VIVEKANANDHA

COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University-Chennai
Approved by AICTE – Accredited by NAAC and ISO 9001:2015 Certified)
Elayampalayam , Tiruchengode – 637 205, Namakkal District, Tamilnadu.

CURRICULUM & SYLLABI – 2023

FOR

UNDER GRADUATE (UG)

B.TECH. – INFORMATION TECHNOLOGY

REGULATION 2023

(After 18th BoS)

CHOICE BASED CREDIT SYSTEM

(Applicable to the students admitted from the academic year 2023-2024 onwards)

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous)

B.TECH. INFORMATION TECHNOLOGY

Regulations - 2023

CHOICE BASED CREDIT SYSTEM

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

Providing quality education to transform students into technically competent skilled women to excel in IT profession, innovation and entrepreneurship

DEPARTMENT MISSION

- To empower knowledge on cutting-edge technologies in the field of Information Technology to develop innovative solutions for real-world problems
- To create a platform for innovation, research and new technology development
- To inculcate ethical practices, life-long learning and sense of societal responsibilities to support the career and personal development of the learner

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1: Graduates will have knowledge in various programming languages and continuous up-gradation in emerging IT technologies.

PEO 2: Graduates will be able to analyze and find solutions for current industrial needs.

PEO 3: Graduates will contribute to the society by their ethical behavior and effective teamwork

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1	**Optimal Solution :** Graduates will be able to develop computer applications for the real life problem using suitable programming platform
PSO2	**Successful Career :** Graduates will be able to think innovatively and work on multi-disciplinary areas

PROGRAMME OUTCOMES (POs):

Undergraduate engineering programmes are designed to prepare graduates to attain the following program outcomes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **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
4. **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.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **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.
7. **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.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **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.
11. **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.
12. **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.

Mapping of Program Educational Objectives with Program Outcomes

A broad relation between the program objective and the outcomes is given in the following table

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	√	√	√		√	√		√	√			
II		√		√			√	√	√	√		
III		√	√		√		√		√	√	√	√

CURRICULUM BREAKDOWN STRUCTURE
(Applicable to the Students admitted from the Academic Year 2023 - 24)

Summary of Credit Distribution

Category	Semester								Total No. of Credits	Curriculum Content (% of total number of credits of the program)
	SEM 1	SEM 2	SEM 3	SEM 4	SEM 5	SEM 6	SEM 7	SEM 8		
HSMC	4	4	-	-	-	-	-	-	8	5.0%
BSC	8	8	4	4	-	-	-	-	24	14.9%
ESC	7	8	-	-	-	-	-	-	15	9.3%
PCC	-	-	14	14	15	16	7	-	66	40.9%
PEC	-	-	-	-	3	3	9	-	15	9.3%
OEC	-	-	-	-	3	3	3	-	9	5.6%
EEC	1	-	2	2	1	1	3	10	20	12.4%
MC	-	-	-	-	-	1	-	-	1	0.6%
CTC	-	-	-	1	1	1	-	-	3	1.9%
Semester wise total	**20**	**20**	**20**	**21**	**23**	**25**	**22**	**10**	**161**	**100%**

	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	**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, CSE & IT

	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	**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 தொழில் நுட்பமும்/ 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 BT,CSE,CST,IT,AI&DS

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

$Common for CSE,CST, IT,BT, AI&DS

	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	**INFORMATION TECHNOLOGY**		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
U23IT301	Digital Systems Design	PCC	3	0	0	3	40	60	100
U23CS305	Computer Organization and Architecture$	PCC	3	0	0	3	40	60	100
U23IT302	Data Structures#	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 WIH 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
U23CTCP2	Personality Development	EEC	1	0	2	1	60	40	100
					Total Credits	**20**	**370**	**430**	**800**

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, CSE, EEE, ECE, IT, BME & AIDS

$ Common CSE , IT , CST & AIDS

* Common CSE , IT , CST

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Programme	**B.E. / B. Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**		Semester		**IV**

CURRICULUM

(Applicable to the students admitted from the academic year 2023-2024onwards)

Course Code	Course Name	Category	Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23MA405	Probability and Statistics[$]	BSC	3	1	0	4	40	60	100
U23IT405	Agile Software Engineering	PCC	3	0	0	3	40	60	100
U23IT407	Database Systems	PCC	3	0	0	3	40	60	100
U23CS408	Design and Analysis of Algorithms*	PCC	3	0	0	3	40	60	100
	Additional Language	EEC	3	0	0	2	40	60	100
THEORY INTEGRATED WIH PRACTICAL									
U23CT407	Operating Systems[$]	PCC	3	0	2	4	50	50	100
PRACTICAL									
U23IT408	Database Systems Laboratory	PCC	0	0	2	1	60	40	100
CAREER TRACK COURSES									
	Career Track Course – I	CTC	2/0	0	0/2	1	40/60	60 / 40	100
					Total Credits	**21**	**350 /370**	**450/ 430**	**800**

