and holes - Band gap determination. Extrinsic semiconductor types, donor and acceptor level. Application: Construction and working of LED. Metallic glasses: preparation, properties and applications - Shape memory alloys (SMA): Characteristics and applications of NiTi alloy.			
Unit – V	LASER AND FIBER OPTICS	Periods	9
Laser: Interactions of Radiations with matters - Characteristics of laser – Derivation of Einstein’s A and B coefficients. Types: CO ₂ laser - Semiconductor laser: Homo junction - Applications. Optical fiber: Principle of propagation of light through optical fiber - Numerical aperture and acceptance angle (Qualitative) -Types of optical fibers -Fiber optical communication system (block diagram) - Application: Temperature sensor, Displacement sensor.			
Total Periods			45
Text Books			
1.	R.K. Gaur and Gupta. S.L, Engineering Physics, Dhanpat Rai Publishers, 2017.		
2.	S.O Pillai., Solid state physics, New Age International Private Limited.		
3.	Dr.A.Panneerselvam and Dr.P.Mani, “Engineering Physics”, Dhanam publisher, Chennai – 600 042. (2025)		
References			
1.	B.K. Pandey, S. Chaturvedi. “Engineering Physics”, 1 st Edition, Cengage Learning India Pvt Ltd, (2012).		
2.	David Halliday, Robert Resnick Jearl Walker, Fundamentals Of Physics Extended 8/Ed 8th Edition, ,Wiley India Pvt Ltd, 2008.		
3.	Lawrence H.Vanvlack, “Elements of materials Science Engineering, 6 th Edition, Pearson Publication.		
4.	S.O.Pillai, “Solid State Physics”, New Age International Publishers		
5.	Dr.V.Rajendran, “Engineering Physics”, Tata McGraw Hill Education Private Limited, New Delhi		
E-Resources			
1.	www.e-booksdirectory.com		
2.	Home.iitk.ac.in		
3.	physics.cu.ac.bd		

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U23CS101	Programming for Problem Solving	3	0	0	3	40	60	100																																																																																																																																									
Course Objective	The main objective of this course is to: Learn the fundamentals of computers, languages, number systems and acquire problem solving skills in C Programming																																																																																																																																																
Course Outcome	At the end of the course, the student should be able to,							Knowledge Level																																																																																																																																									
	CO1: Examine number systems and to apply problem solving techniques							K3																																																																																																																																									
	CO2: Learn the basics of C programming with branching and looping statements							K2																																																																																																																																									
	CO3: Experiment the C programs using Arrays and Pointers for simple applications							K3																																																																																																																																									
	CO4: Solve C programs with the Functions and Strings							K3																																																																																																																																									
	CO5: Apply Structures, Union and File concepts to solve simple real world problems							K3																																																																																																																																									
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Unit – I	INTRODUCTION TO PROBLEM SOLVING					Periods		9																																																																																																																																									
Basic organization of Computer - Programming languages - Compilers – Interpreter - Flowchart – Pseudocode – Algorithm.																																																																																																																																																	
Number Systems – Decimal, Binary, Octal and Hexadecimal conversions.																																																																																																																																																	

Unit - II	BASICS OF C PROGRAMMING	Periods	9
Introduction to C – Features - Data Types – Constants – Variables - I/O Statement - Operators –Expressions - Decision Making and Branching – Looping Statements - Break, Go to, Continue.			
Unit – III	ARRAYS AND POINTERS	Periods	9
Arrays: Concepts – Need – one dimensional array – array declaration – features – array initialization - Two-Dimensional Arrays- Multidimensional Arrays.			
Pointers: Introduction, pointer declaration-accessing variable through pointer- Pointers and Arrays, Pointers and strings – Pointer Arithmetic - Array of Pointers – dynamic memory allocation - malloc, realloc, free.			
Unit - IV	FUNCTIONS AND STRINGS	Periods	9
Functions: Introduction, function declaration, defining and accessing functions, User-defined Functions-storage classes-function prototypes-parameter passing methods-recursion.			
Strings: Concepts – Strings manipulation - String Input / Output Functions- Strings standard functions - Arrays of Strings.			
Unit – V	STRUCTURES, UNIONS AND FILE SYSTEMS	Periods	9
Structures: Introduction- nested structures- Arrays of Structures - Structures and Functions – Pointers and structures - Pointers to Structures – Unions.			
File: opening, defining, closing, File Modes, File Types, Writing contents into a file, Reading file contents, Appending an existing file, File permissions and rights, Changing permissions and rights.			
Total Periods			45
Text Books			
1.	S.Kuppuswami, S.Malliga, C. S. Kanimozhi and K.Kousalya, “Problem Solving and Programming”, McGraw Hill, 2019.		
2.	E. Balagurusamy, “Programming in ANSI C”, 8 th Edition, Mc Graw Hill, 2019.		
References			
1.	Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition, 2017		
2.	Kernighan BW and Ritchie DM, “The C Programming Language”, 2 nd Edition, Prentice Hall of India, 2017.		
3.	Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, “Computer Programming”, VRB Publishers Pvt.Ltd, 2016.		
Tools Required			
	Codetandra/HackerRank/ HackerEarth / Any online Problem Solving Platforms		
E-Resources			
1.	https://www.geeksforgeeks.org/c-language-set-1-introduction/		
2.	https://www.programiz.com/c-programming		
3.	https://www.cprogramming.com/		

அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்கு	Periods	3
இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள் , கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.			
		Total Periods	15

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Programme	B.E	Programme Code		101		Regulation		2023	
Department	Computer Science and Engineering			Semester			I		
Course code	Course name	Periods per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
U23TA101	Heritage of Tamils / தமிழ் மரபு	1	0	0	1	40	60	100	
Content of the syllabus									
UNIT I	LANGUAGE AND LITERATURE				Periods	3			
Language Families in India – Dravidian Languages-Tamilasa Classical Language- Classical Literature in Tamil-Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature-Management Principles in Thirukural –Tamil Epic sand Impact of Buddhism & Jainism in Tamil Land -Bakthi Literature Azhwars and Nayanmars –Forms of minor Poetry – Development of Modem literature in Tamil-Contribution of Bharathiyar and Bharathidhasan.									
UNIT II	HERITAGE-ROCK ART PAINTINGS TO MODERN ART-SCULPTURE				Periods	3			
Hero stone to modern sculpture -Bronzeicons-Tribesand their handicrafts-Artoftemplecar making—Massive Terracotta sculptures Village deities, Thiruvalluvar Statueat Kanyakumari,Making of musical instruments-Mridhangam,Parai Veenai, Yazhand Nadhaswaram –Role of Temple sin Social and Economic Life of Tamils.									
UNIT III	FOLK AND MARTIAL ARTS				Periods	3			
Therukoothu,Karagattam,VilluPattu ,Kaniyan Koothu,Oyillattam,Leatherpuppetry,Silambattam,Valari,Tigerdance-Sportsand Games of Tamils.									
UNIT IV	THINAI CONCEPT OF TAMILS				Periods	3			
Flora and Fauna of Tamils & Ahamand Puram Concept from Tholkappiyam and Sangam Literature- Aram Concept of Tamils-Educationand Literacy during Sangam Age- Ancient Cities and Port so Sangam Age- Export and Import during Sangam Age-Overseas Conques to Cholas.									
UNIT V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIANCULTURE				Periods	3			
Contribution of amils to Indian Freedom Struggle-The Cultural Influence of Tamils over the other parts of India- Self- Respect Movement- Role of Siddha Medicine in Indigenous Systems of Medicine–Inscriptions &Manuscripts —Print History of Tamil Books.									
					Total Periods	15			

TEXT-CUM-REFERENCE BOOKS:

1	தமிழகவரலாறும் – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடுபாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3	கீழடி – வைகை நதிக்கரையில் சங்க நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருதை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் வெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies)
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.



Programme	B.E.	Programme Code			101	Regulation	2023								
Department	Computer Science and Engineering					Semester	I								
Course Code	Course Name				Periods Per Week			Credit		Maximum Marks					
					L	T	P	C		CA	ESE	Total			
U23GE101	Engineering Graphics				2	0	3	3		50	50	100			
Course Objective	The main objective of this course is to: - Develop skills to enhance their ability to know the concept of engineering graphics and to draw the points kept in various positions, lines and planes. - Project the drawing of various solids. - Sketch sectioned views of solids. - Draw the development of surfaces. - Draw the isometric and orthographic projections for any given object to the required standard.														
	At the end of the course, the student should be able to										Knowledge Level				
											K2				
											K4				
											K3				
K2															
Course Outcomes	CO1: Construct plane curves and develop projection of points , lines and plane surfaces										K2				
											K4				
											K3				
											K2				
											K2				
Pre - requisites	Nil														
	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping		
	COs	Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
		CO 1	3	3	3	3	3	-	-	-	-	-	-	3	2
CO 2		3	3	2	2	2	-	-	-	-	-	-	2	-	
CO 3		3	2	2	2	3	-	-	-	-	-	-	2	2	
CO 4		3	2	3	3	2	-	-	-	-	-	-	3	3	
CO 5		3	3	2	3	3	-	-	-	-	-	-	2	2	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III															
2. Assignment															
3. End-Semester examination															
Indirect															
1. Course - end survey															

Content of the Syllabus			
Concepts & Conventions (Not for Examination)	Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.	Periods	1
Unit – I	PROJECTION OF POINTS, LINES AND PLANE SURFACES	Periods	3+8
Introduction to Plane curves, Orthographic projection – principles – projection of points, straight lines (only first angle projections) and plane surfaces (polygonal and circular).			
Unit - II	PROJECTION OF SOLIDS	Periods	3+8
Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane.			
Unit - III	SECTION OF SOLIDS	Periods	3+8
Sectioning of solids - prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other - Obtaining true shape of section.			
Unit - IV	DEVELOPMENT OF SURFACES	Periods	3+8
Development of lateral surfaces of simple solids like prisms, pyramids, cylinders and cones – development of simple truncated solids involving prisms, pyramids, cylinders and cones.			
Unit - V	ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS	Periods	5+10
Isometric Projection and Introduction to AutoCAD / Solid Edge: Principles of isometric projection - Isometric scale -Isometric projections of simple solids like prisms, pyramids, cylinders and cones & orthographic views from pictorial views.			
Demonstration only:			
Computer Aided Drafting (Auto CAD / Solid Edge): Introduction to drafting packages and demonstration of their use.			
Total Periods			60
Text Book:			
1.	Basant Agrawal and C.M Agrawal ,“Engineering Drawing ”,Tata McGraw Hill , 2019		
2.	Jain and Gautam ,“Engineering Graphics & Design ”,Khanna Publishing House, 2020		
Reference Book :			
1.	Dr.P.Kannan and Dr.J.Bensam Raj, “Engineering Graphics”, JBR Tri Sea Publishers Pvt. Ltd, 2024.		
2.	K.V Natarajan, "Engineering Drawing and Graphics", M/s. N.Dhanalakshmi, Chennai, 2020.		
3.	K.Venugopal and V. Prabhu Raja, “Engineering Graphics” New Age International Publishers, 2016.		
4.	N.S Parthasarathy and Velamurali, “ Engineering Graphics”, Oxford University, New Delhi,2015		
5.	Bhatt N.D and Panchal V.M, “Engineering Drawing”, Charotar Publishing House, 2014		
e-RESOURCES:			
1.	http://nptel.ac.in/courses/105104148 , “Engineering Graphics” - Dr. Nihar Ranjan Patra , IIT Kanpur		
2.	http://cfd.annauniv.edu/webcontent.htm , “Engineering Graphics” - Dr.Velamurali		
3.	http://link.springer.com/ “Engineering Graphics”-Springer Nature.		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E	Programme code	101	Regulation			2023		
Department	Computer Science and Engineering			Semester			I		
Course Code	Course name		Periods per week			Credit	Maximum Marks		
U23GE102	Design Thinking		L	T	P	C	CA	ESE	Total
			1	0	2	1	50	50	100
Course Objective	The student should be made to, - Familiarize with design thinking concepts and principles - Practice the methods, processes and tools of design thinking. - Apply the design thinking approach and have ability to model real world situations.								
Course Outcome	At the end of the course, the student should be able to,								KL
	CO1: Understand and apply the concept of team building activity								K2
	CO2: Understand Design Thinking and apply the designthinking approach to empathize situations in real world								K3
	CO3: Identify various methods of empathy and define the problem								K3
	CO4: Develop creative ideas through design thinking								K4
	CO5: Understand benefits of learning through observation, experience and application								K4
Pre-requisites	-								

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												CO/PSO Mapping	
COs		Programme Outcomes (POs)											PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	3	3	3	3	2	2	3	3	3	2	2	3	3
CO 2	3	3	3	3	3	3	3	3	3	3	3	3	2	2
CO 3	3	3	1	2	2	2	2	1	2	1			2	2
CO 4	3	3	3	3	3	2	2	2	2	2	2	1	2	2
CO 5	3	3	3	3	1	2	2	2	1	2	2	1	2	2

Course Assessment Methods

Direct

- Continuous Assessment Test through activities, assignment & Quiz
- Models (Chart/paper/3D)
- Prototype & Presentation

Indirect

- Course - end survey

Content of the Syllabus		
SESSION-I	Periods	6
Introduction – Team Building - Types – 4 C’s of Team Building – Levels of Team Building – Benefits of Team Work – Team Building Activity.		
SESSION - II	Periods	9
Introduction to Design Thinking – Purpose of Design Thinking – Design Thinking Framework, Empathy and related case studies		
SESSION - III	Periods	6
Define: Examine and Reflect on the problem.		
SESSION - IV	Periods	12
Generating Ideas – Identifying ideas – Bundling the ideas and create concepts – Rapid Prototyping – Idea Refinement.		
SESSION - V	Periods	12
Importance & testing the design with people - Retest and redefine results		
Total Periods		45
Textbooks		
1.	Solving Problems with Design Thinking - Ten Stories of What Works by Jeanne Liedtka 2013.	
2.	Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.	
3.	Yousef Haik and Tamer M.Shahin, “Engineering Design Process”, Cengage Learning, 2 nd edition, 2011	
4.	Design of Business: Why Design Thinking is the Next Competitive Advantage by Roger L. Martin 2009.	
5.	Change by Design: How Design thinking transforms organizations and empires Innovation, 2009, Harper Business, Brown, Tim and Berry.	
References		
1.	Design thinking toolbox by Michael Lewick, Wiley 2020	
2.	Design thinking playbook by Michael Lewrick , Wiley 2019	
3.	Creative Confidence: Unleashing the Creative Potential Within Us All by Tom 2014	
4.	The Design of Everyday Things: by Don Norman 2013	
E-Resources		
1.	https://www.collectivecampus.io/blog/6-resources-to-help-you-learn-design-thinking	
2.	https://thisisdesignthinking.net/on-design-thinking/design-thinking-resources/	
3.	http://hs.griet.ac.in/pdf/studymaterialsgr20/Design%20Thinking%20Lab%202020-21.pdf	
4.	https://www.mindtools.com/brainstm.html	
5.	https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit	
6.	https://www.youtube.com/watch?v=2mjSDIBaUIM	
7.	thevirtualinstructor.com/foreshortening.html	
Activity Based Learning/Practical Based Learning		
http://dschool.stanford.edu/dgift/		
Online Course		
1	https://onlinecourses.nptel.ac.in/noc19_mg60/preview	
2	https://www.ibm.com/design/thinking/page/badges/core-skills	

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U23PH102		PHYSICS LABORATORY			0	0	3	1	60	40	100																																																																																																																																								
Course Objective		➤ Understand elastic behavior of Materials ➤ Predict viscous force in liquids. ➤ Gain knowledge in measuring the lowest thickness materials ➤ To Identify wavelengths of prominent lines using polychromatic lamp ➤ Observe heat conduction in bad conductor ➤ Understand the principle of interferometer ➤ To learn about the characteristics of Lasers																																																																																																																																																	
Course Outcome		At the end of the course, the student will be able to									Knowledge Level																																																																																																																																								
		CO1: Measure the young’s modulus of the materials, Rigidity modulus – Torsion pendulum.									K3																																																																																																																																								
		CO2: Calculate Coefficient of viscosity of liquid and thickness of thin wire using Air wedge.									K3																																																																																																																																								
		CO3: Observe and measure the different wavelengths of mercury Spectrum and dispersive power of a prism.									K3																																																																																																																																								
		CO4: Illustrate the conductivity of bad conductors. To know how to determine the velocity of ultrasonic waves in liquid.									K3																																																																																																																																								
		CO5: To understand the importance of laser beam compared to ordinary light.									K2																																																																																																																																								
Pre-requisites		Nil																																																																																																																																																	
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CO 5	3	1	1		1								2																																																																																																																																						

Course Assessment Methods		
Direct		
1. Prelab and post lab test 2. Execution of experiment and Viva-Voce 3. End-Semester examinations		
Indirect		
Course - end survey		
Content of the syllabus		
PHYSICS LABORATORY		
S.No.	Experiments	CO
1.	Determination of Young's modulus of the material - Uniform bending method	CO1
2.	Determination of Young's modulus of the material - Non uniform bending method	CO1
3.	Determination of Rigidity modulus – Torsion pendulum	CO1
4.	Determination of Coefficient of viscosity of a liquid – Poiseuille's method	CO2
5.	Determination of thickness of a thin material – Air wedge method	CO2
6.	Determination of wavelength of mercury spectrum – spectrometer grating	CO3
7.	Determination of Dispersive power of a prism – Spectrometer	CO3
8.	Determination of thermal conductivity of metallic glass using Lee's Disc Method	CO4
9.	Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer	CO4
10.	Determination of Wavelength and particle size using Laser	CO5
Total Periods		30
Lab Manual		
1.	R. Jayaraman, Engineering Physics Laboratory Manual, Pearson Pub, Edition-2021.	
2.	A.K. Katiyar & C.K. Pandey Engineering Physics: Theory and Practical, Wiley Pub, 2 nd Edition.	
3.	Dr.P.Mani, "Physics laboratory manual", Dhanam publisher, Chennai – 600 042. (2024)	
4.	Dr.G.Senthil Kumar, "Physics laboratory manual", VRB Publishers Private Limited, Chennai. 2024.	

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U23CS102		Programming for Problem Solving Laboratory				0	0	2	1	60	40	100																																																																																																																																								
Course Objective		The main objective of the course is to Develop simple C programs to illustrate the applications of User Defined and Derived Data Types such as Arrays, Pointers, Structures, and Functions.																																																																																																																																																		
Course Outcome		At the end of the course, the student should be able to,											Knowledge Level																																																																																																																																							
		CO1: Develop C programs for computer based solution of simple real world problems using Conditional and Looping statements											K3																																																																																																																																							
		CO2: Implement simple C Programs using Strings and Arrays											K3																																																																																																																																							
		CO3: Implement C program for simple applications using Pointers											K3																																																																																																																																							
		CO4: Write C programs that perform operations on File											K4																																																																																																																																							
		CO5: Demonstrate C Programs using Structures											K3																																																																																																																																							
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Indirect																																																																																																																																																				
1. Course - end survey																																																																																																																																																				
List of Experiments													CO's																																																																																																																																							
1. Write a C program that accepts an employee's ID, total worked hours in a month and the amount he received per hour. Print the ID and salary (with two decimal places) of the employee for a particular month.													CO1																																																																																																																																							
2. Write a program in C to calculate the sum of three numbers with input on one line separated by a comma.													CO1																																																																																																																																							
3. Write a program in C to find the sum of the series [x - x^3 + x^5 + ...].													CO1																																																																																																																																							
4. Write a program in C to find the number and sum of all integers between 100 and 200 which are divisible by 9.													CO1																																																																																																																																							
5. Write a program in C to count the total number of duplicate elements in an array.													CO2																																																																																																																																							
6. You are given an input string 'S'. Your task is to find and return all possible permutations of the input string. Note: 1. The input string may contain the same characters, so there will also be the same permutations. 2. The order of permutation does not matter.													CO2																																																																																																																																							

Sample Input xyz sample Output xyz, xzy, yxz, yzx, zxy, zyx Sample Output : All the possible permutations for string "XYZ" will be "XYZ", "XZY", "YXZ", "YZX", "ZXY" and "ZYX".		
7. Find the Smallest and Largest Element in an Array Method 1: Traverse the array iteratively and keep track of the smallest and largest element until the end of the array. Method 2: Traverse the array recursively and keep track of the smallest and largest element until the end of the array. Method 3: Sort the array using STL and return the first element as the smallest element and the last element as the largest element. For example, consider the array. arr = {1, 2, 3, 4, 5} Sample output: Smallest element: 1 Largest element: 5		CO2
8. Write a C program to find the sum of all the multiples of 3 and 5 below 100 using pointers. We have to find the number of numbers which are multiples of both 3 and 5 in the first 100 natural numbers. Multiples of both 3 and 5 in the first 100 natural numbers are the multiples of LCM of 3 and 5. LCM of 3 and 5 = 3×5=15 Sample output: Multiples of 15 below 100 are 15, 30, 45, 60, 75 and 90.		CO3
9. Write a C program to count number of characters, words and lines in a text file. Logic to count characters, words and lines in a file in C program. How to count total characters, words and lines in a text file in C programming. Example Source file I love programming. Working with files in C programming is fun. I am learning C programming at VCEW. Sample output Total characters = 100 Total words = 18 Total lines = 3		CO4
10. Write a C program to implement Student database using Structure Sample output: Enter details of student: Name :abi RollNo:101 Percentage :89.7 Entered details: Name: abi RollNo: 101 Percentage: 89.70		CO5
Total Periods		45
Tools Required		
Codetandra / HackerRank / HackerEarth / Any online Problem Solving Platforms		
E-Resources		
1.	https://www.programiz.com/c-programming	
2.	https://www.cprogramming.com/	
3.	https://beginnersbook.com/2015/02/simple-c-programs/	

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme		B.E		Programme Code				101		Regulation		2023			
Department		Computer Science and Engineering						Semester				I			
Course Code		Course Name				Periods Per Week			Credit		Maximum Marks				
						L	T	P	C	CA		ESE	Total		
U23MCFY1		Environmental Science and Engineering				2	0	0	0	100		0	100		
Course Objective		The main objective of this course is to: - Familiarize basics of ecosystem and creating environmental awareness. - Congregate about environmental pollution. - Contrast on solid waste and social issues. - Acquire knowledge in environmental legislation and protection. - Summarize population growth, human rights and Environment													
Course Outcome		At the end of the course, the student should be able to,											Knowledge Level		
		CO1: Acquire knowledge about Eco-system, Natural resources and Bio-diversity.											K1		
		CO2: Be aware of Environmental Pollution and its control.											K3		
		CO3: Infer and express Solid waste management and Social issues.											K3		
		CO4: Acquire Knowledge about Environmental legislation and protection.											K3		
		CO5: Awareness about population growth, human rights and Environment											K2		
Pre-requisites		Nil													
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
COs		Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1		1	2	2			2	3				2	2		
CO 2		3	2	2		1	2	3				1	3		
CO 3		3	2	2		1	3	3				1	2		
CO 4		1	1	1			2	3				1	2		
CO 5		1	2	1			2	2				1	3		
Course Assessment Methods															
Direct															
Continuous Assessment Test I, II & III Assignment															
Indirect															
Course - end survey															
Content of the syllabus															
Unit – I		INTRODUCTION TO ENVIRONMENTAL SCIENCE AND ENGINEERING										Periods		6	
Nature and scope of environmental education- natural resources – (forest, water, food,& land resources) problems and remedial measures. Ecosystem-Structure, characteristics and functions of ecosystem . Biodiversity – definition – conservation of biodiversity (in-situ and Ex-situ)-environmental awareness and sustainable development.															

Unit – II	ENVIRONMENTAL POLLUTION AND ITS CONTROL	Periods	6
Water pollution-causes, effects and control measures of water pollution- waste water treatment process (secondary-BOD,COD) . Air Pollution – types of air pollutants-CO ₂ , SO ₂ , NO ₂ , PAN-sources- control measures (electro static precipitator, bag house filter, wet scrubber and cyclone separator).			
Unit – III	SOCIAL ISSUES AND SUSTAINABILITY	Periods	6
Solid waste Management-Types (E-Waste, Hazardous waste, Bio-waste)-Disposal method. Sustainability-Definition-Sustainable development Goals-Environmental issues-global warming and Ozone depletion, Climate change, Acid rain, Carbon foot print-Possible solutions to Environmental issues.			
Unit – IV	SUSTAINABILITY PRACTICES AND ENVIRONMENTAL LEGISLATION	Periods	6
Zero waste and R-concept-circular economy, material life cycle assessment- energy efficiency and management-environmental legislation-air act, water act-wildlife protection act-environmental protection act.			
Unit – V	Human population and the environment	Periods	6
Population growth, human rights, value education, environment and human health, family welfare program,women and child welfare, role of information technology in environment – satellite, data base, GeographicalInformation System (GIS), Effects of Narcotic Drugs in human health and its social impact, Environmental impact Analysis (EIA) and human health.			
Total Periods			30
Text Books			
1.	Dr.S.Mageswari, Dr.G.Vijayakumar, A.Preethi-“Environment Science and Engineering” RK publication. Second Edition-2023		
2.	Gilbert.M.Masters-“Environmental Science”-Pearson education. Edition-2-2013		
3.	Dr.S. Vairam - “Environment Science and Engineering” Gems publication. Edition 2018		
References			
1.	Linda Williams- “Environmental Science”-Tata McGRAW – Hill Edition. Edition-I-2008		
2.	T.G.Miller Jr-“Environmental Science”-Wadsworth publishing Co. Edition -10-2004		
3.	William P. Cunningham, Barbara Woodworth Saigo- Tata McGraw Hill.Edition-4-2011		
4.	NPTEL Course Notes		
5.	Cunnighum and cooper-“Environmental Science”-Jaico Publ, House Edition-4-2007		
E-Resources			
1.	https://libraries.ou.edu/		
2.	https://libguides.reading.ac.uk/		
3.	https://www.loc.gov/ , https://rdl.lib.uconn.edu/		

Semester – II



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205



Programme	B.E	Programme Code			101	Regulation	2023	
Department	COMPUTER SCIENCE AND ENGINEERING				Semester		II	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23MA202	Complex Analysis and Ordinary Differential Equations	3	1	0	4	40	60	100
Course Objective	The Main Objective of the course is to - Understand the Analytic functions and Bilinear transformations. - Proficiently understand the Complex Integration. - Demonstrate Vector Differentiation and Integration. - Know about the Ordinary Differential Equations. - Identify the Laplace Transform of Derivatives and Integrals.							
Course Outcome	At the end of the course, the student should be able to,						Knowledge level	
	CO1: Analyze the construction of analytic functions.						K4	
	CO2: Understand the concepts of cauchy’s integral theorem and residue theorem in evaluation of complex integrals.						K3	
	CO3: Explore the concepts of Green's , Stoke's and Gauss Divergence theorems in real life problems.						K5	
	CO4: Understand the concepts of solving second order differential equations.						K5	
	CO5: Apply the concepts of Laplace transform in solving ODE.						K3	
Pre-requisites	-							

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	1	1									2		
CO 2	3	2	1	1									2		
CO 3	3	2	1	1									2		
CO 4	3	2	1	1									2		
CO 5	3	2	1	1									2		

Course Assessment Methods

Direct
Continuous Assessment Test I, II & III
Assignment.
End-Semester examinations
Indirect
Course - end survey

Content of the syllabus			
Unit – I	ANALYTIC FUNCTIONS	Periods	9+3
Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $c+z$, cz , $1/z$ and Bilinear transformation.			
Unit - II	COMPLEX INTEGRATION	Periods	9+3
Problem solving using Cauchy’s integral theorem and integral formula- Taylor’s and Laurent’s expansions- Residues- Cauchy’s residue theorem- Application: Contour integration over unit circle.			
Unit – III	VECTOR DIFFERETIATION & INTEGRATION	Periods	9+3
Vector Differentiation: Vector and Scalar Functions- Derivatives- Curves, Gradient of a Scalar Field- Directional Derivative -Divergence of a Vector Field - Curl of a Vector Field – Line, Surface and Volume integrals (concepts only), Green’s theorem in a plane(excluding proof), Gauss Divergence theorem(excluding proof), Stoke’s theorem (Excluding proof).			
Unit - IV	ORDINARY DIFFERENTIAL EQUATIONS	Periods	9+3
Second order Linear ordinary differential equations with constant coefficients, Cauchy’s - Euler equations (excluding proof)- Legendre’s Linear differential equations(excluding proof) - Method of variation of parameters.			
Unit – V	LAPLACE TRANSFORMS	Periods	9+3
Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems(excluding proof) -Transforms of derivatives and integrals – Initial and final value theorems(excluding proof) – Inverse transforms – Convolution theorem(excluding proof) – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.			
Total Periods			45+15=60
Text Books			
1.	Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44 th Edition, 2020.		
2.	Ravish R Sing , Mukul Bhatt, “Engineering Mathematics”, Mc Graw Hill Education Pvt. Ltd-2018		
3.	Sivaramakrishna Das. P, Vijayakumari.C, “ Engineering Mathematics – II”, Pearson India Education Pvt. Ltd-2022.		
References			
1.	Wylie, R.C. and Barrett, L.C., “Advanced Engineering Mathematics” , Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.		
2.	Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John Wiley (2015).		
3.	Alan Jefferis , Advanced Engineering Mathematics, Academic Press- New Delhi-2003		
4.	Yunus A.Cengel, William J.Palm III,” Differential equations for Engineers & Scientists”, Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.		
5.	John Bird, Higher Engineering Mathematics, Anuradha Agencies(2004)		
E-Resources			
1.	https://en.wikipedia.org › wiki › Ordinary_differential_equation		
2.	www.learnerstv.com/Free-engineering-Video-lectures		
3.	www.nptel.ac.in		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205												
Programme	B.E	Programme Code					101	Regulation		2023				
Department	Computer Science and Engineering					Semester			II					
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks								
		L	T	P		C	CA	ESE	Total					
U23CH201	Engineering Chemistry	3	0	0	3	40	60	100						
Course Objective	The main objective of this course is to: - Recognize the basic technology requirements in water treatment - Gain knowledge in basics and preparations, properties and applications of Polymers. - Enrich the Knowledge of the students with the basics of Nano materials, their properties and applications. - Familiarize about the Non renewable, renewable energy and different types of storage devices in the engineering application. Gain knowledge in destruction and protection of metals for engineering applications.													
Course Outcome	The students who complete this course successfully are expected to:										Knowledge Level			
	CO1: Implement innovative solutions in wastewater treatment process.										K4			
	CO2: Familiarize with the applications of polymers in the field of engineering.										K3			
	CO3: Identify the synthesis methods of Nanoparticles and their industrial applications										K2			
	CO4: Recognize the renewable, non renewable energy and storage devices for domestic and industrial applications.										K4			
	CO5: Categorize the metal corrosion in different environment and find out appropriate control techniques to avoid corrosion										K3			
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	3	3	2	1	2	2	2					1	1
CO 2	3	2	2	2		2	2	1					2	2
CO 3	3	2	2	3	2	1	2	1					2	1
CO 4	3	3	2	2	1	1	3	2					3	2
CO 5	3	3	3	2	1	2	2	1					2	1
Pre-requisites		Nil												
Course Assessment Methods														
Direct														
1. Continuous Assessment Test I, II & III														
2. Assignment														
3. End-Semester examinations														
Indirect														
1. Course - end survey														

Content of the syllabus			
Unit - I	WATER TECHNOLOGY	Periods	9
Introduction-sources and impurities in water-soft and hard water- water quality parameters.Types of hardness. Determination of hardness by EDTA method. Domestic water treatment. Boiler feed water –requisites, scale and sludge formation in boilers-caustic embrittlement- boiler corrosion- treatment of boiler feed water. Internal conditioning (carbonate, phosphate, and calgon conditioning) ,external conditioning – ion exchange process, zeolite process, Electrodialysis. Brackish water –water purification by reverse osmosis.			
Unit - II	POLYMER CHEMISTRY	Periods	9
Introduction - occurrence, definitions – functionality - degree of polymerization- classification of polymers – structure (linear, branched & network polymer structure) block, random & graft copolymers, tacticity, Tg (Factors influencing Tg), molecular weight - number and weight average method. Types of polymerizations - addition, condensation and copolymerization. Mechanism of polymerization (Free radical). Preparation, properties and applications of PE, nylon6, nylon 66, Poly Urethane, poly isoprene and Vulcanization of rubber, TEFLON ,PET, and Bakelite			
Unit - III	NANO CHEMISTRY	Periods	9
Basics- distinction between molecules, nanoparticles and bulk materials; size dependent properties. Nanoparticles: nanocluster, nanorod, nanotube (CNT) and nanowires. Synthesis: Top down process- laser ablation,spray pyrolysis, chemical vapour deposition, electro deposition. Bottom up process- precipitation, sol-gel, thermolysis - hydrothermal, solvothermal -properties and applications of nano materials in medical and electronic devices.			
Unit - IV	ENERGY RESOURCES AND STORAGE DEVICES	Periods	9
Non renewable energy - nuclear energy, nuclear reaction and its types; Nuclear power plant and its working (light water nuclear power plant & breeder reactor).Renewable energy and its sources - solar Energy - photo voltaic cells-working of photovoltaic cell, recent advances in solar cell materials; wind energy - types of wind power plants (WPPs), components and working of WPPs. Batteries and fuel cells: types of batteries -alkaline battery, lead storage battery, Ni-Cd battery, lithium battery, fuel cell - H ₂ -O ₂ fuel cell-applications.			
Unit - V	CORROSION AND ITS CONTROL	Periods	9
Introduction, types of corrosion - chemical and electrochemical corrosion, mechanism, pilling -bedworth rule, types of electrochemical corrosion – galvanic corrosion, pitting corrosion, crevice corrosion, corrosion on wire fence and pipeline corrosion, factors influencing rate of corrosion. Corrosion control methods – sacrificial anode and impressed cathodic current. Protective coatings – paints: constituents and functions, metallic coatings - steps involved in cleaning the surface for electroplating, electroplating (Au), and electro less plating (Ni).			
Total Periods			45
Text Books			
1.	Dr.S.Mageswari, Dr.K.Balachandran, Dr.G.Vijayakumar, “Engineering Chemistry” Tata Mc Graw Hill Pvt. Ltd., First Edition-2024.		
2.	O.G.Palanna, “Engineering Chemistry” Tata Mc Graw Hill Pvt. Ltd., Second Edition -2017		
References			
1.	P. C. Jain and Monica Jain, “Engineering Chemistry”, 17th Edition, DhanpatRai Publishing Company Pvt. Ltd., 2018.		
2.	Arun Bahl, B.S. Bahl, G.D. Tuli, “Essentials of Physical Chemistry” Published by S. Chand & Company Ltd., 2014		
3.	Sashi Chawla, Dhanpat Rai & Co. Pvt. Ltd., “Engineering Chemistry” Fifth Edition - 2017.		
4.	Dr.S.Vairam, Dr.Suba Ramesh, “Engineering Chemistry” First Edition, Wiley Publication, Reprint-2016		
E-Resources			
1.	https://www.who.int/water_sanitation_health/dwq/arsenicun6.pdf		
2.	https://www.schandpublishing.com/books/tech-professional/applied-science/a-textbook-polymer-chemistry/9788121941129/#.XdZ214MzY2w		
3.	https://www.elsevier.com/books/nanochemistry/klabunde/978-0-444-59397-9		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205														
Programme		B.E./B.Tech		Programme Code		101		Regulation		2023						
Department		CSE					Semester		II							
Course Code		Course Name		Periods Per Week			Credit		Maximum Marks							
				L	T	P	C	CA	ESE	Total						
U23EE201		Basic Electrical and Electronics Engineering		3	0	0	3	40	60	100						
Course Objective		The students should made to • Introduce the basics of electric circuits and analysis • Impart knowledge in the basics of working principles and application of electrical machines • Learn the electrical wiring methods • Analyze the characteristics of Semiconductor devices • Educate on the fundamental concepts of digital electronics and introduce the functional elements and working of measuring instruments														
Course Outcome		At the end of the course, the student should be able to,								Knowledge Level						
		CO1: Understand the basics of electric circuits and type of the connection								K2						
		CO2: Understand the basics of electromagnetic laws and basic working principle of DC and AC machines.								K2						
		CO3: Understand the concepts of tariff, energy saving, illumination, electric lamps and safety measures.								K2						
		CO4: Understand the basic operating characteristics of semiconductor devices.								K2						
Pre-requisites		CO5: Understand the fundamentals of digital logics and measuring instruments										K2				
		Basic concepts and understanding of magnetic fields														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping			
COs		Programme Outcomes (POs)											PSOs			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	
CO 1		3	2	1					1				3	3		
CO 2		3	2	1					1				3	3		
CO 3		3	1	1					1				3	3		
CO 4		3	2	1					1				3	3		
CO 5		3	2	1					1				3	3		
Course Assessment Methods																
Direct																
1. Continuous Assessment Test I, II & III																
2. Assignment																
3. End-Semester examinations																
Indirect																
1. Course –end Survey																

Content of the syllabus			
Unit – I	INTRODUCTION OF ELECTRICAL CIRCUITS	Periods	9
Definition of Voltage, Current, Power, Energy, Power factor, Circuit parameters, Ohm’s law, Kirchhoff’s law Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Real power, Reactive power and Apparent power, Power factor. Introduction to three phase systems - types of connections Concept of DC circuits.			
Unit - II	ELECTRICAL MACHINES AND ITS APPLICATIONS	Periods	9
Faraday’s laws of electromagnetic induction - Lens law - Fleming's left hand rule and Right hand rule. Working principle and construction of AC and DC machines - Construction, Working principle and Applications of single phase Transformer. Motor used for domestic applications.			
Unit – III	WIRING AND ILLUMINATION	Periods	9
Types of wiring-staircase and corridor wiring - wiring accessories. Different types of safety measures - Earthing. Electrical tariff -Energy conservation. Simple layout of power system-various energy resources, The Laws of Illumination- Different types of electrical lamps.			
Unit - IV	SEMICONDUCTOR DEVICES	Periods	9
PN junction diodes - Zener diodes - characteristics. Transistors: PNP and NPN transistors - Theory of operation - Transistor configurations -characteristics - comparison. Special semiconductor devices: FET - SCR - LED – V-I characteristics – Rectifier and Inverters -UPS – SMPS.			
Unit – V	DIGITAL FUNDAMENTALS AND MEASUREMENTS	Periods	9
Number systems - Boolean Theorems – DeMorgan's Theorem - Logic gates -Implementation of Boolean Expression using Gates - SOP and POS forms- Functional elements of an instrument, Standards and calibration, Operating Principle of Ammeters and Voltmeters.			
Total Periods			45
Text Books			
1.	S.K.Bhattacharya, “Basic Electrical and Electronics Engineering”,Pearson,2017		
2.	D.P. Kotharti and I.J Nagarath, “Basic Electrical and Electronics Engineering”, Mc Graw Hill, Third Edition, 2020.		
References			
1.	S.B. Lal Seksena and Kaustuv Dasgupta, “Fundaments of Electrical Engineering”, Cambridge, 2016		
2.	Mittle,Mittal, Basic Electrical Engineering, 2nd Edition, Tata McGraw-Hill Edition, 2016.		
3.	T.K. Nagsarkar and M.S. Sukhija, “Basic Electrical Engineering”, Oxford, 2017.		
4.	John Bird, “Electrical and Electronic Principles and Technology”, Fourth Edition, Elsevier, 2010.		
5.	K MurugeshKumar, “Elements of Electrical Engineering”, Vikas Publishing House Pvt. Ltd.2011.		
E-Resources			
1.	https://nptel.ac.in/courses		
2.	https://www.electrical4u.com/electrical-engineering-articles/illumination-engineering/		
3.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/lecture-notes		
4.	https://www.google.co.in/books/edition/_/4nJROSC7iK8C?hl=en&gbpv=1		



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University ,Chennai)

Elayampalayam, Tiruchengode – 637 205



Programme	B.E/B.Tech.	Programme code	101	Regulation			2023	
Department	COMPUTER SCIENCE AND ENGINEERING		Semester			II		
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA202	தமிழரும் தொழில்நுட்பமும்/ TAMILS AND TECHNOLOGY	1	0	0	1	40	60	100

Content of the syllabus

அலகு 1	நெசவு மற்றும் பாணைத்தொழில்நுட்பம்	Periods	3
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சங்ககாலத்தில் நெசவுத்தொழில் - பானைத்தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு 2	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்	Periods	3
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சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு- சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடைஅமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச்சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் - நாயக்கர்காலக்கோயில்கள் - மாதிரிகட்டமைப்புகள் பற்றி அறிதல், மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலைநாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக்கலை.

அலகு 3	உற்பத்தித் தொழில்நுட்பம்	Periods	3
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கப்பல்கட்டும்கலை - உலோகவியல் - இரும்புத்தொழிற்சாலை - இரும்பை உருக்குதல்,எஃகு - வரலாற்றுச் சான்றுகளாக - செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணிஉருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடிமணிகள் - சுடுமண்மணிகள் - சங்குமணிகள் - எலும்புத்துண்டுகள் - தொல்லியல்சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள் .

அலகு 4	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்	Periods	3
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அணை, ஏரி, குளங்கள் ,மதகு - சோழர்காலக் குழுழித்தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார்அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டையஅறிவு - அறிவு சார் சமூகம்.

அலகு 5	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	Periods	3
அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மின்பொருட்கள் உருவாக்கம் – தமிழ் இணையக்கல்விக்கழகம் – தமிழ் மின்நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்க்குவைத்திட்டம்.			
		Total Periods	15

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.E/B.Tech.	Programme code			101	Regulation		2023	
Department	COMPUTER SCIENCE AND ENGINEERING				Semester			II	
Course code	Course name	Periods per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
U23TA202	TAMILS AND TECHNOLOGY	1	0	0	1	40	60	100	
Content of the syllabus									
UNIT I	WEAVING AND CERAMIC TECHNOLOGY					Periods		3	
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) –Graffiti on Potteries									
UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY					Periods		3	
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)-ThirumalaiNayakarMahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.									
UNIT III	MANUFACTURING TECHNOLOGY					Periods		3	
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.									
UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOG					Periods		3	
Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.									
UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING					Periods		3	
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.									
						Total Periods		15	

TEXT-CUM-REFERENCE BOOKS:

1	தமிழகவரலாறும் – மக்களும்பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3	கீழடி – வைகை நதிக்கரையில் சங்க நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருதை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் வெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies)
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205												
Programme		B.E.			Programme code			101		Regulation		2023		
Department		Computer Science and Engineering						Semester			II			
Course Code		Course name				Periods per week			Credit		Maximum Marks			
U23CS204		Object Oriented Programming				L		T	P	C		CA	ESE	Total
						3		0	0	3		40	60	100
Course Objective		The student should be made to, - Introduce the fundamental concepts of Object-Oriented Programming (OOP) and their implementation using Java. - Develop the ability to design and implement class hierarchies, inheritance, and polymorphism. - To apply structured exception handling, perform file input/output operations, and implement modular programming using packages and interfaces in Java.. - Provide hands-on experience in multithreaded programming and synchronization mechanisms. - Familiarize students with event handling, AWT components, and GUI design in Java applications												
Course Outcome		At the end of the course, the student should be able to,												KL
		CO1: Explain the principles of object-oriented programming such as abstraction, encapsulation, and inheritance												K2
		CO2: Apply Java programming concepts to define classes, objects, constructors, and methods												K3
		CO3: Develop Java applications using inheritance, interfaces, and packages												K3
		CO4: Construct multithreaded programs and manage inter-thread communication and synchronization												K4
		CO5: Design basic graphical user interfaces using AWT and handle events using event listeners												K4
Pre-requisites		--												

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2–Medium, 1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	3	3	3	3					2			3	2
CO 2	3	2	2	2	2					2			3	2
CO 3	2	3	2	3	3				2	2			3	3
CO 4	3	2	2	3	3				2	2			3	3
CO 5	3	2	2	2	3				1	2			3	3

Course Assessment Methods	
Direct	
1.	Continuous Assessment Test I, II&III
2.	Assignments / Seminar/Quiz
3.	End-Semester examination
Indirect	
1.	Course -end survey

Content of the syllabus			
Unit– I	INTRODUCTION TO OOP AND JAVA FUNDAMENTALS	Periods	9
Object Oriented Programming - objects and classes - Abstraction - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java - Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members - Data Types, Control Flow, Arrays-Strings: Basic String class, methods and String Buffer Class..			
Unit-II	INHERITANCE AND PACKAGES	Periods	9
Inheritance Basics – Multilevel Hierarchy – Constructors – Method Overriding -Using super – Dynamic Method Dispatch –Using final – Abstract Classes – Packages – Importing Packages – Interfaces.			
Unit – III	EXCEPTION HANDLING AND I/O	Periods	9
Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files			
Unit– IV	MULTITHREADING PROGRAMMING	Periods	9
Java Thread Model Introduction, Multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups, Wrappers – Auto boxing.			
Unit– V	EVENT HANDLING	Periods	9
Event Basics – Handling Key and Mouse Events-Event Handling – Mechanisms -- Event Classes – Action Event - Action Listener. AWT Classes - Window Fundamentals - Frame Windows – AWT Controls – Layout Managers.			
Total Periods			45
Suggested List of Experiments			CO's
1. Develop a simple C++ application using operator overloading and function overloading			CO1
2. Develop simple Java programs using control statements and arrays			CO2
3. Demonstrate polymorphism using Java programs			CO3
4. Develop Java applications using interfaces and packages			CO3
5. Demonstrate exception handling in Java			CO3
6. Develop multithreaded applications in Java			CO4
7. Develop programs in Java using java.io packages			CO4
8. Demonstrate string manipulation in Java			CO5
9. Develop applications in Java using collections classes			CO5
10. Design a GUI based simple application using AWT classes			CO5
Lecture 45: Practical 30; Total: 75			
References			
1.	Reema Thareja, Object Oriented Programming with C++, Third Edition, Oxford University Press, New Delhi, 2018 (UNIT 1)		
2.	Herbert Schildt, —Java: The Complete Reference, 12th Edition, McGraw Hill Education, New Delhi, 2022.(UNIT 2 to 5)		
3.	Buyya Rajkumar, ThamaraiSelvi S. and Xingchen Chu, —Object Oriented Programming with Java Essentials and Applications, 1st Edition, McGraw Hill, New Delhi, 2009.		
4.	Cay S. Horstmann, —Core Java: Volume I Fundamentals, 11th Edition, Addison Wesley, New Delhi, 2019.		
5.	Deitel Paul and Deitel Harvey, —Java How to Program, 11th Edition, Pearson Education, New Delhi, 2018.		
E-Resources			
1.	www.nptel.ac.in		
2.	https://www.javatpoint.com/cpp-oops-concepts		
3.	https://www.javatpoint.com/java-tutorial		

Content of the syllabus			
Unit – I		Periods	15
Listening- Listening for Cultural Awareness, Listening to Professional Conversations, Talks, Interviews and Lectures Speaking- Developing Confidence to get rid of Fear on the Dias, Discussion at a Corporate Context. Reading– Inferential Reading, Reading Short Messages and Technical Articles, Writing- Introduction to Letter Writing, Writing Formal and Informal Letters, Thanking Letters, Letters Calling for Quotations, Letters Placing an Order, Seeking clarification, Letters of Complaint. Focus on Language– Adjectives and Degrees of Comparisons			
Unit – II		Periods	15
Listening- Listening to specific information relating to technical content, Listening for statistical information Speaking- Expressing opinions, Formal Discussions, Describing Role Play at Business Context and Consolidating Ideas. Reading– Reading Technical Articles in Journals and Comparing Articles. Writing- Letter seeking permission to undergo practical training and to undertake project work. Focus on Language– Simple, compound and complex sentences and Transformation of Sentences.			
Unit – III		Periods	15
Listening- Listening to understand the overall meaning, Listening to Interviews and Presentations. Speaking- Giving Instructions and Showing Directions and Rephrasing Instructions. Reading– Skimming and Scanning, Reading Job Advertisements. Writing- Applying for a Job, Writing a CV. Group Discussion: Introduction – Topic Analysis – Thematic Expressions-Objective and content of discussion.			
Unit – IV		Periods	15
Listening- Listening and retrieving Information. Speaking- Developing fluency and Coherence, Accent Neutralization, Voice Modulation, and Intonation, Improving Voice Quality. Reading– Reading and understanding Advertisements. Writing- Letters to the Editor, Letter of Complaint, Various kinds of Reports, Permission to go for Industrial visits. Presentation skills: Making Self Introduction Effectively-Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Accents analysis – Stylistics.			
Unit – V		Periods	15
Listening- Listening to Fragmented Texts and Filling in the Blanks. Speaking- Mind Mapping, Developing Coherence and Self-Expression, Making presentations, Paralinguistic and Extra linguistic Features (body language), Reading– Predicting content, Interpreting Reports. Writing- Writing Proposals, Agenda, Minutes of the Meeting. Soft Skills: Introduction - Change in Today’s Workplace: Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft skills - Ability to work as a team.			
Total Periods			75
Text Books			
1.	Dr. S. R. Kannan, Sumant. S, Pereira Joyce, Professional Communication, Vijay Nicole Imprints Pvt. Ltd., 2023.		
2.	Sokkaalingam, S.R.M., The Art Of Speaking, English Versatile Publishing House, 2019.		
References			
1.	Norman Whitby - Business Benchmark Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2008. , 1997.		
2.	Dutt, Rajeevan, Prakash .A Course in Communication Skills (Anna University, Coimbatore edition) ∴ Cambridge University Press India Pvt.Ltd, 2007.		
3.	Meenakshi Raman and Sangeeta Sharma-'Technical Communication English Skills for Engineers'; Oxford University Press, 2008.		
4.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient Blackswan Pvt, Ltd, 2009.		
5.	Technical English – I & II, Sonaversity, Sona College of Technology, Salem, First Edition, 2012.		
E-Resources			
1.	http://www.kalevleetaru.com/Publish/Book_Review_Who_Moved_My_Cheese.pdf		
2.	http://www.bookbrowse.com/reviews/index.cfm/book_number/304/who-moved-my-cheese		
3.	http://www.imdb.com/title/tt0482629/plotsummary		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme	B.E	Programme Code					101	Regulation		2023				
Department	Computer Science and Engineering					Semester			II					
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks								
		L	T	P		C	CA	ESE	Total					
U23CH201	Engineering Chemistry	3	0	0	3	40	60	100						
Course Objective	The main objective of this course is to: - Recognize the basic technology requirements in water treatment - Gain knowledge in basics and preparations, properties and applications of Polymers. - Enrich the Knowledge of the students with the basics of Nano materials, their properties and applications. - Familiarize about the Non renewable, renewable energy and different types of storage devices in the engineering application. Gain knowledge in destruction and protection of metals for engineering applications.													
Course Outcome	The students who complete this course successfully are expected to:										Knowledge Level			
	CO1: Implement innovative solutions in wastewater treatment process.										K4			
	CO2: Familiarize with the applications of polymers in the field of engineering.										K3			
	CO3: Identify the synthesis methods of Nanoparticles and their industrial applications										K2			
	CO4: Recognize the renewable, non renewable energy and storage devices for domestic and industrial applications.										K4			
	CO5: Categorize the metal corrosion in different environment and find out appropriate control techniques to avoid corrosion										K3			
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping		
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	3	3	2	1	2	2	2					1	1
CO 2	3	2	2	2		2	2	1					2	2
CO 3	3	2	2	3	2	1	2	1					2	1
CO 4	3	3	2	2	1	1	3	2					3	2
CO 5	3	3	3	2	1	2	2	1					2	1
Pre-requisites		Nil												
Course Assessment Methods														
Direct														
7. Continuous Assessment Test I, II & III														
8. Assignment														
9. End-Semester examinations														
Indirect														
3. Course - end survey														
Content of the syllabus														
Unit - I		WATER TECHNOLOGY								Periods		9		

Introduction-sources and impurities in water-soft and hard water- water quality parameters.Types of hardness. Determination of hardness by EDTA method. Domestic water treatment. Boiler feed water –requisites, scale and sludge formation in boilers-caustic embrittlement- boiler corrosion- treatment of boiler feed water. Internal conditioning (carbonate, phosphate, and calgon conditioning) ,external conditioning – ion exchange process, zeolite process, Electrodialysis. Brackish water –water purification by reverse osmosis.			
Unit - II	POLYMER CHEMISTRY	Periods	9
Introduction - occurrence, definitions – functionality - degree of polymerization- classification of polymers – structure (linear, branched & network polymer structure) block, random & graft copolymers, tacticity, Tg (Factors influencing Tg), molecular weight - number and weight average method. Types of polymerizations addition, condensation and copolymerization. Mechanism of polymerization (Free radical). Preparation, properties and applications of PE, nylon6, nylon 66, Poly Urethane, poly isoprene and Vulcanization of rubber, TEFLON ,PET, and Bakelite			
Unit - III	NANO CHEMISTRY	Periods	9
Basics- distinction between molecules, nanoparticles and bulk materials; size dependent properties. Nanoparticles: nanocluster, nanorod, nanotube (CNT) and nanowires. Synthesis: Top down process- laser ablation,spray pyrolysis, chemical vapour deposition, electro deposition. Bottom up process- precipitation, sol-gel, thermolysis - hydrothermal, solvothermal -properties and applications of nano materials in medical and electronic devices.			
Unit - IV	ENERGY RESOURCES AND STORAGE DEVICES	Periods	9
Non renewable energy - nuclear energy, nuclear reaction and its types; Nuclear power plant and its working (light water nuclear power plant & breeder reactor).Renewable energy and its sources - solar Energy - photo voltaic cells-working of photovoltaic cell, recent advances in solar cell materials; wind energy - types of wind power plants (WPPs), components and working of WPPs. Batteries and fuel cells: types of batteries -alkaline battery, lead storage battery, Ni-Cd battery, lithium battery, fuel cell - H ₂ -O ₂ fuel cell-applications.			
Unit - V	CORROSION AND ITS CONTROL	Periods	9
Introduction, types of corrosion - chemical and electrochemical corrosion, mechanism, pilling -bedworth rule, types of electrochemical corrosion – galvanic corrosion, pitting corrosion, crevice corrosion, corrosion on wire fence and pipeline corrosion, factors influencing rate of corrosion. Corrosion control methods – sacrificial anode and impressed cathodic current. Protective coatings – paints: constituents and functions, metallic coatings - steps involved in cleaning the surface for electroplating, electroplating (Au), and electro less plating (Ni).			
Total Periods			45
Text Books			
2.	Dr.S.Mageswari, Dr.K.Balachandran, Dr.G.Vijayakumar, “Engineering Chemistry” Tata Mc Graw Hill Pvt. Ltd., First Edition-2024.		
3.	O.G.Palanna, “Engineering Chemistry” Tata Mc Graw Hill Pvt. Ltd., Second Edition -2017		
References			
6.	P. C. Jain and Monica Jain, “Engineering Chemistry”, 17th Edition, DhanpatRai Publishing Company Pvt. Ltd., 2018.		
7.	Arun Bahl, B.S. Bahl, G.D. Tuli, “Essentials of Physical Chemistry” Published by S. Chand & Company Ltd., 2014		
8.	Sashi Chawla, Dhanpat Rai & Co. Pvt. Ltd., “Engineering Chemistry” Fifth Edition - 2017.		
9.	Dr.S.Vairam, Dr.Suba Ramesh, “Engineering Chemistry” First Edition, Wiley Publication, Reprint-2016		
E-Resources			
4.	https://www.who.int/water_sanitation_health/dwq/arsenicun6.pdf		
5.	https://www.schandpublishing.com/books/tech-professional/applied-science/a-textbook-polymer-chemistry/9788121941129/#.XdZ214MzY2w		
6.	https://www.elsevier.com/books/nanochemistry/klabunde/978-0-444-59397-9		



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Elayampalayam, Tiruchengode – 637 205



Programme	B.E	Programme Code			101	Regulation		2023	
Department	Computer Science and Engineering					Semester		II	
Course Code	Course Name	Periods Per Week			Credit		Maximum Marks		
		L	T	P	C	CA	ESE	Total	
U23GE204	Engineering Practices Laboratory	0	0	3	1	60	40	100	

Course Objective	The main objective of this course is to: The students should made to 1. Know the plumbing line assemblies. 2. Weld lap joint, butt joint and T-joint. 3. Learn the assembling and dismantling methodology of home appliances. 4. Learn the resistor value identification through colors coated on resistor. 5. Learn the basics of signal generation in CRO. 6. Learn the soldering techniques in PCB board for designing the projects.	