CA - Continuous Assessment, ESE - End Semester Examination, BSC - Basic Science Courses, PCC – Professional Core Courses, EEC- Employability Enhancement Courses, CTC – Career Track Course

[$] Common for CSE, IT , CST & AIDS

* Common for CSE, IT

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Programme	**B.E. /B. Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**		Semester		**V**

CURRICULUM

(Applicable to the students admitted from the academic year 2023-2024onwards)

Course Code	Course Name	Category	Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U23IT511	Automata Theory and Compiler Design	PCC	3	1	0	4	40	60	100
U23IT512	Artificial Intelligence *	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 WIH PRACTICAL									
U23CS512	Data Communication and Networks *	PCC	3	0	0	4	40	60	100
PRACTICAL									
U23CS516	Microprocessor and Microcontroller Laboratory*	PCC	0	0	2	1	60	40	100
U23IT513	Mini Project - I	EEC	0	0	2	1	100	-	100
CAREER TRACK COURSES									
-	Career Track Course - II	CTC	2/0	0	0/2	1	40/ 60	60/ 40	100
					Total	**23**	**440/ 460**	**460/ 440**	**900**

CA - Continuous Assessment, ESE - End Semester Examination, PCC – Professional Core Courses, PEC – Professional Elective Courses, OEC – Open Elective Courses, EEC- Employability Enhancement Courses, CTC – Career Track Course

[$] Common for CSE & IT

* Common for CSE & IT

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Department	**INFORMATION TECHNOLOGY**		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									
U23IT614	Internet Programming	PCC	3	0	0	3	40	60	100
U23IT615	Advanced Java Programming	PCC	3	0	1	4	40	60	100
U23CT616	Internet of Things*	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 INTERGRATED WITH PRACTICAL									
U23IT616	Machine Learning Essentials #	PCC	3	0	2	4	50	50	100
PRACTICAL									
U23IT617	Internet Programming Laboratory	PCC	0	0	2	1	60	40	100
U23CT620	Internet of Things Laboratory*	PCC	0	0	2	1	60	40	100
U23IT618	Mini Project - II	EEC	0	0	2	1	100	-	100
CAREER TRACK COURSES									
-	Career Track Course -III	CTC	2	0	0/2	1	40/ 60	60/ 40	100
MANDATORY COURSE									
U23IT619	Comprehensive Examination	MC	2	0	0	1	100	-	100
					Total	**25**	**610 /630**	**490/ 470**	**1100**

CA - Continuous Assessment, ESE - End Semester Examination, PCC – Professional Core Courses, PEC – Professional Elective Courses, OEC – Open Elective Courses, MC- Mandatory courses, EEC- Employability Enhancement Courses, CTC –Career Track Course

Common to CSE and IT

* Common to CSE , IT & CST

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205				
Programme	**B.E. / B.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**		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									
U23IT720	Cryptography and Network Security	PCC	3	0	0	3	40	60	100
U23IT721	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									
U23IT722	Security Laboratory	PCC	0	0	2	1	60	40	100
U23IT723	Internship and Project Phase – I	EEC	0	0	6	3	60	40	100
					Total	**22**	**340**	**460**	**800**

CA - Continuous Assessment, ESE - End Semester Examination, PCC – Professional Core Courses, PEC – Professional Elective Courses, OEC – Open Elective Courses, EEC - Employability Enhancement Courses

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Programme	**B.E. / B.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**		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
PRACTICAL									
U23IT821	Project Phase - II	EEC	0	0	20	10	60	40	100
Total						**10**	**60**	**40**	**100**

Cumulative Credits: 161

CA - Continuous Assessment, ESE - End Semester Examination, EEC- Employability Enhancement Courses.

Type of Courses

PCC :	Professional Core Course
PEC :	Professional Elective Course
OEC :	Open Elective Course
EEC :	Employability Enhancement Course
MC :	Mandatory Course
HSMC :	Humanities, Sciences and Management Course
ESC :	Engineering Sciences Course
BSC :	Basic Sciences Course
CTC :	Career Track Course

Additional Language Courses										
Sem	**Course Code**	**Course Name**	**Category**	**Periods/Week**			**Credit**	**Maximum Marks**		
				L	**T**	**P**	**C**	**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

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

PROFESSIONAL ELECTIVE COURSES: 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	Web Application Attacks	Smart Sensor Technologies	Multimedia and Animation	Cognitive Science
Exploratory Data Analytics	Neuro fuzzy and Genetic Programming	Cyber Law and Ethics	Software Defined Networks	Game Theory	3D Printing and Design
Predictive Analytics	Knowledge based Decision Support Systems	Blockchain Technology	Parallel Programming	Digital Marketing	Generative AI
Image and Video Analytics	AI for Industrial applications	Biometric System	Virtualization	AR and VR	Prompt Engineering
Recommender Systems	Healthcare Analysis	Ethical Hacking	Edge and Fog Computing	Video Creation and Editing	MERN Stack Development
Storage Technologies	Design of AI Products	Security and Privacy in cloud	Amazon Web Services	Multimedia Data Compression and Storage	UI / UX Design
Data Science	Deep Learning	Cyber Forensics and Incident Response	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 specialization / 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

PROFESSIONAL ELECTIVE COURSES

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	104	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**			Semester	**-**

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									
U23ITV11	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
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
U23ITV12	Data Science	PEC	3	0	0	3	40	60	100

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.Tech.**	Programme Code	104	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**			Semester	-

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									
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
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 Analysis	PEC	3	0	0	3	40	60	100
U23CTV29	Design of AI Products	PEC	3	0	0	3	40	60	100
U23ITV21	Deep Learning	PEC	3	0	0	3	40	60	100

VERTICAL III : Cyber Security

	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	**-**

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									
U23CSV31	Information Security	PEC	3	0	0	3	40	60	100
U23CSV32	Cyber Security	PEC	3	0	0	3	40	60	100
U23ITV31	Web Application Attacks	PEC	3	0	0	3	40	60	100
U23CSV34	Cyber Law and Ethics	PEC	3	0	0	3	40	60	100
U23CSV35	Blockchain Technology	PEC	3	0	0	3	40	60	100
U23ITV32	Biometric System	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
U23ITV33	Cyber Forensics and Incident Response	PEC	3	0	0	3	40	60	100

VERTICAL IV : IoT & Cloud

	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	**-**

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									
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

VERTICAL V : Creative Media

	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	**-**

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									
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

VERTICAL VI : Emerging Technologies

	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		-

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									
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
U23ITV61	Prompt Engineering	PEC	2	0	2	3	40	60	100
U23CSV67	MERN Stack Development	PEC	3	0	0	3	40	60	100
U23ITV62	UI / UX Design	PEC	3	0	0	3	40	60	100
U23CSV69	Devops	PEC	3	0	0	3	40	60	100

DEPARTMENT OF INFORMATION TECHNOLOGY
MINOR DEGREE - IoT & Cloud

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MINOR DEGREE – CYBER SECURITY

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

DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

MINOR DEGREE – DATA SCIENCE

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

MINOR DEGREE VERTICALS – ECE

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

(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									
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

Vertical - V Quality and Regulatory Affairs

For Minor Degree in Biotechnology

	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

(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									
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 VERTICAL – EEE

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

(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									
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 OFFERED FROM BME

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

(Applicable to the students admitted from the academic year 2023 – 2024 onwards)

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

	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	**INFORMATION TECHNOLOGY**			Semester	-

CURRICULUM

(Applicable to the students admitted from the academic year 2023- 2024 onwards)

LIST OF OPEN ELECTIVES

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

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205				
Programme	**B.E. / B.Tech.**	Programme Code	107	Regulation	**2023**
Department	**COMPUTER SCIENCE AND TECHNOLOGY**		Semester		-

CURRICULUM

(Applicable to the students admitted from the academic year 2023- 2024 onwards)

LIST OF OPEN ELECTIVES

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

	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

LIST OF OPEN ELECTIVES

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
OPEN ELECTIVE - I									
U23BMOE1	Introduction to Medical Instrumentation	OE	3	0	0	3	40	60	100
U23BMOE2	Telemedicine	OE	3	0	0	3	40	60	100
U23BMOE23	Hospital Engineering and Information Systems	OE	3	0	0	3	40	60	100
OPEN ELECTIVE - II									
U23BMOE4	Advanced Medical Equipments	OE	3	0	0	3	40	60	100
U23BMOE5	Virtual Instrumentation	OE	3	0	0	3	40	60	100
U23BMOE6	Embedded Systems in Medical Applications	OE	3	0	0	3	40	60	100
OPEN ELECTIVE - III									
U23BMOE7	Hospital Management	OE	3	0	0	3	40	60	100
U23BMOE8	Medical Informatics	OE	3	0	0	3	40	60	100
U23BMOE9	Clinical Engineering	OE	3	0	0	3	40	60	100

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

OPEN ELECTIVE (OE) OFFERED

DETAILS OF OPEN ELECTIVE (OE) FOR UG COURSE

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	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

	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

(Applicable to the students admitted from the academic year 2023 - 2024 onwards)

LIST OF OPEN ELECTIVES

Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
OPEN ELECTIVE - I								
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
OPEN ELECTIVE –II								
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
OPEN ELECTIVE –III								
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