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Perform basic machining operations and finish the job to the requirements and quantify the accuracy.	K2
	CO2: Make various joints such as cross lap joint and Tee lap joint in the carpentry.	K2
	CO3: Understand the basics of house wiring techniques and the measurements of basic electrical quantities.	K2
	CO4: Understand the resistor value identification through colors coated on resistor.	K2
	CO5: Understand the soldering techniques in PCB board for designing the projects.	K2

Pre - requisites	Nil
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CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO	3	2	3	2	2	-	-	-	2	-	-	-	2	2
CO	3	2	3	2	2	-	-	-	2	-	-	-	3	2
CO	3	2	2	3	2	2	-	-	2	-	-	-	2	-
CO	3	2	2	3	2	2	-	-	2	-	-	-	2	-
CO 5	3	2	3	3	2	2	-	-	2	-	-	-	3	3

Course Assessment Methods

Direct

- 1.Pre lab and Post lab
- 2.Record mark
- 3.End- Semester Examinations

Indirect

- ## 1.Course –End survey

Content of the Syllabus	
<u>GROUP A</u> <u>(CIVIL & MECHANICAL ENGINEERING)</u>	
<u>CIVIL ENGINEERING PRACTICE:</u>	COs
1.Plumbing: a) Single Tap G.I / PVC pipe connection involving the fitting like valves, taps & bends. b) Two Tap G.I / PVC pipe connection involving the fitting like valves, taps & bends.	CO2
2.Carpentry: a) To make a Cross Lap Joint from the given work piece. b) Preparation of ‘ T’ Lap Joint from the given work piece.	CO2
<u>MECHANICAL ENGINEERING PRACTICE:</u>	
3.Welding: a) To join the metal plates by a Butt Joint in arc welding machine. b) To join the metal plates by a Lap Joint in arc welding machine.	CO1
4.Basic Machining: a) To perform simple facing & turning operation. b) To perform of step turning operation.	CO1
5.Sheet Metal: a) To make a rectangular tray from the given sheet metal. b) To make a basket from the given sheet metal.	CO1
<u>STUDY EXPERIMENT:</u> 6. Study of 3D Printing machine and its applications. 7. Study of CO2 Laser engraving & cutting machine and its applications. 8. Study of Wood routing machine and its applications.	CO1
<u>GROUP B</u> <u>(ELECTRICAL & ELECTRONICS ENGINEERING)</u>	
<u>ELECTRICAL ENGINEERING PRACTICE</u>	
1. Residential house wiring and stair case wiring using switches, fuse, indicator & lamp.	CO3
2. LED lamp assembly.	CO3
3. Measurement of voltage, current, power & power factor using R-Load.	CO3
4. Measurement of energy using single phase meter.	CO3
5. Measurement of resistance to earth of electrical equipment.	CO3
<u>ELECTRONICS ENGINEERING PRACTICE</u>	
1. Study of Electronic components and equipment's – Resistor color-coding, Inductor, Capacitor and CRO.	CO4
2. Logic gates AND, OR, NOR, NAND and NOT.	CO4
3. Generation of Clock Signal.	CO4
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.	CO5
Total Periods	45
Reference Book :	
1	Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, “Engineering Practices Laboratory” Manual. First Edition, 2017.
2	Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, “Engineering Practices Lab” Manual, Vikas Publishing House Pvt Ltd, 2017.

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme	B.E	Programme Code			101	Regulation		2023							
Department	Computer Science and Engineering				Semester		II								
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks									
		L	T	P	C	CA	ESE	Total							
U23MCFY2	Indian Constitution	2	0	0	0	100	NA	100							
Course Objective	The main objective of this course is to:														
	i) To know about the basic structure of Indian constitution.														
	ii) To know about our Central government Executive system of India														
	iii) To know about our State government Executive system of India														
	iv) To learn the Election system, Amendments and Emergency Provisions given by the constitution.														
Course Outcome	v) To know about the Special Constitutional Provisions in India														
	At the end of the course, the student should be able to,						Knowledge level								
	• Understand the functions of the Indian government						K1								
	• Know about our Central Government, political structure & codes, procedures						K1								
	• Understand our State Executive & Elections system of India.						K1								
Pre-requisites	---						---								
	---						---								
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak															
COs	Programme Outcomes (POs)												CO/PSO Mapping		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1						3		3	2						
CO 2						3		3	3						
CO 3						3		3	2						
CO 4						3		3	3						
CO 5						3		3	3						
Course Assessment Methods															
Direct															
Continuous Assessment Test I, II & III Assignment															
Indirect															
Course - end survey															

Content of the syllabus			
Unit – I	INTRODUCTION	Periods	6
Historical Background – Constituent Assembly of India – Fundamental Rights – Citizenship – Constitutional Remedies for citizens			
Unit - II	STRUCTURE AND FUNCTION OF CENTRAL	Periods	6
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India			
Unit – III	STRUCTURE AND FUNCTION OF STATE	Periods	6
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts			
Unit - IV	ELECTION PROVISIONS, EMERGENCY PROVISIONS, AMENDMENT OF THE CONSTITUTION	Periods	6
Election Commission of India-composition, powers and functions and electoral process. Types of emergency- grounds, procedure, duration and effects. Amendment of the constitution- meaning, procedure and limitations.			
Unit – V	SPECIAL CONSTITUTIONAL PROVISIONS	Periods	6
Directive Principles of State Policy: Importance and its relevance. Special Constitutional Provisions for Schedule Castes, Schedule Tribes & Other Backward Classes, Women & Children.			
Total Periods			30
Text Books			
1.	Durga Das Basu, “Introduction to the Constitution of India “, Prentice Hall of India, New Delhi.		
2.	The Constitution of India (Coat Pocket Edition) by Gopal Sankaranarayanan - 17th Edition. (2024)		
References			
1.	R.C.Agarwal, (1997) “Indian Political System”, S.Chand and Company, New Delhi.		
2.	M.Laksmikanth, Indian polity, Tata mchraw hill publications.		
E-Resources			
1.	https://mhrd.gov.in/		
2.	https://niti.gov.in/content/niti-aayog-library		
3.	www.drishtiiias.com/		

Semester – III

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme		B.E		Programme Code				101		Regulation		2023			
Department		COMPUTER SCIENCE AND ENGINEERING						Semester				III			
Course Code		Course Name				Periods Per Week			Credit		Maximum Marks				
						L	T	P			C	CA	ESE	Total	
U23MA304		DISCRETE MATHEMATICS				3	1	0	4	40	60	100			
Course Objective		The Main Objective of the course is to													
		- Introduce basic tools and techniques in Discrete Mathematical Structure. - Provide information about the concepts needed to test the logic of a program and Theory of inference. - Recognize the connection between set, operations and logic. - Identify the domain and range of a relation. - Recognize the concepts of groups.													
		At the end of the course, the student should be able to,													
		CO1: Demonstrate the mathematical reasoning and logics													
		CO2: Reformulate statements from common language to formal language													
Course Outcome		CO3: Posses knowledge in relations and lattices.													
		CO4: Solve recurrence relations by applying appropriate function.													
		CO5: Understand the concepts various algebraic Structures.													
		Knowledge level													
		K2													
Pre-requisites		-													
		K5													
		K3													
		K5													
		K3													

CO / PO Mapping													CO/PSO Mapping		
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak															
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	CO 1	3	2	1	1									2	1
CO 2	CO 2	3	2		1	1								2	1
CO 3	CO 3	3	2	1	1									2	1
CO 4	CO 4	3	2	1		1								2	1
CO 5	CO 5	3	2	1	1	1								2	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & III	
2. Assignment.	
3. End-Semester examinations	
Indirect	
Course - end survey	

Content of the syllabus			
Unit – I	PROPOSITIONAL CALCULUS	Periods	9+3
Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Contrapositive – Logical equivalences and implications – DeMorgan’s Laws – Normal forms – Principal conjunctive normal form and Principal disjunctive normal form			

Rules of inference – Arguments – Validity of arguments.			
Unit - II	PREDICATE CALCULUS	Periods	9+3
Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – Rules of universal specification and generalization – Validity of arguments.			
Unit – III	SET THEORY	Periods	9+3
Set Theory: Cartesian product of sets – Relations on sets – Types of relations and their properties – Matrix representation of a relation - Graph of a relation – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices – Properties of lattices.			
Unit - IV	FUNCTIONS	Periods	9+3
Definition – Classification of functions – Composition of functions – Inverse functions – Characteristic function of a set – Recurrence relations – Solution of recurrence relations – Generating Functions – Solving recurrence relation by generating functions.			
Unit – V	GROUP THEORY	Periods	9+3
Algebraic systems – Definitions – Examples – Properties – Semi groups – Monoids – Sub semi groups and Sub monoids - Groups and Subgroups – Homomorphism – Cosets – Lagrange’s theorem – Normal subgroups – Normal algebraic system with two binary operations.			
Total Periods			45+15=60
Text Books			
1.	Tremblay J P and Manohar R., Discrete Mathematical Structures with Applications to Computer Science, TMH, New Delhi – 2004.		
2.	Rosen K H, “Discrete Mathematics and its Applications”, Sixth Edition, Tata McGraw-Hill Pub.co. Ltd., Delhi, 2006.		
References			
1.	Kenneth H. Rosen, “Discrete Mathematics and its Applications”, 7th Edition, Tata McGraw Hill Publishing Company, 2012		
2.	Singh S.B., Jai Kishore and Ekata, “Discrete Structures”, 3rd Edition, Khanna Book Publishing, Delhi, 2017		
3.	Seymour Lipschutz, Marclars Lipson, “Discrete Mathematics”, Tata McGraw Hill.,New Delhi.		
4.	Bernard Kolman, Robert Busby, Sharon C.Ross,” Discrete Mathematical Structures”, Pearson Education, Delhi, 6th Edition, 2015.		
5.	D.S.Malik, “Discrete Mathematical Structures Theory and Applications”, Thomson Publishers, 2004.		
E-Resources			
1.	https://en.wikipedia.org › wiki › Discrete_mathematics		
2.	www.learnerstv.com/Free-engineering-Video-lectures		
3.	www.nptel.ac.in		

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Department	IT,CSE,CST,BME,ECE,EEE					Semester			III / IV																																																																																																																											
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks																																																																																																																														
		L	T	P		C	CA	ESE	Total																																																																																																																											
U23IT302	Data Structures	3	0	0	3	40	60	100																																																																																																																												
Course Objective	The main objective of this course is to:																																																																																																																																			
	- Understand the significance of Data structures and List ADTs. - Learn the concepts and applications of Stacks, Queues - Understand the Tree ADT and types of balancing the tree - Learn the fundamentals of Graph ADT, various Traversal algorithms, Types and finding the Minimum spanning Tree - Learn the different types of Sorting and Searching Techniques and Hashing																																																																																																																																			
	At the end of the course, the student should be able to,										Knowledge level																																																																																																																									
	CO1: Implement List ADT and its types.										K1																																																																																																																									
	CO2: Implement Stack ADT, Queue ADT, Priority Queue and Parsing the Arithmetic Expression in C										K2																																																																																																																									
	CO3: Implement Tree ADT, Binary search tree, AVL and Splay tree in C										K3																																																																																																																									
Course Outcome	CO4: Develop C Programs to Implement the concept of Topological ordering and Minimum spanning Tree of a Graph ADT										K4																																																																																																																									
	CO5: Implement various sorting and searching algorithms in C										K4																																																																																																																									
	Pre-requisites																																																																																																																																			
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<table><tr><th colspan="13">CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes (POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 5</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr></table>														CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													CO/PSO Mapping		COs	Programme Outcomes (POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	3	3	3	3	2	1				2	2	3	3	CO 2	3	3	3	3	3	2	1				2	2	3	3	CO 3	3	3	3	3	3	2	1				2	2	3	3	CO 4	3	3	3	3	3	2	1				2	2	3	3	CO 5	3	3	3	3	3	2	1				2	2	3	3
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													CO/PSO Mapping																																																																																																																							
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2																																																																																																																						
CO 1	3	3	3	3	3	2	1				2	2	3	3																																																																																																																						
CO 2	3	3	3	3	3	2	1				2	2	3	3																																																																																																																						
CO 3	3	3	3	3	3	2	1				2	2	3	3																																																																																																																						
CO 4	3	3	3	3	3	2	1				2	2	3	3																																																																																																																						
CO 5	3	3	3	3	3	2	1				2	2	3	3																																																																																																																						
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Indirect																																																																																																																																				
1. Course - end survey																																																																																																																																				

Content of the syllabus			
Unit – I	INTRODUCTION	Periods	9
Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Doubly-linked lists - Circularly linked lists – Applications of lists – Polynomial ADT.			
Unit - II	STACKS, QUEUES AND DEQUEUES	Periods	9
Stack ADT – Array based implementation – List based implementation – Balancing Symbols – Evaluating arithmetic expressions - Infix to Postfix conversion – Queue ADT – Array based implementation – List based implementation – Circular Queue ADT – Priority Queue- Double Ended Queue.			
Unit – III	TREES	Periods	9
Tree ADT –Binary Trees – Binary Search Tree - Tree- Traversal Algorithms -Search Trees : AVL Tree – Splay Tree- Balancing Tree- B+.			
Unit - IV	GRAPHS	Periods	9
Graph ADT –Types of Graphs – Graph Traversals – Topological Ordering – Dijkstra’s Algorithm – Minimum Spanning Tree – Prims Algorithm – Kruskal’s Algorithm.			
Unit – V	SORTING, SEARCHING AND HASHING	Periods	9
Types of Sorting - Bubble Sort – Selection Sort – Insertion Sort – Shell Sort – Quick Sort – Radix Sort – Merge Sort- Linear Search – Binary Search- Heap Search -. Hashing – Open Addressing – Separate Chaining –Hash Functions.			
Total Periods			45
Text Books:			
1.	Reema Thareja ,” Data structure using c “,Oxford University Press , Second Edition ,2023.		
2.	Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Pearson India , Second Edition ,2002.		
REFERENCE BOOKS:			
1.	Charles E. Leiserson, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein ,”Introduction to Algorithms “, Fourth Edition , MIT Press , 2022.		
2.	Narasimha Karumanchi - Data structures and algorithms made easy, 1 st Edition ,2016.		
3.	R. Venkatesan and S. Lovelyn Rose,”Data Structures “,2nd Edition, Wiley Publications,2019.		
4.	Robert Sedgewick and Kevin Wayne, “Algorithms”,4 th Edition, Addison-Wesley, 2011.		
5.	Peter Brass, “Advanced Data Structures”, 1 st Edition, Cambridge,2008.		
E-Resources:			
1.	https://www.javatpoint.com/data-structure-tutorial		
2.	https://www.geeksforgeeks.org/data-structures		
3.	https://www.udemy.com/course/data-structures-and-algorithms-deep-dive-using-java		
4.	https://dl.ebooksworld.ir/books/Introduction.to.Algorithms.4th.Leiserson.Stein.Rivest.Cormen.MIT.Press.9780262046305.EBooksWorld.ir.pdf		

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Programme		B.E/B.Tech.		Programme Code						Regulation		2023	
Department		CSE , IT & CST						Semester		III / IV			
Course Code		Course Name				Periods Per Week			Credit	Maximum Marks			
						L	T	P	C	CA	ESE	Total	
U23IT404		Database Management Systems				3	0	0	3	40	60	100	
Course Objective		The Main Objective of the course is to, • Learn the fundamentals of data models, relational algebra and SQL • Understand a database system using ER diagrams and to learn normalization techniques • Understand the fundamental concepts of transaction, concurrency control and recovery • Analyze how the internal storage structures using different file and indexing techniques which will help in physical DB design • Learn the concepts of Distributed databases, Database Security and NoSQL											
Course Outcome		At the end of the course, the student should be able to,										KL	
		CO1: Construct SQL Queries using relational algebra										K1	
		CO2: Design database using ER model and normalize the database										K3	
		CO3: Understand how to handle transactions and maintain consistency of the database										K2	
		CO4: Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database										K2	
		CO5: Understand the concepts of Distributed databases, Database Security and NoSQL										K2	
Pre-requisites		-											

CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	2	2	2								3	2
CO 2	3	2	2	1	2								3	2
CO 3	3	2	2	2	2								3	2
CO 4	3	2	2	1	2								3	2
CO 5	3	2	2	1	2								3	2

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End Semester Examination	
Indirect	
1. Course - end survey	

Content of the syllabus			
Unit – I	Relational Databases	Periods	10
Purpose of Database System – Views of data – Data Models – Database System Architecture – Relational Algebra Introduction to relational databases – Relational Model – Keys – Entity-Relationship model -SQL fundamentals – DML - DDL – DCL – TCL – DQL - Procedures, Functions, Triggers and Views			
Unit – II	Database Design	Periods	8
E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Join Dependencies and fifth Normal Form			
Unit – III	Transactions	Periods	9
Transaction Concepts – ACID Properties – Schedules – Serializability - Need for Concurrency – Concurrency control –Two Phase Locking- Timestamp – Multiversion – Validation and Snapshot isolation – Multiple Granularity locking – Deadlock Handling – Recovery Concepts – Shadow Paging – ARIES Algorithm			
Unit – IV	Implementation Techniques	Periods	9
RAID – File Organization – Organization of Records in Files – Data Dictionary Storage – Column Oriented Storage– Indexing and Hashing – Ordered Indices -Static Hashing – Dynamic Hashing – Query Optimization – Cost Estimation			
Unit – V	Advanced Topics	Periods	9
Distributed Databases: Architecture - Data Storage - Transaction Processing- Query processing – Database Security: Authentication – Authorization and Access Control – SQL Injection - Introduction to NoSQL: CAP Theorem – Sharding - MongoDB Implementation			
Total Periods			45
TEXT BOOKS:			
1.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, 7 th Edition, McGraw Hill, 2021.		
2.	M. Tamer Özsu Patrick Valduriez, “Principles of Distributed Database Systems“ , 4 th Edition, Springer , 2020.		
3.	Michael Kaufmann, SQL and NoSQL Databases: Modeling, Languages, Security and Architectures for Big Data Management,2 nd Edition ,Springer 2023.		
REFERENCE BOOKS:			
1.	C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, 8 th Edition, Pearson Education, 2006.		
2.	Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, 7th Edition, Pearson Education, 2017		
E-RESOURCES:			
1.	https://www.geeksforgeeks.org/		
2.	https://archive.nptel.ac.in/courses/106/105/106105175/		
3.	https://www.khoury.northeastern.edu/home/kathleen/classes/cs3200/20-NoSQLMongoDB.pdf		

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Programme	B.E. /B.Tech.					Programme code			Regulation			2023																																																																																																																											
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Course code	Course name					Periods per week			Credit		Maximum Marks																																																																																																																												
						L	T	P	C	CA	ESE	Total																																																																																																																											
U23CS305	Computer Organization and Architecture					3	0	0	3	40	60	100																																																																																																																											
Course Objective	The student should be made to,																																																																																																																																						
	• Discuss the basic concepts and structure of computers																																																																																																																																						
	• Understand concepts of computer processing units and addressing modes																																																																																																																																						
	• Know the logic and arithmetic operations																																																																																																																																						
	• Explain different types of I/O and memory organization.																																																																																																																																						
Course Outcome	• know about the Parallelism concepts in Programming																																																																																																																																						
	At the end of the course, the students will be able to,													KL																																																																																																																									
	CO1: Examine various concepts of basics of computer organization and architecture													K2																																																																																																																									
	CO2: Identify the difference between RISC and CISC architectures													K2																																																																																																																									
	CO3: Demonstrate various arithmetic operations													K3																																																																																																																									
	CO4: Analyze the various performance measures for memory and I/O organization													K3																																																																																																																									
Pre-requisites	CO5: Interpret performance of different pipelined processors and multi core architectures.													K3																																																																																																																									
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Unit - I		BASIC STRUCTURE OF COMPUTERS										Periods		9																																																																																																																									
Digital Computers: Definition of Computer Organization - Computer Design and Computer Architecture - Bus and memory transfers. Basic Computer Organization and Design: Instruction codes- Computer Registers - Computer instructions - Timing and Control - Instruction cycle - Memory Reference Instructions- Input – Output and Interrupt.																																																																																																																																							

Unit – II	BASIC PROCESSING UNIT	Periods	9
Central Processing Unit: General Register Organization - Instruction Formats-Addressing modes- Data Transfer and Manipulation - Program Control			
Reduced Instruction Set Computer: CISC Characteristics -RISC Characteristics			
Unit – III	ARITHMETIC FOR COMPUTERS	Periods	9
Signed and Unsigned number representations - Arithmetic operations: Addition and Subtraction – Fast Adders – Binary Multiplication – Booth algorithm-Binary Division – Floating Point Numbers – Representation and operations: Arithmetic Micro operations- logic micro operations- shift micro operations- Arithmetic logic shift unit.			
Unit – IV	I/O AND MEMORY ORGANIZATION	Periods	9
Input-Output Organization: Input-Output Interface- Asynchronous data transfer- Modes of Transfer- Priority Interrupt - Direct memory Access.			
Memory Organization: Memory Hierarchy -Main Memory - Auxiliary memory - Associate Memory- Cache Memory.			
Unit - V	PIPELINING AND MULTI CORE ARCHITECTURE	Periods	9
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.			
Multi core architecture: Introduction to Multi-core Processors- Multi-core Processor Architecture- Multi-core Processor Machines - Applications of using Multi-core Processors			
Total Periods			45
Text Books			
1.	M. Morris Mano and Rajib Mall, “Computer System Architecture”, Pearson Education, Revised third edition, 2017		
2.	Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, McGraw Hill Education, 2017.		
References			
1.	William Stallings, “Computer Organization and Architecture – Designing for Performance”, 10 th Edition Pearson Education, 2022.		
2.	John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier Publishers, 6 th Edition, 2017.		
3.	John P. Hayes, “Computer Architecture and Organization”, Third Edition, McGraw Hill, 2017		
4.	V.P. Heuring, H.F. Jordan, “Computer Systems Design and Architecture”, Second Edition, Pearson Education, 2003.		
5.	Shyamala Devi M, “Multi-Core Architectures and Programming”, Vijay Nicole Imprints, 2018.		
E-Resources			
1.	https://www.javatpoint.com/computer-organization-and-architecture-tutorial		
2.	https://www.studytonight.com/computer-architecture/memory-organization		
3.	http://home.ustc.edu.cn/~louwenqi/reference_books_tools/Computer%20Organization%20and%20Architecture%2010th%20-%20William%20Stallings.pdf		
4.	https://medium.com/@adityasinghz/multi-core-processor-architecture-7580bc347042		
5.	https://www.mbit.edu.in/wp-content/uploads/2020/05/computer-systems-Architecture.pdf		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205													
Programme		B.E.				Programme code						Regulation		2023	
Department		Computer Science and Engineering						Semester				III			
Course Code		Course Name				Periods per week			Credit		Maximum Marks				
						L	T	P	C	CA	ESE	Total			
U23CTCP1		Verbal, Quantitative Aptitude and Reasoning - I				2	0	0	1	40	60	100			
Course Objective		The student should be made to, - Identify and begin to apply the language features - Understand the mathematical techniques for solving the real life problems - Use number theory arguments to justify relationships involving divisors, multiples and factoring - Help in preparation of competitive exams													
Course Outcome		At the end of the course, the student should be able to,												Knowledge Level	
		CO1: Use language through acquisition of grammar rules												K2	
		CO2: Demonstrate the use of mathematical reasoning by justifying the patterns and relationships												K2	
		CO3: Face external competitive exams												K3	
		CO4: Solve a question in a fraction of minute using shortcut methods												K3	
		CO5: Enhance their problem solving skills and logical Skills												K4	
Pre-Requisites															
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak														CO/PSO Mapping	
COs		Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1			2		3	2				3		3	1	1	
CO 2		3	3		2	2				3		3	2	2	
CO 3		3	3		3	2				3		3	3	1	
CO 4		3	3		2	3				2		2	3	1	
CO 5			2		2	2				2		2	3	3	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III															
2. Assignment/Quiz															
3. End-Semester Examination															
Indirect															
1.Course - end survey															
Content of the syllabus															
Unit -I		VERBAL ABILITY (ERROR SPOTTING)										Periods		5	
CONJUNCTIONS: Error on coordinative conjunction: The seven coordinating conjunctions are (fan boys): for, and, nor, but, or, yet, so, Errors on Subordinate Conjunction After, although, as soon as, because, before, by the time, in case, now that, since, unless, when, whether or not, while, yet...., Errors on correlative conjunction (Either.....or, neither.....nor, not only.... but also, as....as, both....and, whether.... or, so...as, such...that, the)															

CONDITIONAL CLAUSES: Errors on Zero condition, Errors on first condition of If clauses, Errors on second condition of If clauses, Errors on third condition of If clauses			
ADVERBS: Errors on conjunctive adverb, Errors on adverbs of frequency, Errors on adverbs of time, Errors on adverbs of manner, Errors on adverbs of place, Errors on adverbs of degree			
ADJECTIVES: Errors on descriptive adjectives, Errors on demonstration adjectives, Errors on distributive adjectives, Errors on interrogative adjectives, Errors on numeral, Errors on quantitative adjectives, Errors on proper adjectives, Errors on possessive adjectives			
DETERMINERS: Definite Article, Indefinite Article, Quantifying Article – few, many, Possessive Article, (my, your, his, her, its, our, your, their....)			
NOUNS: Pronoun, Common Noun, Collective Noun, Abstract Noun, Material Noun			
SUBJECT – VERB AGREEMENT: Singular Subjects and Singular Verbs, Errors on plural subjects with plural verbs, Errors on indefinite pronouns, Errors on compound subjects, Errors on collective noun, Errors on singular or plural verb			
Unit–II	NUMBER SYSTEMS	Periods	6
NUMBER SYSTEMS (Divisibility Rule, Unit Digit, Remainder Theorem(1 Or -1, Cancellation, Wilson, Fermets), Progressions(Arithmetic, Geometric, Harmonic), Log, Surds And Indices, Simplification)			
Unit – III	AVERAGE AND LCM & HCF PROBLEMS	Periods	8
AVERAGE (Basic Model, Partial Average, 3. Overall Average, Inclusion/Exclusion of A Value in a Group, Increased or Included or Added or More and Replaced, Substituted, Cricket Based Model, Misread Model, Allegation and Mixture, Mean, Median and Mode, Miscellaneous) LCM and HCF (Find The LCM, HCF and Its fractions, Product of Two Numbers Model, LCM, HCF with Remainders Model, Smallest/Largest Based Model, Tolling Together Model, HCF Related Questions (Keyword: Distinct, Divided, Equal Number of Rows (Distributed Equally)), Mensuration Related Questions, No. of Pairs Model, LCM, HCF With Ratios Model, Algebraic Expressions Model, Reduce To Lowest Terms			
Unit– IV	RATIO AND PROPORTION	Periods	5
RATIO (Zig Zag Model, Finding The Individual Component, Coins & Values Based Ratios, Number Based Ratios, Increment/Decrement Based Ratios, Miscellaneous)- PROPORTION (Continuous, Third, Fourth, Mean)			
Unit-V	LOGICAL REASONING	Periods	6
CODING-DECODING- Types of Coding and Decoding (Letter Coding, Conditional Coding, Crypt arithmetic –Addition, Crypt arithmetic – Subtraction) BLOOD RELATION (Type 1: Pointing or Introducing, Type 2: Family Tree or Relational Puzzle, Type 3: Coded Relation) NUMBER SERIES (Pattern 1: Perfect Square Series, Pattern 2: Perfect Cube Series, Pattern 3: Geometric Series, Pattern 4: Ratio series, Pattern 5: Multi Stage Series) SYLLOGISM (Type 1: BASIC SYLLOGISM, Type 2: Either or Neither nor, Type 3: Only – Only a few)			
Total Periods			30
Text books			
1.	Rajeev Varma, “Fast Track Objective Arithmetics”, Arihant Publications, 2024		
2.	R.S. Aggarwal, “Modern Approach to Logical Reasoning”, S Chand Publishing, 2022		
3.	SP Bakshi, “Objective General English”, Arihant Publications, 2024		
References			
1.	R.S. Aggarwal, “Quantitative Aptitude for Competitive Examinations”, S Chand Publishing, 2013		
2.	Dinesh Khattar, “The Pearson guide to Quantitative Aptitude for Competitive Examinations”, 3 rd edition, 2016		
3.	Arun Sharma, “How to Prepare for Logical reasoning for CAT”, McGraw Hill Education; 2014		
4.	Jaikishan and Premkishan, “How to Crack Test of Reasoning”, Arihant Publications, 2016		
5.	R.S. Agarwal, “A modern Approach to verbal and non-verbal reasoning”, S Chand Publishing, 2018		
E-Resources			
1.	Aptitude: https://www.indiabix.com		
2.	Reasoning: https://placement.freshersworld.com		
3.	Verbal: https://testbook.com		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205												
Programme	B.E. /B.Tech.					Programme code					Regulation		2023	
Department	CSE, IT					Semester					III			
Course code	Course name					Periods per week			Credit		Maximum Marks			
						L	T	P	C	CA	ESE	Total		
U23CS306	Python Programming and Frameworks					3	0	2	4	50	50	100		
Course Objective	The students must be made to - Understand the basic concepts and syntax of Python programming. - Work with Python data types like lists, tuples, sets, and dictionaries, and handle exceptions. - Apply object-oriented programming concepts such as classes, inheritance, and polymorphism. - Perform file handling and database operations using CSV, JSON, and MySQL. - Build simple applications using Python frameworks like Flask, Django, and Pygame.													
Course Outcome	At the end of the course, the student should be able to,											KL		
	CO1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements											K2		
	CO2: Perform operations on list, tuples, sets and Dictionaries using python.											K2		
	CO3: Analyze, design and implement the problems using OOP concepts.											K3		
	CO4: Demonstrate the simple file operations and data manipulation techniques.											K3		
	CO5: Develop basic web applications and games using Python frameworks.											K3		
Pre-requisites	NIL													
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	-	1	-	-	-	-	-	-	2	3	2
CO 2	3	3	1	1	2	-	-	-	-	-	-	2	3	2
CO 3	3	3	1	2	2	-	-	-	-	-	-	2	3	2
CO 4	3	3	1	2	2	-	-	-	-	-	-	2	3	2
CO 5	3	3	1	2	2	-	-	-	-	-	-	2	3	2
Course Assessment Methods Direct - Continuous Assessment Test I, II & III - Assignments / Seminar/Quiz /Model Lab - End-Semester examinations Indirect - Course –end survey														
Content of the syllabus														
Unit –I		Introduction to Python										Periods		9
Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – Indentation– I/O function –Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.														

Unit-II	Data types and Exception	Periods	9
String : String operation- Lists – List operations and built-in methods- Tuples – Tuples operation – Dictionaries - Dictionaries operation- Sets – Set operations- Exception Handling: Built-in Exceptions – User-defined exception.			
Unit – III	Object Oriented Programming using python	Periods	9
Object-oriented features: Class, Object, Abstraction, Encapsulation, Inheritance, Polymorphism, Overloading and Overriding. Functions: return values, parameters, recursion. Get and Set Attribute Values – Name Mangling –Duck Typing – Relationships			
Unit- IV	Files, Modules and Data Bases	Periods	9
File-Introduction, I/O operations -Reading and Writing in Structured Files-: CSV and JSON. Modules, string module and Packages. Database-Introduction, MySQL installing, Data manipulation using MySQL.			
Unit-V	Python Frameworks	Periods	9
Flask Basics – Flask Routing and Templates – Django: Introduction – Django CRUD Operations – Pygame for 2D Game Development – Socket Programming Basics – Sending Email using SMTP in Python.			
Total Periods			45
Suggested List of Experiments			
List of Experiments			CO's
1. Write a Python program to implement a calculator for addition, subtraction, multiplication, and division using functions and conditional statements.			CO1
2. Implement lambda and if-else to check if a number is odd/even and calculate factorial using loops.			CO1
3. Create a Python program to input student names and marks, store them using appropriate data types, and display the result.			CO2
4. Write a Python program to demonstrate built-in and user-defined exceptions using division and file handling examples.			CO2
5. Write a Python program using class inheritance to calculate the area of different shapes (e.g., circle, rectangle, triangle).			CO3
6. Write a recursive function to calculate x^n (x raised to the power n).			CO3
7. Create a Python script to connect to MySQL and perform Create, Read, Update, and Delete operations on a student table.			CO4
8. Read and write student details into a .csv file and display the contents in a structured format.			CO4
9. Build a simple Flask app with a form to accept student data and display it on another page.			CO5
10. Design a basic 2D game using Pygame with keyboard controls and object movement			CO5
Lecture 45: Practical 30; Total: 75			
Text Books			
1.	Yashwant Kanetkar, Aditya Kanetkar, Let Us Python, BPB Publications, Noida, Fifth Edition ,2023.		
2.	Wesley J.Chun, Core Python Programming, Pearson Education, India, Second Edition, 2017		
3.	Jake Vander Plas, “Python Data Science Handbook Essential Tools for Working with Data”, 1 st Edition, O'Reilly Publishers, 2019 for Units IV,V		
Reference			
1.	Martin C Brown, “Python: The Complete Reference”, 4 th Edition, McGraw Hill Education, 2018		
E-Resources			
1.	https://www.dataquest.io/blog/data-structures-in-python/		
2.	https://docs.python.org/3/library/stdtypes.html		
3.	https://www.geeksforgeeks.org/difference-between-association-and-aggregation/		
4.	https://www.i2tutorials.com/crud-operations-with-mysql-database-using-python/		

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				L	T	P	C	CA		ESE	Total																																																																																																																											
U23IT303		Data Structures Laboratory #		0	0	2	1	60		40	100																																																																																																																											
Course Objective		The Main Objective of the course is to																																																																																																																																				
		- Familiarize the operations on Linear Data Structures and Nonlinear Data Structures - Understand the concepts of various Searching and Sorting Techniques - Understand the basic operations on Search Trees - Known to the basics of various graph Traversal methods.																																																																																																																																				
		At the end of the course, the student should be able to,											KL																																																																																																																									
		CO1: Implement List based and Array based Linear and Nonlinear Data Structures											K3																																																																																																																									
		CO2: Implement Stack ADT, Queue ADT, and Parsing the Arithmetic Expression in C											K3																																																																																																																									
Course Outcome		CO3: Suggest appropriate Search Tree for solving a given problem											K4																																																																																																																									
		CO4: Appropriately use the various graph Traversal for a given problem											K4																																																																																																																									
		CO5: Implement various sorting and searching algorithms in C.											K3																																																																																																																									
Pre-requisites		-																																																																																																																																				
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1.Course - end survey																																																																																																																																						

Suggested List of Experiments		CO's
1. Consider a scenario where a firm wants to maintain the data of its employees. The data containing employee number, name, and salary and department are saved in a singly linked list. Create following functions for the employee list. i. Insert at Front: Insertion of a record at the front. ii. Insert at End: Insertion of a record at the end. iii. Delete First: Deletion of first record. iv. Delete Last: Deletion of last record. v. Search: Searching any record based on employee number and dept no. vi. Display: Displaying all records.		CO1
2. Write a C program to add two polynomials using Linked List.		CO1
3. Write a C program to implement different operations on Stack and Queue using Arrays.		CO2
4. Write a C program that implements push(), pop(), display(), isEmpty() and peek() functions of Stack using Linked List.		CO2
5. Write a C program that implements enqueue(), dequeue(), size(), isEmpty() and display() functions of Queue using Linked List.		CO2
6. Write a C program to convert an Infix expression : $a + b * c + (d * e + f) * g$ into the Postfix expression.		CO2
Write a C program to perform the following BST Operations - Creating node, insertion, in-order traversal and pre-order traversal.		CO3
8. Write a C program which results the implementation of Insertion, Deletion and Search operations in AVL Tree.		CO3
9. Write a C program to perform Depth First Search and Breadth First Search traversal on a graph.		CO4
10. Write a C program for constructing a minimum cost spanning tree of a graph using Prim's Algorithm.		CO4
11. Write a C program to Search an element using Linear Search process and Sort given elements using Insertion sort.		CO5
12. Write a C program to implement Linear Probing and Separate Chaining Collision resolution technique.		CO5
Total Periods		45
E-Resources:		
1.	https://www.programiz.com/c-programming	
2.	https://www.cprogramming.com/	
3.	https://beginnersbook.com/2015/02/simple-c-programs/	
Tools / Software Required:		
1.	Codetandra / HackerRank / HackerEarth / Any online Problem Solving Platforms	

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205																																																																																																																																		
Programme		B.E./ B.Tech.		Programme Code				Regulation		2023																																																																																																																										
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Course Code		Course Name		Periods Per Week			Credit	Maximum Marks																																																																																																																												
				L	T	P	C	CA	ESE	Total																																																																																																																										
U23IT406		Database Management Systems Laboratory		0	0	2	1	60	40	100																																																																																																																										
Course Objective		The student should be made to, • Learn and implement important commands in SQL. • Learn the usage of nested and joint queries. • Understand functions, procedures and procedural extensions of databases. • Understand design and implementation of typical database applications. • Familiar with the use of a front end tool for GUI based application development.																																																																																																																																		
Course Outcome		At the end of the course, the student should be able to,									KL																																																																																																																									
		CO1: Create databases with different types of key constraints.									K3																																																																																																																									
		CO2: Construct simple and complex SQL queries using DML and DCL commands.									K4																																																																																																																									
		CO3: Use advanced features such as stored procedures and triggers and incorporate in GUI based application development									K4																																																																																																																									
		CO4: Create and manipulate data using NoSQL database									K3																																																																																																																									
Pre-requisites		-																																																																																																																																		
<table><tr><th colspan="13">CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">Cos</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td></td><td>3</td><td>2</td></tr><tr><td>CO 2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td></td><td>1</td><td>1</td></tr><tr><td>CO 3</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td></td><td>3</td><td>1</td></tr><tr><td>CO 4</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td></td><td>1</td><td>1</td></tr><tr><td>CO 5</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>1</td><td></td><td>2</td><td>2</td></tr></table>														CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													CO/PSO Mapping		Cos	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	3	3	3	2					2	1		3	2	CO 2	3	3	3	3	2					2	1		1	1	CO 3	3	2	2	3	2					2	1		3	1	CO 4	2	2	2	2	2					2	1		1	1	CO 5	3	3	2	2	2					2	1		2	2
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CO 1	3	3	3	3	2					2	1		3	2																																																																																																																						
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CO 3	3	2	2	3	2					2	1		3	1																																																																																																																						
CO 4	2	2	2	2	2					2	1		1	1																																																																																																																						
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1. Course - end survey																																																																																																																																				
Suggested List of Experiments												CO's																																																																																																																								
1.	Create a table called Employee with the following structure.												CO1																																																																																																																							
	Name		Type																																																																																																																																	
	Empno		Number																																																																																																																																	
	Ename		Varchar2(10)																																																																																																																																	
	Job		Varchar2(10)																																																																																																																																	
	Mgr		Number																																																																																																																																	

	a. Add a column commission with domain to the Employee table. b. Insert any five records into the table. c. Update the column details of job d. Rename the column of Employ table using alter command. Delete the employee whose Empno is 105.																																				
2.	a. Create a user and grant all permissions to the user. b. Insert the any three records in the employee table and use rollback. Check the result. c. Add primary key constraint and not null constraint to the employee table. d. Insert null values to the employee table and verify the result.	CO1																																			
3.	Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.	CO2																																			
4.	Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display thesalary difference between the old values and new values: <table><tr><th>ID</th><th>NAME</th><th>AGE</th><th>ADDRESS</th><th>SALARY</th></tr><tr><td>1</td><td>Alive</td><td>24</td><td>Khammam</td><td>2000</td></tr><tr><td>2</td><td>Bob</td><td>27</td><td>Kadappa</td><td>3000</td></tr><tr><td>3</td><td>Catri</td><td>25</td><td>Guntur</td><td>4000</td></tr><tr><td>4</td><td>Dena</td><td>28</td><td>Hyderabad</td><td>5000</td></tr><tr><td>5</td><td>Eeshwar</td><td>27</td><td>Kurnool</td><td>6000</td></tr><tr><td>6</td><td>Farooq</td><td>28</td><td>Nellur</td><td>7000</td></tr></table>	ID	NAME	AGE	ADDRESS	SALARY	1	Alive	24	Khammam	2000	2	Bob	27	Kadappa	3000	3	Catri	25	Guntur	4000	4	Dena	28	Hyderabad	5000	5	Eeshwar	27	Kurnool	6000	6	Farooq	28	Nellur	7000	CO2
ID	NAME	AGE	ADDRESS	SALARY																																	
1	Alive	24	Khammam	2000																																	
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6	Farooq	28	Nellur	7000																																	
5.	Write user defined functions and stored procedures in SQL.	CO3																																			
6.	Execute complex transactions and realize DCL and TCL commands.	CO3																																			
7.	Create Document, column and graph based data using NoSQL database tools.	CO4																																			
8.	Case Study using any of the real life database applications from the following list 1)Inventory Management for a EMart Grocery Shop 2) Society Financial Management 3) Cop Friendly App – E-seva 4) Property Management – e-Mall 5) Star Small and Medium Banking and Finance i) Build Entity Model diagram. The diagram should align with thebusiness and functional goals stated in the application. Apply Normalization rules in designing the tables in scope. ii) Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features. iii) Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer. iv) Ability to showcase ACID Properties with sample queries with appropriate settings	CO5																																			
Total Periods		30																																			
E-RESOURCES																																					
	https://www.javatpoint.com/																																				
	https://www.geeksforgeeks.org/																																				

Content of the Syllabus			
	S. No.	List of Experiments	CO
	1.	Rosenberg's and Hare's Self Esteem tool	CO1
	2.	Myers Brigg's 16 types of Personality	CO1
	3.	Social Functioning scale	CO3
	4.	Huebner, Laughlin, Ash, & Gilman's Multidimensional Students Life Satisfaction Scale	CO3
	5.	Body language Assessment	CO2
	6.	Fleming's VARK Learning Theory, bloom's taxonomy based on learners' queries	CO2
	7.	Alexi's Presentation Secrets Assessment	CO2
	8.	Deductive and inductive logical reasoning assessment	CO4
	9.	Procter and Gamble Assessment Gamified Tests	CO4
	10.	Psychometric Test	CO3
	11.	Stress buster Assessment	CO5
Total Periods : 30			
References			
1. Allan Pease, "Body language – how to read other's thoughts by their gestures", Sheldon press, London publication, Tenth Impression 1988			
2. Alexei Kapterev, "Presentation Secrets", John Wiley and Sons, 2011			
E-Resources			
1. https://scales.arabpsychology.com			
2. http://DOMWebserver.Hitchcock.org/mbti/			
3. https://www.assessmentday.com/free/deductive-reasoning-1/DeductiveFreeTest-Solutions.pdf			
4. www.prepinsta.com			

Semester - IV

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme	B.E	Programme Code			101	Regulation		2023							
Department	COMPUTER SCIENCE AND ENGINEERING				Semester		IV								
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks									
		L	T	P	C	CA	ESE	Total							
U23MA405	Probability and Statistics	3	1	0	4	40	60	100							
Course Objective	The main objective of the course is to														
	- Proficiently understand the expected value, variance, and higher-order moments of random variables (for both discrete and continuous types). - Analyze and interpret statistical data using appropriate probability distribution - Identify testing of hypothesis for all size of samples. - Acquaint the knowledge of analysis of variance, this plays an important role in real life problems. - Introduce the basic concepts of statistical quality control.														
Course Outcome	At the end of the course, the student should be able to,							Knowledge level							
	CO1: Translate the density and distribution functions for discrete and continuous variables.							K3							
	CO2: Enable to identify various probability distributions.							K3							
	CO3: Ability to test the hypothesis using suitable statistical test.							K5							
	CO4: Apply the basic concepts of classifications of design of experiments in the field of agriculture and computer science.							K4							
	CO5: Have the notion of sampling distributions and statistical techniques used in engineering and management problems.							K5							
Pre-requisites		-													
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping			
COs	Programme Outcomes (POs)											PSOs			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	1		1								2	1	
CO 2	3	2	1	1									2	1	
CO 3	3	2	1		1								2	1	
CO 4	3	2		1									2	1	
CO 5	3	2	1	1	1								2	1	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III															
2. Assignment															
3. End-Semester examinations															
Indirect															
1. Course - end survey															
Content of the syllabus															
Unit – I		INTRODUCTION TO PROBABILITY					Periods		9+3						
Introduction to Probability, Axioms of Probability: Sample spaces and events, axioms of Probability, sample spaces having equally likely outcomes – Conditional Probability and independence- Baye’s theorem (without proof) and its applications.															

Unit - II	RANDOM VARIABLES AND SPECIAL DISTRIBUTIONS	Periods	9+3
Random variables-Probability mass function- Probability generating function-moments-moment generating functions. Special discrete and continuous distributions: Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.			
Unit – III	TESTING OF HYPOTHESIS	Periods	9+3
Basic Definitions – Testing of Hypothesis: Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Test for Independence of Attributes & Goodness of Fit.			
Unit - IV	DESIGN OF EXPERIMENTS	Periods	9+3
One way and two way classifications - Completely Randomized design – Randomized block design – Latin square design – 2 ² factorial design.			
Unit – V	STATISTICAL QUALITY CONTROL	Periods	9+3
Control charts for measurements ($\bar{X}$ and R charts)- Control charts for attributes (p,c and np charts) – Tolerance limits – Acceptance sampling.			
Total Periods			45+15=60
Text Books			
1.	Montgomery, D.C. and Runger, C.G., Applied Statistics and Probability for Engineers, 7 th Edition, Wiley Students Edition, Wiley, 2020.		
2.	Ravichandran, J., Probability and statistics for Engineers, 1 st Edition, Wiley India Ltd, 2012.		
References			
1.	Gupta S.C. and Kapoor V.K, Fundamentals of Mathematical Statistics, 12th Edition, Sultan an Sons, 2020.		
2.	Devore, J.L., Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage Learning, 2014.		
3.	Johnson, R.A., Miller, I. and Freund, J., Miller & Freund's Probability and Statistics for Engineers 9th Edition, Pearson Education, 2016.		
4.	Ronald E.Walpole; Raymond H.M.yers; Stiaron L. Myers,"Probability and Statistics for Engineering and the Scientists",Pearson Publishers, 9th Edition,2010.		
5.	Ross, S.M., “Introduction to Probability and Statistics for Engineers and Scientists”, 5th Edition, Elsevier, 2004.		
E-Resources			
1.	https://online.stanford.edu		
2.	www.learnerstv.com/Free-engineering-Video-lectures		
3.	www.nptel.ac.in		

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Programme		B.E.				Programme code				Regulation				2023	
Department		CSE				Semester				IV					
Course code		Course name				Periods per week			Credit		Maximum Marks				
						L	T	P	C	CA	ESE	Total			
U23CS407		Theory of Computation				3	0	0	3	40	60	100			
Course Objective		The student should be made to, • understand foundations of computation including automata theory • construct models of regular expressions and languages. • design context free grammar and push down automata • understand Turing machines and their capability • understand Undecidability and NP class problems													
Course Outcome		At the end of the course, the students will be able to,											KL		
		CO1: Construct Automata for the given language											K1		
		CO2: Write Regular Expression for the given language											K3		
		CO3: Describe the Pushdown Automata and pumping lemma for CFL											K3		
		CO4: Design normal forms and Turing machines for the given problem											K5		
		CO5: Find whether the given problem is decidable or not and NP class problems											K4		
Pre-requisites															
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	
CO 1	3	2	3	3	2	3					3	3	3	3	
CO 2	3	2	3	3	2	3					3	3	3	3	
CO 3	3	2	2	2	2	3					3	3	3	2	
CO 4	3	3	2	2	2	3					3	3	3	2	
CO 5	3	3	2	2	3	2					2	2	2	2	
Course Assessment Methods Direct 1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examination Indirect 1. Course - end survey															
Content of the syllabus															
Unit - I		FINITE AUTOMATA										Periods		9	
Introduction- Basic Mathematical Notation and techniques- Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA – Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ϵ -moves-Conversion of NFA into DFA.															

Unit – II	REGULAR EXPRESSIONS AND LANGUAGES	Periods	9
Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions --Kleene's Theorem. Closure properties of regular languages. Criterion for Regularity- Minimal Finite Automata-Pumping Lemma for Regular Languages— Problems based on Pumping Lemma			
Unit – III	CONTEXT-FREE GRAMMAR AND PUSH-DOWN AUTOMATA	Periods	9
Types of Grammar – Chomsky's hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees-Simplification of Context-free Grammar – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG– Pumping Lemma for CFL-Deterministic Pushdown Automata			
Unit – IV	NORMAL FORMS AND TURING MACHINES	Periods	9
Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) -Turing Machines – Language of a Turing Machine – Turing Machine as a Computing Device - Techniques for TM-Multi head and Multi Tape Turing Machines-The Halting problem– Problems about Turing machine			
Unit - V	UNDECIDABILITY	Periods	9
Non Recursive Enumerable (RE) Language – An Undecidable Problem with RE – Undecidable Problems about Turing Machine – Rice Theorem for Recursive and Recursively Enumerable Languages – Post's Correspondence Problem (PCP) – Modified Post Correspondence Problem-The Class P and NP.			
Total Periods			45
Text Books			
1.	John C. Martin “Introduction to languages and the theory of computation”, Third edition, Mc Graw Hil, 2015		
2.	John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman, “Introduction to Automata Theory, Languages and Computation”, Third Edition, Pearson, 2013.		
References			
1.	Michael Sipser, “Introduction to Theory of Computation”, Third Edition, Cengage learning, 2013		
			
E-Resources			
1.	https://neuraldump.net/2017/11/nfa-and-dfa-equivalence-theorem-proof-and-example/		
2.	https://www.javatpoint.com/automata-greibach-normal-form		
3.	https://ocw.mit.edu/courses/18-404j-theory-of-computation-fall-2020/resources/pushdown-automata-cfg-2194-pda/		
4.	https://web.stanford.edu/class/archive/cs/cs103/cs103.1134/lectures/20/Small20.pdf		



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205



Programme	B.E. /B.Tech.	Programme code			Regulation			2023							
Department	CSE & IT				Semester				IV						
Course code	Course name	Periods per week			Credit		Maximum Marks								
		L	T	P	C	CA	ESE	Total							
U23CS408	Design and Analysis of Algorithms	3	0	0	3	40	60	100							
Course Objective	The student should be made to, - Analyze the asymptotic performance of algorithms. - Apply the concept of Divide and conquer and greedy algorithms - Demonstrate a familiarity of Dynamic Programming. - Apply important concept of Backtracking. - Synthesize efficient algorithms for NP Problems														
Course Outcome	At the end of the course, the student should be able to,							KL							
	CO1: Analysis algorithm techniques and analyze asymptotic runtime complexity of algorithms.							K2							
	CO2: Apply the algorithms and design techniques to solve problems using divide and conquer and Greedy algorithm.							K3							
	CO3: Understand and design algorithms using dynamic programming							K3							
	CO4: Apply concepts of Back tracking							K4							
	CO5: Synthesize efficient algorithms for NP problems							K4							
Pre-requisites	-														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping			
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CO 2	2	2	2	3									2	2	
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3. End-Semester examination															
Indirect															
1. Course - end survey															
Content of the syllabus															
Unit - I	ALGORITHM ANALYSIS AND RECURRENCE EQUATION											Periods	9		
Models of computation- algorithm analysis- time and space complexity- average and worst case analysis- lower bounds- Recurrence Equations-Solving recurrence equations – Analysis of linear search.															

Unit – II	DIVIDE AND CONQUER & GREEDY ALGORITHMS	Periods	9
Divide And Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort.- Quick sort. Greedy Algorithms: Prim’s algorithm - Kruskal’s Algorithm - Dijkstra’s Algorithm– Knapsack Problem – Huffman trees and codes			
Unit – III	DYNAMIC PROGRAMMING	Periods	9
General Method – Multistage Graphs – Warshall’s and Floyd’s algorithm – Optimal binary search trees – 0/1 Knapsack – Traveling salesperson problem.			
Unit – IV	BACKTRACKING & BRANCH AND BOUND	Periods	9
n - Queens problem – Subset Sum Problem – graph coloring - Hamiltonian Circuit problem – knapsack problem. Branch and Bound: LIFO and FIFO search – assignment problem			
Unit - V	PROBLEM CLASSES	Periods	9
NP-Completeness: Polynomial Time, Polynomial-time verification, NP Completeness and reducibility, NP - Completeness Proofs, NP Complete Problems.			
Total Periods			45
Text Books			
1.	T.H.Cormen, C.E.Leiserson, R.L.Rivest, C.Stein, –Introduction to Algorithms, 4 th Edition, Prentice- Hall India, 2022.		
2.	Anany Levitin, “Introduction to the Design and Analysis of Algorithms, 3rd Edition, Pearson Education, 2017		
References			
1.	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms 2nd Edition, 2008.		
2.	J. Kleinberg and E. Tardos, –Algorithm Design, Pearson International Edition, 2005.		
E-Resources			
1.	https://edutechlearners.com/download/Introduction_to_algorithms-3rd%20Edition.pdf		
2.	http://www.cs.sjtu.edu.cn/~jiangli/teaching/CS222/files/materials/Algorithm%20Design.pdf		
3.	www.nptel.ac.in		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205													
Programme	B.E.				Programme code			101		Regulation		2023			
Department	Computer Science and Engineering							Semester			IV				
Course code	Course name				Periods per week			Credit		Maximum Marks					
					L	T	P	C	CA	ESE	Total				
U23CS409	Web technology				3	0	0	3	40	60	100				
Course Objective	The student should be made to, - Describe the various steps in designing a creative and dynamic website. - Create web pages using html, JavaScript, CSS and PHP. - Design dynamic and interactive web pages by embedding Script code such as NodeJS														
Course Outcome	At the end of the course, the student should be able to,												KL		
	CO1: Develop a static webpage by the use of HTML.												K3		
	CO2: Design a well formed web page using CSS & basics of bootstrap												K3		
	CO3: Implement client side scripting using JavaScript												K3		
	CO4: Develop PHP application for implementing session management and database connectivity.												K3		
	CO5: Develop application using frontend framework NodeJS and backend framework with Mongo DB												K3		
Pre-requisites															
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2–Medium, 1 -Weak														CO/PSO Mapping	
COs	Programme Outcomes(POs)											PSOs			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO1	PSO2		
CO 1	3	2	3		3							2	3		
CO 2	3		3	2	3							2	3		
CO 3	3		3		3							2	2		
CO 4	3		3	2	3							2	2		
CO 5	3		3		2							2	3		
Course Assessment Methods Direct 1. Continuous Assessment Test I, II&III 2. Assignments / Seminar/Quiz 3. End-Semester examinations Indirect 1.Course -end survey															
Content of the syllabus															
Unit -I	HYPER TEXT MARKUP LANGUAGE											Periods	9		
The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers. Markup Languages: HTML- An Introduction to HTML History-Versions-Basic HTML Syntax and Semantics- Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms- Creating HTML Documents.															

Unit-II	CSS & BOOTSTRAP	Periods	9
Introduction to Cascading Style Sheets-inline style-embedded style sheets-conflicting style-linking external style sheets-positioning elements- Selectors - Backgrounds and Borders-box model and text effects, bootstrap Introduction-bootstrap components-layouts-form-navigation-utilities			
Unit – III	CLIENT-SIDE SCRIPTING	Periods	9
JavaScript Introduction -Syntax-Variables and Data Types-Statements-Operators- Literals-Functions – Arrays, Built-in Objects, DOM- adding HTML elements, deleting HTML elements -Modifying Element Properties, Event handling: on change, on mouse over, on mouse out.			
Unit- IV	SERVER SIDE SCRIPTING - PHP	Periods	9
Introduction to PHP – Operators – Conditionals – Looping – Functions – Arrays- Date and Time Functions – String functions - File Handling - File Uploading – Email Basics - Email with attachments. Sessions-Cookies-MySQL Basics – Querying single and multiple MySQL Databases with PHP – PHP Data Objects.			
Unit-V	APPLICATION DEVELOPMENT USING NODE JS	Periods	9
Introduction to Node.js- Installing Node.js - Using Events, Listeners, Timers, and Callbacks in Node.js – Introduction to Mongo DB- Accessing MongoDB from Node.js			
Total Periods			45
Text Books			
1.	Brad Dayley, Brendan Dayley, and Caleb Dayley , Node.js, MongoDB and Angular Web Development: The definitive guide to using the MEAN stack to build web applications, 2 nd Edition, Pearson Education, 2018		
2.	Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of India, 2014.		
References			
1.	Deitel and Deitel and Nieto, “Internet and World Wide Web - How to Program”, Prentice Hall, 5th Edition, 2011.		
E-Resources			
1.	https://www.w3schools.com/html/		
2.	https://www.geeksforgeeks.org/html-tutorial/		
3.	https://www.w3schools.com/bootstrap5/bootstrap_spinners.php		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205												
Programme		B.E.				Programme code		101		Regulation		2023		
Department		CSE						Semester			IV			
Course code		Course name				Periods per week			Credit	Maximum Marks				
						L	T	P	C	CA	ESE	Total		
U23CS410		Digital Principles and System Design				3	0	0	3	40	60	100		
Course Objective		The student should be made to, - Understand about binary number system and its conversions. - Understand concept of logic minimization using Karnaugh Map - Understand the concepts of combinational circuits - Understand the concepts of sequential logic circuits. - Learn basic of digital memories and fundamental concepts used in programmable logic.												
Course Outcome		At the end of the course, the students will be able to,											KL	
		CO1: Practice the code conversion and simplification using Properties in Boolean Algebra.											K3	
		CO2: Derive the K-map Simplification											K3	
		CO3: Analyze and Reproduce the combinational circuits.											K3	
		CO4: Analyze and design procedures for Synchronous Asynchronous sequential circuits.											K3	
		CO5: Characterize Boolean functions using programmable logics.											K3	
Pre-requisites		-												
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong 2 –Medium, 1 -Weak													CO/PSO Mapping	
COs		Programme Outcomes (POs)											PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1
CO 1		3	3	2					1				3	3
CO 2		3	2	2					1				3	3
CO 3		3	3	2	1				1				2	2
CO 4		3	2	2	1								2	2
CO 5		3	3	2	1								3	2
Course Assessment Methods Direct - Continuous Assessment Test I, II &III - Assignments / Seminar/Quiz - End-Semester examination Indirect - Course -end survey														
Content of the syllabus														
Unit -I		NUMBER SYSTEMS AND BOOLEAN ALGEBRA										Periods		9
Number Systems: Definition of Digital systems, Number base conversions: Decimal– Binary– Octal– Hexadecimal, 1s and 2s Complements.														

Boolean Algebra: Basic Theorems and properties of Boolean algebra, Principles of duality, Canonical and Standard forms, Digital Logic Gates.			
Unit-II	GATE LEVEL MINIMIZATION	Periods	9
Introduction, Map method-The k-map method: Two Variable, Three variable, four-variable map, Implicants, Prime Implicants, Essential prime Implicants, Minimization using K-map- Quine- McCluskey method, NAND and NOR Implementation.			
Unit – III	COMBINATIONAL CIRCUITS	Periods	9
Analysis and Design procedures, Binary Adder, Binary Subtractor, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, and Demultiplexers, HDL models of combinational circuits.			
Unit- IV	SYNCHRONOUS & ASYNCHRONOUS SEQUENTIAL LOGIC	Periods	9
Synchronous Sequential Logic: Sequential circuits, latches, flip-flops, Analysis of clocked sequential circuits, State reduction and assignment, design procedure, Registers and Counters - Asynchronous Sequential Logic: Analysis and Design of Asynchronous Sequential Circuits -Reduction of State and Flow Tables- Race-free State Assignment -Hazards.			
Unit-V	MEMORY AND PROGRAMMABLE LOGIC	Periods	9
Introduction, Random access memory, memory decoding, error detection and correction, read only memory, programmable logic array, programmable array logic, sequential programmable devices.			
Total Periods			45
Text Books			
1.	M. Morris R. Mano, Michael D. Ciletti, —Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog, 6th Edition, Pearson Education, 2021.		
2.	Charles H.Roth. "Fundamentals of Logic Design",6th Edition, Thomson Learning, 2013		
References			
1.	Digital Electronics - A Conceptual Approach [Print Replica] Kindle Edition, Technical Publication by D.A.Godse A.P.Godse, 2014		
2.	G. K. Kharate, Digital Electronics, Oxford University Press, 2010		
3.	John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.		
4.	Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013		
E-Resources			
1.	https://byjus.com/gate/introduction-of-k-map-karnaugh-map-notes/		
2.	https://www.youtube.com/watch?v=Wj01JfGEQT8		

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Department	CSE , IT & CST								Semester				IV																																																																																																																							
Course Code	Course Name	Periods Per Week			Credit		Maximum Marks																																																																																																																													
		L	T	P	C	CA	ESE	Total																																																																																																																												
U23CT407	Operating Systems	3	0	2	4	50	50	100																																																																																																																												
Course Objective	- To understand the operating system structures. - To learn Processes, Threads and analyze Scheduling algorithms. - To have a basic understanding of Deadlocks and analyze memory management schemes. - To be familiar with File system management. - To be familiar with the basics of virtual machines																																																																																																																																			
Course Outcome	At the end of the course, the student should be able to,											Knowledge Level																																																																																																																								
	CO1: Gain knowledge on operating system structures.											K2																																																																																																																								
	CO2: Analyze various scheduling algorithms and process synchronization.											K3																																																																																																																								
	CO3: Investigate deadlock prevention and avoidance algorithms and compare various memory management schemes.											K3																																																																																																																								
	CO4: Illustrate the functionality of file systems.											K3																																																																																																																								
	CO5: Understand the basic concepts of virtual machines.											K2																																																																																																																								
Pre-requisites	-																																																																																																																																			
<table><tr><th colspan="13">CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">Cos</th><th colspan="12">Programme Outcomes (POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO 2</th></tr><tr><td>CO 1</td><td>3</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td></tr><tr><td>CO 2</td><td>2</td><td>3</td><td>1</td><td>3</td><td>1</td><td></td><td></td><td></td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>2</td></tr><tr><td>CO 3</td><td>2</td><td>2</td><td>3</td><td>3</td><td>2</td><td></td><td></td><td></td><td>3</td><td>1</td><td>1</td><td>2</td><td>2</td><td>1</td></tr><tr><td>CO 4</td><td>2</td><td>2</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td></td><td>1</td><td>3</td><td>2</td><td>1</td><td>2</td><td>1</td></tr><tr><td>CO 5</td><td>2</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>3</td><td>1</td><td>2</td><td>1</td><td>2</td><td>2</td></tr></table>														CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping		Cos	Programme Outcomes (POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	CO 1	3	1	1	1					1	1	1	2	2	2	CO 2	2	3	1	3	1				3	2	2	3	2	2	CO 3	2	2	3	3	2				3	1	1	2	2	1	CO 4	2	2	1	2	1				1	3	2	1	2	1	CO 5	2	3	3	2	1				3	1	2	1	2	2
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping																																																																																																																							
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CO 1	3	1	1	1					1	1	1	2	2	2																																																																																																																						
CO 2	2	3	1	3	1				3	2	2	3	2	2																																																																																																																						
CO 3	2	2	3	3	2				3	1	1	2	2	1																																																																																																																						
CO 4	2	2	1	2	1				1	3	2	1	2	1																																																																																																																						
CO 5	2	3	3	2	1				3	1	2	1	2	2																																																																																																																						
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Content of the syllabus																																																																																																																																				
Unit – I	INTRODUCTION AND OPERATING SYSTEM STRUCTURES											Periods	9																																																																																																																							
Introduction - Computer System organization - Computer-System Architecture- Operating-System Operations – Operating System Services - User Operating System Interface - System Calls – System Services - Operating-System Design and Implementation- Operating-System Structure.																																																																																																																																				
Unit - II	PROCESS MANAGEMENT											Periods	9																																																																																																																							
Process Concept - Process Scheduling -Operations on Processes - Inter-process Communication; Threads -																																																																																																																																				

Multithread Models - Threading issues; CPU Scheduling -Basic Concepts - Scheduling Criteria - Scheduling Algorithms; Process Synchronization - Critical-Section Problem - Synchronization Hardware - Semaphores - Monitors -Classic problems of Synchronization.			
Unit – III	DEADLOCKS AND MEMORY MANAGEMENT	Periods	9
System Model - Deadlock Characterization -Methods for handling Deadlocks - Deadlock Prevention - Deadlock avoidance - Deadlock detection - Recovery from Deadlocks; Main Memory- Swapping - Contiguous Memory allocation - Paging - Structure of the Page Table - Intel 32- and 64-bit Architectures; Virtual Memory - Demand Paging - Page Replacement - Allocation of frames - Thrashing.			
Unit - IV	FILE SYSTEM MANAGEMENT	Periods	9
File-System Interface - File Concept - Access Methods - Directory Structure - File System Mounting - Protection; File System Implementation - Directory Implementation - Allocation Methods - Free-space Management.			
Unit – V	STORAGE MENAGEMENT AND VIRTUALIZATION	Periods	9
Mass-Storage Structure – Disk Scheduling and Management - Swap-Space Management; Virtual Machines – History - Benefits and Features - Building Blocks –Introduction to types of Virtual Machines and their implementations - Virtualization and Operating-System Components.			
Total Periods			45
Suggested List of Experiments			CO's
1. Installation of windows operating system			CO1
2. Illustrate Shell Programming			CO1
3. Process Management using System Calls : Fork, Exec, Getpid, Exit, Wait, Close			CO1
4. Simulation of CPU scheduling algorithms :FCFS, SJF, Priority and Round Robin			CO2
5. Implement process synchronization using semaphores			CO2
6. Simulation of Banker s algorithm to check whether the given system is in safe state or unsafe state			CO3
7. Implementation of Dynamic memory allocation algorithms: First-fit, Best-fit, Worst-fit			CO3
8. Implementation of Page Replacement Algorithms : FIFO, LRU and Optimal			CO3
9. Implement the following File Allocation Strategies : Sequential, Indexed, Linked			CO4
10. Install Linux operating system using VMware			CO5
Lecture 45: Practical 30; Total: 75			
Text Books			
1	Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi.		
2	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 10th Edition, John Wiley and Sons Inc., 2018		
References			
1.	William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition,PrenticeHall, 2018.		
2.	Ramaz Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”,TataMcGraw Hill Edition, 2010.		
Tools Required			
1.	PC, Linux / Windows OS, C Compiler, VMWare / VirtualBox		
E-Resources			
1.	https://www.geeksforgeeks.org/operating-systems		
2.	https://www.tutorialspoint.com/operating_system/ index.htm		
3.	youtube.com/playlist?list=PLDW872573QAb4bj0URobvQTD41IV6gRkx		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205												
Programme	B.E.			Programme code			101		Regulation			2023		
Department	Computer Science and Engineering						Semester				IV			
Course code	Course name			Periods per week			Credit		Maximum Marks					
				L	T	P	C	CA	ESE	Total				
U23CS411	Web Technology Laboratory			0	0	2	1	60	40	100				
Course Objective		The student should be made to, - Understand the web technologies to create adaptive web pages for web application. - Use CSS and Bootstrap to implement a variety of presentation effects to the web application. - Gain the skills and project-based experience needed for entry into web application and development careers. - Explore different web extensions and web services standards. - Acquire knowledge and skills for creation of web site considering both client and server side programming.												
Course Outcome		At the end of the course, the student should be able to,									KL			
		CO1: Create web pages using XHTML, Cascading Style Sheets and Bootstrap									K3			
		CO2: Develop a dynamic webpage by the use of java script and DHTML.									K3			
		CO3: Write a client side script to perform the Event Handling methods									K3			
		CO4: Develop PHP application to catch form data sent from client and store it on database.									K4			
		CO5: Develop a dynamic webpage using Node JS and MongoDB.									K4			
Pre-requisites		-												

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	3	3	2					1				3	2
CO 2	3	3	3	2					2				3	2
CO 3	3	3	3	2	1				2				3	2
CO 4	3	3	3	2	2				2				3	2
CO 5	3	3	3	2	2				2				3	2

Course Assessment	
Methods Direct	
1. Prelab and post lab test /Viva Questions	
2. End-Semester examinations	
Indirect	
1. Course - end survey	

LIST OF EXPERIMENTS		Course Outcome
1. The catalogue page should contain the details of all the books available in the web. The details should contain the following: 1. Snap shot of Cover Page. 2. Author Name. 3. Publisher. 4. Price. 5. Add to cart button.		CO1
2. Create a —registration form —with the following fields 1) Name (Text field) 2) Password (password field) 3) E-mail id (text field) 4) Phone number (text field) 5) Sex (radio button) 6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil) 8) Address (text area)		CO1
3. HTML5 and JavaScript : a) position in the string of the left-most vowel b) number with its digits in the reverse order c) Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show —out of rangell and if it is not a number, it should show —not a numberll message in the result box		CO3
4. Create a JavaScript array that holds a list of your favorite movies. Use built-in array methods to add, remove, and sort the movies. HTML and CSS:		CO3
5. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS/Bootstrap to customize the properties of the font of the capital (color, bold and font size).		CO2
6. Design a web page using CSS (Cascading Style Sheets) and Bootstrap which includes the following: A. Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles		CO2
7. a) Assume four users user1, user2, user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a PHP for doing the following. 1. Create a Cookie and add these four user ID"s and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display —You are not an authenticated user"		CO4
8. Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.		CO4
9. Install NodeJS and MongoDB on your local machine and start the MongoDB server. Verify the installation by creating a new database and inserting a simple document.		CO5
10. Write a Node.js script that connects to a MongoDB database and inserts a new document into a collection. Display a success message upon successful insertion.		CO5
Total Periods		45
E-Resources		
1.	https://www.w3schools.com/html/	
2.	https://www.geeksforgeeks.org/html-tutorial/	
3.	https://www.w3schools.com/bootstrap5/bootstrap_spinners.php	

Semester - V

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai)Elayampalayam, Tiruchengode – 637 205													
Programme		B.E. /B.TECH				ProgrammeCode						Regulation		2023	
Department		CSE & IT										Semester		V	
CourseCode		Course Name				PeriodsPer Week			Credit		Maximum Marks				
						L	T	P			C	CA	ESE	Total	
U23IT512		Artificial Intelligence				3	0	0	3	40	60	100			
Course Objective		The main objective of this course is to:													
		• Understand the various characteristics of intelligent agents.													
		• Learn the different search strategies in AI.													
		• Learn to represent knowledge in solving AI problems.													
		• Know about the various applications of AI.													
Course Outcome		• Design applications for NLP that use Artificial Intelligence													
		At the end of the course, the student should be able to,												Knowledge Level	
		CO1: Understand the principles of Artificial Intelligence.												K2	
		CO2: Use appropriate search algorithms for any AI problem.												K2	
		CO3: Represent a problem using first order and predicate logic.												K3	
CO4: Provide the apt agent strategy to solve a given problem.												K3			
CO5: Design software agents to solve a problem												K3			
CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														CO/PSO Mapping	
COs		Programme Outcomes(POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		3	2	1	-									3	1
CO2		3	2	1	-									3	1
CO3		3	2	1	1									3	1
CO4		3	2	1	1									3	1
CO5		3	2	1	1									3	1
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations															
Indirect															
1. Course-end survey															

Content of the syllabus			
Unit– I	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	Periods	9
Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.			
Unit-II	PROBLEM SOLVING METHODS	Periods	9
Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.			
Unit– III	KNOWLEDGE REPRESENTATION	Periods	9
First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information.			
Unit-IV	SOFTWARE AGENTS	Periods	9
Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.			
Unit– V	APPLICATIONS	Periods	9
AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition.			
TotalPeriods			45
Text Books:			
1.	Artificial Intelligence: A Modern Approach,Stuart Russell and Peter Norvig,Pearson,4th Edition (2020)		
References:			
1.	Artificial Intelligence: Foundations of Computational Agents,David L. Poole and Alan K. Mackworth,Cambridge University Press,1st Edition (2017)		
2.	Handbook of Knowledge Representation,Frank van Harmelen, Vladimir Lifschitz, Bruce Porter,Elsevier,1st Edition (2007)		
3.	Speech and Language Processing,DanielJurafsky and James H. Martin ,Pearson,3rd Edition (2020)		
E-Resources :			
1.	https://onlinecourses.nptel.ac.in/noc22_cs56/preview		
2.	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.html		
3.	https://techvidvan.com/tutorials/learn-artificial-intelligence		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205														
Programme	B.E.			Programme Code				101		Regulation			2023		
Department	CSE							Semester			V				
Course Code	Course Name					Periods Per Week			Credit	Maximum Marks					
						L	T	P	C	CA	ESE	Total			
U23CS513	Compiler Design					3	0	0	3	40	60	100			
Course Objective	The student should be made to,														
	• Enrich the knowledge in various phases of compiler • Define the role of lexical analyzer, use of regular expression and transition diagrams • Extend the knowledge of parser by parsing LL parser and LR parser. • Construct dynamic run-time stack • Enrich the knowledge in code optimization techniques, machine code generation, and use of symbol table.														
Course Outcome	At the end of the course, the student should be able to,											Knowledge Level			
	CO1: Demonstrate the role of compilers and describe the phases of compiler											K2			
	CO2: Apply automata theory and knowledge on formal languages and Improve the Minimization of DFA											K3			
	CO3: Categorize and illustrate the different top-down parsing and bottom-up Parsing techniques.											K3			
	CO4: Design syntax directed translation schemes and intermediate code Generation process and interpret the use of run time environment											K4			
	CO5: Apply the code optimization techniques to improve the performance of a program.											K4			
Pre-requisites	Programming language														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3 – Strong, 2 – Medium, 1 - Weak														CO / PSO Mapping	
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	
CO1	2	3	3	2					2	1		2	2	2	
CO2	3	3	3	3	2				2	1		2	3	3	
CO3	3	3	3	3	3		2		3	1	1	3	3	3	
CO4	3	3	3	2	2		1		2	2	1	2	2	2	
CO5	3	3	3	2	2		2		2	3		3	3	3	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz /Seminar / Case Study 3. End-Semester examinations															
Indirect															
1. Course-end survey															

Content of the syllabus			
Unit –I	INTRODUCTION TO COMPILERS	Periods	8
Translators - Compilation and Interpretation - Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases – Compiler Construction Tools - Programming Language basics			
Unit-II	LEXICAL ANALYSIS	Periods	9
Need and Role of Lexical Analyzer - Lexical Errors - Expressing Tokens by Regular Expressions - Converting Regular Expression to DFA – Minimization of DFA – Language for Specifying Lexical Analyzers - LEX.			
Unit –III	SYNTAX ANALYSIS	Periods	10
Need and Role of the Parser – Context Free Grammars – Top Down Parsing –General Strategies - Recursive Descent Parser Predictive Parser – LL (1) Parser – Shift Reduce Parser – LR Parser -LR(0) Item – Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC.			
Unit-IV	SYNTAX DIRECTED TRANSLATION & RUNTIME ENVIRONMENT	Periods	9
Intermediate Languages – Syntax directed Definitions – Construction of Syntax Tree – Bottom-up Evaluation of S-Attribute Definitions. RUN-TIME ENVIRONMENT: Source Language Issues –Storage Organization - Storage Allocation - Parameter Passing - Symbol Tables - Dynamic Storage Allocation.			
Unit –V	CODE OPTIMIZATION AND CODE GENERATION	Periods	9
Principle Sources of Optimization – DAG - Optimization of Basic Blocks - Global Data Flow Analysis - Efficient Data Flow Algorithms - Issues in Design of a Code Generator - A Simple Code Generator Algorithm.			
Total Periods			45
Text Books			
1.	Alfred V Aho, Monica S Lam, Ravi Sethi & Jeffrey D.Ullman, "Compilers : Principles, Techniques and Tools", 2 nd Edition, Pearson Education, India, 2023.		
References			
1.	O.G.Kakde, "Compiler Design", 5 th Edition, An Imprint of Laxmi Publications Pvt.Ltd., 2015.		
2.	V Raghavan, "Principles Of Compiler Design", Mcgraw Hill Publishing Co Ltd, 2016.		
3.	Randy Allen , KenKennedy, —Optimizing Compilers for Modern Architectures : A Dependence-Based Approach ,Morgan Kaufmann Publishers ,2009		
4.	Steven S. Muchnick,—Advanced Compiler Design and Implementation,—Morgan Kaufmann Publishers – Elsevier Science, India, Indian Reprint 2007		
5.	Charles N.Fischer, Richard.J. LeBlanc — Craftinga Compiler with C, Pearson Education, 2008		
E-Resources			
1.	https://nptel.ac.in/courses/106/105/106105190/		
2.	https://www.geeksforgeeks.org/compiler-design-tutorials/		
3.	https://nptel.ac.in/courses/106/108/106108113/		
4.	gatecse.in/category/compiler-design/		
5.	www.tutorialspoint.com/compiler_design		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205												
Programme	B.E	Programme Code					101	Regulation			2023			
Department	CSE,IT					Semester					V			
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks								
		L	T	P		C	CA	ESE	Total					
U23CS514	Microprocessor and Microcontroller	3	0	0	3	40	60	100						
Course Objective	The student should be made to, • Study the Architecture and programming of • 8086 microprocessor. • Study the addressing modes and instruction set of 8051. • Develop the skill to write simple programs for 8051 applications													
Course Outcome	At the end of the course the student should be able to,												KL	
	CO1: Describe the architecture and addressing modes of 8086 microprocessor												K3	
	CO2: Connect various interfaces with 8086 processor												K2	
	CO3: Illustrate the architecture and addressing modes of 8051 microprocessor												K3	
	CO4: Write simple programs using 8051 parallel ports, serial ports, timers and interrupts												K3	
	CO5: Interface peripherals and memory with 8051												K3	
Pre-requisites	Computer Organization													

CO/PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2–Medium,1-Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1									2	2
CO2	2	1	1										2	2
CO3	3	2	1	1									2	2
CO4	3	2	1	1									2	2
CO5	3	2	1	1									2	2

Course Assessment Methods														
Direct														
1. Continuous Assessment Test I,II & III														
2. Assignment														
3. End-Semester examinations														
Indirect														
1. Course-end survey														

Content of the syllabus			
Unit– I	8086 Microprocessor	Periods	9
Intel 8086 microprocessor – Architecture – Basic 8086/8088 Configurations: Minimum Mode and Maximum Mode. Instruction set - Addressing modes Assembly language programming			
Unit–II	Interfacing with 8086	Periods	9
8255A Programmable Peripheral Interface - 8251A Serial Communication Interface – 8253 Programmable Interval Timer - 8279 Programmable Keyboard/Display Interface - 8259A Programmable Interrupt Controller.			
Unit–III	8051Microcontroller	Periods	9
Introduction to 8051 - Block Diagram of 8051 - 8051 data types and directives - flag bits and PSW register - register bank and stack - Jump and Call Instructions - Arithmetic and logic Instructions - Addressing modes - Timing diagram of 8051 (Opcode fetch, Memory Read/Write, I/O Read/Write).			
Unit–IV	Programming with 8051	Periods	9
IO port programming. Programming 8051 Timers - counter programming - Serial Port Programming in Assembly - basics of serial communication - 8051connection to RS232 - Interrupts Programming in Assembly			
Unit–V	8051 Interfacing	Periods	9
Interfacing: LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface – Semiconductor memory - memory address decoding - 8051 interfacing with external ROM			
Total Periods			45
Text Books:			
1.	Yn-chengLiu, GlennA.Gibson,“Microcomputer systems:The8086/8088 Family architecture, Programming and Design”, Second Edition, Prentice Hall of India , 2006.		
2.	Muhammad Ali Mazidi, Janice Gillispie Mazidi,RolinD.MCKinlay,”The8051 Microcontroller and Embedded Systems”, Pearson Education, Second Edition,2008.		
References:			
1.	KennethJ.Ayala,“The8051 microcontroller Architecture, Programming and Applications”, Third Edition, Penram international 2004.		
2.	DouglasV.Hall, “Microprocessors and Interfacing: Programming andHardware”, TMH, Revised Second Edition, 2006.		
3.	KrishnaKant, “Microprocessors and Microcontrollers: Architecture, Programming and System Design 8085, 8086, 8051, 8096”, Prentice Hall of India Pvt. Ltd., 2012.		
E-Resources:			
1.	http://www.gpcet.ac.in/wp-content/uploads/2018/03/UNIT-5-MPI-LECTURE-NOTES.pdf		



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Elayampalayam, Tiruchengode – 637 205



	Programme		B.E./B.Tech.			Programme Code			101	Regulation		2023	
Department	CSE,IT						Semester				V		
Course Code	Course Name					Periods Per Week			Credit	Maximum Marks			
						L	T	P	C	CA	ESE	Total	
U23CS512	Data Communication and Networks					3	0	2	4	50	50	100	

Course Objective	The main objective of this course is to: • To understand data communication principles, network models, and transmission media. • Discover data link layer concepts, including addressing, error control, media access, connecting devices for reliable and efficient communication. • Learn the network services, addressing, routing protocols and algorithms. • To understanding algorithms to design and implement the scalable, efficient network systems. • Learn the concepts of switching, ISDN and Acquire knowledge of Application layer, Presentation layer, Session Layer paradigms and protocols.
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Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Describe the functions of each layer in ISO/OSI model	K2
	CO2: Apply data link layer addressing, analyze error detection, correction techniques, flow control protocols, media access methods.	K2
	CO3: Design scalable and efficient network communication systems by utilizing network layer services.	K2
	CO4: Analyze IPv4/IPv6 addressing and header formats, network layer services like DHCP ,ARP.	K4
	CO5: Understand the operational principles of major application-layer protocols (FTP, HTTP, Email, DNS, SNMP, TELNET).	K3

CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													CO/PSO Mapping	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2	1	1	2							2	3	3
CO2	2	1	1		2							2	2	2
CO3	3	2	1	1	2							2	3	3
CO4	3	2	1	1	2							2	3	3
CO5	3	2	1	1	2							2	3	3

Course Assessment Methods

Direct	
1. Continuous Assessment Test I, II & III	
2. Assignment / Seminar/ Quiz	
3. End-Semester examinations	
Indirect	
1. Course - end survey	

Content of the syllabus			
Unit –I	PHYSICAL LAYER	Periods	9
Data Communication: components, Data flow – Networks: Physical structures, network types: LAN, MAN, WAN, network , Network Models: Protocol Layering – Principles of protocol layering, TCP/IP Protocol Suite, OSI Model, Performance - Transmission media: Guided media , unguided media.			
Unit-II	DATA LINK LAYER	Periods	9
Introduction to data link layer: Link-layer addressing – ARP, Error Detection and Correction: Block coding, CRC, Checksum, Data Link Control: Flow and Error Control – Stop and wait Protocol – Framing, Point-to-Point Protocol, Media Access Control: CSMA– Channelization, Connecting devices: Hub, Switch, Router.			
Unit –III	NETWORK LAYER	Periods	9
Network Layer Services - IPV4 address: Header format-Types – DHCP, Network Address Resolution, IPV6: Header format- Address Space allocation, Routing and forwarding – Packet switching, Routing Algorithms: Distance-Vector, Link-State, Path-Vector, Unicast Routing Protocols: RIP, OSPF, BGP, Multicast Routing Protocols: DVMRP			
Unit-IV	TRANSPORT LAYER	Periods	9
Transport Layer Services – Stop-and-Wait Protocol, Go-back-N Protocol, Selective-Repeat Protocol – User datagram Protocol – Transmission Control Protocol			
Unit –V	APPLICATION LAYER	Periods	9
Application layer Paradigms – FTP – HTTP - Email – DNS – SNMP- TELNET - Quality of Service			
Total Periods			45
Lecture 45: Practical 30; Total:75			
Suggested List of Experiments			
1. Implementation of Data Link Layer flow control mechanism - Stop and Wait, Sliding Window protocol.			
2. Write a code simulating PING and TRACEROUTE commands			
3. Analyze the performance Distance Vector and Link State Routing Algorithm			
4. Applications using TCP and UDP Sockets like a. DNS b. SNMP			
5. Simulation of Congestion Control Algorithms using Network Simulator (NS)			
6. Simulation of error correction code (CRC).			
7. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer using NS2 Simulator. a. Link State routing b. Flooding c. Distance vector			
8. Study the performance of Token Bus and Token Ring Protocols using simulation			
9. Introduction to packet tracer			
10. Creating a Network topology using CISCO packet tracer software.			
Text Books			
1.	Data Communications and Networking, Behrouz A. Forouzan , Fifth Edition TMH 2019.		
2.	Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI 2018.		
References			
1.	Behrouz A. Forouzan. Data Communications and Networking. Tata McGraw-Hill Edition, Fourth Edition. 2017		
2.	Andrew s. Tanenbaum .Computer Networks. Pearson Education .Fourth Edition 2012.		
3.	Alberto Leon- Garcia and IndraWidjaja.Communication Networks- Fundamental Concepts and key Architectures. Tata Mcgraw-Hill. Second Edition 2004.		
E-Resources			
1.	https://ebooks.inflibnet.ac.in/ae01/chapter/data-communications-and-networking-systems/		
2.	https://www.accessengineeringlibrary.com/content/book/9780073250328/chapter/chapter1		
3.	https://www.cet.edu.in/noticefiles/265_DCCN%20Lecture%20Notes.pdf		

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Programme		B.E. / B.Tech.		Programme code					Regulation		2023				
Department		CSE, IT							Semester		V				
Course Code		Course name			Periods per week			Credit		Maximum Marks					
U23CS516		Microprocessor and Microcontroller Laboratory			L	T	P	C	CA	ESE	Total				
					0	0	2	1	60	40	100				
Course Objective		The student should be made to, - Understand the Architecture of 8086 Microprocessor. - Learn about general-purpose interfaces. - Understand the basics of 8051 applications.													
Course Outcome		At the end of the course, the student should be able to,										KL			
		CO1 : Identify the functions of 8086 microprocessors.										K3			
		CO2 : Programming the 8086 to connect general-purpose interfaces.										K2			
		CO3 : Understand the basics of 8051 microprocessor.										K3			
		CO4 : Develop skills to write programs using 8051 ALP.										K3			
		CO5 : Interface peripherals and memory with 8051.										K2			
Pre-requisites		Computer Organization													
		CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												CO/PSO Mapping	
COs		Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1		3	2	1	1									2	2
CO2		3	2	1	1									2	2
CO3		3	2	1	1									2	2
CO4		3	2	1	1									2	2
CO5		3	2	1	1									2	2
Course Assessment Methods															
Direct															
1. Pre lab and post lab Test 2. Record 3. End-Semester examinations															
Indirect															
1. Course-end survey															

Content of the syllabus		
List of Experiments		Course Outcome
8086 Programming using kits		CO1,CO2
1.	Program for 16 bit Arithmetic Operations using 8086.	CO1
2.	Programs for Sorting and Searching using 8086.	CO3
3.	Interfacing 8255 with 8086.	CO2
4.	Interfacing 8251 with 8086.	CO2
5.	Interfacing 8279 with 8086.	CO3
8051 Experiments using kits		
6.	Simple Arithmetic 8 bit Operations using 8051.	CO4
7.	Program for Logical and Bit manipulation using 8051.	CO4
8.	Interface 7 segment LED and buzzer with 8051.	CO5
9.	Design a Traffic Light control using 8051.	CO5
10.	Interfacing External ROM, 4*4 Keypad, LCD and ADC Sensor with 8051.	CO5
Total Periods		45
Hardware Requirements:		
1 Microprocessor kit 8086/8051 2 ADC Sensor 3 4*4 Keypad		
Software Requirements:		
1 GNU Sim (simulator) 8085 / Vlab (Virtual Lab) 2 Tinkercad		
E-Resources		
1.	https://pdfcoffee.com/1 pdfnetmicrocomputer-systems-the-8086-8088-family-architecture-pdf-pdf-free.html	
2.	https://www.staroceans.org/kernal-and-driver/PIC%20Microcontroller%20and%20Embedded%20Systems%20using%20ASM%20%26%20C%20for%20PIC18.pdf	
3.	https://www.worldcat.org/totle/pic-microcontroller-and-embedded-systems-using-assembly-and-c-for-pic18/oclc/77476437	

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						 																																																																																																																												
Programme		B.E.		Programme Code			101		Regulation		2023																																																																																																																									
Department		COMPUTER SCIENCE AND ENGINEERING						Semester		V																																																																																																																										
Course Code		Course Name			Periods Per Week			Credit	Maximum Marks																																																																																																																											
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U23CS517		Mini Project - I			0	0	2	1	100	-	100																																																																																																																									
Course Objective		The student should be made to to,																																																																																																																																		
		- For gaining domain knowledge, and technical skills to solve potential business / research problems. - Gather requirements and Design suitable software solutions and evaluate alternatives. - To work in small teams and understand the processes and practices in the ‘industry. - Implement, Test and deploy solutions for target platforms - Preparing project reports and presentation																																																																																																																																		
		At the end of the course, the student should be able to,										Knowled ge Level																																																																																																																								
		CO1: Gain Domain knowledge and technical skill set required for solving industry / research problems.										K2																																																																																																																								
		CO2: Provide solution architecture, module level designs, algorithms.										K3																																																																																																																								
Course Outcome		CO3: Implement, test and deploy the solution for the target platform.										K4																																																																																																																								
		CO4: Prepare detailed technical report, demonstrate and present the work.										K3																																																																																																																								
		CO5: Apply engineering and management principles to achieve project goal.										K3																																																																																																																								
		Pre-requisites		-																																																																																																																																
<table><tr><th colspan="13">CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes (POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO 2</th></tr><tr><td>CO 1</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td></td><td>2</td><td></td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td></tr><tr><td>CO 2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td>3</td><td>3</td><td>3</td></tr><tr><td>CO 3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>1</td><td></td><td>2</td><td></td><td>2</td><td>2</td><td>3</td><td>2</td><td>2</td></tr><tr><td>CO 4</td><td>2</td><td>3</td><td>2</td><td>3</td><td>3</td><td>2</td><td></td><td>2</td><td></td><td>2</td><td>3</td><td>3</td><td>2</td><td>2</td></tr><tr><td>CO 5</td><td></td><td>3</td><td>2</td><td>2</td><td>3</td><td>3</td><td></td><td>2</td><td></td><td></td><td>2</td><td>3</td><td>2</td><td>3</td></tr></table>														CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping		COs	Programme Outcomes (POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	CO 1	3	3	2	2	3	2		2		2	3	3	3	3	CO 2	3	3	3	3	3	2		2		2	2	3	3	3	CO 3	3	3	3	2	3	1		2		2	2	3	2	2	CO 4	2	3	2	3	3	2		2		2	3	3	2	2	CO 5		3	2	2	3	3		2			2	3	2	3
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping																																																																																																																							
COs	Programme Outcomes (POs)												PSOs																																																																																																																							
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2																																																																																																																						
CO 1	3	3	2	2	3	2		2		2	3	3	3	3																																																																																																																						
CO 2	3	3	3	3	3	2		2		2	2	3	3	3																																																																																																																						
CO 3	3	3	3	2	3	1		2		2	2	3	2	2																																																																																																																						
CO 4	2	3	2	3	3	2		2		2	3	3	2	2																																																																																																																						
CO 5		3	2	2	3	3		2			2	3	2	3																																																																																																																						
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1. Course - end survey																																																																																																																																				

Semester – VI

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205										 			
Programme		B.E.	Programme Code					101		Regulation			2023		
Department		Computer Science and Engineering					Semester					VI			
Course Code		Course Name					Periods Per Week			Credit	Maximum Marks				
							L	T	P	C	CA	ESE	Total		
U23CS618		Cloud Computing					3	0	0	3	40	60	100		
Course Objective		The Student should be made to, - Insight into the basics of cloud computing and traditional network infrastructure to a Cloud - Understand the concept of Virtualization - Emphasizes on how to build cloud Architecture - Interpret the Scheduling , Storage systems and Amazons AWS instances - Understand the need for security and cloud applications													
		At the end of the course, the student should be able to,											Knowledge Level		
		CO1: Summarize the fundamental principles of Cloud computing											K2		
		CO2: Examine the importance of virtualization and how this has enabled the development of Cloud Computing.											K3		
		CO3: Describes the knowledge about cloud Architecture											K3		
Course Outcome		CO4: Design and develop deployable Amazons AWS instances											K4		
		CO5: Recognize the concept of Cloud Security and cloud applications											K2		
Pre-requisites															
CO/PO Mapping (3/2/1indicatesstrengthhofcorrelation)3-Strong,2–Medium,1–Weak														CO/PSO Mapping	
COs		PSOs												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	2	2	3	2	2	0	0	3	2	2	0	2	2	2	
CO2	2	3	3	2	2	0	0	3	2	3	0	3	2	3	
CO3	3	2	3	3	3	0	0	2	2	3	0	2	3	3	
CO4	2	3	3	2	2	0	0	3	2	2	0	3	3	2	
CO5	2	2	3	3	3	0	0	2	2	3	0	2	2	3	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III															
2. Assignment/Quiz/Seminar															
3. End-Semester examinations															
Indirect															
1. Course - end survey															

Content of the syllabus			
Unit – I	CLOUD COMPUTING BASICS	Periods	9
System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:-Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS)–Public vs Private Cloud– Cloud Solutions-Cloud ecosystem–Service management– Computing on demand.			
Unit - II	VIRTUALIZATION	Periods	9
Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Virtualization of CPU, Memory, I/O Devices - Virtual Private Cloud(VPC)-Virtual Clusters and Resource management – Virtualization for Data-center Automation			
Unit – III	CLOUD ARCHITECTURE	Periods	9
Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.			
Unit - IV	SCHEDULING AND STORAGE SYSTEMS	Periods	9
Scheduling Algorithms for Computing Clouds- Borrowed Virtual Time- Cloud Scheduling Subject to Deadlines-Scheduling MapReduce Applications Subject to Deadlines. Storage Systems: Google file system- Apache Hadoop- Big Table, Megastore, Amazon Simple Storage Service (S3)-,HDFS, Hive, Java AWS DK, S3 API, Microsoft Azure - SimpleDB Service, NoSQL Databases - Create and manipulate Azure.			
Unit – V	SECURITY AND APPLICATIONS OF CLOUD	Periods	9
Security Overview–Cloud Security Challenges and Risks–Security Governance– Risk Management–Security Monitoring–Virtual Machine Security-Identity Management and Access Control .Applications: Scientific Applications – Healthcare –Biology – Geo science – Business and Consumer Applications.			
Total Periods			45
Text Books			
1.	Anthony T Velte, Toby J Velte, Robert elsenpeter—Cloud computing, A practical approach-Indian edition, 2023		
2.	Cloud application architectures, Building applications and infrastructure in the Cloud- George Reese – 2021		
3.	Cloud computing: Methodology, systems, and applications by Lizhe Wang, Rajiv Ranjan, Jinjun chen, and Boualem Benatallah - 2017		
References			
1.	Advancements, Challenges, and Future Directions in Cloud Computing, Cloud Computing, November 2024		
2.	The future of computing Explained by Douglas E. Comer, Cloud computing book - 2021		
3.	Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH,2017		
E-Resources			
1.	https://www.elsevier.com/books/cloud-computing/marinescu/978-0-12-812810-7		
2.	https://www.jigsawacademy.com/blogs/cloud-computing/implementation-levels-of-virtualization-in-cloud-computing/		
3.	https://electricalfundablog.com/cloud-storage-architecture-types/		
4.	https://ptgmedia.pearsoncmg.com/images/9780133387520/samplepages/0133387526.pdf		
5.	https://www.geeksforgeeks.org/best-cloud-computing-books-for-beginners		
6.	https://books.google.co.in/books?id=ETtmAgAAQBAJ&printsec=frontcover#v=onepage&q&f=false		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode-637205										 			
Programme		B.E.		Programme Code					107		Regulation		2023		
Department		COMPUTER SCIENCE AND TECHNOLOGY							Semester			VI			
Course Code		Course Name			Periods Per Week			Credit		Maximum Marks					
					L	T	P	C	CA	ESE	Total				
U19CT616		Internet of Things			3	0	0	3	40	60	100				
Course Objective		The Main Objective of the course is to - To study the fundamentals about IoT - Understand the architecture and fundamental concepts of IoT and sensors. - Learn various communication protocols used in IoT applications. - Develop IoT applications using Raspberry Pi. - Design and implement real-time smart IoT applications using embedded systems.													
Course Outcome		At the end of the course, the student should be able to,										Knowledge level			
		CO1: Outline the IoT architecture and sensor fundamentals.										K2			
		CO2: Explain the various protocols used in IoT applications.										K2			
		CO3: Build IoT Systems using Arduino, Esp8266 and Jetson Nano Developer kit.										K3			
		CO4: Develop IoT applications with Raspberry PI.										K3			
		CO5: Construct real time smart IoT Application using embedded										K3			
Pre-requisites		-													
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1-Weak														CO/PSO Mapping	
Programme Outcomes(POs)													PSOs		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2	2	2	1	1				2	1	2	2	3	
CO2	3	2	2	2	2	1				2	1	1	2	3	
CO3	3	3	3	3	3	1				2	1	1	2	3	
CO4	3	2	2	2	1	1				2	1	2	2	3	
CO5	3	2	2	1	1	1				1	1	2	3	2	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III															
2. Assignment.															
3. End-Semester examinations															
Indirect															
1. Course - end survey															

Content of the syllabus			
Unit – I	FUNDAMENTALS OF IoT	Periods	9
Evolution of Internet of Things - IoT Enabling Technologies - IoT Levels - IoT Architectures- IoT and M2M – Classification of Sensors, Motion Sensors – Potentiometer, Ultrasonic Ranging.			
Unit - II	IoT PROTOCOLS	Periods	9
IoT Access Technologies: Physical and MAC Layers, Topology – Application layer protocols: CoAP and MQTT , Bluetooth - Design Methodology.			
Unit – III	IoT APPLICATION WITH RASPBERRY Pi	Periods	9
Arduino - Board Details, IDE Programming –Logical Design using Python, ESP8266 WiFi Module, Working with third party cloud thickspk, Working with local server.			
Unit - IV	BUILDING IoT WITH ARDUINO, ESP8266	Periods	9
Overview of Raspberry Pi – General-Purpose Input/Outputs – Sensors with Raspberry Pi – Actuators with Raspberry Pi -Raspberry Pi Programming examples.			
Unit – V	CASE STUDIES AND REAL WORLD APPLICATIONS	Periods	9
IoT Cloud Storage Models and Communication APIs - Cloud for IoT – Smart Agriculture - Power Utility Industry - Smart Grid - Smart and Connected Cities: Smart Lighting, Smart Parking, Smart Traffic Control and Commercial building automation.			
Total Periods			45
Text Books			
1.	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton & Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017.		
References			
1.	Arshdeep Bahga and Vijay Madisetti, Internet of Things - A hands-on approach, Universities Press, 2015.		
2.	Olivier Hersent, David Boswarthick and Omar Elloumi, The Internet of Things - Key Applications and Protocols, Wiley, 2012 (for Unit 2).		
3.	Adeel Javed, “Building Arduino Projects for the Internet of Things Experiments with Real-World Applications”, Apress, 2016		
4.	John C. Shovic, “Raspberry Pi IoT Projects Prototyping Experiments for Makers”, Apress, 2016		
E-Resources			
1.	https://developer.nvidia.com/embedded/learn/get-started-jetson-nano-devkit#next -projects		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme		B.E.			Programme code			101			Regulation			2023	
Department		CSE						Semester						VI	
Course Code		Course name					Periods per week			Credit		Maximum Marks			
U23CS619		Agile Methodologies					L	T	P	C	CA	ESE	Total		
							3	0	0	3	40	60	100		
Course Objective		The student should be made to, • Learn the background and origins of various agile concepts and methodologies. • Apply the fundamental principles and practices of agile software development on a project of interest and relevance. • Successfully manage a project in the business environment. • Select and use both classical and modern project management tools. • Understand and be able to integrate both the customer and the quality tools into project management.													
		At the end of the course, the student should be able to,													KL
		CO1: Explain the background and driving forces for taking an Agile approach to Software development													K2
		CO2: Recognize the business value of adopting Agile approaches													K2
		CO3: Drive development with unit tests using Test Driven Development													K3
Course Outcome		CO4: Apply design principles and refactoring to achieve Agility													K2
		CO5: Deploy automated build tools, version control and continuous integration													K4
		Pre-requisites													-
		CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											CO/PSO Mapping		
		Programme Outcomes (POs)											PSOs		
COs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1		3	2	1	1	3	1	-	-	-	1	1	3	3	2
CO2		3	2	1	2	3	1	-	-	-	1	2	3	1	2
CO3		3	1	1	2	3	1	-	-	-	1	1	3	2	2
CO4		3	2	1	2	3	1	-	-	1	1	2	3	1	2
CO5		3	2	1	2	3	1	-	-	1	1	2	3	3	2
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignments/ Quiz / Seminar 3. End-Semester examinations															
Indirect															
1. Course-end survey															

Content of the syllabus			
Unit-I	FUNDAMENTALS OF AGILE	Periods	9
The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.			
Unit-II	AGILE SCRUM FRAMEWORK	Periods	9
Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burndown chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.			
Unit- III	AGILE TESTING	Periods	9
The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester			
Unit- IV	CORBA	Periods	9
Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.			
Unit-V	INDUSTRY TRENDS	Periods	9
Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.			
Total Periods			45
Textbooks			
1.	Ken Schawber, Mike Beedle,—Agile Software Development with Scrum I, Pearson Publications, 2008.		
2.	Robert C. Martin,—Agile Software Development, Principles, Patterns and Practices I, Prentice Hall Publications, 2002.		
References			
1.	Lisa Crispin, Janet Gregory,—Agile Testing: A Practical Guide for Testers and Agile Teams I, Addison Wesley Publications, 2008.		
2.	Alistair Cockburn,—Agile Software Development: The Cooperative Game I, Addison Wesley Publications, 2006.		
3.	Mike Cohn,—User Stories Applied: For Agile Software I, Addison Wesley Publications, 2004.		
E-Resources			
1.	http://martinfowler.com/agile.html		
2.	https://www.tutorialspoint.com/agile/index.htm		
3.	https://www.tutorialspoint.com/scrum/index.htm		
4.	https://www.edureka.co/blog/what-is-agile-testing/		

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										 		
Programme			B.E.		Programme Code					107		Regulation		2023	
Department			Computer Science & Technology					Semester			VI				
Course Code			Course Name		Periods Per Week			Credit		Maximum Marks					
					L	T	P	C	CA		ESE	Total			
U19CT620			Internet of Things Laboratory		0	0	4	2	60		40		100		
Course Objective			The student should be made to, • Learn how to use various sensors to collect and process data • Design and develop IoT applications using Arduino for automation • Work with ESP8266 and Raspberry Pi to create wireless IoT solutions • Build real-time smart IoT applications for real-world use cases												
Course Outcome			At the end of the course, the student should										Knowledge Level		
			CO1: Develop simple IoT applications using various sensors.										K3		
			CO2: Implement IoT applications utilizing a variety of sensors.										K3		
			CO3: Design and build IoT applications using Arduino.										K3		
			CO4: Develop IoT solutions using ESP8266 and Raspberry Pi processors.										K3		
			CO5: Create real-time smart IoT applications.										K3		
Pre-requisites			-												
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
Programme Outcomes (POs)														PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	
CO1	3	3	3	3	3	1	1		2		1	3	3	3	
CO2	3	3	3	3	3				1			3	3	3	
CO3	3	3	3	3	3				1			3	3	3	
CO4	3	3	3	3	3							3	3	3	
CO5	3	3	3	3	3							3	3	3	

Course Assessment Methods Direct

Direct

1. Prelab and post lab test
2. End-Semester examinations

Indirect

1. Course - end survey

LIST OF EXPERIMENTS		
Internet of things		
ARDUINO		
1.	Study of Arduino Board and its IDE and the type of Sensors used for IoT applications	CO1

2.	Experiment using LED Blinking, Temperature Sensor(DHT 11 DHT 22),Pressure sensor, Heartrate sensors	CO1
3.	Experiment using Ultrasonic Sensor, Motion Sensor	CO1
RASPBERRY Pi –ESP 8266		
4.	Implement a Bluetooth-based IoT system (e.g., temperature sensor) that transmits data to a mobile app.	CO2
5.	Study ESP8266 WIFI module and implement a basic programming a. Blink LED b. Wifi Configuration c. Distance Measure	CO3
6.	Applications using Raspberry Pi a. Blink LED b. Stepper Motor Control	CO4
7.	Implementation of Reading sensor data using Raspberry Pi	CO4
8.	Smart Application development using ARDUINO	CO5
9.	Mini Project-Home Automation System	CO5
Total Periods		45
Text Books		
1.	Michael Margolis and Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 3rd Edition, O'Reilly Media, 2020	
2.	https://www.maxbotix.com/articles/how-ultrasonic-sensors-work.htm	

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205												
Programme	B.E.	Programme Code						101	Regulation				2023	
Department	COMPUTER SCIENCE AND ENGINEERING						Semester				VI			
Course Code	Course Name	Periods Per Week			Credit		Maximum Marks							
		L	T	P	C	CA	ESE	Total						
U23CS620	Mini Project-II	0	0	2	1	100	-	100						
Course Objective	The student should be made to, - To develop problem-solving and analytical skills through hands-on implementation. - To enhance proficiency in relevant tools, technologies, or programming languages. - To foster creativity and innovation in designing and implementing solutions. - To improve teamwork, communication, and project management abilities. - To document and present project outcomes in a professional format.													
	At the end of the course, the student should be able to,												Knowledge Level	
	CO1: Demonstrated proficiency in using specific tools, technologies, or programming languages.												K3	
	CO2: . Identify the problems, analysis, and solution design.												K3	
	CO3: Gain knowledge in experiencing collaborative work, effective communication, and time management.												K2	
CO4: Creation of project documentation, reports, and presentations in a professional manner.												K6		
CO5: Make the project in standard format and apply for publication												K3		
Pre-requisites	-													
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak														
COs	Programme Outcomes (POs)												CO/PSO Mapping	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	3	2	3	3			2		3		3	3	3
CO 2	3	3	3	3	3			2		3		3	3	3
CO 3	3	3	3	3	3			2		3		3	2	2
CO 4	2	3	2	3	3			2		3		3	2	2
CO 5	2	3	2	3	3			2		3		3	2	3
Course Assessment Methods														
Direct														
1. Project Reviews														
Indirect														
1. Course - end survey														

[illegible]