	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

(Applicable to the students admitted from the academic year 2023- 2024 onwards)

LIST OF OPEN ELECTIVES

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
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

SEMESTER - I

	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		**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 • Familiarize the students with differential calculus • Familiarize the student with functions of several variables. This is needed in many branches of engineering • Make the students understand various techniques of integration • Acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications	
Course Outcome	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
	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	-	

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	3	2		1								2		
CO 3	3		2	1									2		
CO 4	3	2	2	1	1								2		
CO 5	3		1	1	1								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	**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", Cengage Learning, 8th Edition, 2015
2.	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45th Edition, 2024
References	
1.	Kreyszig E, "Advanced Engineering Mathematics", John Wiley, 10th Edition (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", 10th Edition, Wiley (2016).
5.	B V Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Education Pvt Ltd., New Delhi (2016)
E-Resources	
1.	https://freevideolectures.com › All Courses › Calculus › UCLA
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.Tech.**	Programme Code	**104**	Regulation	**2023**		
Department	**INFORMATION TECHNOLOGY**			Semester	**I**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
U23EN101	**English for Communication***	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Improve the communicative ability of learners. • Make learners read widely in order to practice writing • Make learners develop vocabulary and strengthen grammatical understanding • Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning. • Identify and begin to apply the language features of academic and professional writing and speaking	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Use appropriate vocabulary in a professional context	K1
	CO2: Write appropriately based on the knowledge gained through reading of a variety of materials	K1
	CO3: Use language through their grammatical acquisition	K2
	CO4: Read and infer meanings of technical texts	K2
	CO5: Comprehend and retain the contextual and syntax understanding from reading	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**	**PO7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1						2			3	3		3		1
CO 2						2			3	3		3		1
CO 3						2			3	3		3		1
CO 4						2			3	3		3		1
CO 5						2			3	3		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		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**- 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.	Dr. S. R. Kannan & Faculty from the Department of English -English for Communication, Karun Printers Pvt. Ltd, 2023.
2.	Sokkaalingam, S.RM., The Art Of Speaking, English Versatile Publishing House, 2019.
References	
1.	Dr. Padma Ravindran, Poorvadevi, M. Y. Abdur Razack- English for life, English for work, students Book, Ebek language laboratory pvt ltd, 2011.
2.	Dutt Rajeevan, Prakash. A Course in Communication Skill (Anna University, Coimbatore edition): Cambridge University Press India Pvt.Ltd, 2007.
3.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient Blackswan Pvt, Ltd, 2009.
4.	Technical English – I & II, Sonaversity, Sona College of Technology, Salem, First Edition, 2012.
5.	Meenakshmi Raman and Sangeeta Sharma- 'Technical communication English Skills for Engineers; oxford University Press, 2008.
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

	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	**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23PH101	**Engineering Physics$**	3	0	0	3	40	60	100

Course Objective

The student should be made to,
- Understand the basic concepts of properties of matter
- Gain knowledge about the conduction properties of metals
- Identify the different types of crystal structures and crystal growth techniques. Study the production and applications of ultrasonics.
- Correlate better understanding the carrier concentration and its variations with temperature in a semiconductor. Study the properties of modern engineering materials and its uses
- Categorize the types of laser and fiber optics

Course Outcome	At the end of the course, the student will be able to	Knowledge Level
	• Understand the elastic properties of the materials	K2
	• Gain knowledge about the conduction properties of metals	K3
	• Determine packing factor for various unit cells and understand different types of crystal imperfections and learn the engineering, medical applications.	K1
	• Discuss the basic idea of semiconducting materials and realize the function of modern engineering materials	K1
	• Learn the optical properties of materials and its uses	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** PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	2	3	1	2									2
CO 2	3	2	3	3	1									
CO 3	3	3		3	1									2
CO 4	3		2	1	1								3	2
CO 5	3			1	2	2								2

Course Assessment Methods

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

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 semiconductor: (Qualitative only) – Carrier concentration – Fermi level – Electrical conductivity - Band gap determination. Extrinsic semiconductors: Carrier concentration in n – type and p – type semiconductor (Qualitative) – Variation of Fermi level with temperature. 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.