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations			
Indirect			
1. Course - end survey			
Content of the syllabus			
Unit – I	COA & DIGITAL SYSTEM DESIGN	Periods	9
Machine instructions and addressing modes. ALU, data path, and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory, and secondary storage; I/O interface (interrupt and DMA mode). Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).			
Unit - II	Data Structures	Periods	9
Introduction to Data Structures and Algorithms, Arrays and Linked Lists, Stacks and Queues, Trees (including Binary Trees and Binary Search Trees), Graphs, Hashing Techniques, and Sorting and Searching Algorithms.			
Unit – III	Theory of Computation & Compiler Design	Periods	9
Regular expressions and finite automata. Context-free grammar and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undesirability. Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimization, Data flow analyses: constant propagation, liveness analysis, common sub expression elimination.			
Unit - IV	Database Management Systems and Operating Systems	Periods	9
Introduction to Database Systems and Architecture, Data Models and Entity-Relationship (ER) Model, Relational Model and Relational Algebra, Structured Query Language (SQL), Database Design and Normalization, Transaction Management and Concurrency Control, Recovery Techniques, and Database Storage and Indexing Techniques. Introduction to Operating Systems and their Functions, System calls, processes, threads, inter-process communication, concurrency, and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.			
Unit – V	Data Communication Networks	Periods	9
OSI and TCP/IP Protocol Stacks, Basics of the packet, circuit, and virtual circuit switching ,Data link layer: framing, error detection, Medium Access Control, Ethernet bridging, shortest path, flooding, distance vector, and link state routing, Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT), Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.			
Total Periods			45
Text Books:			
1.	David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Elsevier (Morgan Kaufmann imprint), New Delhi, 6th Edition, 2021 (MIPS edition)		
2.	Seymour Lipschutz, “Data Structures with C”, Schaum’s Outlines Series, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 1st Edition		
3.	John C. Martin “Introduction to languages and the theory of computation”, Third edition, Mc Graw Hil, 2015		
4.	Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson Education, New Delhi, 7th Edition, 2016 Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, “Operating System Concepts”, Wiley India Pvt. Ltd., New Delhi, 10th Edition, 2025		
5.	Data Communications and Networking, Behrouz A. Forouzan , Fifth Edition TMH 2019.		
E-Resources:			
1.	https://gnindia.dronacharya.info/IT/3rdSem/Downloads/DataStructure/Books/DATA-STRUCTURE-BOOK-3.pdf		
2.	https://library.uc.edu.kh/userfiles/pdf/7.Fundamentals%20of%20Database%20Systems.pdf		
3.	https://www.mbit.edu.in/wp-content/uploads/2020/05/Operating_System_Concepts_8th_EditionA4.pdf		

Professional Elective courses(PEC) Vertical

VERTICAL I DATA SCIENCE

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205																																																																																																																																			
Programme	B.E./B.Tech.				Programme code				Regulation		2023																																																																																																																									
Department	Computer Science and Engineering						Semester				-																																																																																																																									
Course Code	Course name				Periods per week			Credit	Maximum Marks																																																																																																																											
U23CSV11	Data Visualization				L	T	P	C	CA	ESE	Total																																																																																																																									
					3	0	0	3	40	60	100																																																																																																																									
Course Objective	The student should be made to,																																																																																																																																			
	- Explore how to design and create data visualizations based on data available data modeling, data processing (such as aggregation and filtering) - Mapping data attributes to graphical attributes - To learn to evaluate the effectiveness of visualization designs, and think critically about each design decision - To create their own data visualizations, and learn to use Python visualization tools. - To design and develop interactive dashboards.																																																																																																																																			
Course Outcome	At the end of the course, the student should be able to,										KL																																																																																																																									
	CO1: Design and create data visualizations.										K6																																																																																																																									
	CO2: Conduct exploratory data analysis using visualization										K5																																																																																																																									
	CO3: Craft visual presentations of data for effective communication										K3																																																																																																																									
	CO4: Use knowledge of perception and cognition to evaluate visualization design alternatives										K3																																																																																																																									
	CO5: Integrate multiple visualization elements to create a cohesive, user-friendly cloud data dashboard.										K6																																																																																																																									
Pre-requisites	-																																																																																																																																			
<table><tr><th colspan="13">CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>1</td><td>2</td><td>2</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 2</td><td>2</td><td>1</td><td>2</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 3</td><td>1</td><td>0</td><td>3</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 4</td><td>3</td><td>1</td><td>3</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 5</td><td>2</td><td>1</td><td>3</td><td>2</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr></table>														CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping		COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	1	2	2	1	2							3	2	CO 2	2	1	2	3	2	2							3	2	CO 3	1	0	3	2	1	1							3	2	CO 4	3	1	3	3	2	2							3	2	CO 5	2	1	3	2	1	1							3	2
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping																																																																																																																							
COs	Programme Outcomes(POs)												PSOs																																																																																																																							
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2																																																																																																																						
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Course Assessment Methods Direct 1. Continuous Assessment Test I, II&III 2. Assignments / Seminar/Quiz 3. End-Semester examination Indirect 1. Course -end survey																																																																																																																																				

Content of the syllabus			
Unit– I	CREATING BASIC DATA VISUALIZATIONS	Periods	9
Creating Charts - Chart types -Bar Charts, Legends, Filters and Hierarchies - Line Charts - Highlight Tables - Heat Maps - Bullet Charts - Cumulative Sums with Waterfall Charts.			
Unit-II	CREATING MAPS	Periods	9
Creating Symbol Maps - Filled Maps - Density Maps - Map Layers - Maps embedded with Pie Charts			
Unit – III	CREATING ADVANCED DATA VISUALIZATIONS	Periods	9
Aggregate Functions - Calculated Fields - Aggregations in Calculated Fields - Text Operator - Data fields - Logical functions – Parameters - Types of calculations - Quick Table calculations - Level of detailed expression.			
Unit– IV	INTRODUCTION TO POWER BI	Periods	9
Power BI introduction and overview-Power BI Architecture-Introduction Power BI desktop and Power BI in Excel-Using data from Excel sheets>Create tables and Matrices-From table to chart. Interactive sorting, filtering and highlighting.-Working with bubble charts-Connecting with Data Introduction to Power BI Components: Power Query, Power Pivot.			
Unit– V	CREATING INTERACTIVE DASHBOARDS	Periods	9
Creating a Dashboard - Dashboard Title - Navigation Buttons - Dashboard Actions - Templates for visualizing Cloud data.			
Total Periods			45
References			
1.	Claus O. Wilke, “Fundamentals of Data Visualization”, O’Reilly, 2019		
2.	Davy Cielen, Arno D. B. Meysman and Mohamed Ali, “Introducing Data Science”,Manning Publications, 2016.		
3.	D J Patil, Hilary Mason & Mike Loukides, Ethics and Data Science, O’ Reilly, 2018.		
E-Resources			
1.	https://flowingdata.com/2017/01/24/one-dataset-visualized-25-ways/		
2.	https://www.tableau.com/learn/tutorials/ondemand/gettingstarted?playlist=554268&signin=4bec05bc7a876b95af7722b08fff9224		
3.	https://flowingdata.com/2017/01/24/one-dataset-visualized-25-ways/		

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U23CTV11		Data Warehousing and Data Mining			3	0	0	3	40		60	100																																																																																																																																							
Course Objective		The Main Objective of the course is, • Introduce core concepts of data warehousing, including architecture, modeling, and implementation. • Explain the fundamentals of data mining and techniques for data preprocessing. • Teach association rule mining, classification, and prediction methods for data analysis. • Explore clustering, outlier detection, and mining techniques for complex data types. • Provide insight into advanced data mining areas, tools, applications, and ethical impacts.																																																																																																																																																	
Course Outcome		At the end of the course, the student should be able to,										KL																																																																																																																																							
		CO1: Understand the basics of data warehousing, including its structure, modeling , and use in data analysis..										K1																																																																																																																																							
		CO2:. Know the fundamentals of data mining and use preprocessing techniques to get data ready for analysis.										K2																																																																																																																																							
		CO3: To understand and apply association rule mining, classification, and prediction techniques for analyzing data and making informed decisions.										K2																																																																																																																																							
		CO4: To use clustering and outlier detection methods to analyze complex data like time series and data streams.										K3																																																																																																																																							
		CO5:. To understand advanced data mining tools and applications, and recognize their real-world uses and ethical impacts.										K3																																																																																																																																							
Pre-requisites		-																																																																																																																																																	
<table><tr><th colspan="13">CO /PO Mapping</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th colspan="15">(3/2/1 indicates strength of correlation)3-Strong,2–Medium,1–Weak</th></tr><tr><th rowspan="2">Cos</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>2</td><td>1</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td><td>3</td><td>2</td></tr><tr><td>CO 2</td><td>3</td><td>3</td><td>2</td><td>2</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td><td>3</td><td>3</td></tr><tr><td>CO 3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>2</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 4</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>2</td><td>3</td></tr><tr><td>CO 5</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>3</td><td>1</td><td>1</td><td>1</td><td>3</td><td>2</td><td>2</td></tr></table>														CO /PO Mapping													CO/PSO Mapping		(3/2/1 indicates strength of correlation)3-Strong,2–Medium,1–Weak															Cos	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	2	1	1	1	-	-	-	-	-	-	1	3	2	CO 2	3	3	2	2	1	-	-	-	-	-	-	1	3	3	CO 3	3	3	3	2	2	-	-	-	-	-	-	2	3	3	CO 4	2	3	3	3	2	-	-	-	-	-	-	2	2	3	CO 5	2	2	2	2	2	2	1	3	1	1	1	3	2	2
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1.Course - end survey																																																																																																																																																			

Content of the syllabus			
Unit– I	Foundations of Data Warehousing and OLAP Essentials	Periods	9
Introduction to Data Warehouse - Multidimensional Data Model - Data Warehouse Architecture - Implementation - Data Warehousing to Data Mining - Efficient Methods for Data Cube Computation			
Unit–II	Data Mining Fundamentals and Data Preparation	Periods	9
Data Mining – Definition- Motivation – Importance - Kinds of Data – Functionalities –Preprocessing Cleaning – Integration – Transformation – Reduction - Discretization - Concept Hierarchy Generation			
Unit – III	Data Mining Techniques	Periods	9
Association Rule Mining: Introduction, Key concept &Application, Classification and Prediction: Efficient and Scalable Frequent Item set Mining Methods, Mining, Various Kinds of Association Rules, Association Rules, Market Basket Analysis, Apriori Algorithm, Tree Based Algorithms. Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines, Lazy Learners, Prediction Techniques, Regression Models.			
Unit -IV	Clustering Analysis	Periods	9
Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.			
Unit– V	Emerging Trends and Applications in Data Mining	Periods	9
Spatial Data Mining - Multimedia Data Mining - Text Mining - Mining World Wide Web – Data Mining Applications - Data Mining Systems Products and Research Prototypes - Social Impacts of Data Mining - Trends in Data Mining.			
Total Periods			45
TEXTBOOKS:			
1	Jiawei Han, Micheline Kamber, Jian Pei "Data Mining: Concepts and Techniques" 4th Edition, Morgan Kauffman Publisher, 2021, ISBN: 978-0128163524.		
2	Paulraj Ponniah, "Data Warehousing Fundamentals for IT Professionals", 2nd Edition, Wiley India Pvt. Ltd., 2010, ISBN: 978-8126525803		
REFERENCEBOOKS:			
1	Pang-Ning Tan, Michael Steinbach, Vipin Kumar "Introduction to Data Mining" 2nd Edition, Pearson Education / Addison-Wesley,2018		
2	Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining and OLAP",Tata McGraw Hill.		
3	David Hand, Heikki Mannila, Padhraic Smyth, "Principles of Data Mining",MIT Press		
E-RESOURCES:			
1	https://nptel.ac.in/courses/106105174		
2	https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining		
3	https://www.nesoacademy.org/		



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205



Programme	B.E/B.Tech.	Programme Code				Regulation	2023	
Department	CSE ,IT&CST				Semester		-	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTV12	Big Data Analytics	3	0	0	3	40	60	100
Course Objective	The main objective of this course is to: • To understand big data. • To learn and use NoSQL big data management. • To learn Map Reduce analytics using Hadoop and related tools. • To work with Map Reduce applications • To understand the usage of Hadoop related tools for Big Data Analytics							
Course Outcome	At the end of the course, the student should be able to,						Knowledge level	
	CO1: Describe big data and use cases from selected business domains.						K2	
	CO2: Explain NoSQL big data management.						K2	
	CO3: Install, configure, and run Hadoop and HDFS.						K3	
	CO4: Perform map-reduce analytics using Hadoop.						K3	
	CO5: Use Hadoop-related tools such as HBase, Cassandra, Pig, and Hive for big data analytics.						K3	
Pre-requisite	-							

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													CO/PSO Mapping	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	3	3	3	3				2	2	3	1	3	2
CO 2	3	3	2	3	2				2	2	3	3	3	2
CO 3	3	3	3	2	3				2	2	1	2	3	3
CO 4	2	3	3	3	3				2	2	3	2	3	2
CO 5	3	3	3	3	3				3	1	3	2	3	2

Course Assessment Method

Direct

1. Continuous Assessment Test I, II & III
2. Assignment / Quiz / Seminar
3. End-Semester examinations

Indirect

- 1.Course - end survey

Content of the syllabus

Unit – I	UNDERSTANDING BIG DATA	Periods	9
Introduction to big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data applications– big data technologies – introduction to Hadoop – open source technologies –			

cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics.			
Unit - II	NO SQL DATA MANAGEMENT	Periods	9
Introduction to NoSQL – aggregate data models – key-value and document data models – relationships – graph databases – schemaless databases – materialized views – distribution models – master-slave replication – consistency - Cassandra – Cassandra data model – Cassandra examples – Cassandra clients			
Unit – III	MAP REDUCE APPLICATIONS	Periods	9
MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats.			
Unit - IV	BASICS OF HADOOP	Periods	9
Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures - Cassandra – Hadoop integration.			
Unit – V	HADOOP RELATED TOOLS	Periods	9
Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.			
Total Periods			45
Text Books:			
1.	Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.		
2.	Eric Sammer, "Hadoop Operations", O'Reilley, 2012.		
3.	Sadalage, Pramod J. “NoSQL distilled”, 2013		
REFERENCE BOOKS			
1	E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.		
2	Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.		
3	Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.		
4	Alan Gates, "Programming Pig", O'Reilley, 2011.		
E-Resources			
1.	https://www.javatpoint.com/what-is-big-data		
2.	https://www.geeksforgeeks.org/introduction-to-nosql/		
3.	https://youtu.be/Bupt4F06RWQ?si=yHDfFWOHXyMhiRnr		
4.	https://youtu.be/aReuLtY0YMI?si=y5sMoufOEdv9rxRJ		
5.	https://www.geeksforgeeks.org/top-10-hadoop-analytics-tools-for-big-data/		

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Programme		B.E/B.Tech.		Programme Code						Regulation		2023	
Department		CSE ,IT&CST						Semester		-			
Course Code		Course Name			Periods Per Week			Credit	Maximum Marks				
					L	T	P	C	CA	ESE	Total		
U23CTV13		Exploratory Data Analysis			3	0	0	3	40	60	100		
Course Objective		The Main Objective of the course is, - Understand the fundamentals of data science and the importance of EDA in decision-making. - Use charts and graphs to visually explore and interpret data trends. - Learn techniques to clean, transform, and prepare data for analysis or modeling. - Apply statistical methods to study relationships in single and multiple variable datasets. - Perform complete EDA on real data and develop, test, and deploy basic machine learning models.											
Course Outcome		At the end of the course, the student should be able to,										KL	
		CO1: Learn the basics of data science and how exploratory data analysis helps in making smart decisions.										K1	
		CO2: Use charts and graphs to understand and explain data visually.										K2	
		CO3: Learn how to clean and prepare data for further analysis or building models.										K2	
		CO4: Use simple statistics to study and understand different types of data sets.										K2	
		CO5: Do full data analysis on real data and build and test basic machine learning models										K3	
Pre-requisites		-											

CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping	
Cos	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	1	-	1	-	-	-	-	-	-	1	2	1
CO 2	3	2	2	-	2	-	-	-	-	-	-	1	2	2
CO 3	3	3	2	2	2	-	-	-	-	-	-	2	3	2
CO 4	3	3	2	2	2	-	-	-	-	-	-	2	3	3
CO 5	2	3	3	3	3	1	-	1	2	2	2	3	3	3

Course Assessment Methods	
Direct	
1.Continuous Assessment Test I, II & III 2.Assignment / Quiz / Seminar 3.End Semester Examination	
Indirect	
1.Course - end survey	

Content of the syllabus			
Unit– I	Basics of Data Science and Exploratory Data Analysis	Periods	9
Exploratory Data Analysis Fundamentals, Understanding data science, The significance of EDA, Steps inEDA, Making sense of data, Numerical data, Categorical data, Measurement scales, Comparing EDA withclassical and Bayesian analysis, Software tools available for EDA, Getting started with EDA.			
Unit–II	Visual Aids and Practical Implementation in EDA	Periods	9
Visual Aids for EDA, Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar chart, Histogram, Choosing the best chart Case Study: EDA with Personal Email, Technical requirements, Loading the dataset, Data transformation, Data cleansing, Applying descriptive statistics, Data refactoring, Data analysis.			
Unit – III	Data Transformation and Preprocessing Techniques	Periods	9
Data Transformation, Merging database-style dataframes, Concatenating along with an axis, Merging onindex, Reshaping and pivoting, Transformation techniques, Handling missing data, Mathematical operations with NaN, Filling missing values, Discretization and binning, Outlier detection and filtering, Permutation and random sampling, Benefits of data transformation, Challenges.			
Unit – IV	Statistical Foundations for Data Analysis and Interpretation	Periods	9
Descriptive Statistics, Distribution function, Measures of central tendency, Measures of dispersion, Types of kurtosis, Calculating percentiles, Quartiles, Grouping Datasets, Correlation, Understanding univariate, bivariate, multivariate analysis, Time Series Analysis.			
Unit– V	Model Development, Evaluation, and EDA Case Study	Periods	9
Model Development and Evaluation, Unified machine learning workflow, Data preprocessing, Data preparation, Training sets and corpus creation, Model creation and training, Model evaluation, Best model selection and evaluation, Model deployment Case Study: EDA on Wine Quality Data Analysis			
Total Periods			45
TEXTBOOKS:			
1.	Suresh Kumar Mukhiya, Usman Ahmed, Hands-On Exploratory Data Analysis with Python, Packt Publishing, 2020		
REFERENCEBOOKS:			
1.	Ronald K. Pearson, Exploratory Data Analysis Using R, CRC Press, 2020.		
2.	Radhika Datar, Harish Garg, Hands-On Exploratory Data Analysis with R: Become an expert in exploratory data analysis using R packages, Ist Edition, Packt Publishing, 2019		
E-RESOURCES:			
1.	https://www.youtube.com/results?search_query=exploratory+data+analysis		
2.	https://www.youtube.com/c/joshstarmer		
3.	https://www.youtube.com/channel/UCBJycsmduvYEL83R_U4JriQ		
4.	https://www.youtube.com/user/analyticsvidhya		

Content of the syllabus			
Unit– I	Introduction to Social Media Analytics	Periods	9
Overview of Social Media Analytics, Importance and Applications in Business and Society, Types of Social Media Platforms and Data, Basics of Social Network Analysis (SNA), Key Metrics and KPIs in Social Media, Data Collection Methods (APIs, Web Scraping), Ethical and Privacy Considerations in Social Media Data			
Unit–II	Social Media Data Preprocessing and Visualization	Periods	9
Data Cleaning and Transformation, Handling Missing and Noisy Data, Text Mining Basics: Tokenization, Stop words, Stemming, Lemmatization, Sentiment Analysis Techniques, Visualization Techniques: Word Clouds, Network Graphs, Time Series, Tools: Python (Pandas, Matplotlib, NetworkX), Tableau			
Unit – III	Text Analytics and Sentiment Analysis	Periods	9
Natural Language Processing (NLP) Overview, Bag-of-Words and TF-IDF Representations, Sentiment Classification Models (Naive Bayes, SVM), Topic Modeling (LDA), Emotion Detection, Case Studies: Twitter Sentiment Analysis, Brand Monitoring			
Unit – IV	Social Network Analysis and Community Detection	Periods	9
Graph Theory Basics, Network Metrics: Degree, Centrality, Closeness, Betweenness, Community Detection Algorithms (Modularity, Girvan-Newman), Influence and Information Diffusion Models, Social Media Campaign Analysis, Tools: Gephi, NetworkX			
Unit– V	Predictive Analytics and Reporting	Periods	9
Predictive Modeling using Social Media Data, Classification and Regression Models, Real-time Analytics and Trend Detection, Dashboard Design and Reporting, Case Studies and Project Presentation, Ethical Reporting and Interpretation.			
Total Periods			45
TEXTBOOKS:			
1.	Marshall Sponder, “ <i>Social Media Analytics: Effective Tools for Building, Interpreting, and Using Metrics</i> ”, Routledge, 2013		
2.	Ranganathan Srinivasan, “ <i>Social Media Analytics: Techniques and Insights for Extracting Business Value</i> ”, Springer, 2021		
3.	Matthew A. Russell, “Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Instagram, GitHub, and More”, 3rd Edition, O’Reilly Media, 2017		
REFERENCEBOOKS:			
1.	Gohar F. Khan, Ismail Gunes, “ <i>Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media</i> ”, Wiley, 2019		
2.	Ajit Kumar, Michael W. Berry, “ <i>Practical Social Network Analysis with Python</i> ”, Apress, 2020, I		
E-RESOURCES:			
1.	https://www.coursera.org/specializations/social-media-analytics		
2.	https://www.kaggle.com/datasets?search=social+media+analytics		
3.	https://snap.stanford.edu/data/		

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Programme		B.E. / B.Tech.		Programme Code						Regulation		2023			
Department		CSE ,IT&CST						Semester		-					
Course Code		Course Name				Periods Per Week			Credit	Maximum Marks					
						L	T	P	C	CA		ESE	Total		
U23CTV15		Predictive Analytics				3	0	0	3	40		60	100		
Course Objective		The Main objective of this course is to:													
		• Introduce fundamental concepts of predictive analytics and its role in business decision-making. • Familiarize students with linear regression, logistic regression, segmentation techniques, and their applications. • Develop understanding of supervised and unsupervised learning models including decision trees. • Enable students to apply time series methods and feature extraction techniques for forecasting. • Provide knowledge and skills for effective documentation, knowledge sharing, and corporate record management.													
		At the end of the course, the student should be able to,												Knowledge level	
		CO1: Understand the concepts, tools, and environment of predictive analytics and apply linear regression techniques for business modeling..												K2	
		CO2: Build, interpret, and evaluate logistic regression models and differentiate between supervised and unsupervised learning techniques.												K3	
		CO3: Apply objective segmentation techniques including decision trees for classification and regression tasks.												K3	
Course Outcome		CO4: Analyze time series data, apply forecasting methods, and perform feature extraction for predictive tasks.												K4	
		CO5: Prepare professional documents following standard formats and processes for knowledge sharing and corporate communication.												K2	
		Pre-requisites												-	
CO /PO Mapping (3/2/1indicates strength of correlation) 3-Strong, 2–Medium, 1–Weak														CO/PSO Mapping	
COs		Programme Outcomes (POs)												PSOs	
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CO 1		3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 2		2	3	3	-	-	-	-	-	-	-	-	-	2	1
CO 3		2	3	3	-	-	-	-	-	-	-	-	-	3	3
CO 4		1	2	2	3	-	-	-	-	-	-	-	-	3	3
CO 5		1	1	-	-	-	-	-	-	3	3	-	-	2	3

Course Assessment Methods-**Direct**

1. Continuous Assessment Test I, II & III
2. Assignment / Quiz / Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit – I	INTRODUCTION TO PREDICTIVE ANALYTICS & LINEAR REGRESSION	Periods	9
What and Why Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of data and variables, Data Modeling Techniques, Missing imputations etc. Need for Business Modeling, Regression — Concepts, Linear property-assumptions-Least Square Estimation, Variable Rationalization, and Model Building etc.			
Unit - II	LOGISTIC REGRESSION	Periods	9
Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc. Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Over fitting, Pruning and complexity, Multiple Decision Trees etc.			
Unit – III	OBJECTIVE SEGMENTATION	Periods	9
Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Over fitting, Pruning and complexity, Multiple Decision Trees etc. Develop Knowledge, Skill and Competences (NOS 9005) Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping. etc.			
Unit - IV	TIME SERIES METHODS I FORECASTING,FEATURE EXTRACTION	Periods	9
Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height. Average, Energy etc and Analyze for prediction.			
Unit – V	WORKING WITH DOCUMENTS	Periods	9
Standard Operating Procedures for documentation and knowledge sharing, Defining purpose and scope documents, Understanding structure of documents — case studies, art ideas, white papers, technical reports, minutes of meeting etc., Style and format, Intellectual Property and Copyright, Document preparation tools — Vision, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base, Peer review and feedback.			
Total Periods			45
Text Books:			
1	Student’s Handbook for Associate Analytics-Ill.		
REFERENCE BOOKS			
1	Gareth James’ Daniela Witten Trevor Hastie Robert Tibshirani. An Introduction to Statistical Learning with Applications in R		
2	Max Kuhn & kjell Johnson An introduction to applied predictive modeling,implementing predictive models in R		
3	Foster provost & tom Fawcett.principles behind data-driven business decisions.		
E-Resources			
1	www.predictiveanalyticsworld.com/predictive_analytics.php		
2	www.sas.com/en_us/insights/analytics/predictive-analytics.html		
3	www.inc.com/internet/articles/201006/chittoor.html		
4	www.kaushik.net/.../data-mining-and-predictive-analytics-on-web-data-works-nyet		
5	https://hbr.org/2014/09/a-predictive-analytics-prime		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme		B.E. / B.Tech.		Programme Code						Regulation		2023			
Department		CSE ,IT&CST						Semester		-					
Course Code		Course Name				Periods Per Week			Credit	Maximum Marks					
						L	T	P	C	CA		ESE	Total		
U23CTV16		Image and Video Analytics				3	0	0	3	40		60	100		
Course Objective		The main objective of this course is to: - Introduce the fundamentals of image processing and transforms - Discuss the concepts of image enhancement and restoration - Acquire knowledge on object detection using machine learning - Acquire knowledge on face detection and recognition - Apply motion estimation methods in video processing and utilize the concepts of image and video processing for practical applications													
Course Outcome		At the end of the course, student should be able to,										Knowledge Level			
		CO1: Demonstrate the basics of digital image processing fundamentals and transforms										K1			
		CO2: Design 2D filters and apply it for image enhancement and restoration										K1			
		CO3: Apply image compression and segmentation methods on digital images										K2			
		CO4: Compile various motion techniques used in video coding										K2			
		CO5: Implement the concepts of digital image, video processing and their applications										K3			
Pre-requisites		-													
CO /PO Mapping (3/2/1indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														CO/PSO Mapping	
		Programme Outcomes (POs)												PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	
CO 1	1	-	-	2	-	-	-	-	-	-	-	2	2	-	
CO 2	3	3	-	3	3	-	-	-	-	-	-	2	2	2	
CO 3	2	3	-	3	3	-	-	-	-	-	-	2	-	2	
CO 4	3	2	-	3	3	-	-	-	-	-	-	2	-	-	
CO 5	2	-	-	-	-	-	-	-	-	-	-	-	2	-	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations															
Indirect															
1. Course - end survey															

Content of the syllabus			
Unit – I	Digital Image Fundamentals	Periods	9
Introduction to Computer Vision -Image representation and image analysis tasks- Fundamental steps in digital image processing – Components of an image processing system-Structure of human eye, Image formation- Image representations -digitization – properties– Levels of image data representation – Traditional and Hierarchical image data structures.			
Unit - II	Image Pre-Processing	Periods	9
Local pre-processing - Image smoothing - Edge detectors - Zero-crossings of the second derivative - Scale in image processing - Canny edge detection - Parametric edge models - Edges in multi speralct images - Local pre-processing in the frequency domain - Line detection by local preprocessing operators - Image restoration			
Unit – III	Object Detection Using Machine Learning	Periods	9
Object detection- Object detection methods – Deep Learning framework for Object detection bounding box Approach-Intersection over Union (IoU) -Deep Learning Architectures-R-CNN-Faster R-CNN-You Only Look Once(YOLO)-Salient Features-Loss Functions-YOLO architectures			
Unit - IV	Face Detection and Recognition	Periods	9
Face Tracking Vs Face Analysis-Face Detection Vs. Face Recognition-Common Approaches to Face Detection-Face Detection Technologies- LBPH Algorithm Process -Uses of Face Detection-Advantages of Face Detection-Popular Face Detection Software-			
Unit – V	Video Analytics	Periods	9
Basic Steps of Video Processing- Simultaneous Motion Estimation and Segmentation, Motion Tracking, Multi-target/Multi-camera tracking -Video Analysis Action Recognition, Video based rendering, Context and scene understanding. Case Study: Surveillance - Advanced Driver Assistance System			
Total Periods			45
Text Books:			
1	Vaibhav Verdhhan,(2021, Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras,Apress 2021		
2	Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing, Analysis, and Machine Vision, 4nd edition, Thomson Learning, 2013.		
REFERENCE BOOKS			
1	D. A. Forsyth, J. Ponce, “Computer Vision: A Modern Approach”, Pearson Education, 2003.		
2	E. R. Davies, (2012), “Computer & Machine Vision”, Fourth Edition, Academic Press		
3	Caifeng Shan, FatihPorikli, Tao Xiang, Shaogang Gong, “Video Analytics for Business Intelligence”, Springer, 2012.		
E-Resources			
1	http://homepages.inf.ed.ac.uk/rbf/CVonline/Imagedbase.htm		
2	https://www.cs.cmu.edu/~cil/v-images.html		
3	http://www.imageprocessingplace.com/root_files_V3/image_databases.htm		

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Programme		B.E. / B.Tech.		Programme Code								Regulation		2023		
Department		CSE ,IT&CST										Semester		-		
Course Code		Course Name				Periods Per Week			Credit		Maximum Marks					
						L	T	P	C	CA		ESE	Total			
U23CTV17		Recommender Systems				3	0	0	3	40		60	100			
Course Objective		The main objective of this course is to: - Understand basic techniques and problems in the field of recommender systems - Learn about content-based recommendation systems - Familiarize the knowledge based recommendation and hybrid approaches - Acquire knowledge on attack-resistant recommender systems - Evaluating Recommender System														
Course Outcome		At the end of the course, student should be able to,												Knowledge Level		
		CO1: Demonstrate the basics techniques and problems in the field of recommender systems												K1		
		CO2: Discuss about content-based recommendation systems												K1		
		CO3: Illustrate the knowledge based recommendation and hybrid approaches												K2		
		CO4: Discuss about attack-resistant recommender systems												K2		
		CO5: Implement and evaluate recommender systems.												K3		
Pre-requisites		-														
CO /PO Mapping (3/2/1indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														CO/PSO Mapping		
COs		Programme Outcomes (POs)												PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	
CO 1		1			2								2	2		
CO 2		3	3		3	3							2	2	2	
CO 3		2	3		3	3							2		2	
CO 4		3	2		3	3							2			
CO 5		2												2		
Course Assessment Methods																
Direct																
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations																
Indirect																
1. Course - end survey																

Content of the syllabus			
Unit – I	Introduction	Periods	9
Introduction and basic taxonomy of recommender systems – Traditional and non-personalized Recommender Systems – Data mining methods for recommender systems- similarity measures- python tools available for implementation - Dimensionality reduction – Singular Value Decomposition (SVD).			
Unit - II	Content-Based Recommendation Systems	Periods	9
High-level architecture of content-based systems – Item profiles, Representing item profiles, Methods for learning user profiles, Similarity-based retrieval, and Classification algorithms- Clustering Based Algorithms in Recommendation System-Real time applications			
Unit – III	Knowledge Based Recommendation And Hybrid Approaches	Periods	9
Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders. Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies			
Unit - IV	Attack-Resistant Recommender Systems	Periods	9
Introduction – Types of Attacks and mitigation – Detecting attacks on recommender systems – Individual attack - Group attack – Strategies for robust recommender design – Robust recommendation algorithms- preventing attacks using the CAPTCHAs			
Unit – V	Evaluating Recommender System	Periods	9
Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centred metrics.			
Total Periods			45
Text Books:			
1	Charu C. Aggarwal, Recommender Systems: The Textbook, Springer, 2016.		
2	Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, Mining of massive datasets, 3rd edition, Cambridge University Press, 2020.		
Reference Books			
1	Dietmar Jannach , Markus Zanker , Alexander Felfernig and Gerhard Friedrich , Recommender Systems: An Introduction, Cambridge University Press (2011), 1st ed.		
2	Ricci F., Rokach L., Shapira D., Kantor B.P., Recommender Systems Handbook, Springer(2011), 1st ed.		
3	Manouselis N., Drachsler H., Verbert K., Duval E., Recommender Systems For Learning, Springer (2013), 1st ed		
E-Resources			
1	https://en.wikipedia.org/wiki/Recommender_system		
2	https://developers.google.com/machine-learning/recommendation/overview/types		
3	https://onlinecourses.nptel.ac.in/noc24_ge35/preview		

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Programme		B.E. / B.Tech.		Programme Code						Regulation		2023			
Department		CSE ,IT&CST						Semester				-			
Course Code		Course Name			Periods Per Week			Credit	Maximum Marks						
					L	T	P	C	CA		ESE	Total			
U23CTV18		Storage Technologies			3	0	0	3	40		60	100			
Course Objective		The main objective of this course is to: • Characterize the functionalities of logical and physical components of storage • Describe various storage networking technologies • Identify different storage virtualization technologies • Discuss the different backup and recovery strategies • Understand common storage management activities and solutions													
Course Outcome		At the end of the course, the student should be able to,										Knowledge level			
		CO1: Demonstrate the fundamentals of information storage management and various models of Cloud infrastructure services and deployment										K4			
		CO2: Illustrate the usage of advanced intelligent storage systems and RAID										K2			
		CO3: Interpret various storage networking architectures - SAN, including storage subsystems and virtualization										K4			
		CO4: Examine the different role in providing disaster recovery and remote replication technologies										K2			
		CO5: Infer the security needs and security measures to be employed in information storage management										K4			
Pre-requisites		-													
CO / PO Mapping (3/2/1indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														CO/PSO Mapping	
CO's	Programme Outcomes (PO's)												PSO's		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	
CO 1	1	2	1	3	3	-	-	-	1	1	1	3	1	2	
CO 2	3	1	2	3	3	-	-	-	3	2	3	2	2	3	
CO 3	1	1	3	2	2	-	-	-	3	1	1	2	2	3	
CO 4	3	2	1	2	2	-	-	-	1	1	3	1	3	2	
CO 5	1	3	2	1	2	-	-	-	1	2	3	1	3	2	
Course Assessment Method															
Direct															
1.Continuous Assessment Test I, II & III 2.Assignment / Quiz / Seminar 3.End-Semester examinations															
Indirect															
1.Course - end survey															

Content of the syllabus			
Unit – I	INTRODUCTION	Periods	9
Digital data and its types, Information storage, Key characteristics of data centre and Evolution of computing platforms Big data analytics, Social networking and mobile computing, Characteristics of third platform infrastructure and Imperatives for third platform transformation. Data Centre Environment: Building blocks of a data centre, Compute systems and compute virtualization and Software-defined data centre			
Unit – II	INTELLIGENT STORAGE SYSTEMS AND RAID	Periods	9
5 Components of an intelligent storage system, Components, addressing, and performance of hard disk drives and solid-state drives, RAID, Types of intelligent storage systems, Scale-up and scale out storage Architecture.			
Unit – III	STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION	Periods	9
Fiber Channel SAN: FC SAN components and architecture, FC SAN topologies (Point-to-Point, Switched Fabric), zoning (Introduction only), Virtualization in FC SAN environment. Internet Protocol SAN: iSCSI protocol, network components, and connectivity, VLAN (Introduction only). Fiber Channel over Ethernet SAN: Components of FCoE SAN, FCoE SAN connectivity, FCoE architecture			
Unit – IV	BACKUP, ARCHIVE AND REPLICATION	Periods	9
Introduction to Business Continuity, Backup architecture, Backup targets and methods, Data deduplication, Cloud-based and mobile device backup, Data archive, Uses of replication and its characteristics, Compute based, storage-based, and network-based replication, Data migration, Disaster Recovery as a Service (DRaaS).			
Unit – V	SECURING STORAGE INFRASTRUCTURE	Periods	9
Information security goals, Storage security domains, Threats to a storage infrastructure, Security controls to protect a storage infrastructure, Governance, risk, and compliance, Storage infrastructure management functions, Storage infrastructure management processes			
Total Periods			45
Text Books:			
1.	EMC Corporation, Information Storage and Management, Wiley, India		
2.	Jon Tate, Pall Beck, Hector Hugo Ibarra, Shanmuganathan Kumaravel and Libor Miklas, Introduction to Storage Area Networks, Ninth Edition, IBM - Redbooks, December 2017		
REFERENCE BOOKS			
1.	"Fundamentals of Storage Technologies" by Sachi Choudhary		
2.	Storage Systems" by Alexander Thomasian		
E-Resources			
1.	https://www.geeksforgeeks.org/dbms/raid-redundant-arrays-of-independent-disks/		

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Programme		B.E/B.Tech.		Programme Code					Regulation		2023																																																																																																																									
Department		CSE ,IT&CST						Semester		-																																																																																																																										
Course Code		Course Name		Periods Per Week			Credit	Maximum Marks																																																																																																																												
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U23CTV21		Computer Vision		3	0	0	3	40		60	100																																																																																																																									
Course Objective		The Main Objective of the course is, - To review image processing techniques for computer vision - To know various features and recognition techniques - To understand shape and region analysis. - To apply three-dimensional image analysis techniques. - Study real world applications of computer vision algorithms																																																																																																																																		
		At the end of the course, the student should be able to,										KL																																																																																																																								
		CO1: Know the various image processing fundamentals and transformation techniques applied to images.										K1																																																																																																																								
		CO2: Explain the feature extraction, segmentation and object recognition methods.										K2																																																																																																																								
		CO3: Perform shape analysis and Implement boundary tracking techniques										K2																																																																																																																								
Course Outcome		CO4: Apply 3D vision techniques for real time applications										K3																																																																																																																								
		CO5: Apply vision techniques to real time applications.										K2																																																																																																																								
Pre-requisites		-																																																																																																																																		
<table><tr><th colspan="13">CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2-Medium,1-Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">Cos</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td>2</td></tr><tr><td>CO 2</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td>2</td></tr><tr><td>CO 3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td>2</td></tr><tr><td>CO 4</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td>2</td></tr><tr><td>CO 5</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td>2</td></tr></table>														CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping		Cos	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	2	2	2	2	1						2	3	2	CO 2	3	2	2	3	2	3						2	3	2	CO 3	3	2	2	2	2	3						2	3	2	CO 4	3	2	2	3	2	3						2	3	2	CO 5	3	2	2	3	2	3						2	3	2
CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping																																																																																																																							
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1.Course - end survey																																																																																																																																				

Content of the syllabus			
Unit– I	IMAGE PROCESSING FOUNDATIONS	Periods	9
Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture			
Unit–II	FEATURE DETECTION, MATCHING AND SEGMENTATION	Periods	9
Points and patches – Edges – Lines – Segmentation – Active contours – Split and merge – Mean shift and mode finding – Normalized cuts – Graph cuts and energy-based methods.			
Unit – III	SHAPES AND REGIONS	Periods	9
Binary shape analysis – connectedness – object labeling and counting – size filtering – skeletons and thinning – boundary tracking procedures – handling occlusion – boundary length measures – boundary descriptors – chain codes			
Unit – IV	3D VISION AND MOTION	Periods	9
Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – parametric motion– spline based motion			
Unit– V	APPLICATIONS	Periods	9
Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.			
Total Periods			45
TEXTBOOKS:			
1.	Richard Szeliski, Computer Vision: Algorithms and Applications, Second Edition, 2021		
2.	D. L. Baggio et al., Mastering Open CV with Practical Computer Vision Projects, Packt Publishing, 2012..		
3.	Digital Image Processing Author: Rafel C. Gonzalez and Richard E. Woods, Publisher: Pearson Education		
REFERENCEBOOKS:			
1.	E. R. Davies, Computer and Machine Vision, Fourth Edition, Academic Press, 2012.		
2.	Feature Extraction & Image Processing for Computer Vision, Author: Mark Nixon and Alberto S. Aquado, Third Edition, Academic Press, 2012		
E-RESOURCES:			
1.	https://www.ibm.com/think/topics/computer-vision		
2.	https://www.geeksforgeeks.org/computer-vision/		
3.	ws.amazon.com/what-is/computer-vision/		

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Programme	B.E. / B.Tech.	Programme Code			107	Regulation	2023								
Department	CSE ,IT&CST				Semester		-								
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks									
		L	T	P	C	CA	ESE	Total							
U23CTV22	Knowledge Engineering	3	0	0	3	40	60	100							
Course Objective	The student should be made to ● To understand the basics of Knowledge Engineering. ● To discuss methodologies and modeling for Agent Design and Development. ● To design and develop ontologies. ● To apply reasoning with ontologies and rules. ● To understand learning and rule learning.														
Course Outcome	At the end of the course, the student should be able to,						Knowledge Level								
	CO1: Understand and apply reasoning techniques under uncertainty						K2								
	CO2: Design and model intelligent systems.						K3								
	CO3: Develop and manage ontologies.						K2								
	CO4: Implement reasoning mechanisms using ontologies and rules						K3								
	CO5: Apply machine learning techniques						K4								
Pre-requisites	-														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
Programme Outcomes (POs)														PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	
CO1	2	2	3	2	1	-	-	-	2	1	1	1	2	1	
CO2	3	1	1	1	1	-	-	-	2	3	3	3	3	1	
CO3	3	2	3	2	1	-	-	-	2	1	1	2	2	3	
CO4	1	2	3	2	-	-	-	-	3	2	3	3	1	2	
CO5	1	1	3	3	2	-	-	-	1	3	3	1	2	2	

Course Assessment Methods Direct	
Direct	
1. Continuous Assessment Test I, II & III	
2. Assignment.	
3. End-Semester examinations	
Indirect	
1.Course - end survey	

Course Assessment Methods Direct

Direct	
1. Continuous Assessment Test I, II & III 2. Assignment. 3. End-Semester examinations	
Indirect	
1.Course - end survey	

Content of the syllabus			
Unit – I	REASONING UNDER UNCERTAINTY	Periods	9
Introduction – Abductive reasoning – Probabilistic reasoning: Enumerative Probabilities – Subjective Bayesian view – Belief Functions – Baconian Probability – Fuzzy Probability – Uncertainty methods - Evidence-based reasoning – Intelligent Agent – Mixed-Initiative Reasoning – Knowledge Engineering.			
Unit – II	METHODOLOGY AND MODELING	Periods	9
Conventional Design and Development – Development tools and Reusable Ontologies – Agent Design and Development using Learning Technology – Problem Solving through Analysis and Synthesis – Inquiry-driven Analysis and Synthesis – Evidence-based Assessment – Believability Assessment – Drill-Down Analysis, Assumption-based Reasoning, and What-If Scenarios.			
Unit – III	DESIGN AND DEVELOPMENT	Periods	9
Concepts and Instances – Generalization Hierarchies – Object Features – Defining Features – Representation – Transitivity – Inheritance – Concepts as Feature Values – Ontology Matching. Design and Development Methodologies – Steps in Ontology Development – Domain Understanding and Concept Elicitation – Modelling-based Ontology Specification.			
Unit – IV	REASONING WITH ONTOLOGIES AND RULES	Periods	9
Production System Architecture – Complex Ontology-based Concepts – Reduction and Synthesis rules and the Inference Engine – Evidence-based hypothesis analysis – Rule and Ontology Matching – Partially Learned Knowledge – Reasoning with Partially Learned Knowledge.			
Unit – V	LEARNING AND RULE LEARNING	Periods	9
Machine Learning – Concepts – Generalization and Specialization Rules – Types – Formal definition of Generalization. Modelling, Learning and Problem Solving – Rule learning and Refinement – Overview – Rule Generation and Analysis – Hypothesis Learning.			
Total Periods			45
Text Books			
1.	Gheorghe Tecuci, Dorin Marcu, Mihai Boicu, David A. Schum, Knowledge Engineering Building Cognitive Assistants for Evidence-based Reasoning, Cambridge University Press, First Edition, 2016.		
2.	Ronald J. Brachman, Hector J. Levesque: Knowledge Representation and Reasoning, Morgan Kaufmann		
References			
1.	Ela Kumar, Knowledge Engineering, I K International Publisher House, 2018.		
2.	John F. Sowa: Knowledge Representation: Logical, Philosophical, and Computational Foundations, Brooks/Cole, Thomson Learning.		
3.	King , Knowledge Management and Organizational Learning , Springer, 2009.		
4.	Jay Liebowitz, Knowledge Management Learning from Knowledge Engineering, 1st Edition.		
5.	Ronald J. Brachman, Hector J. Levesque: Knowledge Representation and Reasoning, Morgan Kaufmann		
E-Resources			
1.	https://plato.stanford.edu/entries/knowledge-engineering/		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205												
Programme		B.E. /B.Tech.					Programme code			Regulation			2023	
Department		CSE ,IT&CST							Semester			-		
Course code		Course name					Periods per week			Credit	Maximum Marks			
							L	T	P	C	CA	ESE	Total	
U23CTV23		Natural Language Processing					3	0	2	4	50	50	100	
Course Objective		The main objective of this course is to: - To learn the fundamentals of natural language processing. - To learn the word level analysis methods. - To explore the syntactic analysis concepts. - To understand the semantics and pragmatics. - To learn to analyze discourses and Lexical Resources.												
Course Outcome		At the end of the course, the students will be able to,											KL	
		CO1: To know the basics of Artificial intelligence and intelligent agents.											K1	
		CO2: To know the basics of Artificial intelligence and intelligent agents.											K2	
		CO3: To apply the concepts of AI in Game playing techniques											K3	
		CO4: To carry out and apply the concept of Logic programming and represent the different knowledge representation techniques for various AI applications											K2	
Pre-requisites		-												
CO's	PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	3	2	3	3	-	1	-	-	-	1	3	3
CO2	2	3	3	2	3	3	-	1	-	-	-	1	3	3
CO3	2	3	3	2	3	3	-	1	-	-	-	1	3	3
CO4	2	3	3	2	3	3	-	1	-	-	-	1	3	3
CO5	2	3	3	2	3	3	-	1	-	-	-	1	3	3
Course Assessment Methods Direct														
Direct														
1. Continuous Assessment Test I, II & III 2. Assignment. 3. End-Semester examinations														
Indirect														
1.Course - end survey														

Content of the syllabus			
Unit – I	OVERVIEW AND MORPHOLOGY	Periods	9
Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM -Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance			
Unit – II	WORD LEVEL AND SYNTACTIC ANALYSIS	Periods	9
Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.			
Unit – III	SYNTACTIC ANALYSIS	Periods	9
Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar– Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs -Feature structures, Unification of feature structures.			
Unit – IV	SEMANTICS AND PRAGMATICS	Periods	9
Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, sectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.			
Unit – V	DISCOURSE ANALYSIS AND LEXICAL RESOURCES	Periods	9
Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus,British National Corpus (BNC).			
Total Periods			45
Text Books			
1	Hobson Lane, Cole Howard, Hannes Hapke Foreword by Dr. Arwen Griffioen Natural Language Processing in Action ,Understanding, analyzing, and generating text with Python 2 nd Edition, 2023		
2.	Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.		
3.	Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, O'Reilly Media, 2009.		
REFERENCE BOOKS			
1	Richard M Reese, —Natural Language Processing with Javal, O'Reilly Media, 2015.		
2	Nitin Indurkha and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.		
E-Resources			
1	https://www.geeksforgeeks.org/advanced-data-structures/		
2	https://www.coursera.org/		

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Programme		B.E.	Programme Code						Regulation		2023			
Department		CSE & CST						Semester		-				
Course Code		Course Name		Periods Per Week			Credit	Maximum Marks						
				L	T	P	C	CA	ESE	Total				
U23CTV24		Reinforcement Learning		3	0	0	3	40	60	100				
Course Objective		The Main Objective of the course is to • To recollect the machine learning algorithms techniques • To understand the basics of reinforcement learning techniques • To connect machine learning engineering and business automation. • To explore various methods used in reinforcement learning. • To apply reinforcement learning techniques for various case studies												
Course Outcome		At the end of the course, the student should be able to,								Knowledge Level				
		CO1: Understand the fundamentals and scope of reinforcement learning with illustrative examples.								K2				
		CO2: Apply tabular solution methods like dynamic programming, Monte Carlo, and TD learning.								K3				
		CO3: Apply n-step bootstrapping and planning techniques for efficient learning in tabular reinforcement learning.								K3				
		CO4: Illustrate appropriate solution methods for larger state space problems								K2				
		CO5: Apply reinforcement technique for various case studies								K3				
Pre-requisites		-												
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1-Weak														
Programme Outcomes (POs)													CO/PSO Mapping	
													PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	2	-	2							2	1	3
CO2	3	1	2	-	2							2	1	3
CO3	3	1	2	-	2							2	1	3
CO4	3	1	2	-	1							1	1	3
CO5	3	1	2	-	1							2	1	3
Course Assessment Methods Direct														
Direct														
1.Continuous Assessment Test I, II & III 2.Assignment. 3.End-Semester examinations														
Indirect														
1.Course - end survey														

Content of the syllabus			
Unit – I	INTRODUCTION	Periods	9
Reinforcement Learning – Examples – Elements of Reinforcement Learning –Limitations and scope – Tic-Tac-Toe; Multi- armed Bandits- Finite Markov Decision process.			
Unit–II	TABULAR SOLUTION METHODS	Periods	9
Dynamic Programming; Monte Carlo Methods: Prediction – Estimation of Action Values – Control – Control without Exploring Starts – Off-policy Prediction via Importance Sampling – Incremental Implementation – Off policy Monte Carlo Control; Temporal-Difference Learning			
Unit – III	INTEGRATION OF TABULAR METHODS	Periods	9
n-step Bootstrapping: TD Prediction – Sarsa – Off-policy Learning; Planning and Learning with Tabular Methods Applications.			
Unit– IV	APPROXIMATE SOLUTION METHODS	Periods	9
On-policy Prediction with Approximation; On-policy Control with Approximation; Eligibility Traces: The λ -return – TD(λ) – n-step Truncated λ return Methods – Online λ -return Algorithm – True Online TD(λ); Policy			
Unit – V	APPLICATIONS AND CASE STUDIES	Periods	9
TD-Gammon; Watson’s Daily-Double Wagering; Optimizing Memory Controlorithm – True Online TD(λ); policy			
Total Periods			45
Text Books			
1.	Boris Belousov, Hany Abdulsamad, Pascal Klink, Simone Parisi & Jan Peters, “Reinforcement Learning Algorithms: Analysis and Applications”, Springer, 1st edition, 2021		
2.	Richard S Sutton & Andrew G. Barto, “Reinforcement Learning: An Introduction”, The MIT Press, 2nd Edition, 2018		
References			
1.	Marco Wiering, Martijn van Otterlo, “Reinforcement Learning State-of-theArt”, Springer, 2012		
2.	Micheal Lanham, “Hands-On Reinforcement Learning for Games”, Packt Publishing Ltd., 2020.		
E-Resources			
1.	https://spinningup.openai.com		
2.	http://incompleteideas.net/book/the-book-2nd.html		
3.	https://www.youtube.com/playlist?list=PLqYmG7hTraZBiG_XpjnPrSNw-1XQaM_gB		

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Programme		B.E. / B.Tech.		Programme Code						Regulation		2023			
Department		CSE ,IT&CST						Semester		-					
Course Code		Course Name		Periods Per Week			Credit		Maximum Marks						
				L	T	P	C	CA	ESE	Total					
U23CTV25		Neuro Fuzzy and Genetic Programming		3	0	0	3	40	60	100					
Course Objective		The Main Objective of the course is to													
		- Understand the fundamentals of Neural Networks. - Understand the principles and fundamentals of Fuzzy Logic. - Understand the Fuzzy Rule based systems. - Understand the concepts and techniques of Genetic Algorithms. - Understand the Integration of Neuro-Fuzzy Systems with Genetic Programming.													
		At the end of the course, the student should be able to,										Knowledge level			
		CO1: Acquire the knowledge on constructing a neural network.										K2			
		CO2: Identify the basic Neural net and learning algorithm to apply for a real time problem.										K3			
Course Outcome		CO3: Acquire the ability to use Fuzzy operators, membership functions, Fuzzification and Defuzzification Techniques.										K2			
		CO4: Gain Knowledge to integrate Fuzzy rules to genetic algorithms in different applications.										K3			
		CO5: Apply the Fuzzy Operators and Genetic Algorithm to real-time applications.										K4			
Pre-requisites		-													
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
Programme Outcomes (POs)														PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	
CO1	1	2	1	-	-	-	-	-	-	-	-	-	-	1	
CO2	1	1	2	-	-	-	-	-	-	2	-	-	1	2	
CO3	2	1	2	-	-	-	-	-	-	-	3	-	2	-	
CO4	1	1	1	-	-	-	-	-	-	2	-	-	3	2	
CO5	2	2	1	-	-	-	-	-	-	-	-	-	1	3	
Course Assessment Methods Direct															
Direct															
1. Continuous Assessment Test I, II & III															
2. Assignment.															
3. End-Semester examinations															
Indirect															
1.Course - end survey															

Content of the syllabus			
Unit – I	INTRODUCTION TO NEURAL NETWORK	Periods	9
Introduction to Soft Computing and Neural Network-Components of Soft Computing- Introduction to ANN architectures and Learning Algorithms - Simulation of Logic Functions- Perceptron Network, Hebbian network- Linear Separability problem and solutions-ADALINE and MADALINE networks-Practice of Neural Network tool : Simple Logic functions			
Unit - II	PATTERN ASSOCIATION, UNSUPERVISED LEARNING	Periods	9
Delta Rule, Derivation of GDR-Backpropagation Algorithm, Local Minima Problem-Radial Basis Function- Pattern Association, Auto Associative net-Hetero Associative nets-Bidirectional Associative Memory- Hopfield network-Competitive networks: SOM-Learning, Vector Quantization, Adaptive Resonance Theory			
Unit – III	FUNDAMENTALS OF FUZZY LOGIC	Periods	9
Crisp sets, Fuzzy sets, Fuzzy membership functions-Operations of Fuzzy sets, Fuzzy Relations, Operations- Fuzzy Extension Principle-Crisp Relations, Fuzzy relations, Properties, operations,-Crisp Logic, Propositional Logic, Predicate Logic Rules of Inference-Fuzzy Truth, Fuzzy Rules,-Fuzzy Reasoning- Practice of Fuzzy Logic tool: Fuzzy functions, operations- Fuzzification and Defuzzification			
Unit - IV	INTEGRATION OF NEURO-FUZZY SYSTEMS WITH GENETIC PROGRAMMING	Periods	9
Introduction Genetic Algorithms and Genetic Programming- GA Cycle and Data Representation - Genetic Programming for Symbolic Regression - Hybridization of Neuro Fuzzy Systems and Genetic Algorithms- GP for Fuzzy Rule Evolution-Evaluation of Fuzzy rules, Aggregation of output Fuzzy set- Trees represent fuzzy rules-Fuzzy Propositions			
Unit – V	APPLICATION OF INTEGRATED SYSTEM	Periods	9
Fuzzy Controller : Air conditioner control, Cruise Controller-Fuzzy Decision making- Genetic Operators - Application of Genetic Algorithm- Control Systems- Pattern Recognition.			
Total Periods			45
Text Books			
1.	Himanshu Singh , Yunis Ahmad Lone, Deep Neuro-Fuzzy Systems with Python: With Case Studies and Applications from the Industry December 2021		
2.	B.K.Tripathy, J.Anuradha,” Soft Computing”, Cengage Learning, 2015.		
3.	S.N.Sivanadam, S.N.Deepa,”Principles of Soft Computing, Wiley India Edition, 2007.		
4.	Laurene Fausett, "Fundamentals of Neural Networks, Architectures, Algorithms and Applications”, Pearson Education, 2008.		
References			
1.	Timothy J. Ross , “Fuzzy Logic with Engineering Applications”, McGraw-Hill International Editions,1995.		
2.	David E. Goldberg, “Genetic Algorithms-In Search, optimization and Machine Learning”, Pearson Education.		
E-Resources			
1.	https://www.sciencedirect.com/science/article/pii/S0898122102002742		
2.	http://www.soukalfi.edu.sk/01_NeuroFuzzyApproach.pdf		
3.	https://www.ece.nus.edu.sg/stfpage/elepv/soft_comp.html		