	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.	A.Panneerselvam and Dr.P.Mani, "Engineering Physics", Dhanam publisher, Chennai – 600 042. (2024)

References

1.	B.K. Pandey, S. Chaturvedi. "Engineering Physics", 1st 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, 6th 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

	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, EEE, ECE, IT, BT, CST & BME**			Semester	**I**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
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

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	2							2	3	3
CO 2	2	1	1		2							2	2	2
CO 3	3	2	1	1	2							2	3	3
CO 4	3	2	1	1	2							2	3	3
CO 5	3	2	1	1	2							2	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	**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 – Pointers structures - Pointer Arithmetic - Array of Pointers – dynamic memory allocation - mallaoc, 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 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.Maliga, C. S. Kanimozhi and K.Kousalya, "Problem Solving and Programming", Tata McGraw Hill, 2019.
2.	E. Balagurusamy, "Programming in ANSI C", 8th 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", 2nd 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	
1.	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/

	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			I	
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA101	**Heritage of Tamils***	1	0	0	1	40	60	100

Content of the syllabus

அலகு **1**	மொழி மற்றும் இலக்கியம்	**Periods**	**3**

இந்திய மொழிக்குடும்பங்கள் – திராவிடமொழிகள் – தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்றத்தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் திருக்குறளில் மேலாண்மைக்கருத்துக்கள் – தமிழ்க்காப்பியங்கள் – தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம்,ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசனின் பங்களிப்பு.

அலகு 2	மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை –சிற்பக்கலை	**Periods**	**3**

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன்சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப்பொருட்கள்,பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறதெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக்கருவிகள் – மிருதங்கம், பறை,யாழ்,வீணை,நாதஸ்வரம் – தமிழர்களின் பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3	நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுக்கள்	**Periods**	**3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஒயிலாட்டம் ,தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம் , தமிழர்களின் விளையாட்டுக்கள்.

அலகு 4	தமிழர்களின் திணைக்கோட்பாடுகள்	**Periods**	**3**

தமிழகத்தின் தாவரங்களும் விலங்குகளும்– தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடுகள் – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவு, கல்வியறிவு – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்கு	**Periods**	**3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்தமருத்துவத்தின் பங்கு – கல்வெட்டுகள் கையெழுத்துப்படிகள் – தமிழ்ப்புத்தகங்களின் அச்சுவரலாறு.

Total Periods	**15**

	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			I
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA101	**Heritage of Tamils***	1	0	0	1	40	60	100

Content of the syllabus

UNIT I	**LANGUAGE AND LITERATURE**	**Periods**	**3**

Language Families in India – Dravidian Languages–Tamil as a Classical Language-Classical Literature in Tamil–Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature-Management Principles in Thirukural- Tamil Epics and Impact of Buddhism & Jainism in Tamil and -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**

Herostone to modern sculpture - Bronzeicons- Tribes and their handicrafts- Art of temple car making—Massive Terracotta sculptures Villagedeities , Thiruvalluvar Statue at Kanyakumari, Making of musical instruments-Mridhangam,Parai Veenai,Yazhand Nadhaswaram – Role of Temples in Social and Economic Life of Tamils.

UNIT III	**FOLK AND MARTIAL ARTS**	**Periods**	**3**

Therukoothu, Karagattam, VilluPattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance- Sports and 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- Education and Literacy during Sangam Age- Ancient Cities and Portso Sangam Age-Export and Import during Sangam Age- Overseas Conques to Cholas.

UNIT V	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	**Periods**	**3**

Contribution of tamils 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.	தமிழக வரலாறும் – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	கீழடி – வைகை நதிக்கரையில் சங்க நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை – 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.Subaramanian, 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) (Publishedby: 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.

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

Programme	**B.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**Information Technology**			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.

Course Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO1: Construct plane curves and develop projection of points , lines and plane surfaces	K2
CO2: Construct projection of solids with various conditions.	K4
CO3: Design the section of solids and analyze the true shape of the section	K3
CO4: Design and develop the different solid surfaces.	K2
CO5: Construct isometric and orthographic projection of different solids.	K2

Pre-requisites Nil

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

Cos	Programme Outcomes (POs)												**CO/PSO Mapping** 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	-
CO 2	3	3	2	2	2	-	-	-	-	-	-	-	2	2
CO 3	3	2	2	2	3	-	-	-	-	-	-	-	2	-
CO 4	3	2	3	3	2	-	-	-	-	-	-	-	2	2
CO 5	3	3	2	3	3	-	-	-	-	-	-	-	3	-

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.

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Elayampalayam, Tiruchengode – 637 205

Programme	**B.Tech.**	Programme code	**104**		Regulation			**2023**
Department	**Information Technology**		Semester					**I**
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23GE102	**Design Thinking***	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 design thinking 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	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**
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
1. Continuous Assessment Test through activities, assignment & Quiz 2. Models (Chart/paper/3D) 3. Prototype & Presentation
Indirect
1. 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, 2nd edition, 2011
4.	Design of Business: Why Design Thinking is the Next Competitive Advant age 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, Wily 2020
2.	Design thinking playbook by Michael Lewrick , Wily 2019
3.	Creative Confidence: Unleashing the Creative Potential Within Us All by 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=2mjSDIBaUlM
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

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Programme	**B.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**Information Technology**			Semester	**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23PH102	**Physics Laboratory$**	0	0	3	1	60	40	100

Course Objective

The main objective of this course is to:

- 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
- 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: Understand the importance of laser beam compared to ordinary light	K2
Pre-requisites	**Nil**	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												**CO/PSO Mapping** 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											2	
CO 2	3	3	1	2	2								2	
CO 3	3	2			2								3	
CO 4	3	3		1									1	
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.	G.Senthil Kumar, "Physics laboratory manual", VRB Publishers Private Limited, Chennai. 2024.