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Programme	B.E. / B.Tech.	Programme Code					107	Regulation	2023					
Department	CSE ,IT&CST					Semester			-					
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks								
		L	T	P	C	CA	ESE	Total						
U23CTV26	Knowledge Based Decision Support System	3	0	0	3	40	60	100						
Course Objective	The Main Objective of the course is to													
	- Get an overview of decision support systems. - Get Familiarize on group decision support systems. - Learn about knowledge management. - Study about Intelligent DSS. - Get familiarize on building decision support systems.													
Course Outcome	At the end of the course, the student should be able to,							Knowledge Level						
	CO1: Understand the basic ideas about knowledge based decision support systems.							K2						
	CO2: Understand the characteristics and deployment mechanism of knowledge based decision support systems.							K3						
	CO3: Acquire the knowledge on semi structured and unstructured problems.							K2						
	CO4: To support individuals and groups.							K3						
	CO5: Apply and support knowledge based decision processes and styles.							K4						
Pre-requisites	-													
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1-Weak													CO/PSO Mapping	
Programme Outcomes (POs)													PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	1										1	2
CO2	1	2	1										1	-
CO3	1		2							2			1	2
CO4	2	1	1										2	2
CO5	1	1											3	1
Course Assessment Methods Direct														
Direct														
1. Continuous Assessment Test I, II & III														
2. Assignment.														
3. End-Semester examinations														
Indirect														
1.Course - end survey														

Content of the syllabus			
Unit – I	INTRODUCTION TO DECISION SUPPORT SYSTEMS	Periods	9
Management Support Systems: An Overview, Changing Business Environments and Computerized Decision-Managerial Decision Making and Techniques of Managerial Decision Support-The Concept of Decision Support Systems(DSS)-Decision Support Systems: An Overview-DSS configurations, description, characteristics and capabilities, classifications, components and sub systems .Decision Making, Systems ,Modeling, and Support-Decision Making: Introduction, Definitions ,Models-Phases of the Decision Making Process.			
Unit–II	GROUP DECISION SUPPORT SYSTEMS	Periods	9
Making Decisions in Groups: Characteristics, Process, Benefits, and Dysfunctions – Supporting Group work with Computerized systems-Tools for Indirect Support of Decision Making–Products and Tools for GDSS/GSS and Successful Implementation.-Decision Analysis with Decision Tables and Decision Trees Applications of Data Mining-Role of Data Warehouse sing decision support.			
Unit – III	KNOWLEDGE MANAGEMENT TECHNOLOGIES	Periods	9
Knowledge Management: Introduction–Organizational Learning and Transformation–Knowledge Management Activities– Group support systems- Enterprise DSS- supply chain and DSS – Knowledge management methods, technologies and tools.			
Unit– IV	INTELLIGENT DECISION SUPPORT SYSTEMS	Periods	9
Artificial Intelligence: Concepts, Definitions and Applications- Expert Systems: Basic Concepts ,Applications, Knowledge engineering, Suitable Problem Areas, Benefits, Limitations, and success Factors .Advanced Intelligent Systems :Machine Learning techniques-Genetic Algorithms-Fuzzy inference systems-Support Vector machines-Intelligent agents.			
Unit – V	MANAGEMENT SUPPORT SYSTEMS	Periods	9
Implementing and Integrating Management Support Systems – Implementation –Major Issues –Strategies – System Integration – Generic Models MSS – DSS – ES– Integrating EIS – DSS and ES – Global Integration – Intelligent DSS – Intelligent Modeling and Model Management –Examples of Integrated Systems – Problems and Issues in Integration – Impacts of Management Support Systems			
Total Periods			45
Text Books			
1.	EfraimTurban,JayAronsonE.,Ting-PengLiang,"DecisionSupportSystemsandIntelligent Systems",9th Edition,PearsonEducation,2014.		
2.	Kimiz Dalkir , Knowledge Management in Theory and Practice, fourth edition, ISBN: 9780262048125 Pub date: May 9, 2023,The MIT Press		
References			
1.	GeorgeM.Marakas,"DecisionSupportSystemsinthe21stcentury",Pearson,2016.		
E-Resources			
1.	https://repository.up.ac.za/bitstream/handle/2263/22959/02Chapter2.pdf		
2.	https://www.lotame.com/what-are-the-methods-of-data-collection/		
3.	https://www.managementstudyguide.com/building-knowledge-driven-decision-support-system.htm		
4.	https://www.sciencedirect.com/science/article/pii/S1877050915029099		
5.	https://www.techtarget.com/searchcio/definition/decision-support-system		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637205													
Programme	B.E. / B.Tech.	Programme Code			107	Regulation	2023							
Department	CSE ,IT&CST				Semester		-							
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks								
		L	T	P	C	CA	ESE	Total						
U23CTV27	AI for Industrial Applications	3	0	0	3	40	60	100						
Course Objective	The Main Objective of the course is to													
	- To introduce fundamental AI concepts and their relevance in industrial applications. - Explore machine learning and deep learning techniques for predictive maintenance and quality control. - To understand the role of AI in industrial automation, robotics, and process optimization. - To apply AI techniques to enhance decision-making in supply chain management and logistics. - To analyze ethical considerations, security challenges, and deployment strategies for industrial AI solutions.													
Course Outcome	At the end of the course, the student should be able to,						Knowledge Level							
	CO1: Understand the fundamental principles of AI and its industrial applications						K1							
	CO2: Implement machine learning models for predictive maintenance and defect detection.						K1							
	CO3: Design AI-based automation solutions for industrial robotics and process optimization.						K2							
	CO4: Develop AI-driven systems for improving supply chain management and logistics.						K2							
	CO5: Evaluate AI solutions for ethical compliance, security, and real-world deployment.						K3							
Pre-requisites	-													
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1-Weak Programme Outcomes(POs)												CO/PSO Mapping PSOs		
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	3	1	3	3	3	3	3	1	3	3	1
CO2	2	3	2	2	2	3	3	3	3	3	1	3	3	1
CO3	2	2	2		2	3	3	3	3	3	1	3	3	1
CO4	2	3	2	2	2	3	3	3	3	3	1	3	3	1
CO5	2	3	2	2	2	3	3	3	3	3	1	3	3	1
Course Assessment Methods Direct														
Direct														
1. Continuous Assessment Test I, II & III														
2. Assignment.														
3. End-Semester examinations														
Indirect														
1.Course - end survey														

Content of the syllabus			
Unit – I	INTRODUCTION	Periods	9
Overview of AI and its industrial Impact-Types of AI: Machine Learning, Deep Learning, Expert Systems-AI adoption in industries: Manufacturing, Automotive, Energy, Healthcare, Logistics- Challenges and opportunities in industrial AI- Ethical considerations and AI regulations			
Unit–II	MACHINE LEARNING AND DEEP LEARNING FOR INDUSTRIAL AI	Periods	9
Supervised vs Unsupervised Learning-Feature Engineering and Data Preprocessing-Neural Networks and Deep Learning-Convolutional Neural Networks (CNNs) for industrial vision-Recurrent Neural Networks (RNNs) for time-series forecasting-AI model evaluation and optimization techniques			
Unit – III	AI FOR PREDICTIVE MAINTENANCE & QUALITY CONTROL	Periods	9
Industrial IoT (IIoT) and AI-driven maintenance-Time Series Analysis for Predictive Maintenance-Anomaly Detection and Fault Diagnosis- AI for Automated Visual Inspection & Quality Control- Case Studies: AI-powered maintenance in manufacturing and automotive industries			
Unit– IV	AI IN INDUSTRIAL AUTOMATION, ROBOTICS, AND PROCESS OPTIMIZATION	Periods	9
AI-powered Industrial Robotics-Reinforcement Learning for Autonomous Robots-AI in Motion Control and Path Planning-AI-based Process Monitoring and Digital Twins-AI for Energy Optimization and Smart Manufacturing			
Unit – V	AI IN SUPPLY CHAIN, LOGISTICS & DEPLOYMENT CHALLENGES	Periods	9
AI for Demand Forecasting and Inventory Management-Route Optimization using AI-AI in Warehouse Automation- AI Security Challenges and Risk Mitigation-AI Deployment Strategies: Edge AI, Cloud AI, On-Premises Solutions- Case Study: AI-powered supply chain in the retail and manufacturing industries			
Total Periods			45
Text Books			
1.	Niels A. Haxthausen "Artificial Intelligence for Supply Chain Planning: Resolving Human-Intelligence Conflicts" – Springer 2021		
2.	Francis X. Govers "Artificial Intelligence for Robotics: Build Intelligent Robots that Perform Human Tasks Using AI Techniques" – Packt Publishing 2019		
3.	Melanie Mitchell "Artificial Intelligence: A Guide for Thinking Humans" 2019		
References			
1.	Kevin P. Murphy ,"Machine Learning: A Probabilistic Perspective",2012 , MIT Press		
2.	Richard Szeliski , "Computer Vision: Algorithms and Applications" , 2010, Springer		
3.	Dirk H. Hartel , "AI in the Supply Chain: A Guide to Successful Implementation" , 2021, Springer		
E-Resources			
1.	https://www.newequipment.com/industry-trends/article/21270243/artificial-intelligence-for-industrial-applications		
2.	https://www.sciencedirect.com/science/article/pii/S2090447924002612		
3.	https://ieeexplore.ieee.org/Xplore/home.jsp		

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Programme		B.E. / B.Tech.		Programme Code				107		Regulation		2023			
Department		CSE ,IT&CST						Semester		-					
Course Code		Course Name		Periods Per Week			Credit		Maximum Marks						
				L	T	P	C	CA	ESE	Total					
U23CTV28		Healthcare Analysis		3	0	0	3	40	60	100					
Course Objective		The Main Objective of the course is to													
		- To introduce the fundamentals of healthcare analysis, including the history and parameters of medical care systems, healthcare policies, standardized code sets, and data formats. - To provide a foundation in machine learning techniques relevant to healthcare data analysis, covering topics such as tree-like reasoning, probabilistic reasoning, and Bayes Theorem. - To explore deep learning applications in healthcare. - To analyze case studies on predicting mortality in cardiology, smart ambulance systems using IoT, hospital-acquired conditions programs, and ECG data analysis.													
		At the end of the course, the student should be able to,													
		CO1: Use machine learning and deep learning algorithms for health data analysis													
		CO2: Apply the data management techniques for healthcare data													
Course Outcome		CO3: Evaluate the need of healthcare data analysis in e-healthcare, telemedicine and other critical care applications													
		CO4: Design health data analytics for real time applications													
		CO5: Design emergency care system using health data analysis													
Pre-requisites		-													
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1-Weak Programme Outcomes(POs)														CO/PSO Mapping PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	
CO1	3	2	1	1	1	2	2	1	1	1	1	1	2	2	
CO2	3	2	2	1	2	2	2	1	1	1	1	1	2	2	
CO3	3	2	2	1	2	2	2	1	1	1	1	1	2	2	
CO4	3	2	2	1	2	2	2	1	1	1	1	1	2	2	
CO5	3	2	2	1	3	2	2	1	1	1	1	1	2	2	
Course Assessment Methods Direct															
Direct															
1.Continuous Assessment Test I, II & III 2.Assignment. 3.End-Semester examinations															
Indirect															
1.Course - end survey															

Content of the syllabus			
Unit – I	INTRODUCTION TO HEALTHCARE ANALYSIS	Periods	9
Overview – History of Healthcare Analysis Parameters on medical care systems- Health care policy- Standardized code sets – Data Formats – Machine Learning Foundations: Tree Like reasoning , Probabilistic reasoning and Bayes Theorem, Weighted sum approach.			
Unit–II	ANALYTICS ON MACHINE LEARNING	Periods	9
Machine Learning Pipeline – Pre-processing -Visualization – Feature Selection – Training model parameter -Evaluation model : Sensitivity , Specificity , PPV ,NPV, FPR ,Accuracy , ROC , Precision Recall Curves , Valued target variables -Python: Variables and types, Data Structures and containers , Pandas Data Frame Operations – Scikit -Learn : Pre-processing , Feature Selection.			
Unit – III	INTRODUCTION TO DEEP LEARNING	Periods	9
Deep Feedforward Networks (DFF)- Convolutional Neural Networks (CNN)- Recurrent Neural Networks (RNN) for sequences- Biomedical image and signal analysis- Natural language processing and data mining for clinical data- Mobile imaging and analytics- Clinical decision support systems.			
Unit– IV	HEALTHCARE AND DEEP LEARNING	Periods	9
Introduction on Deep Learning – DFF network CNN- RNN for Sequences – Biomedical Image and Signal Analysis – Natural Language Processing and Data Mining for Clinical Data – Mobile Imaging and Analytics – Clinical Decision Support System			
Unit – V	CASE STUDIES	Periods	9
Predicting Mortality for cardiology Practice -Smart Ambulance System using IOT -Hospital Acquired Conditions (HAC) program- Healthcare and Emerging Technologies – ECG Data Analysis.			
Total Periods			45
Text Books			
1.	Ankur Taly, Pradeep Gohil, and Pradeep Dubey, "Deep Learning for Healthcare", 1st Edition, Packt Publishing, 2020		
2.	Sergio Consoli, Salvatore Gaglio, and Salvatore Sorce, "Data Science for Healthcare: Methodologies and Applications", 1st Edition, Springer, 2019		
3.	Trevor “L. Strome Healthcare Analytics for Quality and Performance Improvement”(1st Edition) Wiley-IEEE Press, 2013		
References			
1.	Niels Henriksen, "Health Data Science: A Handbook for Healthcare Professionals", 1st Edition,CRC PRESS, 2020		
2.	Ravindra N. Nanjundiah, Anil K. Gupta "Big Data in Healthcare: Statistical Analysis of the Electronic Health Record" 1st Edition Springer 2018		
3.	Raghu Raman, Sanjay Chawla, "Predictive Modeling for Healthcare Management", 1st Edition, Wiley, 2020		
E-Resources			
1.	Coursera: Health Informatics Specialization		
2.	edX: Data Science in Healthcare edX - Data Science in Healthcare		
3.	Udacity - Predictive Analytics for Healthcare		



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1. Course - end survey

Content of the syllabus			
Unit – I	Neural Networks	Periods	9
Introduction – Basic Architecture of Neural Networks – Training Neural Network with Backpropagation – Practical Issues in Neural Network Training - Power of Function Composition – Common Neural Architectures – Neural Architectures : Binary Classification Models – Multiclass Models – Matrix Factorization with Autoencoders – Basic Principles of Autoencoders – Nonlinear Activations –Deep Autoencoders.			
Unit - II	Training Deep Neural Networks	Periods	9
Introduction – Backpropagation- Setup and Initialization Issues – Vanishing and Exploding Gradient Problems – Gradient Descent Strategies – Batch Normalization – Practical Tricks for Acceleration and Compression – Bias – Variance Trade-Off –Generalization Issues in Model Tuning and Evaluation – Penalty-based Regularization – Ensemble Methods – Early Stopping – Unsupervised Pretraining			
Unit – III	Radial Basis Function Networks and Boltzmann Machines	Periods	9
Radial Basis Function : Introduction –Training an RBF Network – Hopfield Network – The Boltzman Machine – Restricted Boltzman Machine – Applications of Restricted Boltzman Machines.			
Unit - IV	Recurrent Neural Networks	Periods	9
Introduction – Architecture of Recurrent Neural Networks – Challenges of training Recurrent Networks – Echo-State Networks – Long Short-Term Memory (LSTM) – Gated Recurrent Units (GRUs) – Applications of Recurrent Neural Networks			
Unit – V	Convolution Neural Networks	Periods	9
Introduction – Basic Structure of Convolutional Network – Training a Convolutional Network – Case Studies of Convolutional Architectures – Applications of Convolutional Networks – Attention Mechanism.			
Total Periods			45
Text Books:			
1.	Aggarwal, Charu C, “Neural Networks and Deep learning”, 1 st Edition, Springer Cham, 2018.		
REFERENCE BOOKS :			
1.	Ian Goodfellow, Yoshua Bengio, and Aaron Courvill, “Deep Learning”, 1 st Edition, MIT Press, USA, 2016.		
2.	Josh Patterson and Adam Gibson, “Deep Learning – A Practitioner’s Approach”, 1 st Edition, O’Reilly Series, August2017.		
E-Resources :			
1.	https://www.coursera.org/specializations/deep-learning		

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Programme	B.E./B.Tech.			Programme code			101		Regulation		2023																																																																																																																									
Department	CSE,IT&CST						Semester			-																																																																																																																										
Course Code	Course name					Periods per week			Credit		Maximum Marks																																																																																																																									
U23CSV31	Information security					L	T	P	C	CA	ESE	Total																																																																																																																								
						3	0	0	3	40	60	100																																																																																																																								
Course Objective	The student should be made to, • Introduce the basic concepts and principles of information security. • Understand legal, ethical, and professional responsibilities in the field of information security. • Identify, assess, and manage risks associated with information systems. • Explore various international standards and frameworks used in securing information systems. • Design and implement appropriate security techniques for protecting data and systems from threats and vulnerabilities.																																																																																																																																			
Course Outcome	At the end of the course, the student should be able to,											KL																																																																																																																								
	CO1: Outline the basics of information security											K2																																																																																																																								
	CO2: Illustrate the legal, ethical, and professional issues in information security											K2																																																																																																																								
	CO3: Demonstrate the aspects of risk management											K3																																																																																																																								
	CO4: Analyze the various standards in the Information Security System											K2																																																																																																																								
	CO5: Design and implementation of Security Technique											K3																																																																																																																								
Pre-requisites	-																																																																																																																																			
<table><tr><th colspan="13">CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>2</td><td></td><td>2</td><td></td><td></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td></tr><tr><td>CO 2</td><td>2</td><td></td><td>2</td><td></td><td></td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>2</td><td>2</td></tr><tr><td>CO 3</td><td>2</td><td></td><td>2</td><td></td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td></tr><tr><td>CO 4</td><td>2</td><td></td><td>2</td><td></td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td></tr><tr><td>CO 5</td><td>2</td><td></td><td>2</td><td></td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td>2</td><td></td><td>2</td></tr></table>														CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping		COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	2		2			2	2						2	2	CO 2	2		2			2	2					2	2	2	CO 3	2		2			2	3					2		2	CO 4	2		2			2	3							2	CO 5	2		2			2	3					2		2
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping																																																																																																																							
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Course Assessment Methods Direct - Continuous Assessment Test I, II&III - Assignments / Seminar/Quiz - End-Semester examination Indirect - Course -end survey																																																																																																																																				

Content of the syllabus			
Unit– I	INTRODUCTION	Periods	9
History, definition- Critical characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.			
Unit-II	SECURITY INVESTIGATION	Periods	9
Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies			
Unit – III	SECURITY ANALYSIS	Periods	9
Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms, Information Flow and Confinement Problem			
Unit– IV	SECURITY POLICIES	Periods	9
Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity			
Unit– V	SECURITY TECHNOLOGY	Periods	9
Security Technology: Introduction,IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel			
Total Periods			45
References			
1.	Michael E Whitman and Herbert J Mattord, - Principles of Information Security,Vikas Publishing House, New Delhi, 2021		
2.	Micki Krause, Harold F. Tipton, - Handbook of Information Security Managementll, 6th edition,2019		
3.	Stuart Mc Clure, Joel Scrambray, George Kurtz, -Hacking Exposedll, McGraw Hill, 2019		
4.	Matt Bishop,- Computer Security Art and Sciencell, Pearson/PHI, 2021		
5.	SanilNadkarniFundamentals of Information Securityll1st edition, 2020		
E-Resources			
1.	https://www.utc.edu/sites/default/files/2021-06/3600		
2.	https://www.geeksforgeeks.org/principle-of-information-system-security/		
3.	https://www.coursehero.com/file/33632699/		
4.	https://lecturenotes.in/subject/453/information-security		

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Programme	B.E./B.Tech.			Programme code						Regulation	2023																																																																																																																																								
Department	CSE,IT&CST						Semester			-																																																																																																																																									
Course Code	Course name				Periods per week			Credit		Maximum Marks																																																																																																																																									
U23CSV32	CYBER SECURITY				L	T	P	C	CA	ESE	Total																																																																																																																																								
					3	0	0	3	40	60	100																																																																																																																																								
Course Objective	The student should be made to,																																																																																																																																																		
	- Understand the basic concepts of cyber security - Learn about security attacks, models and risk management - Understand the key terms and concepts of security plans and procedures - Describe about security tools and encryption methods - Learn about testing and forensics methods																																																																																																																																																		
Course Outcome	At the end of the course, the student should be able to,										KL																																																																																																																																								
	CO1: Outline the security principles and security architecture										K2																																																																																																																																								
	CO2: Explore the security attacks and management roles.										K3																																																																																																																																								
	CO3: Apply the cyber security policies and procedures for an organizations										K3																																																																																																																																								
	CO4: Practice the security tools and hardening techniques										K4																																																																																																																																								
	CO5: Employ the Penetration Testing and explore the Next Generation Security										K3																																																																																																																																								
Pre-requisites	-																																																																																																																																																		
<table><tr><th colspan="13">CO /PO Mapping</th><th colspan="2">CO/PSO Mapping</th></tr><tr><td colspan="15">(3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak</td></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>1</td><td>2</td><td>3</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td></tr><tr><td>CO 2</td><td>2</td><td>2</td><td>3</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td></tr><tr><td>CO 3</td><td>2</td><td>3</td><td>3</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td></tr><tr><td>CO 4</td><td>2</td><td>3</td><td>3</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td></tr><tr><td>CO 5</td><td>2</td><td>2</td><td>3</td><td></td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>2</td></tr></table>														CO /PO Mapping													CO/PSO Mapping		(3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak															COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	1	2	3		2	3							2	2	CO 2	2	2	3		2	3							2	2	CO 3	2	3	3		2	3							2	2	CO 4	2	3	3		2	3							2	2	CO 5	2	2	3		2	3							2	2
CO /PO Mapping													CO/PSO Mapping																																																																																																																																						
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COs	Programme Outcomes(POs)												PSOs																																																																																																																																						
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CO 1	1	2	3		2	3							2	2																																																																																																																																					
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Course Assessment Methods Direct 1. Continuous Assessment Test I, II&III 2. Assignments / Seminar/Quiz 3. End-Semester examination Indirect 1. Course -end survey																																																																																																																																																			
Content of the syllabus																																																																																																																																																			
Unit– I	INTRODUCTION TO CYBER SECURITY										Periods	9																																																																																																																																							
Introduction to Cyber Security, Need for security, Concept of Cyber Space, Cyber Crimes and Cyber-attack. Fundamental security principles – threats, attacks and vulnerability. Key Security triad – Confidentiality, Integrity and Availability. Key components of cyber security network architecture. Authentication,																																																																																																																																																			

Authorization, Access control, Identification and Accounting.			
Unit-II	SECURITY ATTACKS, PRINCIPLES AND MANAGEMENT	Periods	9
Introduction to different classes of security attacks - active and passive. Impact of attacks on an organization and individuals. Principles of Cyber security - Apply cyber security architecture principles. Cyber security models .Techniques used by Hackers - The Reconnaissance Phase-. Risk Management – Principles, Types and Strategies - The Risk Management Framework (RMF). Cyber security Management concepts – Security Governance and Management roles, models and functions.			
Unit – III	SECURITY PLANS, POLICIES AND PROCEDURES	Periods	9
Defining a Cyber Security policy, General security expectations, roles and responsibilities in the organization – Stakeholders. Cyber security standards and controls - Certification and accreditation (C&A) process. Audit goals - Updating and auditing cyber security procedures - Compare the organization's cyber security policy to actual practices			
Unit– IV	OVERVIEW OF SECURITY COUNTERMEASURE TOOLS	Periods	9
Introduction to key security tools including firewalls, anti-virus and cryptography – Identify security tools and hardening techniques – Prevention of cyber-attacks. Security Countermeasure tools and techniques - Encryption standards - Modern Methods - Legitimate versus Fraudulent Encryption Methods. Security threats – Threat and Risk exposure - Determine the organization's exposure to internal threats - Evaluate the risk of external security threats.			
Unit– V	CYBER SECURITY TESTING, DIGITAL FORENSICS AND NEXT GENERATION SECURITY	Periods	9
Cyber security testing – Penetration testing. System Level Solutions - Intrusion Detection System (IDS) and Intrusion Protection System (IPS). Basic Concept of Ethical Hacking. Protecting against Cyber Crime – Identity Theft, Cyber Stalking and Investment fraud. Introduction to digital forensics - Digital Forensics Tools and Forensics Investigative Process. Introduction to Next-Generation Firewall – Preventing Infection and Finding Infected Hosts.			
Total Periods			45
References			
1	Lawrence C. Miller, —Cyber security for Dummies‡ -Palo Alto Networks, by John Wiley & Sons, Inc., 7 th Edition, 2022.		
2	William Stallings, —Effective Cyber security: A Guide to Using Best Practices and Standards‡, Addison - Wesley Professional Publishers, 1st Edition, 2018		
3	RaefMeeuwisse, —Cyber security for Beginners‡, Cyber Simplicity Publications, 2nd Edition, 2017.		
4	Mehdi Khosrow-Pour, DBA, Information Resources Management Association, USA, —Cyber security and threats: concepts, methodologies, tools, and applications‡, IGI Global, Vol. 1, 2018.		
E-Resources			
1	https://uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf		
2	https://www.simplilearn.com/tutorials/cyber-security-tutorial/cyber-security-books		
3	https://www.tutorialspoint.com/information_security_cyber_law/cyber_security_strategies.htm		
4	https://uru.ac.in/uruonlinelibrary/Cyber_Security/Cybersecurity-for-dummies.pdf		

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Programme	B.E./B.Tech.	Programme Code						Regulation				2023			
Department	CSE&CST						Semester				-				
Course Code	Course Name	Periods Per Week			Credit		Maximum Marks								
		L	T	P	C	CA	ESE	Total							
U23CSV33	Malware Analysis	3	0	0	3	50	50	100							
Course Objective	The student should be made to,														
	• Understand the nature, evolution, and types of malware.														
	• Perform both static and dynamic analysis of malicious software.														
	• Identify the behaviour and functionality of different types of malware.														
	• Explore detection techniques using signatures and machine learning.														
Course Outcome	• Analyze mobile malware with a focus on Android applications.														
	At the end of the course, the student should be able to,											Knowledge Level			
	CO1: Explain the malware types based on behaviour and propagation.											K2			
	CO2: Analyze system and network behavior using tools like Wireshark.											K4			
	CO3: Demonstrate the roles of downloaders, backdoors, and stealers in malware.											K3			
	CO4: Evaluate the strengths and weaknesses of various malware detection approaches.											K5			
Pre-requisites	CO5: Analyze case studies like Plankton, DroidKungFu, and AnserverBot.											K4			
	-														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping		
Cos	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	3	2		2		2			2		2	2	
CO 2	2	2	3	3		2		2			2		2	2	
CO 3	2	2	3	3		2		2			2		2	2	
CO 4	2	2	3	2		2		2			2		2	2	
CO 5	2	2	3	3		2		3			2		2	2	
Course Assessment Methods															
Direct															
1.Continuous Assessment Test I, II & III 2.Assignment 3. End-Semester examinations															
Indirect															
1.Course - end survey															

Content of the syllabus			
Unit – I	INTRODUCTION TO MALWARE	Periods	9
Introduction to malware, OS security concepts, malware threats, evolution of malware, malware types- viruses, worms, rootkits, Trojans, bots, spyware, adware, logic bombs, malware analysis, static malware analysis, dynamic malware analysis.			
Unit – II	DYNAMIC ANALYSIS	Periods	9
Live malware analysis, dead malware analysis, analyzing traces of malware- system-calls, API-calls, registries, network activities. Anti-dynamic analysis techniques, anti-vm, runtime-evasion techniques, , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching			
Unit – III	MALWARE FUNCTIONALITY	Periods	9
Downloader, Backdoors, Credential, Stealers, Persistence Mechanisms, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection			
Unit – IV	MALWARE DETECTION TECHNIQUES	Periods	9
Signature-based techniques: malware signatures, packed malware signature, metamorphic and polymorphic malware signature Non-signature based techniques: similarity-based techniques, machine-learning methods, invariant inferences.			
Unit – V	ANDROID MALWARE	Periods	9
Malware Characterization, Case Studies – Plankton, DroidKungFu, AnserverBot, Smartphone (Apps) Security,Reverse Engineering of Mobile App			
Total Periods			45
Text Books			
1.	Michael Sikorski, Andrew Honig ” Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software" (2nd Edition) , 2018		
References			
1.	Christopher C. Elisan “Malware Analysis and Detection Engineering" (2nd Edition),2020		
2.	Michael Hale Ligh, Steven Adair, Blake Hartstein, Matthew Richard "The Malware Analyst's Cookbook and DVD: Tools and Techniques for Fighting Malicious Code" (2nd Edition),2017		
3.	Mujeeb Anwar, Huong Nguyen "Android Malware and Analysis" 2021		
E-Resources			
1.	https://www.techtarget.com/searchsecurity/feature/Top-static-malware-analysis-techniques-for-beginners		
2.	https://www.reflectiz.com/blog/malware-analysis		
3.	https://arxiv.org/abs/1808.01201		

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Programme		B.E./B.Tech.			Programme code					Regulation		2023		
Department		CSE,IT&CST						Semester			-			
Course Code		Course name				Periods per week			Credit		Maximum Marks			
U23CSV34		Cyber Law and Ethics				L	T	P	C	CA	ESE	Total		
						3	0	0	3	40	60	100		
Course Objective		The student should be made to, - To understand the basics of cyber threats & security. - To learn various fundamentals of law & act - To study about cyber & security policies. - To understand the nature and applications of cyber law in real life - To understand various security issues in cyber.												
Course Outcome		At the end of the course, the student should be able to,										KL		
		CO1: Understand Basic information on cybercrime										K2		
		CO2: Identify Cyber laws for various crime activities.										K3		
		CO3: Identify the security policies for cyber issues										K3		
		CO4: Analyze the role of organization for securing cyberspace										K4		
		CO5: Gain knowledge about various security in organizations.										K2		
Pre-requisites														

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PS Os	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	2	3	2	3	2	2	2						2	2
CO 2	2	3	2	3	2	2	2					2	2	2
CO 3	2	3	2	3	2	2	3					2		2
CO 4	2	3	2	3	2	2	3							2
CO 5	2	3	2	3	3	2	3					2		2

Course Assessment Methods

Direct

- Continuous Assessment Test I, II&III
- Assignments / Seminar/Quiz
- End-Semester examination

Indirect

- Course -end survey

Content of the syllabus			
Unit– I	INTRODUCTION	Periods	9
Introduction, Forgery, Hacking, Software Piracy, Computer Network intrusion - Category of Cybercrime - Cybercrime Mobile & Wireless devices - Tools and Methods used in Cybercrime - Phishing & Identity Theft.			
Unit-II	CYBER CRIME	Periods	9
Constitutional & Human Rights issues in cyberspace freedom of speech and Expression in cyber space, right to access in cyber space-access to internet, right to privacy, right to data protection cybercrimes and legal framework, cybercrime against individual, institution and state, Hacking Digital Forgery cyber stalking/Harassment, Cyber Pornography, identity theft & fraud, cyber terrorism, cyber defamation.			
Unit – III	CYBER LAW	Periods	9
Cyber torts cyber defamation, different types of civil wrongs under IT Act 2000, Intellectual property issues in cyber space, interface with copyright law, interface with patent law, trademark & domain names related issues.			
Unit– IV	E-COMMERCE	Periods	9
E-commerce concept-commerce-salient features online approaches like B2B, B2C & C2C online contracts, click wrap contracts, applicability of Indian contract act 1872.			
Unit– V	JURISDICTION	Periods	9
Dispute Resolution in cyberspace, concepts of Jurisdiction, Indian context of Jurisdiction and IT Act 2000. Interantional Law and Jurisdictional issues in cyberspace.			
Total Periods			45
References			
1.	Reich, Pauline C, “Law, Policy, and Technology: Cyberterrorism, Information Warfare, and Internet Immobilization”, IGI Global, 2012.		
2.	Jennifer L. Bayuk, Jason Healey, Paul Rohmeyer, Marcus H. Sachs, Jeffrey Schmidt, “Cyber Security Policy Guidebook”, John Wiley & Sons, 2012.		
3.	Chris Reed & John Angel, Computer Law, OUP, New York, 2015		
4.	Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delh, 2019		
5.	Kenneth J. Knapp, “Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions”, IGI Global, 2009.		
E-Resources			
1.	https://doc.lagout.org/security/ceh-official-certified-ethical-hacker-review-guide-exam-312-50.9780782144376.27422.pdf		
2.	hhttps://www.mediafire.com/file/dyewn6f3r3olnuw/A_Beginners_Guide_To_Hacking_Computer_Systems.zip/file		
3.	https://www.pdfdrive.com/hacking-beginner-to-expert-guide-to-computer-hacking-basic-security-and-penetration-testing-computer-science-series-e175287729.html		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637205													
Programme		B.E./B.Tech.				Programme code				Regulation				2023	
Department		CSE,IT&CST								Semester				-	
Course code		Course name				Periods per week			Credit		Maximum Marks				
						L	T	P	C	CA	ESE	Total			
U23CSV35		Blockchain Technology				3	0	0	3	40	60	100			
Course Objective		The student should be made to, • Understand the fundamentals and real-time applications of blockchain technology • Learn the principles of decentralization and cryptography in blockchain systems • Apply blockchain concepts to cryptocurrencies • Develop distributed applications using the Ethereum platform • Build enterprise blockchain solutions using Hyperledger													
Course Outcome		At the end of the course, the student should be able to,											KL		
		CO1: Apply the basics and various real time applications of blockchain											K3		
		CO2: Apply decentralization and cryptography for blockchain applications											K3		
		CO3: Make use of blockchain technology for bitcoin, alternative coins and develop smart contracts											K2		
		CO4: Develop a distributed application using Ethereum											K4		
Pre-requisites		-													
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1 -Weak													CO/PSO Mapping		
COs		Programme Outcomes(POs)											PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO 1		3	2	2	1	2	1	1	1	1	1	2	2	3	
CO 2		3	3	2	2	2	1	1	2	1	1	2	3	2	
CO 3		3	2	3	2	3	1	1	2	1	2	2	3	2	
CO 4		3	2	3	2	3	1	1	1	2	2	2	3	2	
CO 5		3	2	3	2	3	2	1	1	2	2	3	3	3	
Course Assessment Methods															
Direct 1. Continuous Assessment Test I, II&III 2. Assignments / Seminar/Quiz 3. End-Semester examinations															
Indirect 1.Course -end survey															
Content of the syllabus															
Unit -I		BLOCKCHAIN TECHNOLOGY										Periods		9	
Distributed systems - The history of blockchain - Introduction to blockchain – definitions - elements - Features - Applications of blockchain technology - Tiers - Types of blockchain - Consensus in blockchain - CAP theorem - Benefits and limitations of blockchain.															

Unit-II	DECENTRALIZATION AND CRYPTOGRAPHY TECHNICAL FOUNDATIONS	Periods	9
Decentralization using blockchain – Methods – Routes - Blockchain and full ecosystem decentralization - Smart contract - Decentralized applications – Platforms for decentralization. Cryptography and Technical Foundations – Introduction – Cryptography - Confidentiality - Integrity – Authentication - Cryptographic primitives - Asymmetric cryptography - Public and private keys – RSA - Discrete logarithm problem - Hash functions - Elliptic Curve Digital signature algorithm			
Unit – III	BITCOINS AND ALTERNATIVE COINS	Periods	9
Bitcoin – Transactions – Blockchain - Bitcoin payments - Alternative Coins - Theoretical foundations - Bitcoin limitations –Namecoin - Litecoin – Primecoin – Zcash - Smart Contracts.			
Unit- IV	FUNDAMENTALS OF ETHEREUM	Periods	9
Introduction – Ethereum blockchain - Elements of the Ethereum blockchain - Precompiled contracts – Accounts – Block – Ether –Messages – Mining - Clients and wallets - The Ethereum network - Ethereum Development.			
Unit-V	HYPERLEDGER	Periods	9
Projects – Protocol - Hyperledger Fabric – Sawtooth lake – Corda – Blockchains-Outside of Currencies: Internet of Things –Government – Health – Finance.			
Total Periods			45
References			
1.	Imran Bashir, “Mastering Blockchain Distributed ledgers, decentralization and smart contracts Explained”, Packt Publishing, 1st Edition, 2017.		
2.	Brenn Hill, Samanyu Chopra, Paul Valencourt, “Blockchain Quick Reference: A guide to exploring decentralizedblockchain application development”, Packt publishing, 1st Edition 2018.		
3.	Mark Gates, “Block chain: Ultimate guide to understanding block chain, bit coin, cryptocurrencies, smart contracts and the future of money”, Wise Fox Publishing and Mark Gates 2017.		
4.	Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, “Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer”, 2018		
E-Resources			
1.	https://onlinecourses.nptel.ac.in/noc19_cs28/preview		
2.	https://nptel.ac.in/downloads/106105184/		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205												
Programme	B.E./B.Tech.			Programme code						Regulation	2023		
Department	CSE,CST						Semester			-			
Course Code	Course name				Periods per week			Credit		Maximum Marks			
U23CSV36	Social Network Security				L	T	P	C	CA	ESE	Total		
					3	0	0	3	40	60	100		
Course Objective	The student should be made to, - Familiarize the Concept of semantic web and the introduction to social network security - Get familiar with the Privacy and Security issues in Social Networking - Explore the method of extracting and mining data from social network communities - Understanding and predicting human behavior for social communities - Describe the Access Control, Privacy and Security management of social networks												
Course Outcome	At the end of the course, the student should be able to,										KL		
	CO1: understand the concepts of semantic web and introduction of social network analysis										K2		
	CO2: Address Privacy and Security issues in Social Networking										K3		
	CO3: Learn about the social network communities										K2		
	CO4: understand and predict the human behavior for social communities										K3		
	CO5: Design and implement the social network representations and visualize its applications										K4		
Pre-requisites	-												

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	1	2	3	2	-	-	-	3	2	1	2	3	3
CO 2	2	2	2	3	3	-	-	-	1	2	2	3	3	3
CO 3	2	1	1	3	2	-	-	-	1	2	1	1	1	3
CO 4	3	3	3	3	2	-	-	-	1	1	1	1	2	1
CO 5	1	3	2	2	2	-	-	-	1	1	3	1	2	3

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II&III	
2. Assignments / Seminar/Quiz	
3. End-Semester examination	
Indirect	
1. Course -end survey	

Content of the syllabus			
Unit– I	Introduction	Periods	9
Introduction to Semantic web: Limitations of current web, Development of Semantic web, Emergence of the Social Web, Social Network analysis, Components, Development of Social Network Analysis, Key concepts and measures in network analysis, overview of privacy and security, Major paradigms, for understanding privacy and security.			
Unit-II	Security Issues in Social Networks	Periods	9
The evolution of privacy and security concerns with networked technologies, Contextual influences on privacy attitudes and behaviors, Anonymity in a networked world.			
Unit – III	Extraction and Mining communities in web social networks	Periods	9
Extracting evolution of Web Community from a Series of Web Archive, Definition of Community, Examples for Community, Detecting communities in social Networks, Examples for Detection of Communities, Algorithms, Tools for detecting communities social network infrastructures and communities, Examples for various tools, Big data and Privacy.			
Unit– IV	Predicting Human behavior and Privacy issues	Periods	9
User data management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Privacy in online social networks, Trust model example, Trust network analysis, Trust transitivity Analysis			
Unit– V	Access Control, Privacy and Identity Management	Periods	9
Enforcing Access Control Strategies, Authentication and Authorization, Roles-based Access Control, Host, storage and network access control options, Firewalls, Authentication, and Authorization in Social Network, Identity & Access Management, Single Sign-on, Identity Federation, Identity providers and service consumers, The role of Identity provisioning			
Total Periods			45
References			
1.	Peter Mika, “Social Networks and the Semantic Web”, First Edition, Springer 2007		
2.	Borko Furht, “Handbook of Social Network Technologies and Applications”, 1st Edition, Springer, 2010.		
3.	Guandong Xu,Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, First Edition Springer, 2011		
4.	Dion Goh and Schubert Foo, “Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively”, IGI Global Snippet, 2008.		
5.	David Easley, Jon Kleinberg, Networks, Crowds, and Markets: Reasoning about a Highly Connected Worldl, First Edition, Cambridge University Press, 2010		
6.	Ian McCulloh, Helen Armstrong and Anthony Johnson, “Social Network Analysis with Applications”, Wiley Publications, 2013.		
E-Resources			
1.	https://www.sciencedirect.com/science/article/abs/pii/B9780128215999000017		
2.	https://www.computer.org/csdl/magazine/ic/2011/03/mic2011030010/13rRUzphDrO		
3.	https://link.springer.com/article/10.1007/s40747-021-00409-7		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205										 
Programme	B.E./B.Tech.			Programme code				Regulation		2023	
Department	CSE,IT&CST						Semester			-	
Course Code	Course name				Periods per week			Credit	Maximum Marks		
U23CSV37	Ethical Hacking				L	T	P	C	CA	ESE	Total
					3	0	0	3	40	60	100
Course Objective	The student should be made to, • Learn aspects of security, importance of data gathering, foot printing and system hacking • Learn tools and techniques to carry out a penetration testing. • Compare different types of hacking tools • Explain DoS Attacks, Wireless LANs, vulnerability assessment and penetration testing										
	At the end of the course, the student should be able to,										KL
	CO1: Understand the different ethical hacking techniques										K2
	CO2: Learn about Foot printing and port scanning										K3
	CO3: Analyze the packets and able to find the intruders										K3
Course Outcome	CO4: Discover Vulnerabilities in a web application and servers										K4
	CO5: Implement Pentest tools.										K3
	Pre-requisites										

VIVEKANANDHACOLLEGE OF ENGINEERINGFORWOMEN



Programme	B.E./B.Tech.	Programme code				Regulation	2023		
Department	CSE,IT&CST				Semester		-		
Course Code	Course name		Periods per week			Credit	Maximum Marks		
U23CSV37	Ethical Hacking		L	T	P	C	CA	ESE	Total
			3	0	0	3	40	60	100
Course Objective	The student should be made to, • Learn aspects of security, importance of data gathering, foot printing and system hacking • Learn tools and techniques to carry out a penetration testing. • Compare different types of hacking tools • Explain DoS Attacks, Wireless LANs, vulnerability assessment and penetration testing								
Course Outcome	At the end of the course, the student should be able to,							KL	
	CO1: Understand the different ethical hacking techniques							K2	
	CO2: Learn about Foot printing and port scanning							K3	
	CO3: Analyze the packets and able to find the intruders							K3	
	CO4: Discover Vulnerabilities in a web application and servers							K4	
	CO5: Implement Pentest tools.							K3	
Pre-requisites	-								

CO /PO Mapping (3/2/1indicates strength of correlation) 3-Strong,2–Medium,1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	1	3	2	2	2			2					2	3
CO 2	2	3	2	2	2			2					2	2
CO 3	2	2	2	2	3			2					2	2
CO 4	2	2	2	3	3			2					2	3
CO 5	2	3	2	3	2			2					2	3

Course Assessment Methods

1. Continuous Assessment Test I, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examination

Indirect

Content of the syllabus			
Unit– I	ETHICAL HACKING OVERVIEW & VULNERABILITIES	Periods	9
Understanding the importance of security, Concept of ethical hacking and essential Terminologies Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit Phases involved in hacking.			
Unit-II	FOOTPRINTING & PORT SCANNING	Periods	9
Foot printing - Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase. Port Scanning - Introduction, using port scanning tools, ping sweeps, Scripting Enumeration-Introduction.			
Unit – III	SYSTEM HACKING	Periods	9
Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers, Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection.			
Unit– IV	HACKING WIRELESS NETWORKS	Periods	9
Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.			
Unit– V	MALWARES AND PENETRATION TESTING	Periods	9
Malware Threats - Viruses and Worms, Trojans, Covert Communication, Keystroke Logging and Spyware, Malware Counter measures, Wireless Technologies, Mobile Security and Attacks- Wireless Technologies, Mobile Security and Attacks : Wireless Technologies, Mobile Device Operation and Security, Wireless LANs, vulnerability assessment and penetration testing.			
Total Periods			45
References			
1.	Michael Gregg, Certified Ethical Hacker (CEH) Version 9 Cert Guidel, 2ndEdition, Pearson Education, 2018		
2.	Patrick Engebretson, The Basics of Hacking and Penetration Testing: Ethical Hacking andPenetration Testing Made Easy , 2nd Edition, Syngress , Elseveir, 2013		
3.	Parteek Sharma, Hacking Revealed , 1stEdition, White Falcon Publishing, 2018 4. Reginald Wong, —Mastering Reverse Engineering: Re-engineer your ethical hacking skills , Packt Publishing,2018		
4.	Parteek Sharma, Hacking Revealed , 1stEdition, White Falcon Publishing, 2018 4. Reginald Wong, —Mastering Reverse Engineering: Re-engineer your ethical hacking skills , Packt Publishing,2018		
E-Resources			
1.	“Hacking: The Art of Exploitation” by Jon Erickson (PDF)		
2.	https://csrc.nist.gov/publications		
3.	NPTEL		
4.	OWASP testing guide		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205																																																																																																																																					
Programme	B.E./B.Tech.				Programme code			101		Regulation		2023																																																																																																																										
Department	CSE,IT&CST							Semester			-																																																																																																																											
Course Code	Course name					Periods per week			Credit		Maximum Marks																																																																																																																											
U23CSV38	Security and Privacy in Cloud					L	T	P	C		CA	ESE	Total																																																																																																																									
						3	0	0	3		40	60	100																																																																																																																									
Course Objective	The student should be made to, • To Introduce Cloud Computing terminology, definition & concepts • To understand the security design and architectural considerations for Cloud • To understand the Identity, Access control in Cloud • To follow best practices for Cloud security using various design patterns • To be able to monitor and audit cloud applications for security																																																																																																																																					
	At the end of the course, the student should be able to,														KL																																																																																																																							
	CO1: Understand the cloud concepts and fundamentals.														KL2																																																																																																																							
	CO2: Explain the security challenges in the cloud.														KL3																																																																																																																							
	CO3: Define cloud policy and Identity and Access Management.														KL3																																																																																																																							
Course Outcome	CO4: Understand various risks and audit and monitoring mechanisms in the cloud.														KL3																																																																																																																							
	CO5: Define the various architectural and design considerations for security in the cloud.														KL3																																																																																																																							
Pre-requisites	Cloud Computing																																																																																																																																					
<table><tr><th colspan="13">CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>3</td><td>3</td><td>1</td><td>2</td><td></td><td></td><td></td><td>1</td><td>1</td><td>1</td><td>3</td><td>3</td><td>2</td></tr><tr><td>CO 2</td><td>1</td><td>3</td><td>2</td><td>3</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>2</td><td>2</td><td>3</td></tr><tr><td>CO 3</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td>3</td><td>1</td><td>1</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 4</td><td>2</td><td>1</td><td>2</td><td>3</td><td>3</td><td></td><td></td><td></td><td>3</td><td>2</td><td>3</td><td>3</td><td>2</td><td>2</td></tr><tr><td>CO 5</td><td>1</td><td>3</td><td>3</td><td>1</td><td>1</td><td></td><td></td><td></td><td>2</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td></tr></table>																CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping		COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	3	3	1	2				1	1	1	3	3	2	CO 2	1	3	2	3	1				2	2	3	2	2	3	CO 3	3	2	2	3	2				3	1	1	2	3	3	CO 4	2	1	2	3	3				3	2	3	3	2	2	CO 5	1	3	3	1	1				2	3	3	2	2	3
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping																																																																																																																									
COs	Programme Outcomes(POs)												PSOs																																																																																																																									
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2																																																																																																																								
CO 1	3	3	3	1	2				1	1	1	3	3	2																																																																																																																								
CO 2	1	3	2	3	1				2	2	3	2	2	3																																																																																																																								
CO 3	3	2	2	3	2				3	1	1	2	3	3																																																																																																																								
CO 4	2	1	2	3	3				3	2	3	3	2	2																																																																																																																								
CO 5	1	3	3	1	1				2	3	3	2	2	3																																																																																																																								
Course Assessment Methods Direct 1. Continuous Assessment Test I, II&III 2. Assignments / Seminar/Quiz 3. End-Semester examination Indirect 1. Course -end survey																																																																																																																																						

Content of the syllabus			
Unit– I	FUNDAMENTALS OF CLOUD SECURITY CONCEPTS	Periods	9
Overview of cloud security- Security Services - Confidentiality, Integrity, Authentication, Nonrepudiation, Access Control - Basic of cryptography - Conventional and public-key cryptography, hash functions, authentication, and digital signatures.			
Unit-II	SECURITY DESIGN AND ARCHITECTURE FOR CLOUD	Periods	9
Security design principles for Cloud Computing - Comprehensive data protection - End-to-end access control - Common attack vectors and threats - Network and Storage - Secure Isolation Strategies - Virtualization strategies - Inter-tenant network segmentation strategies - Data Protection strategies: Data retention, deletion and archiving procedures for tenant data, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key			
Unit – III	ACCESS CONTROL AND IDENTITY MANAGEMENT	Periods	9
Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention			
Unit– IV	CLOUD SECURITY DESIGN PATTERNS	Periods	9
Introduction to Design Patterns, Cloud bursting, Geo-tagging, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud			
Unit– V	MONITORING, AUDITING AND MANAGEMENT	Periods	9
Proactive activity monitoring - Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges - Events and alerts - Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management			
Total Periods			45
References			
1.	Mather, Kumaraswamy and Latif, “Cloud Security and Privacy”, OREILLY 2023		
2.	Raj Kumar Buyya , James Broberg, andrzejGoscinski, “Cloud Computing:”, Wiley 2013		
3.	Dave shackleford, “Virtualization Security”, SYBEX a wiley Brand 2013		
4.	Mark C. Chu-Carroll —Code in the Cloudl,CRC Press, 2011		
5.	Mastering Cloud Computing Foundations and Applications Programming RajkumarBuyya, Christian Vechhiola, S. ThamaraiSelvi		
E-Resources			
1.	https://onlinecourses.nptel.ac.in/noc20_cs20/preview		
2.	https://vdocument.in/cccloud-computing-a-practical-approach.html		
3.	https://www.elsevier.com/books/cloud-computing/marinescu/978-0-12-812810-7		
4.	https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/EC2_GetStarted.html		

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Programme	B.E./B.Tech.	Programme Code				101		Regulation		2023					
Department	CSE&CST					Semester				-					
Course Code	Course Name	Periods Per Week			Credit		Maximum Marks								
		L	T	P	C	CA		ESE	Total						
U23CSV39	DIGITAL FORENSICS	3	0	0	3	40		60	100						
Course Objective	The student should be made to,														
	• To understand the various computer and cyber-crimes in the digital world. • To understand a significance of digital forensics life cycle, underlying forensics principles and investigation process. • To be able to identify the live data in case of any incident handling and application of appropriate tools and practices for the same. • To Develop the skills in application of various tools and investigation report writing with suitable evidences. • To be able to identify the network and mobile related threats and recommendation of suitable forensics procedures for the same.														
	At the end of the course, the student will be able to												Knowledge Level		
	CO1: Gain knowledge in various computer and cyber-crimes occurs in the digital world.												K2		
	CO2: Understand the need of digital forensic and the role of digital evidence.												K2		
	CO3: Identify and acquire live data from systems involved in security incidents.												K3		
Course Outcome	CO4: Apply appropriate forensic tools for collecting digital evidence and develop comprehensive case reports.												K3		
	CO5: Analyze the impact of attacks such as sniffing, spoofing, and denial-of-service on networks and mobile systems.												K4		
	Pre-requisites														

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
COs	Programme Outcomes (POs)											PSOs			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O 2	
CO 1	3	2	2	3	3	3							2	3	
CO 2	3	2	2	3	3	3							3	3	
CO 3	3	2	2	3	3	3							3	3	
CO 4	3	2	2	3	3	3							2	3	
CO 5	3	2	2	3	3	3							2	3	