	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, EEE, ECE, IT, BT, CST & BME**				Semester	**I**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
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

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	2							2	3	3
CO 2	3	2	1	1	2							2	3	3
CO 3	3	2	1	1	2							2	3	3
CO 4	3	2	1	1	2							2	3	3
CO 5	3	2	1	1	2							2	3	3

Course Assessment Methods

Direct
1. Pre lab and post lab test 2. End-Semester examination
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. **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".	CO2
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	CO5

Entered details: Name: abi RollNo: 101 Percentage: 89.70	
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.TECH**	Programme Code			**104**	Regulation	**2023**	
Department	**Information Technology**				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	3	
CO 3	3	2	2		1	3	3				1	2	3	
CO 4	1	1	1			2	3				1	2	2	
CO 5	1	2	1			2	2				1	3	1	

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment
Indirect
1. 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, Geographical Information System (GIS), Environmental impact Analysis (EIA) and human health.			
		Total Periods	**30**

Text Books	
1.	**Dr.S. Vairam - "Environment Science and Engineering" Gems publication. Edition 2018**
2.	Gilbert.M.Masters-"Environmental Science"-Pearson education. Edition-2-2013
3.	Dr.S.Mageswari, Dr.G.Vijayakumar, Ms. A. Preethi-"Environment Science and Engineering" RK Publication. Edition 2022.
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.TECH**	Programme Code	**104**	Regulation	**2023**		
Department	**INFORMATION TECHNOLOGY**			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

COs	Programme Outcomes (POs)												**CO/PSO Mapping** 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	1								2		
CO 2	3	2	1	1									2		
CO 3	3	2		1									2		
CO 4	3	2		1	1								2		
CO 5	3	2	1	1									2		

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment. 3. End-Semester examinations
1. 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, 45th Edition, 2024.
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.TECH**	Programme Code			**104**	Regulation	**2023**	
Department	**Information Technology**				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.	K3
	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.	K3
	CO5: Categorize the metal corrosion in different environment and find out appropriate control techniques to avoid corrosion	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** 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	**CO 1**	3	3	3	2	1	2	2					1	1
CO 2	**CO 2**	3	2	2	2		2	2					2	2
CO 3	**CO 3**	3	2	2	3	2	1	2					2	2
CO 4	**CO 4**	3	3	2	2	1	1	3					3	3
CO 5	**CO 5**	3	3	3	2	1	2	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	**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, M.S.Viswaksenan, Engineering Chemistry : First Edition, RK publication, Edition-2022.
2.	O.G.Palanna, "Engineering Chemistry "Tata Mc GrawHill PVT,Ltd. Second Edition -2017
References	
1.	P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing company (P) Ltd, New Delhi, 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" Edition- 5- 2013.
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

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Programme	**B.E./B.Tech**	Programme Code	104	Regulation	**2023**			
Department	**Information Technology**			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 be able 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
	CO5: Understand the fundamentals of digital logics and measuring instruments	K2
Pre-requisites	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

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Programme	B.TECH	Programme code		104	Regulation		2023	
Department	**INFORMATION TECHNOLOGY**			Semester			II	
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA202	**தமிழரும்தொழில்நுட்பமும் / Tamils and Technology***	1	0	0	1	40	60	100

Content of the syllabus

அலகு **1**	நெசவு மற்றும் பானைத்தொழில்நுட்பம்	**Periods**	**3**

சங்ககாலத்தில் நெசவுத்தொழில்– பானைத்தொழில்நுட்பம் – கருப்புசிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு **2**	வடிவமைப்பு மற்றும் கட்டிடத்தொழில்நுட்பம்	**Periods**	**3**

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்–மாமல்லபுரச்சிற்பங்களும் கோவில்களும் – சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிறவழிபாட்டுத்தலங்கள் – நாயக்கர்காலக்கோயில்கள்-மாதிரிகட்டமைப்புகள் பற்றி அறிதல் மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக்கட்டிடக்கலை.

அலகு **3**	உற்பத்தித் தொழில்நுட்பம்	**Periods**	**3**

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத்தொழிற்சாலை – இரும்பை உருக்குதல் எஃகு – வரலாற்றுச்சான்றுகளாக - செம்பு மற்றும் தங்கநாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடிமணிகள் – சுடுமண்மணிகள் – சங்குமணிகள் – எலும்புத்துண்டுகள் – தொல்லியல்சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு **4**	வேளாண்மை மற்றும் நீர்ப்பாசனத்தொழில்நுட்பம்	**Periods**	**3**

அணை, ஏரி, குளங்கள் ,மதகு – சோழர்காலக்குமுழித்தூம் பின் முக்கியத்துவம் – கால்நடைபராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச்சார்ந்த செயல்பாடுகள் – கடல்சார்அறிவு – மீன்வளம் – முத்துமற்றும்முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார்சமூகம்.

அலகு **5**	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	**Periods**	**3**

அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ்நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மின் பொருட்கள் உருவாக்கம் – தமிழ் இணையக்கல்விக்கழகம் – தமிழ் மின்நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்க்குவைத்திட்டம்.

	Total Periods	**15**

	VIVEKANANDHACOLLEGE 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			II	
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23TA202	**தமிழரும்தொழில்நுட்பமும் / 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)-Thirumalai Nayakar Mahal - 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 TECHNOLOGY				**Periods**		**3**	
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu 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**: **தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்**).
2	**கணினித்தமிழ் – முனைவர்இல. சுந்தரம்**. (**விகடன்பிரசுரம்**).
3	**கீழடி – வைகைநதிக்கரையில்சங்கநகரநாகரிகம்** (**தொல்லியல்துறைவெளியீடு**)
4	**பொருநை - ஆற்றங்கரைநாகரிகம்**. (**தொல்லியல்வெளியீடு**)
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.

	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		**II**
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
U23CS204	**OBJECT ORIENTED PROGRAMMING**	3	0	2	4	50	50	100
Course Objective	The main objective of the course is to, • Provide the concepts of object oriented programming with a comprehensive introduction to C++. • Learn Java programming and its basic packages including GUI programming.							
Course Outcome	At the end of the course, the student should be able to,						Knowledge Level	
	CO1: Apply the concepts of classes and objects to solve simple problems using C++						K3	
	CO2: Develop simple applications using basic Java constructs						K3	
	CO3: Build applications making use of packages, interfaces and exception handling in Java						K3	
	CO4: Make use of multithreading and I/O streams						K3	
	CO5: Develop simple event-based GUI applications in Java using AWT classes and controls						K3	
Pre-requisites	Nil							

CO / PO 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**	**PSO 2**
CO 1	3	2	1	1									3	3
CO 2	3	2	1	1									3	3
CO 3	3	2	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. Assignments / Quiz 3. End-Semester examinations
Indirect
1. Course - End survey

Content of the syllabus

Unit – I	**INTRODUCTION TO OOP AND C++**	Periods	**9**

Object Oriented Programming - Features – Merits & Demerits- Applications – Difference –Structure ofC++ - Input and Output statements- Classes and Objects– Constructors – Destructors

Unit - II	INTRODUCTION TO JAVA	Periods	9
Structure of Java - Data Types - Variables – control statements - Arrays –Classes – Fundamentals – Declaring Objects - Assigning Object Reference Variables - Methods –Constructors - this keyword - Overloading Methods - Access Control – Static – Inheritance – Basics – Super keyword			
Unit – III	**PACKAGES, INTERFACES AND EXCEPTION HANDLING**	Periods	**9**
Abstract Classes - final with Inheritance. Packages - Access Protection - Importing Packages – Interfaces - Exception Handling basics – Multiple catch Clauses- Nested try Statements – Java's Built- in Exceptions – User defined Exception			
Unit - IV	**MULTITHREADING AND I/O**	Periods	**9**
Java Thread Model - Creating a Thread –Creating Multiple Threads – Synchronization – Enumerations –Type Wrappers - Auto Boxing. I/O Basics - Reading and Writing Console I/O – Reading and Writing Files.			
Unit – V	**STRINGS AND EVENT HANDLING**	Periods	**9**
String Class – operations – String Buffer Class. 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

Text Books

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)

References

1.	Buyya Rajkumar, ThamaraiSelvi S. and Xingchen Chu, "Object Oriented Programming with Java Essentials andApplications", 1st Edition, McGraw Hill, New Delhi, 2009.
2.	Cay S. Horstmann, "Core Java: Volume I Fundamentals", 11th Edition, Addison Wesley, New Delhi, 2019.
3.	Deitel Paul and Deitel Harvey, "Java How to Program", 11th Edition, Pearson Education, New Delhi, 2018.