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & III 2. Assignments and Mind map 3. End-Semester examinations			
Indirect			
Course - end survey			
Content of the syllabus			
Unit – I	Introduction to Digital Forensics and Digital Evidences	Periods	9
Introduction to cybercrimes- Hacking, DoS Attacks, Trojan Attacks, Credit Card Frauds, Cyber Terrorism, Cyber Stalking. - classification of computer crimes - Prevention of Cybercrime: Hackers, Crackers- Steps performed by Hacker- Principles of Digital Forensic- Challenging Aspects of Digital Evidence, Scientific Evidence, Presenting Digital Evidence- Physical Model, Staircase Model, Evidence Flow Model.			
Unit - II	Computer Forensics	Periods	9
OS File Systems Review: Windows Systems- FAT32 and NTFS, UNIX File Systems-MAC File Systems-Registry- Event Logs- RAM Forensic Analysis- Creating a RAM Memory Image-Volatility framework-Extracting Information- Need of Computer Forensic Tools-Types of Computer Forensic Tools-Tasks performed by Computer Forensic Tools- Study of ‘The Sleuth Kit’ Autopsy tool for Digital Forensics			
Unit – III	Incident Response Management, Live Data Collection and Forensic Duplication	Periods	9
Incidence Response Methodology: Goals of Incident Response- Finding and Hiring IR Talent- Initial Response- Investigation-Remediation- Tracking of Significant Investigative Information- : Live Data Collection on Microsoft Windows- Forensic Duplicates as Admissible Evidence- Forensic Duplication Tools: Creating a Forensic evidence-Duplicate/Qualified Forensic Duplicate of a Hard Drive- Live Data Collection on Unix-Based Systems			
Unit - IV	Forensic Tools and Report Writing	Periods	9
Forensic Image Acquisition in Linux : Acquire an Image with dd Tools- Acquire an Image with Forensic Formats, Preserve Digital Evidence with Cryptography- Image Acquisition over a Network- Acquire Removable Media- Reporting Standards- Report Style and Formatting- Report Content and Organization			
Unit – V	Network Forensics	Periods	9
Sources of Network Based Evidence- Principles of Internetworking- Internet Protocol Suite-Evidence Acquisition- Analyzing Network Traffic: Packet Flow and Statistical Flow-Network Intrusion Detection and Analysis- Investigation of Routers- Investigation of Firewalls- Mobile Phone Challenges, Mobile phone evidence extraction- process- Android OS Architecture, Android File Systems basics			
Total Periods			45
Text Books			
1.	Digital Forensics by Dr. Dhananjay R. Kalbande Dr. Nilakshi Jain, Wiley Publications, First Edition, 2019.		
2.	Digital Evidence and Computer Crime by Eoghan Casey, Elsevier Academic Press, Third Edition, 2011.		
3.	Incident Response & Computer Forensics by Jason T. Luttgens, Matthew Pepe and Kevin Mandia, McGraw-Hill Education, Third Edition (2014).		
4.	Network Forensics : Tracking Hackers through Cyberspace by Sherri Davidoff and Jonathan Ham, Pearson Edu,2012		
5.	Practical Mobile Forensic by Satish Bommisetty, Rohit Tamma, Heather Mahalik, PACKT publication, Open source publication, 2014 ISBN 978-1-78328-831-1		

References	
1.	Scene of the Cybercrime: Computer Forensics by Debra Littlejohn Shinder, Syngress Publication, First Edition, 2002.
2.	Digital Forensics with Open Source Tools by Cory Altheide and Harlan Carvey, Syngress Publication, First Edition, 2011
3.	Practical Forensic Imaging Securing Digital Evidence with Linux Tools by Bruce Nikkel, NoStarch Press, San Francisco, (2016)
4.	Android Forensics : Investigation, Analysis, and Mobile Security for Google Android by Andrew Hogg, Elsevier Publication, 2011
E-Resources	
1.	https://flylib.com/books/en/3.394.1.51/1/

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		L	T	P		C	CA	ESE	Total																																																																																																																																							
U23ITV41	CLOUD COMPUTING	3	0	0	3	40	60	100																																																																																																																																								
Course Objective	The Main Objective of the course is to																																																																																																																																															
	- Introduce the broad perceptive of cloud architecture and model - Understand the concept of Virtualization and features of cloud simulator - Familiar with the lead players in cloud. - Apply different cloud programming model as per need																																																																																																																																															
Course Outcome	At the end of the course, the students should be able to,										Knowledge level																																																																																																																																					
	CO1: Understand the design challenges in cloud										K1																																																																																																																																					
	CO2: Apply the concept of virtualization and its types										K2																																																																																																																																					
	CO3: Experiment with virtualization of hardware resources and Docker.										K3																																																																																																																																					
	CO4: Explain security challenges in the cloud environment										K4																																																																																																																																					
CO5: Identify the core issues of cloud computing											K4																																																																																																																																					
Pre-requisites	-																																																																																																																																															
<table><tr><th colspan="12">CO /PO Mapping</th><th colspan="2">CO/PSO Mapping</th></tr><tr><td colspan="14">(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>2</td><td>1</td><td>-</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>2</td></tr><tr><td>CO 2</td><td>3</td><td>2</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>2</td></tr><tr><td>CO 3</td><td>2</td><td>2</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>2</td></tr><tr><td>CO 4</td><td>3</td><td>2</td><td>1</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>2</td><td>2</td></tr><tr><td>CO 5</td><td>-</td><td>2</td><td>2</td><td>1</td><td>-</td><td>2</td><td>1</td><td>-</td><td>2</td><td>-</td><td>-</td><td>3</td><td>2</td><td>2</td></tr></table>													CO /PO Mapping												CO/PSO Mapping		(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	2	1	-	-	1	-	-	-	-	-	-	2	2	CO 2	3	2	1	-	-	-	-	-	-	-	-	-	2	2	CO 3	2	2	1	-	-	-	-	-	-	-	-	-	2	2	CO 4	3	2	1	-	1	-	-	-	-	-	-	2	2	2	CO 5	-	2	2	1	-	2	1	-	2	-	-	3	2	2
CO /PO Mapping												CO/PSO Mapping																																																																																																																																				
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CO 3	2	2	1	-	-	-	-	-	-	-	-	-	2	2																																																																																																																																		
CO 4	3	2	1	-	1	-	-	-	-	-	-	2	2	2																																																																																																																																		
CO 5	-	2	2	1	-	2	1	-	2	-	-	3	2	2																																																																																																																																		
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Unit – I	CLOUD ARCHITECTURE MODELS AND INFRASTRUCTURE										Periods	9																																																																																																																																				
Cloud Architecture: System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture – Cloud deployment models – Cloud service models; Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Design Challenges																																																																																																																																																
Unit -II	VIRTUALIZATION										Periods	9																																																																																																																																				
Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.																																																																																																																																																

Unit – III	VIRTUALIZATION INFRASTRUCTURE AND DOCKER	Periods	9
Desktop Virtualization – Network Virtualization – Storage Virtualization – System-level of Operating Virtualization – Application Virtualization – Virtual clusters and Resource Management – Containers vs. Virtual Machines – Introduction to Docker – Docker Components – Docker Container – Docker Images and Repositories.			
Unit -IV	CLOUD SECURITY	Periods	9
Virtualization System-Specific Attacks: Guest hopping – VM migration attack – hyperjacking. Data Security and Storage; Identity and Access Management (IAM) – IAM Challenges – IAM Architecture and Practice.			
Unit – V	APPLICATION OF CLOUD	Periods	9
Scientific Applications – Healthcare –Biology – Geo science – Business and Consumer Applications - Cloud Computing Collaboration - Multimedia – Storage – Corporate – Communication.			
Total Periods			45
TextBooks:			
1.	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012.		
2.	James Turnbull, The Docker Book, OReilly Publishers, 2014.		
REFERENCEBOOKS			
1.	Krutz, R. L., Vines, R. D, Cloud security. A Comprehensive Guide to Secure Cloud Computing, Wiley Publishing, 2010.		
E-Resources			
1.	https://www.slideshare.net/slideshow/cloud-computing-simple-ppt-41561620/41561620		



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode-637 205



Programme	B.E./B.Tech	Programme Code				Regulation	2023								
Department	CSE,IT&CST				Semester										
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks									
		L	T	P		C	CA	ESE	Total						
U23ITV42	DISTRIBUTED SYSTEMS	3	0	0	3	40	60	100							
Course Objective	The students should made to: - Introduce the core concepts and characteristics of Distributed Systems. - Understand the design and implementation of remote invocation techniques such as Remote Procedure Call (RPC) and Remote Method Invocation (RMI). - Examine operating system-level support for distributed environments and synchronization techniques. - Understand advanced concepts such as transactions, concurrency control, replication, and distributed multimedia systems.														
Course Outcome	At the end of the course, the students should be able to,							KL							
	CO1: Understand and explain the key characteristics and applications of Distributed Systems.							K2							
	CO2: Explore the concepts and mechanisms of IPC, RPC and RMI in distributed systems.							K3							
	CO3: Demonstrate knowledge of OS-level support, process management, and distributed file systems.							K3							
	CO4: Understand synchronization methods and manage transactions, concurrency, recoverability, and deadlocks in distributed systems.							K2							
	CO5: Gain knowledge of replication methods, fault tolerance, and managing distributed multimedia systems							K2							
Pre-requisites	Data structures and Algorithms . Operating Systems														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping		
COs	Programme Outcomes (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO 1	2	1											2	2	
CO 2	3	2	1										3	3	
CO 3	3	2	1										3	3	
CO 4	2	1											2	2	
CO 5	2	1											2	2	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations															

Indirect			
1. Course - end survey			
Content of the syllabus			
Unit– I	INTRODUCTION TO DISTRIBUTED SYSTEMS	Periods	9
Characterization of DS: Examples of DS- Web Search , MMOG – Pervasive Networking, ubiquitous computing and Distributed computing - resource sharing - challenges.System model: Difficulties and threats for DS - Physical model- Architectural models - Fundamental models.			
Unit–II	IPC AND REMOTE INVOCATION IN DISTRIBUTED SYSTEMS	Periods	9
Inter process Communication – Characteristics of IPC – UDP datagram Communication- CORBA’s Data Representation – Java Object Serialization - Remote Object References – Group Communication. Remote Invocation: Request- reply protocols – Design Issues for RPC – Implementation of RPC – Case Study: Sun RPC – Design Issues for RMI – Implementation of RMI.			
Unit– III	OPERATING SYSTEMS SUPPORT AND DISTRIBUTED FILE SYSTEMS	Periods	9
Operating System Supports : Address Spaces – Creation of New Processes- Threads- Invocation Performance- Asynchronous Operations- Virtualization at OS Level - Distributed Objects- Case Study : CORBA . Distributed File Systems: Characteristics of Distributed File Systems - File service architecture –Case study: Sun Network File system - Name service and domain name system-Directory services.			
Unit-IV	SYNCHRONIZATION AND TRANSACTIONS IN DISTRIBUTED SYSTEMS	Periods	9
Introduction - Clocks, events and process states – The Berkeley Algorithm – Network Time Protocol – Logical Clocks – The snapshot algorithm - Distributed Mutual exclusion .Transactions and Concurrency Control: Concurrency control – Recoverability form aborts - Nested transactions – Locking rules for Nested Transactions- Increasing concurrency – Two version Locking – Hierarchic Locks - Timestamp ordering –Flat and Nested Distributed Transactions - Concurrency Control in Distributed Transactions – Distributed Deadlocks			
Unit– V	REPLICATION AND MULTIMEDIA SYSTEMS	Periods	9
Replication –System model and the role of Group Communication - fault tolerant services- Passive Replication – Active Replication - Case study :Bayou – Transactoin with Replicated Data – Architecutes for Replicated Transactions – Network Partitions.Distributed multimedia system: Introduction - Characteristic of multimedia data- Quality of Service Management – Case Study : Tiger.			
Total Periods			45
Text Book:			
1.	George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.		
References:			
1.	Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.		
2.	Tanenbaum A.S., Van Steen M., “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.		
E-Resources:			
1.	https://www.slideshare.net/sunitasahu101/introduction-to-distributed-system-127420140		
2.	https://www.slideshare.net/mjagadeeshmtech/peer-to-peer-services-and-file-systems		
3.	https://www.slideshare.net/SHATHAN/synchronization-34088991		
4.	https://www.slideshare.net/sandpoonia/10-resource-management		
5.	https://nptel.ac.in/courses/106/106/106106168/		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205															
Programme		B.E. /B.Tech.		Programme Code								Regulation		2023			
Department		CSE,IT&CST										Semester		-			
Course Code		Course Name				Periods Per Week			Credit		Maximum Marks						
						L	T	P	C	CA		ESE	Total				
U23ITV43		Smart Sensor Technologies				3	0	0	3	40		60	100				
Course Objective		The Main Objective of the course is - To learn about Sensor ,Transducer. - To study the Memory and I/O Management - To understand the need for Embedding Computers and Applications															
Course Outcome		At the end of the course, the student should be able to,												Knowledge Level			
		CO1: Analyze the sensors available in IoT based on application requirement and the Sensing methods												K2			
		CO2: Analyze the Memory and I/O Management and handling of Interrupts.												K3			
		CO3: Apply the Inter process communication mechanisms in Real Time												K3			
		CO4: Infer Embedding Computers and Program Optimization method												K4			
		CO5: Design a real-time application for Network-Based Design in Distributed Embedded System												K3			
Pre-requisites		-															
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak														CO/PSO Mapping			
COs		Programme Outcomes (POs)												PSOs			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	PO 11	PO 12	PSO 1	PSO 2		
CO 1		2	3	2	3						3			1	2		
CO 2		1	3	2	2						3			2	2		
CO 3		2	2	2	2						2			2	2		
CO 4		3	2	2	2						3			2	2		
CO 5		2	3	2	2						3			2	2		
Course Assessment Methods																	
Direct																	
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations																	
Indirect																	
1.Course - end survey																	
Content of the syllabus																	
Unit – I		BASICS OF SENSORS										Periods		9			
Introduction- Sensor Vs Transducer -Nature of Sensors - Sensor Output Characteristics - Sensing Technologies-Digital Output Sensors- -ARM processor – Architecture- Instruction sets and programming																	
Unit - II		MEMORY AND INPUT / OUTPUT MANAGEMENT										Periods		9			
Programming Input and Output – Supervisor Mode, Exceptions and Traps- Co-Processors -Memory system mechanisms – Memory and I/O devices and interfacing – Interrupts handling.																	

Unit – III	PROCESSES AND OPERATING SYSTEMS	Periods	9
Multiple tasks and processes – Preemptive Real-Time Operating Systems - Priority-Based Scheduling.-Inter process communication mechanisms – Performance issues- Power Management and Optimization for Processes.			
Unit - IV	EMBEDDED SOFTWARE	Periods	9
Introduction of Embedding Computers - Components for Embedded Programs - Models of Programs- Assembly, Linking, and Loading - Basic Compilation Techniques - Program Optimization : Expression Simplification, Dead Code Elimination, Procedure In lining, Loop Transformations ,Register Allocation, Scheduling, Instruction Selection, Understanding and Using your Compiler and Interpreters and JIT Compilers.			
Unit – V	EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT	Periods	9
Distributed Embedded Architectures - Networks for Embedded Systems - Network-Based Design – Internet Enabled Systems - Vehicles as Networks - Sensor Networks -Case Study- Design Example: Elevator Controller .			
Total Periods			45
Text Books:			
1.	Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012		
2.	Michael J. Pont, “Embedded C”, Pearson Education, 2007		
REFERENCE BOOKS:			
1.	Steve Heath, “Embedded System Design”, Elsevier, 2005.		
2.	Muhammed Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, Second edition, 2008		
E-Resource:			
1.	https://www.digimat.in/nptel/courses/video/108102045/L01.html		

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		L	T	P	C	CA	ESE	Total																																																																																																																										
U23ITV44	Software Defined Networks	3	0	0	3	40	60	100																																																																																																																										
Course Objective	The Main Objective of the course is to																																																																																																																																	
	• Develop knowledge in networking fundamentals • Learn the conceptual understanding of Software Defined Networks (SDN) • Study the industrial deployment use-cases of SDN • Learn the design and development of SDN and SDX. • Develop the SDN Network using the programming language.																																																																																																																																	
	At the end of the course, the student should be able to,							Knowledge level																																																																																																																										
	CO1: Examine the challenges and opportunities associated with adopting SDN compared to traditional approaches to networking.							K4																																																																																																																										
	CO2: Analyse the functions and components of the SDN architecture.							K3																																																																																																																										
Course Outcome	CO3: Discuss the major requirements of the design of an SDN protocol.							K2																																																																																																																										
	CO4: Design and create an SDN network consisting of SDN switches and a centralized controller.							K3																																																																																																																										
	CO5: Analyze the performance of the SDN network by using verification and troubleshooting techniques. And evaluate the emerging SDN applications.							K3																																																																																																																										
	Pre-requisites							-																																																																																																																										
	<table><tr><th colspan="13">CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>2</td><td>3</td><td>2</td><td>-</td><td>1</td><td>2</td><td>-</td><td>-</td><td>1</td><td>2</td><td></td><td>1</td><td>2</td><td>1</td></tr><tr><td>CO 2</td><td>2</td><td>1</td><td>-</td><td>3</td><td>1</td><td>1</td><td>-</td><td>-</td><td>1</td><td>1</td><td></td><td>1</td><td>2</td><td>1</td></tr><tr><td>CO 3</td><td>2</td><td>2</td><td>1</td><td>2</td><td>-</td><td>1</td><td>-</td><td>2</td><td>-</td><td>1</td><td></td><td>1</td><td>2</td><td>2</td></tr><tr><td>CO 4</td><td>1</td><td>-</td><td>2</td><td>-</td><td>2</td><td>3</td><td>-</td><td>-</td><td>1</td><td>-</td><td></td><td>1</td><td>2</td><td>1</td></tr><tr><td>CO 5</td><td>3</td><td>2</td><td>1</td><td>2</td><td>-</td><td>1</td><td>-</td><td>-</td><td>1</td><td>2</td><td></td><td>1</td><td>2</td><td>2</td></tr></table>												CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													CO/PSO Mapping		COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	2	3	2	-	1	2	-	-	1	2		1	2	1	CO 2	2	1	-	3	1	1	-	-	1	1		1	2	1	CO 3	2	2	1	2	-	1	-	2	-	1		1	2	2	CO 4	1	-	2	-	2	3	-	-	1	-		1	2	1	CO 5	3	2	1	2	-	1	-	-	1	2		1	2
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													CO/PSO Mapping																																																																																																																					
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CO 1	2	3	2	-	1	2	-	-	1	2		1	2	1																																																																																																																				
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CO 4	1	-	2	-	2	3	-	-	1	-		1	2	1																																																																																																																				
CO 5	3	2	1	2	-	1	-	-	1	2		1	2	2																																																																																																																				
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Indirect																																																																																																																																		
1. Course - end survey																																																																																																																																		

Content of the syllabus			
Unit – I	Introduction to SDN	Periods	9
Overview; History and evolution of SDN; Architecture of SDN; SDN Flavours; Scalability (Data Centres, Service provider networks, ISP Automation); Reliability (QoS, and Service Availability); Consistency (Configuration management, and Access Control Violations); Opportunities and Challenges.			
Unit - II	ARCHITECTURE	Periods	9
Network Operating System (NOS). SDN Architecture. Planes - data, management and control. Interfaces - northbound and southbound.			
Unit – III	PROTOCOLS	Periods	9
Languages and functions available for programming SDNs, northbound API. Mininet. Software vs. Hardware SDN switch implementations - Open vSwitch, WhiteBox, ONL. Controller implementations - POX, NOX, Beacon, Floodlight. Special Purpose controllers - Flowvisor, RouteFlow.			
Unit - IV	DESIGN AND DEVELOPMENT	Periods	9
Network Programmability - Network Function Virtualization - NetApp Development, Network Slicing, SDX; Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs.			
Unit – V	PROGRAMMING	Periods	9
Network Virtualization, Network Topology and Topological Information Abstraction, Data Centric Traffic Management, Wide Area Traffic Management, Wireless networks.			
Total Periods			45
Text Books:			
1.	1. Goransson, Paul, Chuck Black, and Timothy Culver. Software defined networks: a comprehensive approach, 1st edition, Morgan Kaufmann, 2016.		
REFERENCE BOOKS			
1.	Stallings, William. Foundations of modern networking: SDN, NFV, QoE, IoT, and Cloud, 1st edition, Addison-Wesley Professional, 2015.		
2.	Oswald Coker, Siamak Azodolmolky. Software-Defined Networking with OpenFlow -Second Edition, Packt Publishing, 2017.		
E-Resources			
1.	https://www.geeksforgeeks.org/software-defined-networking/		
2.	https://www.sdxcentral.com/networking/sdn/definitions/what-the-definition-of-software-defined-netw		
3.	https://www.ibm.com/think/topics/sdn		

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Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & III			
2. Assignment / Quiz / Seminar			
3. End-Semester Examinations			
Indirect			
1. Course - end survey			
Content of the syllabus			
Unit – I	Introduction	Periods	11
History, Graphics Processors, Graphics Processing Units, GPGPUs. Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel programming, CUDA OpenCL / OpenACC, Hello World Computation Kernels, Launch parameters, Thread hierarchy, Warps / Wave fronts, Thread blocks / Workgroups, Streaming multiprocessors, 1D / 2D / 3D thread mapping, Device properties, Simple Programs			
Unit - II	Memory	Periods	9
Memory hierarchy, DRAM / global, local / shared, private / local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories.			
Unit – III	Synchronization & Functions	Periods	11
Synchronization: Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization cross CPU and GPU			
Functions: Device functions, Host functions, Kernels functions, Using libraries (such as Thrust), and developing libraries.			
Unit - IV	Streams	Periods	9
Support: Debugging GPU Programs. Profiling, Profile tools, Performance aspects Streams: Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based-Synchronization - Overlapping data transfer and kernel execution, pitfalls.			
Unit – V	Case Studies	Periods	5
Case Studies: Image Processing, Graph algorithms, Simulations, Deep Learning			
Total Periods			45
TEXT BOOKS:			
1.	Programming Massively Parallel Processors: A Hands-on Approach; David Kirk, Wen-mei Hwu; Morgan Kaufman; 2010 (ISBN: 978-0123814722)		
2.	CUDA Programming: A Developer's Guide to Parallel Computing with GPUs; Shane Cook; Morgan Kaufman; 2012 (ISBN: 978-0124159334)		
REFERENCE BOOKS			
1.	David B. Kirk, Wen-mei W. Hwu , Programming Massively Parallel Processors: A Hands-on Approach		
2.	Shane Cook , CUDA Programming: A Developer's Guide to Parallel Computing with GPUs		
E-Resources			
1.	Introduction to Parallel Computing - GeeksforGeeks		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205										 			
Programme		B.E. /B.Tech.			Programme Code							Regulation		2023	
Department		CSE,IT&CST										Semester		-	
Course Code		Course Name				Periods Per Week			Credit		Maximum Marks				
						L	T	P	C	CA	ESE	Total			
U23ITV46		Virtualization				3	0	0	3	40	60	100			
Course Objective		The Main Objective of the course is to - Describe data center infrastructures and its elements - Describe virtualization of data center elements: compute, network and storage. - Describe software-defined data centers. - Understand different types of compute virtualization software: types of hypervisors. - Install and configure VMware workstation, VMware player and vSphere.													
Course Outcome		At the end of the course, the student should be able to,											Knowledge level		
		CO1: Understand various virtual IT infrastructure concepts and algorithms											K1		
		CO2: Apply various virtualization approaches to create and manage virtualized IT resources											K2		
		CO3: Design and implement private clouds using virtualization											K2		
		CO4: Demonstrate the design of data centers.											K3		
		CO5: Apply the concepts of Virtualization and its performance											K3		
Pre-requisites		-													
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak														CO/PSO Mapping	
COs		Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	2		2								2	2	
CO 2	3	2	2		2								2	2	
CO 3	3	2	2		2								2	2	
CO 4	3	2	2		2								2	2	
CO 5	3	2	2		2								2	2	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations															
Indirect															
1. Course - end survey															
Content of the syllabus															
Unit – I		Virtualized IT infrastructure: Concepts and Trends										Periods		6	
Physical Vs virtual IT infrastructure, Machine, Data centers, types of virtualization, Desktop, Application, Server,Hardware, Storage, Memory and I/O virtualization, Need of network and storage virtualization, Recent trends and technologies in virtualized environments.															

Unit – II	Virtual machine management	Periods	8
Introduction to Hypervisors, Role of VMM. VM life cycle, VM configuration, MVM migration types and process, VM provisioning, Scaling, VM scheduling, Load balancing: Significance, Types and algorithms, Comparing workstation products, QoS parameters-Performance, Functionality, Windows Vs Linux Hosting, Software migration,Migrating workloads from physical to virtual machines.			
Unit – III	Hardware Abstractions	Periods	12
Abstracting hardware-Need & solution, Partitioning physical shared resources, CPU Virtualization approaches and algorithms, Memory virtualization approaches and algorithms, storage virtualization approaches, storage aggregation.			
Unit – IV	Network Virtualization	Periods	8
How to build guest OS, planning for automation installation, Virtual interfaces, VNIC profiles, virtual switches and routers, TUN/TAP drivers and dataflow between VMs, NAT, host only approaches, Designing virtual networks, Bridged, NAT and host only networking, virtual data centers introduction, data center virtualization with ESXi, networking with switches and port groups, optimizing resources utilization.			
Unit – V	Server Virtualization & Virtualization Performance	Periods	11
Server partitioning, choosing virtual server hosts, security implication, Server VMs, Interactive mode, deploying virtual servers, managing virtual servers remotely, server health monitoring using vSphere monitoring and performance services, VM cluster, Distributing workloads via network load balancing(NLB). Performance issues,virtual machine sprawling, Hypervisor vulnerabilities, Hypervisor attacks, VM attacks, VM migration attacks.			
Total Periods			45
Text Books:			
1.	Matthew Portnoy , Virtualization Essentials ,Wiley ,2012		
2.	Jim Smith, Ravi Nair , Virtual Machines: Versatile Platforms for Systems and Processes , Elsevier Science ,2005		
REFERENCE BOOKS:			
1.	Massimo Cafaro(Editor), Giovanni Aloisio(Editor),”Girds,clouds and virtualization” Springer.		
2.	Edward L.Haletky,”VMware ESX Server in the enterprise”.Prentice Hall.		
3.	Gaurav Somani,”Scheduling and isolation in virtualization”, VDM verlagDr.Muller[ISBN:978-3639295139],Muller publisher,Germany.		
4.	Edward Haleky,”VMware ESX and ESXi in th enterprise-Planning deployment of virtualization servers”[ISBN:978-0137058976].,Prentice Hall.		
E-Resource:			
1.	https://www.coursera.org/lecture/cloud-applications-part1/2-1-1-virtualization-d645V		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205														
Programme	B.E./B.Tech.	Programme Code				104	Regulation			2023					
Department	CSE,IT&CST					Semester									
Course Code	Course Name		Periods Per Week			Credit	Maximum Marks								
			L	T	P	C	CA		ESE	Total					
U23ITV47	Edge and Fog Computing		3	0	0	3	40		60	100					
Course Objective	The Main Objective of the course is to														
	- understand the students about edge computing, an important branch of distributed computing and IoT with significant applications in Data Science - implement the concepts of fog and cloud computing and exposes students to modern tools and API to deploy relevant infrastructures..														
Course Outcome	At the end of the course, the student should be able to,									Knowledge level					
	CO1: Explore the need for new computing paradigms.									K1					
	CO2: Explain the major components of fog and edge computing architectures									K2					
	CO3: Identify potential technical challenges of the transition process and suggest solutions.									K2					
	CO4: Analyze data and application requirements and pertaining issues.									K3					
Pre-requisites	CO5: Design and model infrastructures.														
	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												CO/PSO Mapping		
	COs	Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
	CO 1	2	2	2	3				2	2	3	3	1	3	3
	CO 2	2	2	3	3				1	2	3	3	1	3	3
	CO 3	3	3	3	2				1	3	3	2	1	3	2
	CO 4	2	2	3	2				2	3	3	2	1	3	2
CO 5	2	2	2	3				2	2	3	3	1	3	3	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations															
Indirect															
1. Course - end survey															
Content of the syllabus															
Unit – I		EDGE COMPUTING								Periods		9			
Fog computing requirements when applied to IoT: Scalability, Interoperability, FogIoT architectural model, Challenges on IoT Stack Model via TCP/IP Architecture, Data Management, filtering, Event Management, Device Management, cloudification, virtualization, security and privacy issues. Integrating IoT, Fog, Cloud Infrastructures: Methodology , Integrated C2F2T Literature by Modelling Technique re by Use-Case Scenarios , Integrated C2F2T Literature by Metrics															

Unit – II	FOG COMPUTING IN HEALTH MONITORING	Periods	9
Exploiting Fog Computing in Health Monitoring : An Architecture of a Health Monitoring IoTBased System with Fog Computing , Fog Computing Services in Smart E-Health Gateways, Discussion of Connected Components. Fog Computing Model for Evolving Smart Transportation Applications: Introduction , Data-Driven Intelligent Transportation Systems , Fog Computing for Smart Transportation Applications Case Study: Intelligent Traffic Lights Management (ITLM) System.			
Unit – III	FOG COMPUTING APPLICATION	Periods	9
Software Defined Networking and application in Fog Computing: Open Flow Protocol, Open Flow Switch, SDN in Fog Computing, Home Network using SDN. Security and Privacy issues: Trust and privacy issues in IoT Network, web Semantics and trust Management for Fog Computing, Machine Learning based security in Fog Computing, Cyber- Physical Energy Systems over Fog Computing			
Unit – IV	INTRODUCTION TO EDGE COMPUTING	Periods	9
Introduction to Edge Computing Scenarios and Use cases - Edge computing purpose and definition, Edge computing use cases, Edge computing hardware architectures, Edge platforms, Edge vs Fog Computing, Communication Models - Edge, Fog, and M2M.			
Unit – V	IOT ARCHITECTURE AND CORE IOT MODULES	Periods	9
IoT Architecture and Core IoT Modules-A connected ecosystem,IoT versus machine-to-machine versus, SCADA, The value of a network and Metcalfe's and Beckstrom's laws, IoT and edge architecture, Role of an architect, Understanding Implementations with the examples- Edge computing with RaspberryPi, Industrial, and Commercial IoT and Edge, and Edge computing and solutions			
Total Periods			45
Text Books:			
1.	Fog Computing: Theory and Practice by Assad Abbas, Samee U. Khan, Albert Y. Zomaya		
2.	IoT and Edge Computing for Architects - Second Edition, by Perry Lea, Publisher: Packt Publishing, 2020, ISBN: 9781839214806		
REFERENCE BOOKS			
1.	Fog and Edge Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing) by RajkumarBuyya and Satish Narayana Srirama		
2.	FlavioBonomi, Rodolfo Milito, Jiang Zhu, SateeshAddepalli, —Fog Computing and Its Role in the Internet of Things, MCC'12, August 17, 2012, Helsinki, Finland. Copyright 2012 ACM 978- 1-4503- 1519-7/12/08... \$15.00		
3.	Shanhe Yi, Cheng Li, Qun Li, —A Survey of Fog Computing: Concepts, Applications and Issues, Mobidata'15, ACM 978-1-4503-3524-9/15/06, DOI: 10.1145/2757384.2757397, June 21, 2015, Hangzhou, China..		
E-Resources			
1.	https://nptel.ac.in/courses/106104449		

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Programme	B.E/B.Tech.	Programme Code					Regulation					2023		
Department	CSE, IT & CST					Semester					-			
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks								
		L	T	P	C	CA		ESE	Total					
U23ITV48	Amazon Web Services	3	0	0	3	40		60	100					
Course Objective	The Main Objective of the course is, - To learn and understand basics and working definitions of AWS. - To describe and provide an example of the core AWS services, including compute, network, database, and storage services. - To understand the AWS Well-Architected Framework.													
	At the end of the course, the student should be able to,								Knowledge level					
	CO1: Explain the principles of cloud computing and distinguish between various cloud service and deployment models.								K2					
	CO2: Identify and configure different types of Amazon EBS volumes and explain their benefits.								K2					
Course Outcome	CO3: Analyze the cost structure and performance features of Amazon RDS.								K3					
	CO4: Design and manage workflows using AWS Data Pipeline, including setup and deletion.								K3					
	CO5: Explain the benefits and use cases of Amazon SWF in cloud-based applications.								K3					
	Pre- requisites -													
CO /PO Mapping (3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	2	2	2	3	2			2	2	3	3	1	3	2
CO 2	2	2	3	3	2			1	2	3	3	1	3	2
CO 3	3	3	3	2	2			1	3	3	2	1	3	2
CO 4	2	2	3	2	2			2	3	3	2	1	3	2
CO5	2	2	2	2	2								3	2
Course Assessment Methods														
Direct														
1. Continuous Assessment Test I, II & III														
2. Assignment / Quiz / Seminar														
3. End-Semester Examinations														
Indirect														
1. Course - end survey														
Content of the syllabus														
Unit – I		AWS BASICS										Periods		9
AWS – Cloud Computing - What is Cloud Computing? - Types of Clouds - Cloud Service Models - Advantages of Cloud Computing - AWS – Basic Architecture - Key Considerations for Web Hosting in														

AWS - AWS — Management Console - How to Access AWS? - Customizing the Dashboard - AWS — Console Mobile App - AWS — Account - How to Use AWS Account? - AWS Account Identifiers - Account Alias - Multi Factor Authentication - AWS Identity & Access Management (IAM)			
Unit – II	AMAZON STORAGE SERVICES	Periods	9
AWS — Amazon S3 - How to Configure S3? - How to Move S3 Objects? - How to Delete an Object? - How to Empty a Bucket? - Amazon S3 Features - AWS — Elastic Block Store - EBS Volume Types - Amazon EBS Benefits - How to Set Up Amazon EBS? - AWS — Storage Gateway - Volume Gateways - Gateway-Virtual Tape Library (VTL) - AWS — CloudFront - How AWS CloudFront Delivers the Content? - Features of CloudFront - How to Set Up AWS CloudFront? - Test the Links			
Unit – III	AMAZON DATABASE SERVICES	Periods	9
AWS — Relational Database Service - Features of Amazon RDS - How to Set Up Amazon RDS? - How to Connect Database to MySQL DB Instance? - How to Delete a DB Instance? - Cost of Amazon RDS - AWS — DynamoDB - How to Run DynamoDB on Computer? - Benefits of Amazon DynamoDB - AWS — Redshift - How to Set Up Amazon Redshift? - Features of Amazon Redshift			
Unit – IV	AMAZON ANALYTICS SERVICES	Periods	9
AWS — Amazon Kinesis - How to Use Amazon KCL? - Limits of Amazon Kinesis? - How to Use Amazon Kinesis? - Features of Amazon Kinesis - AWS — Elastic MapReduce - How to Set Up Amazon EMR? - Benefits of Amazon EMR - AWS — Data Pipeline - How to Set Up Data Pipeline? - How to Delete a Pipeline? - Features of AWS Data Pipeline - AWS — Machine Learning - Types of Tasks Performed by Amazon Machine Learning - How to Use Amazon Machine Learning? - Features of Amazon Machine Learning			
Unit – V	AMAZON APPLICATION SERVICES	Periods	9
AWS — Simple Workflow Service - How to Use SWF? - Benefits of Amazon SWF - AWS — WorkMail - How to Use Amazon WorkMail? - Features of Amazon Work Mail			
Total Periods			45
REFERENCE BOOKS			
1.	“Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud” 1st Edition by Mark Wilkins		
2.	“AWS: The Ultimate Guide From Beginners To Advanced For The Amazon Web Services” by Theo H. King, 2020		
3.	“Amazon Web Services in Action” by Andreas Wittig and Michael Wittig.		
E-Resources			
1.	https://github.com/siddhant2202/AWS-Cloud-Computing-Study-Material/blob/master/Module1.pdf		

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Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & III			
2. Assignment / Quiz / Seminar			
3. End-Semester examinations			
Indirect			
1. Course - end survey			
Content of the syllabus			
Unit – I	Introduction to Industry 4.0	Periods	9
Evolution of industrial revolutions (1.0 to 4.0).Core concepts: Cyber-physical systems (CPS), Internet of Things (IoT), and Industrial IoT (IIoT).Enabling technologies: Big data, cloud computing, and AI. Challenges and benefits of Industry 4.0.			
Unit - II	Smart Manufacturing and Digital Transformation	Periods	9
Smart factories: Characteristics and architecture. IoT and IIoT: Sensors, actuators, and connectivity. Digital twin technology: Concept and applications. Edge and cloud computing in manufacturing.			
Unit – III	Data Analytics and Artificial Intelligence	Periods	9
Big data analytics: Data collection, processing, and visualization.AI and machine learning: Predictive maintenance and quality control. Cybersecurity in Industry 4.0: Challenges and solutions. Case studies of AI-driven industrial processes.			
Unit - IV	Automation and Robotics	Periods	9
Industrial automation: PLCs, SCADA, and IoT integration. Collaborative robots (cobots): Applications and safety standards. Additive manufacturing (3D printing) in Industry 4.0. Human-machine interaction: Augmented reality (AR) and virtual reality (VR).			
Unit – V	Applications and Future Trends	Periods	9
Applications in various sectors: Healthcare, energy, and smart cities. Sustainability: Green manufacturing and the circular economy. Emerging technologies: Blockchain, 5G, and quantum computing. Workforce transformation and skills for Industry 4.0.			
Total Periods			45
Text Books:			
1.	Alp Ustundag and Emre Cevikcan, ”Industry 4.0: Managing the Digital Transformation”, 1st Edition (2018), Springer		
REFERENCE BOOKS			
1.	Alasdair Gilchrist ,”Industry 4.0: The Industrial Internet of Things”, 1st Edition (2016), Apress		
2.	Klaus Schwab, “The Fourth Industrial Revolution”, 1st Edition (2017), Crown Publishing Group		
E-Resources			
1.	https://link.springer.com/book/10.1007/978-3-319-57870-5		
2.	https://download.e-bookshelf.de/download/0007/6832/86/L-G-0007683286-0014731014.pdf		

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Programme		B.E. / B.Tech.		Programme Code			104		Regulation		2023																																																																																																																									
Department		CSE, IT & CST					Semester			-																																																																																																																										
Course Code		Course Name		Periods Per Week			Credit		Maximum Marks																																																																																																																											
				L	T	P	C	CA		ESE	Total																																																																																																																									
U23ITV51		Pattern Recognition		3	0	0	3	40		60	100																																																																																																																									
Course Objective		The Main Objective of the course is - To learn about supervised and unsupervised pattern classifiers. - To familiarize about different classification and clustering techniques. - To understand unsupervised learning techniques. - To explore the role of Hidden Markov model and SVM in pattern recognition.																																																																																																																																		
Course Outcome		At the end of the course, the student should be able to,									Knowledge level																																																																																																																									
		CO1: Differentiate between supervised and unsupervised classifiers									K2																																																																																																																									
		CO2: Classify the data and identify the patterns									K2																																																																																																																									
		CO3: Clustering data from given data set									K3																																																																																																																									
		CO4: Cluster data using unsupervised learning									K2																																																																																																																									
		CO5: Apply pattern Classifiers and Recognition model using Hidden Markov Models									K3																																																																																																																									
Pre- requisites		Machine Learning																																																																																																																																		
<table><tr><th colspan="13">CO /PO Mapping (3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>3</td><td>1</td><td>1</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 2</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 3</td><td>3</td><td>2</td><td>1</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 4</td><td>3</td><td>2</td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 5</td><td>3</td><td>2</td><td>1</td><td>1</td><td></td><td>2</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr></table>														CO /PO Mapping (3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping		COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	3	1	1		1		1					3	2	CO 2	3	3	2	1									3	2	CO 3	3	2	1		3								3	2	CO 4	3	2	1		1								3	2	CO 5	3	2	1	1		2	1	2					3	2
CO /PO Mapping (3/2/1indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping																																																																																																																							
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CO 5	3	2	1	1		2	1	2					3	2																																																																																																																						
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Unit – I		Introduction							Periods		9																																																																																																																									
Introduction to Pattern recognition - Applications of pattern recognition - Probability distribution basics – Discrete distributions and Continuous distributions – Conditional probability distribution and Joint probability distribution – Statistical decision Making .																																																																																																																																				

Unit - II	Classification and Parameter Estimation Methods	Periods	9
Linear classifiers, Non- Liner classifiers, Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory. Parameter Estimation Methods: Maximum-Likelihood estimation: Gaussian case; Maximum a Posteriori estimation; Bayesian estimation: Gaussian case			
Unit – III	Clustering	Periods	9
Different distance functions and similarity measures, Criterion for clustering, Methods of clustering - partitional,hierarchical, graph theoretic, density based., Cluster validity			
Unit - IV	Un-supervised learning and clustering	Periods	9
Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering.			
Unit – V	Hidden Markov Models and Support Vector Machine	Periods	9
State Machines – Hidden Markov Models – Training – Classification – Support vector Machine – Feature Selection.			
Total Periods			45
Text Books:			
1.	Pattern Recognition: An Algorithmic Approach, By M. Narasimha Murty and V. Susheela Devi, Springer; 2011 edition		
2.	Pattern Recognition, By S. Theodoridis and K. Koutroumbas, 4th Ed., Academic Press, 2009		
REFERENCE BOOKS			
1.	Pattern Recognition and Machine Learning, By Christopher Bishop, Springer-Verlag New York,2006		
2.	R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001		
E-Resources			
1.	https://www.v7labs.com/blog/pattern-recognition-guide		

Content of the syllabus			
Unit – I	DIGITAL IMAGE FUNDAMENTALS	Periods	9
Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.			
Unit - II	IMAGE ENHANCEMENT	Periods	9
Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform–Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.			
Unit – III	IMAGE RESTORATION	Periods	9
Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.			
Unit - IV	IMAGE COMPRESSION AND SEGMENTATION	Periods	9
Image Compression Models, Error-free Compression, Lossy Compression, Image Compression Standards. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.			
Unit – V	REPRESENTATION AND DESCRIPTION	Periods	9
Various schemes for representation, boundary descriptors, and regional descriptors.			
Total Periods			45
Text Books:			
1.	Rafael C. Gonzalez, Richard E. Woods, ‘Digital Image Processing’, Pearson, Third Edition,2010		
2.	Anil K. Jain, ‘Fundamentals of Digital Image Processing’, Pearson, 2002		
REFERENCE BOOKS			
1.	Kenneth R. Castleman, ‘Digital Image Processing’, Pearson, 2006		
2.	Rafael C. Gonlazalez, Richard E. Woods , steven Editions, Digital Image Processing MATLAB’, Pearson Education,Inc., 2011		
3.	William K. Pratt, ‘Digital Image Processing’, John Wiley, New York, 2002		
E-Resources			
1.	https://sde.uoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez,%20R.%20Woods-ilovepdf-compressed.pdf		
2.	https://www.geeksforgeeks.org/electronics-engineering/fundamental-steps-in-digital-image-processing/		
3.	https://lecturenotes.net/uploads/lesson_files/390c3280606d74aa1c571b610619e8d3.pdf		

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Programme		B.Tech.		Programme Code				104		Regulation		2023	
Department		INFORMATION TECHNOLOGY						Semester					
Course Code		Course Name			Periods Per Week			Credit	Maximum Marks				
					L	T	P	C	CA		ESE	Total	
U23ITV53		MULTIMEDIA AND ANIMATION			3	0	0	3	40		60	100	
Course Objective		The Main Objective of the course is											
		- To grasp the fundamental knowledge of Multimedia elements and systems - To get familiar with Multimedia file formats and standards - To learn the process of Authoring multimedia presentations - To learn the techniques of animation in 2D and 3D and for the mobile UI - To explore different popular applications of multimedia											
		At the end of the course, the student should be able to,										Knowledge level	
		CO1: Get the bigger picture of the context of Multimedia and its applications										K1	
		CO2: Use the different types of media elements of different formats on content pages										K2	
Course Outcome		CO3: Author 2D and 3D creative and interactive presentations for different target multimedia applications.										K3	
		CO4: Use different standard animation techniques for 2D, 2 1/2 D, 3D applications										K4	
		CO5: Understand the complexity of multimedia applications in the context of cloud, security, big data streaming, social networking, CBIR etc.,										K4	
Pre-requisites		-											

CO /PO Mapping (3/2/1 indicates strength of correlation)3-Strong,2-Medium,1-Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	3	2	3	-	-	-	3	2	1	2	3	2
CO 2	3	3	3	3	3	-	-	-	3	3	2	2	3	2
CO 3	3	3	3	3	3	-	-	-	3	3	2	3	3	3
CO 4	3	3	3	3	3	2	-	-	3	3	3	3	3	3
CO 5	3	3	3	3	3	2	-	-	3	3	3	3	3	3

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations	
Indirect	
1. Course - end survey	

Content of the syllabus			
Unit – I	INTRODUCTION TO MULTIMEDIA	Periods	9
Definitions, Elements, Multimedia Hardware and Software, Distributed multimedia systems, challenges: security, sharing / distribution, storage, retrieval, processing, computing. Multimedia metadata, Multimedia databases, Hypermedia, Multimedia Learning.			
Unit - II	MULTIMEDIA FILE FORMATS AND STANDARDS	Periods	9
File formats – Text, Image file formats, Graphic and animation file formats, Digital audio and Video file formats,Color in image and video, Color Models. Multimedia data and file formats for the web.			
Unit – III	MULTIMEDIA AUTHORIZING	Periods	9
Authoring metaphors, Tools Features and Types: Card and Page Based Tools, Icon and Object Based Tools, Time Based Tools, Cross Platform Authoring Tools, Editing Tools, Painting and Drawing Tools, 3D Modeling and Animation Tools, Image Editing Tools, audio Editing Tools, Digital Movie Tools, Creating interactive presentations, virtual learning, simulations.			
Unit - IV	ANIMATION	Periods	9
Principles of animation: staging, squash and stretch, timing, onion skinning, secondary action, 2D, 2 ½ D, and 3D animation, Animation techniques: Keyframe, Morphing, Inverse Kinematics, Hand Drawn, Character rigging, vector animation, stop motion, motion graphics, Fluid Simulation, skeletal animation, skinning Virtual Reality,Augmented Reality.			
Unit – V	MULTIMEDIA APPLICATIONS	Periods	9
Multimedia Big data computing, social networks, smart phones, surveillance, Analytics, Multimedia Cloud Computing, Multimedia streaming cloud, media on demand, security and forensics, Online social networking, multimedia ontology, Content based retrieval from digital libraries.			
Total Periods			45
Text Books:			
1.	A.P. Godse , Dr. D.A. Godse , “Multimedia & Animation”, First Edition, Technical Publication,2023		
2.	Ze-Nian Li, Mark S. Drew, Jiangchuan Liu, Fundamentals of Multimedia”, Third Edition, Springer Texts in Computer Science, 2021.		
REFERENCE BOOKS			
1.	Emilio Rodriguez Martinez, Mireia Alegre Ruiz, “UI Animations with Lottie and After Effects: Create, render, and ship stunning After Effects animations natively on mobile with React Native”, Packt Publishing, 2022.		
2.	Mohsen Amini Salehi, Xiangbo Li, “Multimedia Cloud Computing Systems”, Springer Nature, 1 st Edition, 2021		
3.	Gerald Friedland, Ramesh Jain, “Multimedia Computing”, Cambridge University Press, 2018		
E-Resources			
1.	https://www.geeksforgeeks.org/		
2.	https://itsfoss.com/		

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U23ITV54		Game Theory			3 0 0			3		40 60 100																																																																																																								
Course Objective		The Main Objective of the course is to - Provide a foundational understanding of game theory, focusing on strategic interactions among rational decision-makers. - Develop analytical skills to model, analyze, and solve problems involving strategic behavior in competitive and cooperative scenarios.																																																																																																																
Course Outcome		At the end of the course, the student should be able to,									Knowledge level																																																																																																							
		CO1: Identify and classify different types of games and strategies used by players.									K1																																																																																																							
		CO2: Analyze strategic-form games and compute Nash equilibria in pure and mixed strategies.									K2																																																																																																							
		CO3: Solve extensive-form games using backward induction and sub game perfection.									K3																																																																																																							
		CO4: Evaluate outcomes of repeated games and understand conditions for cooperation.									K4																																																																																																							
		CO5: Analyze games under uncertainty using Bayesian frameworks and understand applications in economics, politics, and business.									K5																																																																																																							
Pre-requisites		-																																																																																																																
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Unit – I		INTRODUCTION TO GAME THEORY								Periods		9																																																																																																						

Basic concepts: Players, strategies, payoffs- Classification of games: Cooperative vs. Non-cooperative, Zero-sum vs. Non-zero-sum, Simultaneous vs. Sequential - Representation of games: Strategic and extensive forms-Applications and real-world relevance.			
Unit - II	STRATEGIC FORM GAMES AND NASH EQUILIBRIUM	Periods	9
Dominant and dominated strategies- Best response functions- Nash equilibrium: Concept, existence, uniqueness- Mixed strategy equilibrium- Applications: Pricing games, market entry, and coordination.			
Unit – III	EXTENSIVE FORM GAMES AND SUBGAME PERFECTION	Periods	9
Game trees and representation - Sequential games with perfect information - Backward induction - Subgame perfect equilibrium-Applications: Bargaining, decision-making in firms.			
Unit - IV	REPEATED GAMES	Periods	9
Finite vs. infinite repetition- Strategies: Grim trigger, tit-for-tat- Concept of equilibrium in repeated games- Folk theorems and cooperation- Application: Long-term partnerships, oligopoly pricing.			
Unit – V	BAYESIAN GAMES AND INCOMPLETE INFORMATION	Periods	9
Incomplete and asymmetric information- Bayesian games: Types and beliefs- Bayesian Nash Equilibrium- Applications: Auctions, contract theory, signaling games.			
Total Periods			45
Text Books:			
1.	Osborne, M. J. – An Introduction to Game Theory, Oxford University Press		
2.	Dixit, A., & Skeath, S. – Games of Strategy, W.W. Norton & Company		
REFERENCE BOOKS			
1.	Fudenberg, D., & Tirole, J. – Game Theory, MIT Press		
2.	Myerson, R. B. – Game Theory: Analysis of Conflict, Harvard University Press		
3.	Gibbons, R. – Game Theory for Applied Economists, Princeton University Press		
E-Resources			
1.	https://www.geeksforgeeks.org/game-theory/		

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Programme		B.Tech.		Programme Code				104		Regulation		2023			
Department		INFORMATION TECHNOLOGY						Semester							
Course Code		Course Name			Periods Per Week			Credit		Maximum Marks					
					L	T	P	C	CA		ESE		Total		
U23ITV55		Digital Marketing			3	0	0	3	40		60		100		
Course Objective		The Main Objective of the course is to - The primary objective of this module is to examine and explore the role and importance of digital marketing in today's rapidly changing business environment. - It also focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured.													
Course Outcome		At the end of the course, the student should be able ,											Knowledge level		
		CO1: To examine and explore the role and importance of digital marketing in today's rapidly changing business environment.											K1		
		CO2: To focuses on how digital marketing can be utilized by organization and hoe its effectiveness can be measured.											K2		
		CO3: To know the key elements of a digital marketing strategy.											K3		
		CO4: To study how the effectiveness of a digital marketing campaign can be measured.											K4		
		CO5: To Demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM, Social media and blogs.											K4		
Pre- requisites		-													
CO /PO Mapping (3/2/1indicatesstrengthhofcorrelation)3-Strong,2-Medium,1-Weak														CO/PSO Mapping	
COs		Programme Outcomes(POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1		3	3	2	1	3	-	-	-	1	2	3	3	3	3
CO 2		2	2	2	1	3	-	-	-	1	2	3	3	3	3
CO 3		1	1	1	2	2	-	-	-	1	2	1	1	3	1
CO 4		3	2	2	3	1	-	-	-	1	3	2	3	2	2
CO 5		2	3	1	3	3	-	-	-	2	3	1	2	1	1
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III 2. Assignment / Quiz / Seminar 3. End-Semester examinations															
Indirect															
1. Course - end survey															
Content of the syllabus															
Unit – I		Introduction to Online market										Periods		9	
Online Market space-Digital Marketing Strategy- Components-Opportunities for building brand website- Planning and Creation-Content Marketing.															

Unit - II	Search Engine Optimization	Periods	9
Search Engine Optimization-Key word Strategy-SEO Strategy- SEO success factors-On-Page Techniques-Off- page Techniques. Search Engine Marketing-How Search Engine works-SEM Components-PPC advertising- Display Advertisement.			
Unit – III	E-Mail Marketing	Periods	9
E-Mail Marketing-Types of E-mail Marketing-E-mail Automation-Lead Generation-Integrating E-Mail with Social Media and Mobile-Measuring and maximizing email campaign effectiveness. Mobile Marketing- Mobile Inventory channels-Location based Context based; Coupons and offers, Mobile Apps, Mobile commerce, SMS Campaigns-Profiling and targeting.			
Unit - IV	Social Media Marketing	Periods	9
Social Media Marketing-Social Media Channels-Leveraging Social media for brand conversations and buzz.Successful benchmark social media campaigns. Engagement marketing-Building customer relationships- Creating Loyalty Drivers-Influencer marketing.			
Unit – V	Digital Transformation	Periods	9
Digital Transformation & channel Attributes-Analytics-Ad-words, E-mail, Mobile, Social Media, Web Analytics-Changing your strategy based on analysis-Recent trends in Digital marketing.			
Total Periods			45
Text Books:			
1.	Fundamentals of Digital Marketing by Punnet Singh Bhatia, Publisher Pearson Education.		
REFERENCE BOOKS			
1.	Digital Marketing by vandana Ahuja, Publisher Oxford University press (April 2015).		
2.	Pulizzi j Beginner’s guide to Digital Marketing, McGraw Hill Education.		
E-Resources			
1.	https://www.geeksforgeeks.org/advanced-digital marketing/		

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Programme		B.Tech.		Programme Code				104		Regulation			2023		
Department		INFORMATION TECHNOLOGY						Semester							
Course Code		Course Name			Periods Per Week			Credit		Maximum Marks					
					L	T	P	C	CA		ESE		Total		
U23ITV56		AR and VR			3	0	0	3	40		60		100		
Course Objective		The Main Objective of the course is to - Understand core AR/VR technologies, system types, taxonomy, and key applications across sectors. - Learn VR perception concepts, including geometry, rotation, and transformation methods. - Create AR effects in SPARK AR using 3D models, audio, and tracking tools. - Build AR experiences in Lens Studio with body mesh, occlusion, and lens submission. - Develop AR/VR apps in Unity using game objects, scripts, scenes, and data management.													
Course Outcome		At the end of the course, the student should be able to,										Knowledge level			
		CO1: Describe augmented reality, its types and various applications										K2			
		CO2: Apply virtual reality models and transformations.										K3			
		CO3: Demonstrate 2D,3D objects and filters using spark AR										K3			
		CO4: Develop and visualize lens studio applications using snapchat										K3			
		CO5: Perform various operation on game objects										K3			
Pre- requisites		-													
		O /POMapping (3/2/1indicatesstrengththofcorrelation)3-Strong,2-Medium,1-Weak												CO/PSO Mapping	
		ProgrammeOutcomes(POs)												PSOs	
COs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1		2	1											2	3
CO 2		3	2	1	1	2								2	3
CO 3		3	2	1	1	2								2	3
CO 4		3	2	1	1	2								2	3
CO 5		3	2	1	1	2								2	3

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & III	
2. Assignment / Quiz / Seminar	
3. End-Semester examinations	
Indirect	
1. Course - end survey	

Content of the syllabus			
Unit – I	Introduction and Augmented Reality	Periods	9
Introduction: Definitions – Types of Augmented Reality: Types of Augmented Reality Systems - The			

Taxonomy of Augmented Reality - Contact Lens - Helmet - Head-Up Display – Smart - Glasses - Overview of AR system organization – Key Applications: industry, government, Commercial and Enterprise, Consumer.			
Unit - II	Virtual Reality	Periods	9
Introduction: Virtual Reality – Modern VR Experiences - Hardware – Software – Human physiology and perception – Geometry of virtual worlds: Geometric models – Changing position and orientation – Axis – angle representations of rotations – Viewing transformations – Chaining the transformation.			
Unit – III	Working with SPARK AR	Periods	9
Fundamentals: Layers – Actions – Templates – Creating and prepping assets – Creating 3D objects – Creating audio assets – Face tracker and face mesh – Face, Hand and 2D body tracking, Background segmentation.			
Unit - IV	Working with Lens Studio	Periods	9
Developing new 2D world – Creating memorable reactions – Setting the stage – Exploring the lens – Building your favorite AR lens – 3D asset creating – External body mesh – Occludes- Body in painting tool – creating and submitting a lens.			
Unit – V	Working with Unity	Periods	9
Working with Game objects – Components – Prefabs – Scenes – Managing Assets - Building Unity Projects – Mono behaviors - Callbacks – Creating frame rate – Accessing components – Finding Objects – Co routines –Singletons – Loading a scene – Storing data – Saving and Loading game state – Managing object using object pool – Storing data in assets using scriptable objects			
Total Periods			45
Text Books:			
1.	Jon Peddie, “Augmented Reality”, 1 st Edition, Springer International Publishing, Switzerland		
2.	Steven M.Lavalle, “Virtual Reality” Cambridge University Press, 2020		
3.	Paris Buttfield – Addison, Jon Manning and Tim Nugent, “Unity Game Development Cook Book” –2019 – Oreilly publication		
REFERENCE BOOKS			
1.	Designer's Guide to Snapchat's Lens Studio: A Quick and Easy Resource for Creating Custom Augmented Reality Experiences By Phil Walton · 2022		
2.	M Claudia Tom Dieck - “Augmented Reality And Virtual Reality, New Trends In ImmersiveTechnology” -2021		
3.	Paul Mealy, “Virtual & Augmented Reality” – 2018 – John Wiley & Sons		
E-Resources			
1.	https://www.geeksforgeeks.org/virtual-reality-vs-augmented-reality-whats-the-difference/		
2.	https://www.geeksforgeeks.org/basics-augmented-reality/		
3.	https://sparkar.facebook.com/ar-studio/learn/tutorials/		
4.	https://ar.snap.com/intermediate-courses		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205								
Programme	B.Tech.,	Programme Code			104	Regulation	2023		
Department	INFORMATION TECHNOLOGY				Semester				
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
U23ITV57	Video Creation and Editing	3	0	0	3	40	60	100	
Course Objective	The Main Objective of the course is								
	• To introduce the broad perspective of linear and nonlinear editing concepts. • To understand the concept of Storytelling styles. • To be familiar with audio and video recording. • To apply different media tools. • To analyze and develop the concepts of AVID XPRESS DV 4.								
Course Outcome	At the end of the course, the student should be able to,						Knowledge level		
	CO1: Understand the evolution and principles of video editing, including linear and non-linear techniques.						K2		
	CO2: Understand the fundamentals of digital storytelling and media aesthetics for effective visual communication.						K2		
	CO3: Develop practical skills in video and audio capture, import, and export processes.						K5		
	CO4: Explore the ethical, legal, and creative considerations in digital content creation and media distribution.						K3		
	CO5: Design and develop projects using AVID XPRESS DV 4						K5		
Pre- requisites									

CO /PO Mapping (3/2/1indicatesstrengthofcorrelation)3–Strong,2–Medium,1–Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	2	2	3	-	-	-	2	2	3	2	3	2
CO 2	3	3	3	3	3	-	-	-	2	2	2	1	2	2
CO 3	3	2	3	3	3	-	-	-	2	2	1	1	2	2
CO 4	3	2	2	2	3	-	-	-	2	2	1	1	2	2
CO 5	3	2	2	3	3	-	-	-	2	2	1	2	2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment / Quiz / Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	FUNDAMENTALS	Periods	9
Evolution of film making - linear editing - non-linear digital video - Economy of Expression - risks associated with altering reality through editing.			
Unit - II	STORY TELLING	Periods	9
Story telling styles in a digital world through jump cuts, L-cuts, match cuts, cutaways, dissolves, split edits - Consumer and pro NLE systems - digitizing images - managing resolutions - mechanics of digital editing – pointer files - media management.			
Unit – III	USING AUDIO AND VIDEO	Periods	9
Capturing digital and analog video importing -audio putting- video on exporting- digital video recording to CDs and VCDs.- MPEG standards- video compression techniques - Lossy Compression and Lossless Compression.			
Unit - IV	WORKING WITH FINAL CUT PRO	Periods	9
Working with clips and the Viewer - working with sequences, the timeline and the canvas - Basic Editing - Adding and Editing Testing Effects - Advanced Editing and Training Techniques - Working with Audio – Using Media Tools - Viewing and Setting Preferences.			
Unit – V	WORKING WITH AVID XPRESS DV	Periods	9
Starting Projects and working with Project Window - Using Basic Tools and Logging - Preparing to Record and Recording - Importing Files - Organizing with Bins - Viewing and Making Footage - Using Timeline and Working in Trim Mode - Working with Audio - Output Options.			
Total Periods			45
Text Books:			
1.	Robert M. Goodman and Partick McGarth, Editing Digital Video: The Complete Creative and Technical Guide, Digital Video and Audio, McGraw – Hill 2003.		
REFERENCE BOOKS			
1.	Avid Xpress DV 4 User Guide, 2007.		
2.	Final Cut Pro 6 User Manual, 2004.		
3.	Keith Underdahl, Digital Video for Dummies, Third Edition, Dummy Series, 2001.		
E-Resources			
1.	https://www.geeksforgeeks.org/video-editing-course-with-motion-graphics/		

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U23ITV58	Multimedia Data Compression and Storage	3	0	0	3	40	60	100																																																																																																																											
Course Objective	The Main Objective of the course is to																																																																																																																																		
	- Understand the basic ideas and terms used in data compression. - Learn different methods of lossless compression like Huffman and LZW. - Study lossy compression methods such as quantization and transform coding. - Learn how images, videos, and audio are compressed using standard techniques. - Explore new trends and tools used in modern data compression.																																																																																																																																		
Course Outcome	At the end of the course, the student should be able to,							Knowledge level																																																																																																																											
	CO1: Describe how data compression works and why it is important.							K2																																																																																																																											
	CO2: Use and create simple lossless and lossy compression programs.							K2																																																																																																																											
	CO3: Compare different compression methods based on size and quality.							K3																																																																																																																											
	CO4: Apply standard compression methods to media like images and audio.							K3																																																																																																																											
Pre-requisites	CO5: Recognize new developments in compression and how they are used today.							K3																																																																																																																											
	Computer Organization, Probability and Statistics																																																																																																																																		
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Content of the syllabus			
Unit – I	Introduction & Mathematical Preliminaries	Periods	9
Introduction to Data Compression - Lossless vs. Lossy Compression - Basic Concepts: Modeling, Coding - Mathematical Tools: Information Theory Basics – Models – Physical, Probability and Markov model - Coding Theorems			
Unit - II	Lossless Compression Techniques	Periods	9
Huffman Coding – Adaptive Huffman Coding – Encoding and Decoding Procedure - Arithmetic Coding - Encoding and decoding steps - Difference from Huffman coding - Dictionary Techniques: LZ77, LZ78 - Burrows-Wheeler Transform			
Unit – III	Lossy Compression Techniques	Periods	9
Scalar Quantization: Uniform and Non- Uniform Quantization - Forward and Backward Adaptive Quantization - Vector Quantization - Advantages of Vector Quantization over Scalar Quantization - LBG algorithm (Linde–Buzo–Gray) - Transform Coding: DCT (Discrete Cosine Transform), KLT (Karhunen–Loève Transform)			
Unit - IV	Image and Video Compression Standards	Periods	9
JPEG and JPEG2000 - Video Compression Concepts - Motion Estimation and Compensation - Standards Overview: MPEG-1, MPEG – 2, H.263, H.264			
Unit – V	Audio Compression and Advanced Topics	Periods	9
Audio Compression Standards: MP3, AAC, Dolby – Psychoacoustics - Predictive Coding - Context- Based Compression - Prediction by Partial Matching (PPM) - Applications in Modern Compression Tools			
Total Periods			45
Text Books:			
1.	Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Series in Multimedia Information and Systems, 2018, 5th Edition.		
REFERENCE BOOKS			
1.	David Salomon, Data Compression: The Complete Reference, Springer, 4th Edition, 2007.		
2.	Philip K.C.Tse, Multimedia Information Storage and Retrieval: Techniques and Technologies, 2008		
E-Resources			
1.	https://www.cse.iitm.ac.in/~vplab/courses/CV_DIP/PDF/INTRO_CV_till_Jan2017.pdf		

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U23ITV59	Visual Effects		2	0	2	3	40	60	100																																																																																																																										
Course Objective	The Main Objective of the course is																																																																																																																																		
	- To get a basic idea on animation principles and techniques. - To get exposure to CGI, color and light elements of VFX. - To have a better understanding of basic special effects techniques. - To have a knowledge of state of the art VFX techniques. - To become familiar with popular compositing techniques.																																																																																																																																		
	At the end of the course, the student should be able to,																																																																																																																																		
	CO1: To implement animation in 2D / 3D following the principles and techniques.																																																																																																																																		
	CO2: To use CGI, color and light elements in VFX applications.																																																																																																																																		
Course Outcome	CO3: To create special effects using any of the state of the art tools.																																																																																																																																		
	CO4: To apply popular visual effects techniques using advanced tools.																																																																																																																																		
	CO5: To use compositing tools for creating VFX for a variety of applications.																																																																																																																																		
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Unit – I		Animation Basics							Periods		9																																																																																																																								
VFX production pipeline, Principles of animation, Techniques: Keyframe, kinematics, Full animation, limited animation, Rotoscoping, stop motion, object animation, pixilation, rigging, shape keys, motion paths.																																																																																																																																			
Unit - II		CGI, Color, Light							Periods		9																																																																																																																								
CGI – virtual worlds, Photorealism, physical realism, function realism, 3D Modeling and Rendering: color - Color spaces, color depth, Color grading, color effects, HDRI, Light – Area and mesh lights, image based																																																																																																																																			

lights, PBR lights, photometric light, BRDF shading model			
Unit – III	Special Effects	Periods	9
Special Effects – props, scaled models, animatronics, pyrotechniques, Schüfftan process, Particle effects – wind, rain, fog, fire			
Unit - IV	Visual Effects Techniques	Periods	9
Motion Capture, Matt Painting, Rigging, Front Projection. Rotoscoping, Match Moving – Tracking, camera reconstruction, planar tracking, Calibration, Point Cloud Projection, Ground plane determination, 3D Match Moving			
Unit – V	Compositing	Periods	9
Compositing – chroma key, blue screen/green screen, background projection, alpha compositing, deep image compositing, multiple exposure, matting, VFX tools - Blender, Natron, GIMP.			
Total Periods			45
Text Books:			
1.	Chris Roda, Real Time Visual Effects for the Technical Artist, CRC Press, 1 st Edition, 2022.		
2.	Steve Wright, Digital Compositing for film and video, Routledge, 4 th Edition, 2017.		
3.	John Gress, Digital Visual Effects and Compositing, New Riders Press, 1 st Edition, 2014.		
REFERENCE BOOKS			
1.	Luiz Velho, Bruno Madeira, “Introduction to Visual Effects A Computational Approach”, Routledge,2023.		
2.	Jon Gress, “Digital Visual Effects and Compositing”, New Riders Press, 1 st Edition, 2014.		
3.	Robin Brinkman, The Art and Science of Digital Compositing: Techniques for Visual Effects, Animation and Motion Graphics”, Morgan Kauffman, 2008.		
E-Resources			
1.	https://www.blender.org/features/vfx/		
2.	https://natrongithub.github.io/		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205														
Programme	B.E. / B.Tech.			Programme code						Regulation	2023				
Department	CSE,IT&CST						Semester			-					
Course Code	Course name				Periods per week			Credit		Maximum Marks					
U23CSV61	Robotic Automation Process				L	T	P	C	CA	ESE	Total				
					3	0	0	3	40	60	100				
Course Objective	The student should be made to,														
	• Explain RPA, its applications, and implementation. • Describe variables, control flow, and data manipulation. • Identify automation of images, text, and data tables. • Handle user events, exceptions, and related strategies. • Understand robot deployment and connectivity														
	At the end of the course, the student should be able to,														
	CO 1: Understand what RPA is and how it differs from other automation types														
	CO 2: List the benefits of RPA and name popular RPA platforms														
Course Outcome	CO 3: Understand how to store and handle data persistently using CSV and Excel files														
	CO 4: Model the workflow of different scrapping methodologies.														
	CO 5: Understand how to handle exceptions in a program and Learn to troubleshoot errors and find solutions effectively														
Pre-requisites	Basic Programming Concepts														
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak														CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	
CO 1	3	2	3	3	2	1		2				1	2	3	
CO 2	3	2	3	3	2	1		2				1	2	3	
CO 3	3	2	3	3	2	1		2				1	2	3	
CO 4	3	2	3	3	2	1		2				1	2	3	
CO 5	3	2	3	3	2	1		2				1	2	3	
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II&III															
2. Assignments / Seminar/Quiz															
3. End-Semester examination															
Indirect															
1. Course -end survey															
Content of the syllabus															
Unit– I	Introduction to Robotic process and Automation										Periods	9			

RPA Introduction - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Development methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Process Design Document/Solution Design Document.

Unit-II	RPA Tool Introduction and Basics	Periods	9
Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces- Control Flow - Control Flow Introduction - If Else Statements - Loops - Data Manipulation			
Unit – III	Advanced Automation Concepts & Techniques	Periods	9
Recording Introduction - Basic and Desktop Recording - Web Recording - Input/Output Methods - Screen Scraping - Data Scraping - Scraping advanced techniques - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation- Image based automation - Keyboard based automation - Information Retrieval .			
Unit– IV	Handling User Events & Assistant Bots, Exception Handling	Periods	9
Assistant bots Introduction - Monitoring system event triggers - Hotkey trigger - Mouse trigger - System trigger - Monitoring image and element triggers - An example of monitoring email - Example of monitoring a copying event and blocking it - Launching an assistant bot on a keyboard event. EXCEPTION HANDLING: Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors.			
Unit– V	Deploying And Maintaining the Bot	Periods	9
Publishing using publish utility - Creation of Server - Using Server to control the bots - Creating a provision Robot from the Server - Connecting a Robot to Server - Deploy the Robot to Server - Publishing and managing updates - Managing packages - Uploading packages - Deleting packages			
Total Periods			45
Text Books:			
1.	Alok Mani Tripathi, “Learning Robotic Process Automation”, Packt Publishing, 2018.		
References:			

1.	Frank Casale , Rebecca Dilla, Heidi Jaynes , Lauren Livingston, “Introduction to Robotic Process Automation: a Primer”, Institute of Robotic Process Automation,1st Edition 2015.
2.	Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots,Automate Repetitive Tasks & Become An RPA Consultant”, Independently Published, 1st Edition 2018
3.	Srikanth Merianda,”Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation”, Consulting Opportunity Holdings LLC, 1st Edition
4.	Lim Mei Ying, “Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots and automate business processes”, Packt Publishing, 1st Edition 2018.
E-Resources	
1.	https://www.uipath.com/rpa/robotic-process-automation
2.	https://www.academy.uipath.com

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205																																																																																																																																			
Programme	B.E. / B.Tech.			Programme code						Regulation	2023																																																																																																																									
Department	CSE,IT&CST						Semester			-																																																																																																																										
Course Code	Course name					Periods per week			Credit	Maximum Marks																																																																																																																										
U23CSV62	Quantum Computing					L	T	P	C	CA	ESE	Total																																																																																																																								
						3	0	0	3	40	60	100																																																																																																																								
Course Objective	The student should be made to, - To gain knowledge in the field of quantum computation, - Different quantum algorithms and its implementation in quantum computers.																																																																																																																																			
Course Outcome	At the end of the course, the student should be able to,											KL																																																																																																																								
	CO1: Understand fundamental concepts of quantum computing.											K2																																																																																																																								
	CO2: Apply linear algebra and quantum principles.											K3																																																																																																																								
	CO3: Analyze and construct quantum circuits.											K3																																																																																																																								
	CO4: Apply Quantum Fourier Transform and quantum algorithms.											K3																																																																																																																								
	CO5: Understand physical systems for quantum computing.											K3																																																																																																																								
Pre-requisites	-																																																																																																																																			
<table><tr><th colspan="13">CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>3</td><td>3</td></tr><tr><td>CO 2</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>3</td><td>2</td></tr><tr><td>CO 3</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td>2</td><td>2</td></tr><tr><td>CO 4</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td></tr><tr><td>CO 5</td><td>3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>3</td><td>3</td><td>2</td><td>3</td></tr></table>														CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak													CO/PSO Mapping		COs	Programme Outcomes(POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	2	2	3	2	1				2			3	3	CO 2	3	2	2	3	2	1				2			3	2	CO 3	3	2	2	3	2	1				2			2	2	CO 4	3	2	2	3	2	1				2	3	3	3	3	CO 5	3	2	2	3	2	1				2	3	3	2	3
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2–Medium,1 -Weak													CO/PSO Mapping																																																																																																																							
COs	Programme Outcomes(POs)												PSOs																																																																																																																							
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CO 1	3	2	2	3	2	1				2			3	3																																																																																																																						
CO 2	3	2	2	3	2	1				2			3	2																																																																																																																						
CO 3	3	2	2	3	2	1				2			2	2																																																																																																																						
CO 4	3	2	2	3	2	1				2	3	3	3	3																																																																																																																						
CO 5	3	2	2	3	2	1				2	3	3	2	3																																																																																																																						
Course Assessment Methods Direct - Continuous Assessment Test I, II&III - Assignments / Seminar/Quiz - End-Semester examination Indirect - Course -end survey																																																																																																																																				
Content of the syllabus																																																																																																																																				
Unit– I	Introduction and overview										Periods	9																																																																																																																								
Global perspectives - Quantum bits - Quantum computation - Quantum algorithms - Experimental quantum information processing - Quantum information.																																																																																																																																				

Unit-II	Introduction to quantum mechanics and computer science	Periods	9
Introduction to quantum mechanics: Linear algebra - The postulates of quantum mechanics -Application: superdense coding - The density operator. Introduction to computer science: Models for computation - The analysis of computational problems - Perspectives on computer science.			
Unit – III	Quantum circuits	Periods	9
Single qubit operations - Controlled operations – Measurement - Universal quantum gates - Quantum circuit model of computation - Simulation of quantum systems			
Unit– IV	The quantum Fourier transform and its applications	Periods	9
The quantum Fourier transform - Phase estimation – Order finding and factoring - General applications of the quantum Fourier transform - The quantum search algorithm.			
Unit– V	Quantum computers	Periods	9
Guiding principles - Conditions for quantum computation - Harmonic oscillator quantum computer - Optical photon quantum computer - Optical cavity quantum electrodynamics - Ion traps - Nuclear magnetic resonance.			
Total Periods			45
References			
1.	Hafiz Md. Hasan Babu, “Quantum Computing (second edition), IOP Publishing Ltd,June 2023		
2.	Nielsen M.A & Chuang I.L, "Quantum Computation and Quantum Information", 10th Anniversary Edition, Cambridge University Press, UK, 2010.		
3.	Phillip Kaye, Raymond Laflamme& Michele Mosca, "An Introduction to Quantum Computing", 1st Edition, Oxford University Press, New Delhi, 2010.		
4.	Eleanor Rieffel& Wolfgang Polak, "Quantum Computing: A Gentle Introduction", 1st Edition, MIT Press, USA, 2014.		
5.	Scott Aaronson, "Quantum Computing Since Democritus", 1st Edition, Cambridge University Press, UK, 2013		
E-Resources			
1.	https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf		
2.	https://aaltodoc.aalto.fi/server/api/core/bitstreams/0c552317-8e68-4563-8bbd-c77fd040f7c3/content		
3.	https://www.techtarget.com/whatis/definition/quantum-computing		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205											 	
Programme	B.E./B/Tech.			Programme code					Regulation		2023		
Department	CSE,IT&CST								Semester		-		
Course Code	Course name					Periods per week			Credit		Maximum Marks		
U23CSV63	Cognitive Science					L	T	P	C		CA	ESE	Total
						3	0	0	3		40	60	100
Course Objective	The student should be made to,												
	• To know the theoretical background of cognition • To understand the link between cognition and computational intelligence. • To explore probabilistic programming language. • To study the computational inference models of cognition. • To study the computational learning models of cognition.												
Course Outcome	At the end of the course, the student should be able to,												KL
	CO1: Understand the underlying theory behind cognition.												K1
	CO2: Connect to the cognition elements computationally.												K2
	CO3: Implement mathematical functions through WebPPL												K3
	CO4: Develop applications using cognitive inference model.												K3
	CO5: Develop applications using cognitive learning model.												K3
Pre-requisites													

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	1	3	2	2				1	1	2	2	1	2
CO 2	2	2	1	1	2				3	2	3	1	2	3
CO 3	1	3	1	3	3				1	3	1	3	3	1
CO 4	2	1	1	2	3				1	2	3	1	3	3
CO 5	1	2	3	2	2				1	2	2	2	2	2

Course Assessment Methods														
Direct														
1. Continuous Assessment Test I, II&III														
2. Assignments / Seminar/Quiz														
3. End-Semester examination														
Indirect														
1. Course -end survey														
Content of the syllabus														
Unit- I		PHILOSOPHY, PSYCHOLOGY AND NEURO SCIENCE										Periods		9
Philosophy: Mental-physical Relation – From Materialism to Mental Science – Logic and the Sciences of the Mind – Psychology: Place of Psychology within Cognitive Science – Science of Information														

Processing -Cognitive Neuroscience – Perception – Decision – Learning and Memory – Language Understanding and Processing.			
Unit-II	COMPUTATIONAL INTELLIGENCE	Periods	9
Machines and Cognition – Artificial Intelligence – Architectures of Cognition – Knowledge Based Systems – Logical Representation and Reasoning – Logical Decision Making -Learning -Language – Vision.			
Unit – III	PROBABILISTIC PROGRAMMING LANGUAGE	Periods	9
WebPPL Language – Syntax – Using Javascript Libraries – Manipulating probability types and distributions – Finding Inference – Exploring random computation – Coroutines: Functions that receive continuations –Enumeration			
Unit– IV	INFERENCE MODELS OF COGNITION	Periods	9
Generative Models – Conditioning – Causal and statistical dependence – Conditional dependence – Data Analysis – Algorithms for Inference.			
Unit– V	LEARNING MODELS OF COGNITION	Periods	9
Learning as Conditional Inference – Learning with a Language of Thought – Hierarchical Models- Learning (Deep) Continuous Functions – Mixture Models.			
Total Periods			45
References			
1.	Jose Luis Bermudez, Cognitive Science -An Introduction to the Science of the Mind, Cambridge University Press 2020		
2.	Judith Hurwitz, Marcia Kaufman, Adrian Bowles, Cognitive Computing and Big Data Analytics, Wiley Publications, 2015		
3.	Vijay V Raghavan,VenkatN.Gudivada, VenuGovindaraju, C.R. Rao, Cognitive Computing: Theory and Applications: (Handbook of Statistics 35), Elsevier publications, 2016		
E-Resources			
1.	Noah D. Goodman, Andreas Stuhlmuller, “The Design and Implementation of Probabilistic Programming Languages”, Electronic version of book, https://dippl.org/ .		
2.	Noah D. Goodman, Joshua B. Tenenbaum, The ProbMods Contributors, “Probabilistic Models of Cognition”, Second Edition, 2016, https://probmods.org/ .		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205														
Programme		B.E./B.Tech.			Programme code						Regulation		2023			
Department		CSE,IT&CST						Semester			-					
Course code		Course name				Periods per week			Credit		Maximum Marks					
						L	T	P	C	CA	ESE	Total				
U23CSV64		3D Printing and Design				3	0	0	3	40	60	100				
Course Objective		The student should be made to, • To discuss on basics of 3D printing. • To explain the principles of 3D printing technique. • To explain and Illustrate inkjet technology. • To explain and Illustrate laser technology. • To discuss the applications of 3D printing.														
Course Outcome		At the end of the course, the student should be able to,											KL			
		CO1: Outline and examine the basic concepts of 3D printing technology.											K3			
		CO2: Outline 3D printing workflow.											K3			
		CO3: Explain and categorize the concepts and working principles of 3D printing using inkjet technique.											K3			
		CO4: Explain and categorize the working principles of 3D printing using laser technique.											K3			
Pre-requisites		Basic concepts and understanding of 3D printing.														
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2–Medium, 1 -Weak													CO/PSO Mapping			
COs		Programme Outcomes (POs)											PSOs			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1		1	1	2	2	3	1	-	-	2	-	2	2	3	2	1
CO 2		3	2	3	3	3	2	-	-	3	-	3	2	3	2	3
CO 3		2	2	2	2	2	2	-	-	2	-	2	2	3	2	2
CO 4		2	2	2	2	3	2	-	-	2	-	2	2	3	3	2
CO 5		1	3	3	3	3	3	-	-	3	-	3	3	3	3	1
Course Assessment																
Direct Methods 1. Continuous Assessment Test I, II&III 2. Assignments / Seminar/Quiz 3. End-Semester examinations																
Indirect 1.Course -end survey																
Content of the syllabus																
Unit -I		INTRODUCTION										Periods		9		
Introduction; Design considerations – Material, Size, Resolution, Process; Modelling and viewing – 3D; Scanning; Model preparation – Digital; Slicing; Software; File formats.																

Unit–II	PRINCIPLE	Periods	9
Processes – Extrusion, Wire, Granular, Lamination, Photopolymerization; Materials – Paper, Plastics, Metals, Ceramics, Glass, Wood, Fiber, Sand, Biological Tissues, Hydrogeis, Graphene; Material Selection – Processes, applications, Limitations.			
Unit – III	INKJET TECHNOLOGY	Periods	9
Light Sources – Types, Characteristics; Optics – Deflection, Modulation; Material feeding and flow – Liquid, powder; Printing machines – Types, Working Principle, Build Platform, Print bed Movement, Support structures.			
Unit– IV	LASER TECHNOLOGY	Periods	9
Light Sources – Types, Characteristics; Optics – Deflection, Modulation; Material feeding and flow – Liquid, powder; Printing machines – Types, Working Principle, Build Platform, Print bed Movement, Support structures.			
Unit-V	INDUSTRIAL APPLICATIONS	Periods	9
Product Models, manufacturing – Printed electronics, Biopolymers, Packaging, Healthcare, Food, Medical, Biotechnology, Displays; Future trends.			
Total Periods			45
Text Book			
1.	Christopher Barnatt, 3D Printing: The Next Industrial Revolution, Create Space Independent Publishing Platform, 2013.		
2.	Ian M. Hutchings, Graham D. Martin, Inkjet Technology for Digital Fabrication, John Wiley & Sons, 2013.		
References			
1.	Chua, C.K., Leong K.F. and Lim C.S., Rapid prototyping: Principles and applications, second edition, World Scientific Publishers, 2010		
2.	Ibrahim Zeid, Mastering CAD CAM Tata McGraw-Hill Publishing Co., 2007		
3.	Joan Horvath, Mastering 3D Printing, APress, 2014		
E-Resources			
1.	https://www.3dprinter0s.com/articles/designing-your-first-3d-printed-project-a-step-by-step-guide-utilizing-3d-printing-software-jobs-and-programs-from-concept-to-creation		
2.	https://3dprintingindustry.com/wp-content/uploads/2014/07/3D-Printing-Guide.pdf		
3.	https://3dprintingindustry.com/wp-content/uploads/2014/07/3D-Printing-Guide.pdf		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205														
Programme		B.E./B.Tech.			Programme code						Regulation			2023		
Department		CSE&IT						Semester						-		
Course Code		Course name					Periods per week			Credit		Maximum Marks				
U23CSV65		GENERATIVE AI					L	T	P	C	CA	ESE	Total			
							3	0	0	3	40	60	100			
Course Objective		The student should be made to, - Define generative AI and distinguish it from discriminative AI. - Identify popular generative AI models like GPT and DALL·E. - Describe applications of generative AI in various domains. - Analyze ethical issues related to misinformation, bias, and IP. - Evaluate challenges of generative AI in real-world usage														
		At the end of the course, the student should be able to,														KL
		CO1: Understand the fundamental principles of Generative AI, its applications, and ethical considerations.														K2
		CO2: Design and evaluate responsible generative AI applications considering deployment challenges.														K3
		CO3: Apply advanced Variational Auto Encoders (VAEs) for generative images.														K3
Course Outcome		CO4: Learn the foundations of NLP and how transformer models work.														K2
		CO5: Analyze and mitigate ethical and technical challenges in Generative AI.														K4
Pre-requisites		-														
		CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												CO/PSO Mapping		
COs		Programme Outcomes (POs)												PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	
CO1		3	2	2	2	3	2	2	3		2		3	3	3	
CO2		3	3	2	3	2	3	3		2	2	2	3	3	3	
CO3		3	2	2	2	2	1	2	2		2	2	2	2	3	
CO4		3	3	2	2	3					2		3	3	3	
CO5		3	3	2	3	2	3	3	3	2	2	2	3	3	3	
Course Assessment Methods																
Direct																
1. Continuous Assessment Test I, II & III 2. Assignments/ Quiz / Seminar 3. End-Semester examinations																
Indirect																
1. Course-end survey																

Content of the syllabus			
Unit-I	Introduction to Generative AI	Periods	9
Generative AI-Definition and key concepts, difference between Gen and Discriminative AI, Popular models (GPT,DALL-E etc),Applications of Gen AI-Text, Image, Code Generation, Audio/ Video synthesis. Ethics and Challenges of Gen AI-Bias in AI models, Misinformation and deeptakes and Intellectual Property and Copyright issues			
Unit-II	Generative Adversarial Networks (GANs)	Periods	9
. Introduction to GANs and their components (generator, discriminator),GAN training process: minimax game, adversarial loss, Architectural variations: DCGAN, WGAN, CGAN, etc. GAN applications: image synthesis, style transfer.			
Unit- III	Generation of Images	Periods	9
Introduction to Generative Adversarial Networks – Adversarial Training Process – Nash Equilibrium – Variational Autoencoders – Encoder-Decoder Architectures - Stable Diffusion Models – Introduction to Transformer-based Image Generation – CLIP – Visual Transformers ViT-Dall-E2 and Dall-E3, GPT-4V-Issues of Image generation models like Mode collapse and stability			
Unit- IV	Foundations of Natural Language Processing (NLP)	Periods	9
What is NLP, Key NLP tasks (text classification, sentiment analysis, summarization), Tokenization and Text Representation-Word embeddings, Transformers and attention mechanisms. Introduction to Transformer Models-Architecture of Transformers, Overview of BERT, GPT and other transformer-based models			
Unit-V	Building Real World Applications With Generative AI	Periods	9
Integrating Gen AI into workflows – API’s for Gen AI models(Open AI API, Hugging Face),Automating tasks using AI. Building Custom Apps-Chatbots and Virtual Assistants, Content generation tools (blogwriting, marketing copy),Code generation and debugging tools. Evaluating and Optimizing AI outputs-Metrics for evaluating AI performance, Iterative improvement of prompts and models			
Total Periods			45
Textbooks			
1.	Deep Learning, Ian Goodfellow, Yoshua Bengio, and Aaron Courville, 1st Edition, MIT Press, 2016.		
2.	Generative Adversarial Networks Cookbook, Josh Kalin, Packt Publishing, 2018.		
3.	NLP with Transformers, Lewis Tunstall et al., O'Reilly Media, 2022.		
References			
1.	Ben,The Art of Prompt Engineering,Self-Published,2023,1 st Edition.		
2.	The GAN Handbook, Phil Wang, 2022.		
E-Resources			
1.	https://elearn.nptel.ac.in/shop/iit-workshops/completed/leveraging-generative-ai-for-teaching-programming-courses/		
2.	https://onlinecourses.swayam2.ac.in/imb24_mg116/preview		
3.	https://nielit.gov.in/calicut/content/genai		
4.	https://ifacet.iitk.ac.in/product/applications-of-generative-ai/		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205											
Programme		B.E./B.Tech.			Programme code			Regulation			2023		
Department		CSE&CST						Semester			-		
Course code		Course name				Periods per week			Credit		Maximum Marks		
						L	T	P	C	CA	ESE	Total	
U23CSV66		5G COMMUNICATION NETWORKS				3	0	0	3	40	60	100	
Course Objective		The student should be made to, • learn the evolution of wireless networks • get acquainted with the fundamentals of 5G networks. • study the processes associated with 5G architecture. • study spectrum sharing and spectrum trading. • learn the security features in 5G networks.											
Course Outcome		At the end of the course, the student should be able to,											KL
		CO1: understand the evolution of wireless networks.											K3
		CO2: learn the concepts of 5G networks.											K3
		CO3: comprehend the 5G architecture and protocols											K3
		CO4: understand the dynamic spectrum management											K3
Pre-requisites		CO5: learn the security aspects in 5G networks											K3
		-											
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													
COs		Programme Outcomes (POs)											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO 1		3	2	2	1	1					2	1	
CO 2		3	2	3	1	1					2	1	
CO 3		3	2	2	1	1					2	1	
CO 4		3	2	3	1	1					2	1	
CO 5		3	2	3	1	1					2	1	
Course Assessment Methods Direct 1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations Indirect 1. Course - end survey													
Content of the syllabus													
Unit - I		EVOLUTION OF WIRELESS NETWORKS									Periods		9
Networks evolution: 2G,3G,4G, evolution of radio access networks - need for 5G - 4G versus 5G - Next Generation core (NG-core) - visualized Evolved Packet core(vEPC)													

Unit – II	5G CONCEPTS AND CHALLENGES	Periods	9
Fundamentals of 5G technologies - overview of 5G core network architecture - 5G new radio and cloud technologies - Radio Access Technologies (RATs)- EPC for 5G.			
Unit – III	NETWORK ARCHITECTURE AND THE PROCESSES	Periods	9
5G architecture and core – network slicing – multi access edge computing (MEC) - visualization of 5G components - end-to-end system architecture - service continuity - relation to EPC and edge computing. 5G protocols: 5G NAS – NGAP - GTP-U - IPsec and GRE.			
Unit – IV	DYNAMIC SPECTRUM MANAGEMENT AND MM-WAVES	Periods	9
Mobility management - Command and control - spectrum sharing and spectrum trading - cognitive radio based on 5G - millimetre waves			
Unit - V	SECURITY IN 5G NETWORKS	Periods	9
Security features in 5G networks - Network domain security - User domain security - flow based QoS framework - Mitigating the threats in 5G			
Total Periods			45
References			
1.	Stephen Rommer, 5G Core networks: Powering Digitalization, Academic Press, 2020		
2.	Saro Velrajan, An Introduction to 5G Wireless Networks: Technology, Concepts and Use-cases, First Edition, 2020		
3.	Jyrki.T.J.Penttinen, 5G Simplified: ABCs of Advanced Mobile Communications, Copyrighted Material, 2019		
4.	Wan Lee Anthony, 5G system Design: An end to end Perspective, Springer Publications,2019		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637205																																																																																																																																				
Programme	B.E./B.Tech			Programme code			101		Regulation		2023																																																																																																																										
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Course Code	Course name				Periods per week			Credit		Maximum Marks																																																																																																																											
U23CSV67	MERN Stack Development				L	T	P	C	CA	ESE	Total																																																																																																																										
					3	0	0	3	40	60	100																																																																																																																										
Course Objective	The student should be made to,																																																																																																																																				
	- To introduce students to modern web development using HTML, CSS, JavaScript, and Bootstrap. - To equip students with hands-on skills in building interactive UIs using React.js. - To develop backend servers and RESTful APIs using Node.js and Express.js. - To model, store, and retrieve data using MongoDB and Mongoose. - To integrate all layers and deploy full-stack applications on cloud platforms.																																																																																																																																				
Course Outcome	At the end of the course, the student should be able to,											KL																																																																																																																									
	CO1: Build responsive, mobile-first UIs using HTML, CSS, and Bootstrap.											K2																																																																																																																									
	CO2: Develop modern single-page applications using React with hooks and routing.											K6																																																																																																																									
	CO3: Create secure backend APIs using Express.js with user authentication.											K6																																																																																																																									
	CO4: Work with NoSQL databases using MongoDB and Mongoose ORM.											K2																																																																																																																									
	CO5: Deploy fully functional MERN stack applications using Netlify, Render, or Vercel.											K4																																																																																																																									
Pre-requisites																																																																																																																																					
<table><tr><th colspan="13">CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak</th><th colspan="2">CO/PSO Mapping</th></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes(POs)</th><th colspan="2">PS Os</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO1</th><th>PSO2</th></tr><tr><td>CO 1</td><td>3</td><td>2</td><td>1</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr><tr><td>CO 2</td><td>3</td><td>2</td><td>1</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr><tr><td>CO 3</td><td>3</td><td>2</td><td>1</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr><tr><td>CO 4</td><td>3</td><td>2</td><td>1</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr><tr><td>CO 5</td><td>3</td><td>2</td><td>1</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr></table>															CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak													CO/PSO Mapping		COs	Programme Outcomes(POs)												PS Os		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	CO 1	3	2	1	1	2								3	3	CO 2	3	2	1	1	2								3	3	CO 3	3	2	1	1	2								3	3	CO 4	3	2	1	1	2								3	3	CO 5	3	2	1	1	2								3	3
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Content of the syllabus			
Unit– I	HTML, CSS, Bootstrap & JavaScript Fundamentals	Periods	9
Introduction to Web Development & MERN stack overview- HTML5: structure, tags, semantic HTML, forms, tables, multimedia- CSS3: selectors, box model, positioning, flexbox, media queries- Bootstrap: grid system, components (cards, navbar, modals), utility classes- JavaScript: data types, functions, conditionals, loops, arrays, objects- ES6+ features: let/const, arrow functions, template literals, destructuring- Array methods: map, filter, reduce- Asynchronous JS: callbacks, promises, async/await- Closures, scope, modular JS.			
Unit-II	Frontend Development with React.js	Periods	9
Intro to React & SPA architecture- Functional components, JSX, Props- State management, conditional rendering-Lifecycle methods & useEffect- Lists, keys, form handling- React Router: routing, nested routes, parameters- useState, useEffect, Context API- Custom Hooks & component reusability- Component libraries (React Bootstrap / Tailwind intro)- Folder structure & clean coding practices.			
Unit – III	Backend Development with Node.js and Express	Periods	9
Node.js intro: runtime, event loop, file system- NPM & package.json- Express.js fundamentals: routing, middleware, static files- RESTful API design: CRUD, status codes, response formats- Request body parsing, route parameters, query params- JWT-based authentication: signup, login, token verification- Environment variables with dotenv- API error handling (try/catch, middleware)- Express router & modular folder structure			
Unit– IV	MongoDB and Mongoose Integration	Periods	9
MongoDB overview, collections, documents- MongoDB Atlas setup & Compass tool- Mongoose setup: models, schema design, validations- CRUD operations using Mongoose- Relationships: embedding vs referencing- Timestamps, enums, nested schemas- Aggregation pipelines- Query optimization, indexing, pagination- Error handling with DB operations.			
Unit– V	Full Stack Integration, Git and Deployment	Periods	9
Connecting React frontend to Express backend via Axios/Fetch- Passing tokens between frontend and backend- Protected routes in React & Express- User session management & logout- Git & GitHub: clone, init, commit, push, pull, branches- Repo structuring, .gitignore, README best practices- Deployment: Netlify (frontend), Render/Vercel (backend)- Using .env for secure config- CI/CD overview (GitHub Actions optional)- Final review & wrap-up.			
Total Periods			45
Text Books			
1.	"Full Stack Web Development For Beginners" by Mark Myers (2024 Edition)		
2.	"Learning React: Modern Patterns for Developing React Apps" by Alex Banks and Eve Porcello (5th Edition, 2023)		
3.	"Fullstack Web Development with React and Node" by David Choi (2023 Edition, Packt Publishing)		
4.	"Node.js, MongoDB, and Express.js Web Development" by Brad Dayley (4th Edition, 2022)		
5.	"The DevOps Handbook" by Gene Kim, Jez Humble, Patrick Debois, and John Willis (2nd Edition, 2021)		
Reference Books			
1.	"HTML, CSS, and JavaScript All in One" by Julie C. Meloni (4th Edition)		
2.	"Eloquent JavaScript" by Marijn Haverbeke (4th Edition, 2024)		
3.	"Flask Web Development" by Miguel Grinberg (2nd Edition, 2018)		
4.	Learning React" by Alex Banks and Eve Porcello (5th Edition, 2023, O'Reilly)		

E-Resources	
1.	https://eloquentjavascript.net/
2.	https://guides.github.com/introduction/git-handbook/
3.	https://react.dev/learn
4.	https://www.fullstack.io/fullstack-react

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Programme		B.E./B.Tech				Programme code		101		Regulation		2023			
Department		CSE&CST						Semester			-				
Course code		Course name				Periods per week			Credit		Maximum Marks				
						L	T	P	C	CA	ESE	Total			
U23CSV68		OPTIMIZATION TECHNIQUES				3	0	0	3	40	60	100			
Course Objective		The student should be made to, • To understand the fundamentals of linear programming problems • Evaluate Integer Programming Problems, Transportation and Assignment Problems. • To obtain a solution to network problems using CPM and PERT techniques. • Able to optimize the function subject to the constraints.													
Course Outcome		At the end of the course, the student should be able to,											KL		
		CO1: Formulate and solve linear programming problems (LPP)											K3		
		CO2: Evaluate Integer Programming Problems, Transportation and Assignment Problems.											K3		
		CO3: Implement a solution to network problems using CPM and PERT techniques											K4		
		CO4: Identify to optimize the function subject to the constraints											K2		
		CO5: Discuss the Intelligent Optimization Techniques											K2		
Pre-requisites															
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping		
COs		Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO 1		3	3	2	1	1		-	-	2	-	-	-	3	3
CO 2		3	1	2	2	3		-	-	3	-	-	-	2	1
CO 3		2	3	3	2	2		-	-	3	-	-	-	1	3
CO 4		2	2	1	1	3		-	-	2	-	-	-	2	1
CO 5		2	1	1	2	2		-	-	3	-	-	-	3	2
Course Assessment Methods Direct 1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examinations Indirect 1. Course - end survey															
Content of the syllabus															
Unit - I		INTRODUCTION TO OPTIMIZATION										Periods		9	
Introduction to Classical Methods, Linear Programming Problems Terminology, mathematical formulation of LPP- Graphical Methods to solve LPP- Simplex Method- Two-Phase method															

Unit – II	INTEGER PROGRAMMING AND TRANSPORTATION PROBLEMS	Periods	9
Integer programming: Branch and bound method- Transportation and Assignment problems - Traveling salesman problem			
Unit – III	PROJECT SCHEDULING	Periods	9
Project network -Diagram representation – Floats - Critical path method (CPM) – PERT- Cost considerations in PERT and CPM.			
Unit – IV	CLASSICAL OPTIMIZATION THEORY	Periods	9
Unconstrained problems – necessary and sufficient conditions - Newton-Raphson method, Constrained problems – equality constraints – inequality constraints - Kuhn-Tucker conditions			
Unit - V	INTELLIGENT OPTIMIZATION TECHNIQUES	Periods	9
Introduction to Intelligent Optimization, Genetic Algorithm: Types of reproduction operators, crossover & mutation, Simulated Annealing Algorithm, Particle Swarm Optimization (PSO), Genetic Programming (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation.			
Total Periods			45
Text Books			
1.	Hamdy A Taha, Operations Research: An Introduction, Pearson, 10th Edition, 2017.		
References			
1.	ND Vohra, Quantitative Techniques in Management, Tata McGraw Hill, 4th Edition, 2011.		
2.	J. K. Sharma, Operations Research Theory and Applications, Macmillan, 5th Edition, 2012.		
3.	Hiller F.S, Liberman G.J, Introduction to Operations Research, 10th Edition McGraw Hill,		
E-Resources			
1.	ttps://archive.nptel.ac.in/content/storage2/courses/105108127/pdf/Module_1/M1L1slides.pdf		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205														
Programme		B.E./B.Tech.				Programme code				Regulation				2023		
Department		CSE,IT&CST								Semester				-		
Course code		Course name				Periods per week			Credit		Maximum Marks					
						L	T	P	C	CA	ESE	Total				
U23CSV69		Devops				3	0	0	3	40	60	100				
Course Objective		The student should be made to, • To discuss the basics of DevOps. • To explain the principles of the DevOps lifecycle. • To explain and illustrate version control systems • To explain and illustrate CI/CD pipeline.. • To discuss the applications of DevOps in real-world scenarios.														
Course Outcome		At the end of the course ,the student should be able to,											KL			
		CO1: Outline and examine the basic concepts of DevOps, including its principles, workflow, and benefits.											K3			
		CO2: Outline the principles of the DevOps lifecycle, including automation, integration, and deployment.											K3			
		CO3: Explain the principles and role of version control systems in code management and collaboration using tools like Git.											K3			
		CO4: Explain the principles and role of CI/CD pipelines in automating software integration, testing and deployment.											K3			
		CO5: Explain the real-world applications of DevOps in improving software development and automation.											K3			
Pre-requisites		Basic concepts and understanding of Devops														
CO /POMapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1 -Weak														CO/PSO Mapping		
COs		ProgrammeOutcomes(POs)											PSOs			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO 12	PSO1	PSO2	PSO3
CO 1		3	3	2	1	3	1		1			1		3	2	1
CO 2		3	3	2	2	3	1		1			3		3	2	3
CO 3		3	3	3	2	3	1		1			3		3	2	2
CO 4		3	3	3	3	3	1		1			3		3	3	2
CO 5		3	3	3	3	3	3		1			3		3	3	1
Course Assessment Methods Direct 1. Continuous Assessment Test I, II&III 2. Assignments / Seminar/Quiz 3. End-Semester examinations																
Indirect 1. Course -end survey																

Content of the syllabus			
Unit -I	INTRODUCTION	Periods	9
Introduction, DevOps evolution, principles and benefits, Agile methodologies, DevOps and ITIL, Continuous Delivery principles, DevOps lifecycle, Work flow visualization, Configuration management, Infrastructure as Code (IaC).			
Unit–II	DEVOPS PROCESS AND CONTINUOUS DELIVERY OVERVIEW	Periods	9
Development workflows, Revision control systems, Build servers, Package managers, Test environments, Staging/production, Release management, Scrum, Kanban, and the delivery pipeline, Identifying bottlenecks.			
Unit – III	SOFTWARE ARCHITECTURE	Periods	9
Software architecture principles, Monolithic vs. microservices, Database migrations, Rolling upgrades, Resilience in DevOps, Three-tier systems, Separation of concerns, Cohesion and coupling, Forward-compatible service interfaces.			
Unit– IV	CODE MANAGEMENT AND AUTOMATION	Periods	9
Source code management, Git repositories, Branching strategies, Artifact versioning, Hosted Git servers, Code review models, Automated testing, Containerization with Docker, Infrastructure as Code scripting			
Unit-V	BUILDING, TESTING, AND DEPLOYING CODE	Periods	9
Build systems, Continuous Integration (CI) with Jenkins, Continuous Delivery (CD),Deployment automation using Puppet, Ansible, Chef, Monitoring and logging, Incident management, DevOps in real-world applications, Future trends.			
Total Periods			45
Text Book			
1.	Verona Joakim,”Practical DevOps” -Get to know the background of DevOps, second edition,2018.		
2.	Ishaq Azhar Mohammed, Dhaya Sindhu Battina, Dr. Mehul Patel, “Introduction to DevOps” , BPB Publications,2022.		
References			
1.	Kim, G., Humble, J., Debois, P., & Willis, J. – The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations, O'Reilly Media, 2016.		
E-Resources			
1.	GitHub - devops-asset/devops-reference-material: DevOps books & Reference materials		
2.	DevOps Tutorial For Beginners: A Comprehensive Guide [Updated]		
3.	The Complete Guide to DevOps - Free Ebook		

OPEN ELECTIVE COURSES

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205																																																																																																																																		
Programme		B.E.		Programme code			101		Regulation			2023																																																																																																																								
Department		Computer Science and Engineering					Semester																																																																																																																													
Course Code		Course name			Periods per week			Credit		Maximum Marks																																																																																																																										
U23CSOE1		Fundamentals of OS			L	T	P	C	CA	ESE	Total																																																																																																																									
					3	0	0	3	40	60	100																																																																																																																									
Course Objective		The student should be made to, • Understand the structure, functions, and evolution of operating systems. • Explain process, thread management, synchronization, and deadlock handling. • Describe memory, storage, and file system management techniques. • Explore virtualization concepts and features of mobile operating systems.																																																																																																																																		
Course Outcome		At the end of the course, the student should be able to,											KL																																																																																																																							
		CO1: Explain the structure, objectives, functions, and services of modern operating systems.											K2																																																																																																																							
		CO2: Analyze process management, scheduling, synchronization, and deadlock handling.											K4																																																																																																																							
		CO3: Apply memory management techniques such as paging, segmentation, and virtual memory.											K3																																																																																																																							
		CO4: Demonstrate an understanding of storage systems, file system structures, and file operations.											K2																																																																																																																							
		CO5: Identify the role of virtual machines and compare features of mobile operating systems like iOS and Android.											K3																																																																																																																							
Pre-requisites		-																																																																																																																																		
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CO 4	3	2	1						1	1		1	3	1																																																																																																																						
CO 5	3	2	1						1	1		1	3	2																																																																																																																						
Course Assessment Methods Direct 1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester examination Indirect 1. Course -end survey																																																																																																																																				

Content of the syllabus			
Unit– I	INTRODUCTION	Periods	9
Computer System – Elements and organization; Operating System Overview – Objectives and Functions– Evolution of Operating System; Operating System Structures – Operating System Services – User Operating System Interface – System Calls – System Programs – Design and Implementation – Structuring methods.			
Unit-II	PROCESS MANAGEMENT	Periods	9
Process Concept – Process Scheduling – Operations on Processes – Inter-process Communication; Threads – Multithread Models – Threading issues; Process Synchronization – The Critical-Section problem – Synchronization hardware – Semaphores – Deadlock – Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.			
Unit – III	MEMORY MANAGEMENT	Periods	9
Main Memory – Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation, Segmentation with paging; Virtual Memory – Demand Paging – Copy on Write – Page Replacement – Allocation of Frames –Thrashing.			
Unit– IV	STORAGE MANAGEMENT	Periods	9
Disk Structure – Disk Scheduling and Management; File-System Interface – File concept – Access methods – Directory Structure – Directory organization – File system mounting – File Sharing and Protection; File System Implementation – File System Structure – Directory implementation – Allocation Methods – Free Space Management			
Unit– V	VIRTUAL MACHINES AND MOBILE OS	Periods	9
Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS – iOS and Android.			
Total Periods			45
References			
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 10th Edition, John Wiley and Sons Inc., 2018		
2.	Andrew S Tanenbaum, “Modern Operating Systems”, Pearson, 5th Edition, 2022 New Delhi.		
3.	Ramaz Elmasri, A. Gil Carrick, David Levine, “ Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.		
4.	William Stallings, “Operating Systems: Internals and Design Principles”, 7th Edition, Prentice Hall, 2018.		
5.	Achyut S.Godbole, Atul Kahate, “Operating Systems”, McGraw Hill Education, 2016.		
E-Resources			
1.	https://www.geeksforgeeks.org/operating-systems		
2.	https://www.os-book.com/OS10/study-guide/Study-Guide.pdf		
3.	https://www.tutorialspoint.com/operating_system/index.htm		
4.	https://ocw.mit.edu/courses/6-828-operating-system-engineering-fall-2012/		

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205																																																																																																																																																		
Programme		B.E.			Programme code			101		Regulation			2023																																																																																																																																							
Department		Computer Science and Engineering							Semester																																																																																																																																											
Course code		Course name				Periods per week			Credit		Maximum Marks																																																																																																																																									
						L	T	P	C	CA	ESE	Total																																																																																																																																								
U23CSOE2		Web Designing				3	0	0	3	40	60	100																																																																																																																																								
Course Objective		The student should be made to, - To help students learn the basics of HTML and how to create simple web pages. - To teach students how to design web forms and add images, multimedia, and graphics to websites. - To introduce CSS for styling web pages and explain the use of XML and DHTML. - To explain how to use JavaScript for adding interactive features and form validation. - To introduce AJAX, jQuery, and AngularJS for building modern and dynamic web applications.																																																																																																																																																		
Course Outcome		At the end of the course, the student should be able to,											KL																																																																																																																																							
		CO1: Create basic web pages using HTML with text, links, lists, tables, and frames.											K3																																																																																																																																							
		CO2: Design web forms and add images, multimedia, and graphics to web pages.											K3																																																																																																																																							
		CO3: Use CSS to style web pages and understand XML and DHTML for dynamic web content.											K3																																																																																																																																							
		CO4: Write JavaScript code to make web pages interactive and validate forms.											K3																																																																																																																																							
		CO5: Build dynamic web applications using JavaScript, AJAX, jQuery, and AngularJS.											K3																																																																																																																																							
Pre-requisites		-																																																																																																																																																		
<table><tr><th colspan="13">CO / PO Mapping</th><th colspan="2">CO/PSO Mapping</th></tr><tr><td colspan="15">(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak</td></tr><tr><th rowspan="2">COs</th><th colspan="12">Programme Outcomes (POs)</th><th colspan="2">PSOs</th></tr><tr><th>PO 1</th><th>PO 2</th><th>PO 3</th><th>PO 4</th><th>PO 5</th><th>PO 6</th><th>PO 7</th><th>PO 8</th><th>PO 9</th><th>PO 10</th><th>PO 11</th><th>PO 12</th><th>PSO 1</th><th>PSO 2</th></tr><tr><td>CO 1</td><td>3</td><td>2</td><td>3</td><td>-</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>2</td><td>3</td><td>2</td></tr><tr><td>CO 2</td><td>3</td><td>2</td><td>3</td><td>-</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 3</td><td>3</td><td>2</td><td>3</td><td>-</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 4</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>2</td><td>3</td><td>3</td></tr><tr><td>CO 5</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>2</td><td>3</td><td>3</td></tr></table>															CO / PO Mapping													CO/PSO Mapping		(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak															COs	Programme Outcomes (POs)												PSOs		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	CO 1	3	2	3	-	3	-	-	-	-	2	-	2	3	2	CO 2	3	2	3	-	3	-	-	-	-	2	-	2	3	3	CO 3	3	2	3	-	3	-	-	-	-	2	-	2	3	3	CO 4	3	3	3	2	3	-	-	-	-	2	-	2	3	3	CO 5	3	3	3	2	3	-	-	-	-	2	-	2	3	3
CO / PO Mapping													CO/PSO Mapping																																																																																																																																							
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CO 1	3	2	3	-	3	-	-	-	-	2	-	2	3	2																																																																																																																																						
CO 2	3	2	3	-	3	-	-	-	-	2	-	2	3	3																																																																																																																																						
CO 3	3	2	3	-	3	-	-	-	-	2	-	2	3	3																																																																																																																																						
CO 4	3	3	3	2	3	-	-	-	-	2	-	2	3	3																																																																																																																																						
CO 5	3	3	3	2	3	-	-	-	-	2	-	2	3	3																																																																																																																																						
Course Assessment Methods Direct - Continuous Assessment Test I, II & III - Assignments / Seminar/Quiz - End-Semester examinations Indirect - Course - end survey																																																																																																																																																				
Content of the syllabus																																																																																																																																																				
Unit – I		INTRODUCTION TO HTML										Periods		9																																																																																																																																						
HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and colour-alignment-links-tables-frames.																																																																																																																																																				

Unit – II	HTML FORMS AND GRAPHICS	Periods	9
Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.			
Unit – III	INTRODUCTION TO XML, CSS, AND DHTML	Periods	9
XML & DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language (XML). Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding.			
Unit – IV	JAVASCRIPT PROGRAMMING	Periods	9
JavaScript: Client-side scripting, what is JavaScript, how to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition, Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations			
Unit - V	JAVASCRIPT, AJAX, AND MODERN WEB TECHNOLOGIES	Periods	9
Ajax: Introduction, advantages &disadvantages, Purpose of it, ajax based web application, alternatives of ajax Java Script & AJAX: Introduction to array-operators, making statements-date & time-mathematics-strings-Event handling-form properties. AJAX. Introduction to jQuery and AngularJS			
Total Periods			45
Text Book			
1.	Achyut S Godbole & Atul Kahate, “Web Technologies: TCP/IP to Internet Application Architectures”, 2nd Edition, 2002, Tata McGraw-Hill.		
2.	Ivan Bayross, “Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP”, 4th Edition, BPB Publications.		
3.	Harvey & Paul Deitel, “Internet and World Wide Web: How to Program”, 5th Edition, Pearson Education.		
References			
1.	Thomas A. Powell, “HTML & CSS: The Complete Reference”, 5th Edition, McGraw-Hill Education.		
2.	Jon Duckett, “JavaScript and JQuery: Interactive Front-End Web Development”, Wiley.		
3.	Kogent Learning Solutions Inc., “Web Technologies: Black Book”, Dreamtech Press.		
E-Resources			
1.	https://www.w3schools.com/js/default.asp		
2.	https://developer.mozilla.org/en-US/docs/Web/API		
3.	https://www.geeksforgeeks.org/websites-apps/web-design/		



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Elayampalayam, Tiruchengode – 637 205



Programme	B.E.	Programme code			101	Regulation		2023							
Department	Computer Science and Engineering				Semester										
Course code	Course name	Periods per week			Credit	Maximum Marks									
		L	T	P	C	CA	ESE	Total							
U23CSOE3	Multimedia and Animation Basics	3	0	0	3	40	60	100							
Course Objective	The student should be made to, - To grasp the fundamental knowledge of Multimedia elements and systems. - To get familiar with Multimedia file formats and standards. - To learn the process of Authoring multimedia presentations. - To learn the techniques of animation in 2D and 3D and for the mobile UI. - To explore different popular applications of multimedia.														
Course Outcome	At the end of the course, the student should be able to,							KL							
	CO1: Understand the basic concepts of multimedia elements.							K2							
	CO2: Gain knowledge in different file formats on content pages.							K2							
	CO3: Apply Author 2D, 3D creative and interactive presentations for different target multimedia applications.							K3							
	CO4: Analyze various standard animation techniques for 2D, 21/2 D, 3D applications.							K4							
	CO5: Develop the multimedia applications in the context of cloud, security, bigdata streaming, social networking, CBIR etc.,							K6							
Pre-requisites	-														
	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping		
	COs	Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
	CO 1	3	2	3	2	3	-	-	-	3	2	1	2	3	2
	CO 2	3	3	3	3	3	-	-	-	3	3	2	2	3	2
	CO 3	3	3	3	3	3	-	-	-	3	3	2	3	3	2
	CO 4	3	3	3	3	3	2	-	-	3	3	3	3	3	3
	CO 5	3	3	3	3	3	2	-	-	3	3	3	3	3	3
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & III															
2. Assignments / Seminar/Quiz															
3. End-Semester examinations															
Indirect															
1. Course - end survey															
Content of the syllabus															
Unit – I		INTRODUCTION TO MULTIMEDIA										Periods		9	
Definitions, Elements, Multimedia Hardware and Software, Distributed multimedia systems, Challenges: security, sharing / distribution, storage, retrieval, processing, computing. Multimedia metadata, Multimedia databases, Hypermedia, Multimedia Learning.															

Unit – II	MULTIMEDIA FILE FORMATS AND STANDARDS	Periods	9
File formats- Text, Image file formats, Graphic and animation file formats, Digital audio and Video file formats, Color in image and video, Color Models. Multimedia data and file formats for the web.			
Unit – III	MULTIMEDIA AUTHORIZING	Periods	9
Authoring metaphors, Tools Features and Types: Card and Page Based Tools, Icon and Object Based Tools, Time Based Tools, Cross Platform Authoring Tools, Editing Tools, Painting and Drawing Tools, 3D Modeling and Animation Tools, Image Editing Tools, Audio Editing Tools, Digital Movie Tools, Creating Interactive Presentations, Virtual Learning, Simulations.			
Unit – IV	ANIMATION	Periods	9
Principles of animation: staging, squash and stretch, timing, onion skinning, secondary action, 2D, 2 ½ D, and 3D animation, Animation techniques: Keyframe, Morphing, Inverse Kinematics, Hand Drawn, Character rigging, vector animation, stop motion, motion graphics, , Fluid Simulation, skeletal animation, skinning Virtual Reality, Augmented Reality.			
Unit - V	MULTIMEDIA APPLICATIONS	Periods	9
Multimedia Big data computing, social networks, smart phones, surveillance, Analytics, Multimedia Cloud Computing, Multimedia streaming cloud, media on demand, security and forensics, online social networking, multimedia ontology, Content based retrieval from digital libraries.			
Total Periods			45
Text Book			
1.	Ze-Nian Li, Mark S. Drew, Jiangchuan Liu, Fundamentals of Multimedia”, Third Edition, Springer Texts in Computer Science, 2021.		
2.	John M Blain, The Complete Guide to Blender Graphics: Computer Modeling & Animation, CRC press, 3rd Edition, 2016.		
3.	Gerald Friedland, Ramesh Jain, “Multimedia Computing”, Cambridge University Press, 2018.		
References			
1.	Mohsen Amini Salehi, Xiangbo Li, “Multimedia Cloud Computing Systems”, Springer Nature, 1st Edition, 2021.		
2.	Rick’s parent, “Computer Animation: Algorithms and Techniques”, Morgan Kauffman, 3rd Edition, 2012.		
3.	Emilio Rodriguez Martinez, Mireia Alegre Ruiz, “UI Animations with Lottie and After Effects: Create, render, and ship stunning After Effects animations natively on mobile with React Native”, Packet Publishing, 2022.		
E-Resources			
1.	https://opensource.com/article/18/2/open-source-audio-visual-production-tools		
2.	https://developer.android.com/training/animation/overview		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme	B.E./B.Tech.	Programme Code				101	Regulation	2023						
Department	Computer Science and Engineering					Semester								
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks								
		L	T	P	C	CA	ESE	Total						
U23CSOE4	Software Engineering	3	0	0	3	40	60	100						
Course Objective	The main objective of this course is to: • To understand the evolving role of software and the critical need for software engineering in modern computing environments. • To familiarize students with different types of system models such as context, data, behavioral, and object models. • To develop the ability to use UML for modeling software designs including structural and behavioral aspects. • To the understanding of validation testing, system testing, and the importance of effective debugging techniques. • To Learn a comprehensive view of software quality management, including quality assurance techniques and standards.													
Course Outcome	At the end of the course, the student should be able to,							Knowledge Level						
	CO1: Identify and refute common software myths with factual insights from engineering practice.							K2						
	CO2: Construct and interpret system models including context diagrams, data flow diagrams, state models, and object models.							K3						
	CO3: Create and interpret UML diagrams, including class, sequence, collaboration, and component diagrams to model software systems.							K3						
	CO4: Perform validation testing, system testing , and apply systematic debugging techniques to identify and correct defects.							K2						
	CO5: Apply quality assurance concepts and techniques, including formal technical reviews and statistical SQA methods , to improve software quality.							K2						
CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak											CO/PSO Mapping			
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2			2						2	2	3	2
CO2	2	3		2							2	1	2	3
CO3	3	3	2	2	1				1	1		1	2	3
CO4	2	2	2		2	1	1			1	1	1	3	3
CO5	3	3	3	2	2		1		1		3	2	3	3

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & III			
2. Assignment / Seminar/ Quiz			
3. End-Semester examinations			
Indirect			
1. Course - end survey			
Content of the syllabus			
Unit –I	INTRODUCTION TO SOFTWARE ENGINEERING	Periods	9
The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.			
Unit-II	SOFTWARE REQUIREMENTS	Periods	9
Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. System models: Context models, behavioral models, data models, object models, structured methods.			
Unit –III	DESIGN ENGINEERING	Periods	9
Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.			
Unit-IV	TESTING STRATEGIES	Periods	9
A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.			
Unit –V	METRICS FOR PROCESS AND PRODUCTS	Periods	9
Software measurement, metrics for software quality. Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.			
Total Periods			45
TextBooks			
1.	Software Engineering, A practitioner’s Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.		
2.	Software Engineering- Sommerville, 7th edition, Pearson Education.		
3.	The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.		
References			
1.	Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.		
2.	Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.		
3.	Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.		
E-Resources			
1.	https://intellipaat.com/blog/software-engineering-principles/		
2.	https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf		
3.	https://efaidnbmnnnibpcajpcglclefindmkaj/https://ebooks.lpude.in/computer_application/bca/term_5/D-CAP305_PRINCIPLES_OF_SOFTWARE_ENGINEERING.pdf		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205														
Programme		B.E.			Programme code			101		Regulation			2023			
Department		Computer Science and Engineering						Semester								
Course code		Course name				Periods per week			Credit		Maximum Marks					
						L	T	P	C	CA	ESE	Total				
U23CSOE5		Mobile Application Development				3	0	0	3	40	60	100				
Course Objective		The student should be made to, - To facilitate students to understand android SDK - To help students to gain a basic understanding of Android application development - To inculcate working knowledge of Android Studio development tool - Learn Android app structure - Work with data using SQLite and content sharing														
Course Outcome		At the end of the course ,the student should be able to,											KL			
		CO1: Identify various concepts of mobile programming that make it unique from programming for other platforms											K3			
		CO2: Critique mobile applications on their design pros and cons.											K3			
		CO3: Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.											K3			
		CO4: Program mobile applications for the Android operating system that use basic and advanced phone features.											K3			
		CO5: Deploy applications to the Android market place for distribution.											K3			
Pre-requisites		-														
CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1 -Weak														CO/PSO Mapping		
COs		Programme Outcomes (POs)												PSOs		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO 1		2	2	1	1	3	1	1	1	1	2	1	2	2	3	-
CO 2		1	3	2	2	2	1	1	1	2	2	1	2	2	2	-
CO 3		1	2	3	2	3	1	1	1	2	2	2	2	3	2	-
CO 4		2	2	2	2	3	1	1	1	2	2	2	3	3	3	-
CO 5		1	1	2	1	3	1	1	1	1	2	3	2	3	2	-
Course Assessment Methods Direct - Continuous Assessment Test I, II & III - Assignments / Seminar/Quiz - End-Semester examinations Indirect - Course -end survey																

Content of the syllabus			
Unit -I	FUNDAMENTALS OF ANDROID DEVELOPMENT	Periods	9
Introduction to Android: The Android Platform, Android SDK, Eclipse Installation,Android Installation, Exploring Android Studio, Sample Application programs, Understanding Anatomy of Android Application, Android Manifest file			
Unit-II	CORE CONCEPTS OF ANDROID APPLICATION ARCHITECTURE	Periods	9
Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.			
Unit – III	DESIGNING INTERACTIVE ANDROID USER INTERFACES	Periods	9
Android User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation, Handling User Input and Gestures, Implementing Responsive UI for Multiple Screen Sizes			
Unit- IV	PUBLISHING ANDROID APPLICATIONS	Periods	9
Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.			
Unit-V	DATA MANAGEMENT AND CONNECTIVITY IN ANDROID	Periods	9
Using Android Data and Storage APIs, Managing Data using SQLite, Sharing Data Between Applications with Content Providers, Using Android Networking APIs, Deploying Android Applications			
Total Periods			45
Text Book			
1.	T1.Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)		
References			
1	RetoMeier,“ProfessionalAndroid2ApplicationDevelopment”,WileyIndiaPvtLtd		
2	Mark L Murphy,“Beginning Android”,Wiley India Pvt Ltd		
3	Android Application Development Allinone for Dummies by Barry Burd,Edition:I.		
E-Resources			
1.	https://www.edureka.co/blog/android-sdk-tutorial/		
2.	https://github.com/androiddevnotes/awesome-android-learning-resources		
3.	https://www.geeksforgeeks.org/best-way-to-become-android-developer-a-complete-roadmap/		

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Programme		B.E.			Programme code			101		Regulation			2023		
Department		Computer Science and Engineering						Semester							
Course Code		Course name				Periods per week			Credit		Maximum Marks				
U23CSOE6		Principles of Cloud Computing				L		T	P	C		CA		ESE	Total
						3		0	0	3		40		60	100
Course Objective		The student should be able to:													
		- To understand the basic concepts and architecture of Cloud Computing. - To understand virtualization and Data Storage in cloud computing. - To introduce the various levels of services that can be achieved by cloud and security in cloud computing - To analyze the various tools and technologies in the Cloud. - To implement the applications in the Cloud.													
		At the end of the course, the student should be able to,													
		CO1: Describe the basic concept and architecture of cloud computing													
		CO2: Identify the virtualization and data storage in cloud computing													
		CO3: Categorize varies levels of services can be achieved by cloud and cloud computing security													
Course Outcome		CO4: Analyze the various tools and technologies in Cloud													
		CO5: Develop the implementation of applications in Cloud													
		KL													
		K2													
Pre-requisites		K3													
		K3													
		K4													
		K6													

CO /PO Mapping													CO/PSO Mapping			
(3/2/1 indicates strength of correlation) 3-Strong,2-Medium,1 -Weak																
COs	Programme Outcomes(POs)												PSOs			
	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2		
CO 1	3	2	1									2	1	3		
CO 2	3	3	1		2							2	2	3		
CO 3	3	3	1		2	2	1	2				3	2	3		
CO 4	3	3	2		3							3	3	2		
CO 5	3	3	3	2	3				2	2	2	3	3	2		

Course Assessment Methods

Direct

- Continuous Assessment Test I, II&III
- Assignments / Seminar/Quiz
- End-Semester examination

Indirect

- Course -end survey

Content of the syllabus			
Unit– I	Cloud Computing Foundation And Architecture	Periods	9
Foundations: Introduction to Cloud Computing - Move to Cloud Computing - Types of Cloud -Working of Cloud Computing -Architecture: Cloud computing Technology - Cloud Architecture - Cloud Modeling and Design.			
Unit-II	Virtualization and Data Storage in Cloud Computing	Periods	9
Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Virtualization Support and Disaster Recovery. Storage: Data Storage – Cloud Storage – Cloud Storage from LANs and WANs.			
Unit – III	Cloud Computing Services And Security	Periods	9
Cloud Computing Services: Cloud Computing Elements – Understanding Services and Applications by Typr – Cloud Services – Cloud Computing at Work – Security: Risks in Cloud Computing – Data Security in Cloud – Cloud Security Services.			
Unit– IV	Cloud Computing Tools	Periods	9
Cloud Computing Tools: Tools and Technologies for Cloud – Cloud Mashaps – Apache Hadoop – Cloud Tools.			
Unit– V	Cloud Applications	Periods	9
Moving Applications to the Cloud- Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications			
Total Periods			45
Text Books			
1.	Buyya R., Broberg J., Goscinski A., “Cloud Computing: Principles and Paradigm”, 1st Edition, John Wiley & Sons, 2011.		
2.	Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2017.		
3.	Kumar Saurabh, "Cloud Computing, Architecting Next-Gen Transformation Paradigms", Wiley India Publications, Fourth Edition, 2018.		
Reference Books			
1.	A.Srinivasan and J.Suresh, "Cloud Computing-A Practical Approach for Learning and Implementation", Pearson India Publications 2014.		
2.	Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, “Mastering Cloud Computing”, Tata McGraw Hill, 2013		
3.	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach”, Tata McGraw Hill, 2009		
E-Resources			
1.	https://cloud.google.com/learn/what-is-cloud-computing		
2.	https://www.cloudskillsboost.google/		
3.	https://learn.microsoft.com/en-us/azure/architecture/cloud-adoption/getting-started/cloud-service-models		
4.	https://www.edx.org/course/introduction-to-cloud-infrastructure-technologies		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205													
Programme	B.E.			Programme code			101		Regulation		2023			
Department	Computer Science and Engineering						Semester							
Course Code	Course name				Periods per week			Credit		Maximum Marks				
U23CSOE7	Machine Learning with Python				L	T	P	C	CA	ESE	Total			
					3	0	0	3	40	60	100			
Course Objective	The student should be made to,													
	- Understand the basics of machine learning, its types, and real-world applications. - Learn Python programming and key libraries used in machine learning such as NumPy, Pandas, and Scikit-learn. - Preprocess and visualize datasets effectively to prepare for model building. - Implement and evaluate machine learning algorithms for classification, regression, and clustering tasks. - Apply ML techniques to real-world problems through hands-on projects and case studies													
	At the end of the course, the student should be able to,													
	CO1: Understand the different types of machine learning and their applications.													KL
	CO2: Demonstrate proficiency in Python programming and use of ML libraries.													K2
	CO3: Apply data preprocessing, visualization, and feature engineering techniques.													K3
Course Outcome	CO4: Implement machine learning models for supervised and unsupervised learning problems.													K4
	CO5: Evaluate model performance and optimize using appropriate techniques.													K5
Pre-requisites	-													

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	1				2					3	3	2
CO 2	3	3	2				2	1				2	2	3
CO 3	2	3	3	2					3			3	3	3
CO 4	3	3	2	2	2			2		1		2	3	2
CO 5	2	3	3	3	3	2					2	3	2	3

Course Assessment Methods														
Direct														
1. Continuous Assessment Test I, II&III														
2. Assignments / Seminar/Quiz														
3. End-Semester examination														
Indirect														
1. Course -end survey														

Content of the syllabus			
Unit– I	INTRODUCTION TO MACHINE LEARNING AND PYTHON	Periods	9
Introduction to Machine Learning: Definition and importance of machine learning-Supervised-unsupervised-reinforcement learning-Applications - Introduction to Python programming- NumPy-Pandas-Matplotlib-Data manipulation-visualization using Pandas and Matplotlib-Data Preprocessing.			
Unit-II	SUPERVISED LEARNING	Periods	9
Linear regression-Polynomial regression-MAE-MSE-RMSE-Classification: Logistic regression-KNN-Decision Trees - Random Forests-Model evaluation metrics- Model Training and Evaluation.			
Unit – III	UNSUPERVISED LEARNING	Periods	9
K-Means clustering-Hierarchical clustering- Evaluation of clustering results-Dimensionality Reduction: Principal Component Analysis-Linear Discriminant Analysis - t-Distributed Stochastic Neighbor Embedding (t-SNE)-Association Rule Learning: Apriori algorithm, Market Basket Analysis.			
Unit– IV	ADVANCED MACHINE LEARNING TECHNIQUES	Periods	9
Bagging and Boosting-Gradient Boosting Machines- Extreme Gradient Boosting -Linear and non-linear SVM- Kernel trick-Model evaluation and tuning-Introduction to neural networks-Building and training neural networks-Convolutional Neural Networks- Recurrent Neural Networks.			
Unit– V	DATA ANALYTICS AND REAL-WORLD APPLICATIONS	Periods	9
Data visualization techniques-Statistical analysis and hypothesis testing- Identifying patterns and insights from data- Introduction to time series data- Evaluating - Deployment of machine learning models- Flask – Django- Case studies on real-world applications of machine learning.			
Total Periods			45
Text books			
1.	Practical Machine Learning for Data Analysis Using Python Abdulhamit Subasi.		
2.	Advance Machine Learning with Python by John Hearty.		
References			
1.	"Python Machine Learning: Machine Learning and Deep Learning with Python, scikitlearn, and Tensor Flow " by Sebastian Raschka and Vahid Mirjalili.		
2.	"Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron.		
3.	"Introduction to Machine Learning with Python", Book by Andreas C. Muller and Sarah Guido.		
E-Resources			
1.	https://youtu.be/7eh4d6sabA0?si=JWHNJRVS6NhQOPYe		
2.	https://youtu.be/kqtD5dpn9C8?si=LBep4HWaMFRrAPsD		
3.	https://youtu.be/4SJ7bEILPJk?si=5LurvjzUOuCew1W9		

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205										 		
Programme	B.E.			Programme code			101		Regulation		2023		
Department	Computer Science and Engineering						Semester						
Course Code	Course name				Periods per week			Credit		Maximum Marks			
U23CSOE8	Ethical Hacking				L	T	P	C	CA	ESE	Total		
					3	0	0	3	40	60	100		
Course Objective	The student should be made to,												
	- To explore the concepts of security testing and the knowledge required to protect against the hacker and attackers. - To understand reconnaissance and the publicly available tools used to gather information on potential targets. - To discover the scanning techniques used to identify network systems open ports. - To identify network system vulnerabilities and confirm their exploitability. - To explore techniques for identifying web application vulnerabilities and attacks.												
Course Outcome	At the end of the course, the student should be able to,											KL	
	CO1: Use the various security tools to assess the computing system.											KL2	
	CO2: Predict the vulnerabilities across any computing system using penetration testing											KL3	
	CO3: Identify prediction mechanism to prevent any kind of attacks.											KL3	
	CO4: Ability to protect the system from being attacked by metasploit users.											KL3	
	CO5: Evaluate the wireless network flaws and able to apply security patches.											KL4	
Pre-requisites	-												

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	2	1	2	1	1	1	1	2	1	1	3	2
CO 2	3	3	2	2	2	1	1	1	1	2	1	2	3	3
CO 3	3	2	3	2	3	1	1	1	2	2	2	2	3	2
CO 4	3	3	2	2	2	1	1	1	1	2	1	2	3	2
CO 5	3	2	3	3	3	1	1	1	1	2	2	3	3	3

Course Assessment Methods	
Direct	
1.	Continuous Assessment Test I, II&III
2.	Assignments / Seminar/Quiz
3.	End-Semester examination
Indirect	
1.	Course -end survey

Content of the syllabus			
Unit– I	Introduction To Hacking	Periods	9
Introduction to Hacking – Important Terminologies – Penetration Test – Vulnerability Assessments versus Penetration Test – Pre-Engagement – Rules of Engagement – Penetration Testing Methodologies – OSSTMM – NIST – OWASP – Categories of Penetration Test – Types of Penetration Tests – Vulnerability Assessment Summary – Reports.			
Unit-II	Information Gathering And Scanning	Periods	9
Information Gathering Techniques – Active & Passive Information Gathering – Sources of Information Gathering – Tracing the Location – Trace route :ICMP,TCP,UDP – Enumerating and Fingerprinting the Web servers – Google Hacking – DNS Enumeration – Enumerating SNMP – SMTP Enumeration – Target Enumeration and Port Scanning Techniques – Advanced Firewall/IDS Evading Techniques.			
Unit – III	Network Attacks	Periods	9
Vulnerability Data Resources – Exploit Databases – Network Sniffing – Types of Sniffing – Promiscuous versus Non-promiscuous Mode – MITM Attacks – ARP Attacks – Denial of Service Attacks –Hijacking Session with MITM Attack – SSL Strip: Stripping HTTPS Traffic –DNS Spoofing – ARP Spoofing Attack Manipulating the DNS Records – DHCP Spoofing – Remote Exploitation – Attacking Network Remote Services .			
Unit– IV	Exploitation	Periods	9
Introduction to Metasploit – Reconnaissance with Metasploit – Port Scanning with Metasploit – Compromising a Windows Host with Metasploit – Client Side Exploitation Methods – E-Mails with Malicious Attachments – Creating a Custom Executable – Creating a Backdoor with SET – PDF Hacking – Social Engineering Toolkit – Browser Exploitation – Post Exploitation – Acquiring Situation Awareness – Hashing Algorithms – Windows Hashing Methods – Cracking the Hashes – Brute force Dictionary.			
Unit– V	Wireless And Web Hacking	Periods	9
Wireless Hacking – Introducing Aircrack– Cracking the WEP – Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng – Evil Twin Attack – Causing Denial of Service on the Original AP – Web Hacking – Attacking the Authentication – Brute Force and Dictionary Attacks – Types of Authentication – Log-In Protection Mechanisms – Captcha Validation Flaw – Captcha RESET Flaw – Manipulating User-Agents to Bypass Captcha and Other Protection			
Total Periods			45
References			
1.	Rafay Baloch, “Ethical Hacking and Penetration Testing Guide”, CRC Press, 2014.		
2.	Kevin Beaver, “Ethical Hacking for Dummies”, Sixth Edition, Wiley, 2018		
3.	Jon Erickson , “Hacking: The Art of Exploitation”, Second Edition, Rogunix, 2007		
E-Resources			
1.	https://www.juniper.net/documentation/us/en/software/junos/securityservices/topics/example/port-security-protect-from-arp-spoofing.html		
2.	https://trustedsec.com/resources/tools/the-social-engineer-toolkit-set		
3.	https://www.aircrack-ng.org/		

		VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205												
Programme		B.E.			Programme code			101		Regulation		2023		
Department		Computer Science and Engineering							Semester		-			
Course Code		Course name				Periods per week			Credit		Maximum Marks			
U23CSOE9		OPEN SOURCE SOFTWARE				L	T	P	C	CA	ESE	Total		
						3	0	0	3	40	60	100		
Course Objective		The student should be made to,												
		- Promoting the use of OSS in learning, teaching and administrative IT infrastructure. - Understand the PHP concepts and building blocks - Make the student to develop websites using PHP and Mysql - Understand the open source scripting languages Perl - Exploring the use of the Common Gateway Interface (CGI) scripting language to serve dynamic content.												
		At the end of the course, the student should be able to,											Knowledge Level	
		CO1: Outline the benefits of OSS and essential of Linux											K2	
		CO2: Implement simple PHP programs for various applications											K3	
Course Outcome		CO3: Design & implement a small to medium size web enabled information storage & retrieval system using PHP & MYSQL											K3	
		CO4: Enumerate the syntax and style of PERL scripting.											K4	
		CO5: Implement Perl programs with Database Connectivity											K3	
		Pre-requisites		-										

CO /PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1 -Weak													CO/PSO Mapping	
COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	2		3									2	2	3
CO 2	1		3									3	2	2
CO 3	2	2	3	3	2							2	2	3
CO 4	2	2	3	2	1					2		2	2	3
CO 5	2	2	3	3	1					2		3	2	2

Course Assessment Methods

Direct

- Continuous Assessment Test I, II&III
- Assignments / Seminar/Quiz
- End-Semester examination

Indirect

- Course -end survey

Content of the syllabus			
Unit– I	INTRODUCTION TO OPEN SOURCES	Periods	9
Introduction to Open sources – Need of Open Sources – Advantages of Open Sources – Application of Open Sources. FOSS- Licensing Models - FOSS Licenses – FOSS Examples- Linux Overview.			
Unit-II	LINUX OPERATING SYSTEM	Periods	9
Linux system structure - Kernel and User mode Operations - Process – Signals – Linux Distributions : Cent OS- Debian-Fedora-Redhat- Ubuntu- User Management in Linux –Configuration Services.			
Unit – III	PHP WITH MYSQL	Periods	9
Essential PHP - Operators and Flow control - Strings and Arrays - Creating functions - Reading data in web pages - PHP Browser Handling Power - File Handling -Session Handling in PHP – Cookies –Introduction to MYSQL - Working with Databases –Connection with Mysql.			
Unit– IV	INTRODUCTION TO PERL	Periods	9
PERL overview - Variables and Data types – Arrays- Control Structures – Subroutines, Packages and Modules- Error Handling – Regular Expressions.			
Unit– V	PERL AND CGI	Periods	9
Working with Files – Sending Emails - Database Access – Perl Process Management – Perl CGI Programming – GET and POST Methods – Cookies in CGI.			
Total Periods			45
References			
1.	Remy Card, Eric Dumas and Frank Mevel, —The Linux Kernel BookI, Wiley Publications, January 2013		
2.	Steve Suchring, —MySQL Bible, John Wiley, 2012		
3.	Rasmus Lerdorf and Levin Tatroe, —Programming PHPI, O_Reilly,		
4.	Martin C. Brown, —Perl: The Complete ReferenceI, 2nd Edition, TataMcGraw-Hill		
E-Resources			
1.	https://www.synopsys.com/glossary/what-is-open-source-software.html		
2.	https://opensource.org/		
3.	https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_open_source_software.html		
4.	https://www.javatpoint.com/open-source-operating-system		

CAREER TRACK COURSE

TRACK 1 – ENTREPRENEURSHIP

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme		B.E. / B.TECH			Programme code			101		Regulation			2023		
Department		Computer Science and Engineering						Semester				4			
Course code		Course Name				Periods per week			Credit		Maximum Marks				
						L	T	P	C	CA	ESE	Total			
U23CTCE1		Entrepreneurial Mindset and Business Model Canvas				0	0	2	1	60	40	100			
Course Objective		The student should be made to, • Cultivate an entrepreneurial mindset that embraces innovation and risk-taking. • Learn the components of the Business Model Canvas and develop skills using the Business Model Canvas as a tool for business planning. • Design innovative business models based on customer needs and market opportunities. • Understand the process of transforming a business model into a comprehensive business plan. • Understand the application processes and legal implications of business licenses and permits.													
Course Outcome		At the end of the course, the student should be able to,											KL		
		CO1: Explain the key traits and behaviors of successful entrepreneurs.											K2		
		CO2: Identify and describe the components of the Business Model Canvas.											K2		
		CO3: Design innovative business models tailored to specific customer needs and market conditions.											K6		
		CO4: Demonstrate the ability to write comprehensive business plans, incorporating elements such as market analysis, financial projections, and operational strategies.											K4		
		CO5: Identify different types of licenses and permits necessary for various types of businesses.											K2		
Pre-requisites		-													
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
COs		Programme Outcomes (POs)												PSOs	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO 1		1	1	2	1	1			1	2	1	3	3	1	1
CO 2		2	1	3	3	2			1	2	1	3	3	1	1
CO 3		2	1	3	2	3			1	2	1	3	3	2	2
CO 4		1	1	3	1	2			1	2	1	3	3	2	2
CO 5		1	1	3	1	2			1	2	1	3	3	1	1
Course Assessment Methods Direct 1. Continuous Assessment through Reviews 2. End Semester Examinations Indirect 1. Course - end survey															

Content of the syllabus			
Unit - I	Introduction to Entrepreneurial Mindset	Periods	6
Introduction-Evolution of the Concept of Entrepreneur - Characteristics of Successful Entrepreneurs - The Charms of Becoming an Entrepreneur - The Entrepreneurial Decision Process –Need and types of Entrepreneur – Role of Entrepreneurship in Economic Development -Women Entrepreneurship and Rural Entrepreneurship – Case Study – Opportunities Identification and Selection			
Unit – II	Understanding the Business Model Canvas	Periods	6
Definition of a Business Model- Types of Business Models -Customer Segments - Value Propositions – Channels and Partners - Customer Relationships - Revenue Model and Streams			
Unit – III	Designing and Testing Business Models	Periods	6
Key Resources - Key Activities - Key Partnerships - Cost Structure - Prototyping Business Models - Evaluating Business Models			
Unit – IV	Business Model to Business Plan	Periods	6
Business Plan - reasons for writing a Business Plan - who reads a business plan and what they’re looking for - guidelines for writing an effective business plan - business plan Outline - present a business plan to potential investors.			
Unit - V	Licenses, Permits and Funding	Periods	6
Ethical culture in the entrepreneurial ventures – Dealing Effectively with legal Issues - Obtaining business licenses and permits – forms of Business Organization – Creating new-venture team – Skill Profile – case study – Need for Funding –Sources of Personal Funding, equity funding, debt financing			
Total Periods			30
Text Books			
1	Khanka. S.S., “Entrepreneurial Development” S.Chand and Co. Ltd., New Delhi, 2011, Revised Edition		
2	Osterwalder, A., & Pigneur, Y. “Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers” John Wiley & Sons, Inc., 2010		
3.	R. Duane Ireland Bruce R. Barringer “Entrepreneurship: Successfully Launching New Ventures”, Pearson Education. 2020, 6 th Edition		
References			
1.	Donald F Kuratko, “Entrepreneurship – Theory, Process and Practice”, Cengage Learning, 2016. 10 th Edition		
2.	Ries, E.” The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses “ , Currency, 2017, 9th Edition		
E-Resources			
1.	https://fastercapital.com/content/Entrepreneurship-Education-via-Business-Model-Canvas.html		
2.	https://online.bath.ac.uk/articles/business-models		
3.	https://creately.com/guides/business-model-canvas-explained/		

TRACK II – COMPETITIVE EXAMINATION

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205													
Programme	B.E.			Programme code			101		Regulation			2023			
Department	Computer Science and Engineering						Semester			IV					
Course Code	Course Name				Periods per week			Credit	Maximum Marks						
					L	T	P		C	CA	ESE	Total			
U23CTCP3	Verbal, Quantitative Aptitude and Reasoning - II				2	0	0	1	40	60	100				
Course Objective	The student should be made to, - Identify and begin to apply the language features - Understand the mathematical techniques for solving the real life problems - Use number theory arguments to justify relationships involving divisors, multiples and factoring - Perform well in all competitive exams														
Course Outcome	At the end of the course, the student should be able to,												Knowledge Level		
	CO1: Use language through acquisition of grammar rules												K2		
	CO2: Demonstrate the use of mathematical reasoning by justifying the patterns and relationships												K2		
	CO3: Face external competitive exams												K3		
	CO4: Solve a question in a fraction of minute using shortcut methods												K3		
	CO5: Enhance their problem solving skills and logical Skills												K4		
Pre-requisites	-														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO 1		2		3	2					3		3	1	2	
CO 2	3	3		2	2					3		3	2	3	
CO 3	3	3		3	2					3		3	3	3	
CO 4	3	3		2	3					2		2	3	3	
CO 5		2		2	2					2		2	3	3	
Course Assessment Methods Direct - Continuous Assessment Test I, II & III - Assignments / Seminar/Quiz - End-Semester Examination Indirect - Course -end survey															

Content of the syllabus			
Unit -I	VERBAL ABILITY	Periods	4
Verbal Analogy, Sentence completion, Gen-Z lexis STATEMENT ANALYSIS: Statements and Conclusions, Statements and Assumptions, Statements and Agreements, Cause and effect, Making Judgements.			
Unit-II	PROFIT AND LOSS	Periods	8
PROBLEMS ON PROFIT AND LOSS PERCENTAGE: Profit Percentage, Cost Price and Selling Price are equal, Cost Price and Selling Price are different, Selling Price alone, Selling Price same for two objects, Selling Price and Cost Price are compared, Mixture, Profit Percentage and Loss Percentage are equal, False rate, Problems on Cost Price, Selling Price, Profit, Discount, Successive Discount and Discount Percentage. SIMPLE AND COMPOUND INTEREST: Simple Interest: Find Principal, Amount, Rate of Interest, Number of Years, Simple Interest based on lend into two parts, in case of instalments. Compound Interest: Find Principal, Amount, Rate of Interest, Number of Years, Compound Interest, Simple Interest in co-relation with Compound Interest, Instalments, Population, Present Worth.			
Unit – III	TIME AND WORK	Periods	6
Chain Rule, Combination of people working together, Individuals working together, Joining and Relieving, Efficiency Ratio Model, Works and Wages, Pipes open together: Doubling, Efficiency Ratio Model, Pipes opening and Closing, Capacity based model.			
Unit- IV	TIME, SPEED AND DISTANCE	Periods	6
Basic models, Ratio based model, Average speed based model, Relative speed based model, Algebra based model, Problems on Trains, Boats and Streams, Race and Games. Circular Track, Game based model.			
Unit-V	LOGICAL REASONING	Periods	6
DIRECTION SENSE: Direct yourself, based on Angle, Directional reference point, correct map based on wrong map, Direction in Clocks, Shadowing. SEATING ARRANGEMENT: Linear Seating Arrangement, Single row Uni-Directional and Bi-Directional, Dual row, Triple row, Square, Rectangular and Triangular Arrangement, Seating Arrangement in photograph, Circular Arrangement, Inside and Outside (Linear and Circular), Concentric Arrangement.			
Total Periods			30
Text books			
1.	Rajeev Varma, “Fast Track Objective Arithmetics”, Arihant Publications, 2024		
2.	R.S. Aggarwal, “Modern Approach to Logical Reasoning”, S Chand Publishing, 2022		
3.	SP Bakshi, “Objective General English”, Arihant Publications, 2024		
References			
1.	R.S. Aggarwal, “Quantitative Aptitude for Competitive Examinations”, S Chand Publishing, 2013		
2.	Dinesh Khattar, “The Pearson guide to Quantitative Aptitude for Competitive Examinations”, 3 rd edition, 2016		
3.	Arun Sharma, “How to Prepare for Logical reasoning for CAT”, McGraw Hill Education, 2014		
4.	Jaikishan and Premkishan, “How to Crack Test of Reasoning”, Arihant Publications, 2016		
5.	R.S. Agarwal, “A modern Approach to verbal and non-verbal reasoning”, S Chand Publishing, 2018		
E-Resources			
1.	Aptitude: https://www.indiabix.com		
2.	Reasoning: https://placement.freshersworld.com		
3.	Verbal: https://testbook.com		

TRACK III1 – HIGHER STUDIES

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam,Tiruchengode– 637205														
Programme	B.E. / B.Tech				Programme code				Regulation		2023				
Department	Computer Science Engineering							Semester				V			
Course Code	Course Name				Periods per week			Credit		Maximum Marks					
					L	T	P	C	CA	ESE	Total				
U23CTCP4	Leveraging Arithmetic with logic and Codes Snippet				2	0	0	1	40	60	100				
Course Objective	The student should be made to, • Develop a Strong Understanding of English Grammar for flawless sentence construction. • Enhance Problem-Solving Skills in Mixture and Allegation, and Probability. • Strengthen Mathematical and Analytical Thinking through Permutation and Combination. • Identify the logic behind code snippets and automate flawless codes.														
	At the end of the course, the student should be able to,												Knowledge Level		
	CO1: Demonstrate Mastery in Identifying and Correcting Grammatical Errors to maintain grammatical accuracy.												K3		
	CO2: Apply Mathematical Techniques in Mixture, Allegation, and Probability to Solve Real-World Problems.												K3		
	CO3: Solve Problems Using Permutation and Combination Principles for competitive exams.												K3		
CO4: Develop Proficiency in Programming and Advanced Data Structures.												K4			
CO5: Analyze and Interpret Data for Decision Making and problem solving.												K4			
Pre-requisites															
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO 1		2	2	2		2	1	2	2	3		2	2		
CO 2		3	2	2		1		1	2			1	3		
CO 3		3	2	2		1		1	2			1	2		
CO 4	3	3	3	3	2	2	2	2	2	1	2	3	3	3	
CO 5	3	3	2	1	1	2		2	2	3	2	3	2		

Course Assessment Methods Direct - Continuous Assessment Test I, II & III - Assignments / Seminar/Quiz - End-Semester Examinations Indirect - Course -end survey			
Content of the syllabus			
Unit -I	SENTENCE CORRECTION	Periods	6
Parallelism, Modifiers, Pronoun – Antecedent Agreement, Comparisons, Tenses, Redundancy, Pronouns, Conjunctions, Choose the Grammatically Correct and Incorrect Sentences.			
Unit–II	MIXTURE AND ALLIGATION AND PROBABILITY	Periods	6
MIXTURE AND ALLIGATION: Mixing two Different Liquids(Criss Cross Method), Mixture- Mixing with and without Replacement(Quantity withdrawn and Replacement are same and not same) (Find Price and Ratio), Profit and Loss Obtained. PROBABILITY: Problems on addition and multiplication theorems (dependent and Independent), Problems on coins, dice, deck of cards, balls, Alphabet , Number and Selection Based Model, Independent Events – Application, Conditional Probability , Baye’s Thorem and its Applications, Probability Distribution – (Bernoulli, Binomial, Poisson), Defective, Mensuration and Miscellaneous.			
Unit – III	PERMUTATION AND COMBINATION	Periods	6
PERMUTATION AND COMBINATION: Permutation – Arranging people, digits, numbers, alphabets, letters, and colours(Comes together and never comes together), Picking a person from a group, Picking two favourite colours from a colour brochure, Picking first, second and third place winners(Identical and Non identical). Combination – Selection of menu, food, clothes, subjects, team, Selecting some team members from a group, Picking Some colours from a colour brochure, Picking three winners, Circular Permutation.			
Unit– IV	CODE SNIPPETS	Periods	6
Conditional and control flow based on Array and String, Functions and Recursion based on Array and String, Error Handling: Try-catch, Custom Exceptions, Inheritance, Polymorphism, Encapsulation and Abstraction, Sorting and Searching based on Array, binary and binary search tree, AVL , B and B+ , balanced tree			
Unit-V	DATA INTERPRETATION, CLOCKS, CALENDARS	Periods	6
DATA INTERPRETATION: Tables-Data organized in rows and columns. Charts-Represents data using rectangular bars , Show proportions of a whole, Display trends over time or changes in a variable, Analyzing data presented in a combination of different graph types. CLOCKS: Problems based on angle between hands, the time when the hands overlap, finding actual time from reflections, Time gained or lost by a faulty clock. CALENDARS: Finding the day of the week for a specific date. Calculating the number of odd days in a given period. Solving questions on leap years and date calculations. Determining the day after or before a certain number of days.			
Total Periods			30
Text books			
1.	Fast Track Objective Arithmetic by Rajeev Varma, Arihant Publication- 2023-24 edition.		
2.	Quantitative Aptitude for CAT - Dinesh k Sinha		
3.	Quantitative Aptitude: Permutation and Combination, Probability - Rajnish Mishra (Author) ,Kindle Edition- 2020		

4.	A Modern Approach to Logical Reasoning by R.S. Aggarwal, S. Chand & Company Ltd.-2022 edition.
5.	Objective General English by SP Bakshi – Arihant Publication-2023 edition.
References	
1.	R.S. Aggarwal “An Advanced Approach to Data Interpretation for Competitive Examinations” S.Chand Twelfth Edition.
2.	Dinesh Khattar- The Pearson guide to Quantitative Aptitude for Competitive Examinations 3 rd edition.
3.	Arun Sharma, "How to Prepare for Data Interpretation for CAT" McGraw Hill,2025
4.	How to Crack Test of Reasoning by Arihant Experts-2024 edition
5.	A modern Approach to verbal and non-verbal reasoning by R.S. Aggarwal-2023 edition
E-Resources	
1.	Aptitude: https://pt.scribd.com/
2.	Reasoning: https://placement.freshersworld.com
3.	Verbal: https://testbook.com

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Programme		B.E. / B.Tech				Programme code					Regulation		2023			
Department		Computer Science and Engineering						Semester				VI				
Course Code		Course Name					Periods per week			Credit	Maximum Marks					
							L	T	P	C	C A	ESE	Total			
U23CTCP5		Integrated Reasoning and Pseudo Code					2	0	0	1	4 0	60	100			
Course Objective		The student should be made to, - Develop Proficiency in Verbal Communication and Writing. - Master Mensuration, Geometry, and Coordinate Geometry Concepts. - Apply Pseudo Code in Problem-Solving. - Enhance Logical Reasoning and Analytical Thinking.														
Course Outcome		At the end of the course, the student should be able to,											Knowledge Level			
		CO1: Demonstrate strong Verbal and Written Communication skills.											K3			
		CO2: Apply Mensuration and Geometry Concepts to Solve Real-World Problems.											K3			
		CO3: Design and Implement structure based Pseudo Codes.											K3			
		CO4: Optimize DSA based Pseudo codes for Effective Problem-Solving.											K4			
Pre-requisites		CO5: Enhance Logical and Analytical Reasoning Skills for Complex Problem Solving.													K2	
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak														CO/PSO Mapping		
COs	Programme Outcomes (POs)												PSOs			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	
CO 1	1	2	2	2		1		1	1	3		2	2	2		
CO 2	3	3	3	3		2			1			1	1	2		
CO 3	3	3	3	3	2	2		1	2	2		2	3	3		
CO 4	3	3	3	3	2			1	2	3		2	3	3		
CO 5	3	3	3	3	3	3		1	2	3		2	3	3		
Course Direct Assessment Methods 1. Continuous Assessment Test I, II & III 2. Assignments / Seminar/Quiz 3. End-Semester Examinations Indirect 1.Course -end survey																

Content of the syllabus			
Unit -I	Verbal Ability	Periods	4
Reading Comprehension, Essay Writing			
Unit-II	Mensuration and Geometry	Periods	8
MENSURATION: 2D - Area and Perimeter – Triangles, Square, Rectangle, Parellelogram, Rhombus, Trapezoid, Circles, quadrilaterals and Polygons. 3D - Surface area and Volume – Cuboids, Cube, Cylinder, Cone, Sphere, Prism and Pyramids. GEOMETRY: points, lines, planes, angles and shapes, including triangles, quadrilaterals, and circles and polygons along with topics like congruence, similarity, area and volume, Co-ordinate Geometry.			
Unit – III	Structure based Pseudo code	Periods	6
Pseudo codes: Accenture, Capgemini, TCS , DXC, Hexaware based on string, condition, control, function and recursive			
Unit– IV	DSA based Pseudo code	Periods	6
Pseudoc codes on DSA- Sorting and Graph based on array, tree (inorder, preorder, post order, binary tree, binary search tree, tree rotation, b and b++, balanced tree,			
Unit-V	Logical Reasoning	Periods	6
Analogy –Number analogy, Alphabet analogy; Inequalities –Comparisons-Logical Deduction-Coded Relationships; Ranking and ordering -Ranking from left/right or top/bottom, Total number of people/objects; Cubes and Cuboids – number of sides painted ,Cutting of cubes vertically & Horizontally, Folding of cubes; Non Verbal – Series, mirror image ,water image,grouping of images, clasiification, hidden figures, Heights and Distances -Finding the height of an object, Finding the distance between two objects, Finding the distance of an object.			
Total Periods			30
Text books			
1.	Fast Track Objective Arithmetic by Rajeev Varma, Arihant Publication- 2023-24 edition.		
2.	Quantitative Aptitude for CAT - Dinesh k Sinha		
3.	GEOMETRICKS: 356 Short Tricks of Geometry in Math By A.K.VISHWAKARMA (Author), Kindle Edition- 2019		
4.	A Modern Approach to Logical Reasoning by R.S. Aggarwal, S. Chand & Company Ltd.-2022 edition.		
5.	A Complete Book Of Logical Reasoning, Adda247 Publications.		
6.	Objective General English by SP Bakshi – Arihant Publication-2023 edition.		
7.	Industry based Pseudo code		
References			
1.	R.S. Aggarwal “An Advanced Approach to Data Interpretation for Competitive Examinations” S.Chand Twelfth Edition.		
2.	Dinesh Khattar- The Pearson guide to Quantitative Aptitude for Competitive Examinations 3 rd edition.		
3.	Arun Sharma, "How to Prepare for Data Interpretation for CAT" McGraw Hill,2025		
4.	How to Crack Test of Reasoning by Arihant Experts-2024 edition		
5.	A modern Approach to verbal and non-verbal reasoning by R.S. Aggarwal-2023 edition		
E-Resources			
1.	Aptitude: https://pt.scribd.com/		
2.	Reasoning: https://placement.freshersworld.com		
3.	Verbal: https://testbook.com		

Additional Language

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	B.E./B.Tech	Programme Code				Regulation	2023	
Department	Common to All					Semester	IV	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ADL01	French	2	0	0	1	100	-	100
Content of the syllabus								
Unit –I						Periods	6	
ENGLISH : Introduction about the language and the country, Alphabets and accents, Important phrases in french, pronunciation rules, Days, Months, Numbers 1- 50. FRANÇAIS : Introduction sur le pays France et langue français, L'alphabets et accents, les phrases en français, règles pour pronounciation, Les jours, Les mois et les nombres 1-50.								
Unit –II						Periods	6	
ENGLISH : How are you? what is your name? What is it? Who is he? To be, To have – Verb. Pronoun, Family, School, Adjectives, Nationality, Yes/No type Answering, Negative, professions FRANÇAIS : Comment vas tu?, Comment tu t'appelles? Qu'est – ce-que c'est? Qui est ce? Le verbe – être, avoir, pronoun et conjugation , La famille, L'école, Adjectives, Nationalité , oui/Non, Négatif, Question Words et professions.								
Unit –III						Periods	6	
ENGLISH : Verbs—Er , IR ,RE and pronominal verbs and conjugation. Preposition, Types of articles, Demonstrative and possessive adjectives Sentence formation. FRANÇAIS : Verbs de er, ir , re et pronomial verbes , conjugation , prepositions et articles Démonstratif et possessif adjectifs.								
Unit –IV						Periods	6	
ENGLISH : Introduce the personne , Express the interest, speak about the family and small topics. Verbs - to go, to come, to do, can , want. Vocabulary. FRANÇAIS : Décrire les personnes, Exprimer les goûts, et parler de la famille et petits titres. Verbes – aller venir, faire pouvoir, vouloir vocablaires.								
Unit –V						Periods	6	
ENGLISH : Encouraging students to speak , write and listen the language. FRANÇAIS : Encourage les étudiants pour parler ,becrire et ecouter la langue.								
Total Periods							30	
Text Books								
1.	Babusha Verma, Deepti Walia, “Idées method de francai”, Goyal Publishers.							
2.	A.Monnerie Beinvenue En France. Documentation Marrie Franchoise Boullet							
3.	G.Mauger Cours DE Languet De Civilisation Francaises							
4.	Annie Heminway, Complete French all in one Premium Second Edition, Tata McGraw Hill Education							
5.	Diamond French-Aprenons Le Francois New Saraswathi House (India)Private Limited							

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Programme	B.E./B.Tech	Programme Code				Regulation	2023	
Department	Common to All				Semester		IV	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ADL02	German	2	0	0	1	100	-	100
Content of the syllabus								
Unit –I						Periods	6	
English: Intro of German and Germany, Letters- German Alphabets and Other letters, Pronunciation- Vowel, Consonants; Greetings, Courtesy, The days of the week, The months of the year. German: Einführung in Deutsch, Deutschland - Das Alphabet, Der Umlaut, Aussprache, Vokale, Konsonanten, Die Begrüßungen, Wie heißen sie, Die Wochentage, Monate.								
Unit –II						Periods	6	
English: Articles, Nominative Case, Masculine, Feminine, and Neuter; Gender of nouns; Colours, Seasons, Numbers, Cardinal (1-100) & Ordinal (1-20), Types of Verb. German: Artikel, Masculine, Feminine & Neuter, Nomen, Kleuren, Zeiten; Jahreszeiten; Zahlen, Kardinalzahlen (1-100) und Ordnungszahlen (1-20), Zuge in Deutschland, Verbtypen.								
Unit –III						Periods	6	
English: Nationality, Personal pronoun, Auxiliary verb, Professions, Verb (to have), to call oneself, Regular 1st group (er)verbs - speak, live, like, watch, etc., German: Nationalität, Personal pronomen, Hilfsverben, Sein, Beruf, Haben, Heißen, Reguläre verben, sprechen, wohnen, lieben, schauen.								
Unit –IV						Periods	6	
English: Irregular Verbs, Model Auxiliary verbs, Negation, Ask Questions, Prepositions, Conjunctions, Time units, Form of registration. German: Unregelmäßige verben, Modale hilfsverben, Negationen, Fragewörter, die präposition, Verbindungen, Zeiteinheiten, Anmeldeformular.								
Unit –V						Periods	6	
English: Pronoun, Personnel, Possessive, Indefinite –Reflexive – Relative- Adjective- Adverb- Le verb prefix – Word order- Dialogues in German – Tourist attractions in German German: Das Pronomen - Das Adjektiv- Das Adverb- Die Verb-Präfixe- Die Wortreihenfolge – Dialoge In Deutscher Sprache - Touristenattraktionen								
						Total Periods	30	
Text Books								
1.	Grasp the Basics of Deutsch im schnellgang by Edward Swick							
2.	Netzwerk Deutsch als fremdsprache A1.1 Kursbuch							
3.	Netzwerk Deutsch als fremdsprache A1.1 Arbeitsbuch							



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Programme	B.E./B.Tech	Programme Code				Regulation	2023	
Department	Common to All				Semester		IV	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ADL03	Japanese	2	0	0	1	100	-	100
Content of the syllabus								
Unit –I						Periods	6	
Introduction to Hiragana and Katakana: Chart 1, Chart 2, Chart 3, Annexures 1 and 2 and basic Japanese rules along with similar sounded vocabularies for each chart.								
Unit –II						Periods	6	
Introduction to Nouns, various particles and usages: Forming simple sentences, asking questions, positioning differentiation and owning fundamentals – new particles and usages.								
Unit –III						Periods	6	
Introduction of Verbs, time and place markers: Usage of action words in sentences and framing them – place and time markers usages – giving and receiving – omission of certain particles in a sentence.								
Unit –IV						Periods	6	
Introduction of Adjectives, Adverbs and usages: Describing nouns and verbs and framing them to relate day to day conversations- positive and negative ending of the same – introduction of the likes and dislikes expressions								
Unit –V						Periods	6	
Introduction to Counters and Kanji: How to use numbers-How to use quantifiers-Present form of adjectives and Nouns-Other necessary particles-How to use numbers and quantifiers – 55 kanji characters								
Total Periods						30		
Text Books / Manuals								
1.	Takuji Kobayashi “MINNA NO NIHONGO –Japanese for Everyone”, 2 nd Edition GOYAL Publishers & distributors Pvt.Ltd, New Delhi, 2017.							
2.	“SPEED MASTER N5”							
3.	MINNA NO NIHONGO 1-1 Translation & Grammatical notes in English elementary							
4.	SHIN NIHONGO NO KISO 1 (Grammatical Notes in English)							