Tools Required

1.	Codetandra / HackerRank / HackerEarth / Any online Problem Solving Platforms

E-Resources

1.	www.nptel.ac.in
2.	https://www.javatpoint.com/cpp-oops-concepts
3.	https://www.javatpoint.com/java-tutorial

	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		**II**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23EN202	**Professional Communication***	2	0	3	3	50	50	100

Course Objective	The main objective of this course is to: • Provide suitable reading &writing tasks to develop communicative ability for academic and professional progress • Inculcate channelized reading to make learners proficient in the chosen professional writing contexts. • Improve learners' vocabulary and grammar to supplement their language use at professional context • Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning. • Identify and begin to apply the language features of academic and professional writing and speaking	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Acquire sufficient command over language to speak at an academic or professional context	K1
	CO2: Write technically well at professional contexts through exposing them to similar readings.	K1
	CO3: Use language at length at technical and professional situations through enrichment of vocabulary and strengthening of grammatical knowledge.	K2
	CO4: Ethically gather, understand, evaluate and synthesize information from a variety of written and electronic sources.	K2
	CO5: Be proficient in oral communication and writing.	K3
Pre-requisites	Nil	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

Cos	Programme Outcomes (POs)												**CO/PSO Mapping** 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		1
CO 2						2			3	3		3		1
CO 3						2			3	3		3		1
CO 4						2			3	3		3		1
CO 5						2			3	3		3		1

Course Assessment Methods

Direct
1. Continuous Assessment Test I & II 2. Continuous Assessment Test III in the Communication Skills Lab

3. Assignments 4. End-Semester examinations	
Indirect	
1. Course - end survey	

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.RM., 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.TECH**	Programme Code		**104**	Regulation		**2023**	
Department	**Information Technology**				Semester		**II**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CH202	**Chemistry Laboratory$**	0	0	2	1	60	40	100

Course Objective	The main objective of this course is to: • Gather knowledge about basic simple acid-base reactions and study the mechanism of acid mixture with base. • Learn pH and potential of hydrogen in a sample solution. • Study the redox reaction through potential difference. • Infer iron forms complex with thiocyanate. • Gather knowledge on hardness producing salts and removal of hardness through estimation. • Collect data required for dissolved oxygen present in water sample. • Understand alkalinity and available chlorine present in water sample.	
Course Outcome	The students who complete this course successfully are expected to:	Knowledge Level
	CO1: Infer knowledge on neutralization reaction between acid, acid mixture with base and identify the concentrations.	K3
	CO2: Identify the concentration of sample using pH.	K3
	CO3: Spot the concentration of sample solution through redox reaction by potentiometric method	K4
	CO4: Estimate Iron by complexation reaction spectrometrically.	K4
	CO5: Determine hardness and dissolved oxygen present in domestic water supply and Identify alkalinity and available chlorine present in the given sample.	K4
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**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO 2**
CO 1	3	3		2	2	1	1						2	2
CO 2	3	3		2	2	2	2						2	1
CO 3	3	3		2	2	1							1	2
CO 4	3	3	1	2	2	1							2	2
CO 5	2	3	1	2		2	3						2	2

Course Assessment Methods

Direct
1. Pre lab and Post lab Test 2. Execution of Experiment and Viva-voce 3. End semester examination
Indirect
Course - end survey

Content of the syllabus		
S.No	**Name of the Experiment**	**Course Outcome**
1.	Estimation of HCl using NaOH by Conductometric titration	CO1
2.	Estimation of Mixture of acid [standard HCl+ unknown CH_3COOH] using NaOH by Conductometric titration.	CO1
3.	Estimation of Barium Chloride using sodium sulphate by Conductometric precipitation titration	CO1
4.	Determination of HCl using NaOH by pH metry	CO2
5.	Estimation of Ferrous iron by Potentiometric titration.	CO3
6.	Estimation of Ferric ion by Spectrophotometry	CO4
7.	Determination of Total, Temporary and Permanent hardness of water by EDTA method.	CO5
8.	Estimation of Dissolved Oxygen content in water by Winkler's method	CO5
9.	Estimation of Alkalinity in water sample.	CO5
10.	Estimation of available Chlorine in bleaching powder.	CO5
	Total Periods	**30**
Lab Manuals suggested:		
1	Chemistry laboratory I & II by Dr.A.Ravikrishnan,Sri Krishna Pub,Revised Edition-2017	
2	Chemistry laboratory Manual by Dr.Veeraiyan, Revised Edition-2017	

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

Programme	**B.Tech.**	Programme Code	**104**		Regulation		**2023**	
Department	**Information Technology**				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 Outcomes

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

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	2	-	-	-	2	-	-	-	2	2
CO 2	3	2	3	2	2	-	-	-	2	-	-	-	3	2
CO 3	3	2	2	3	2	2	-	-	2	-	-	-	2	-
CO 4	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	
GROUP A **(CIVIL & MECHANICAL ENGINEERING)**	
CIVIL ENGINEERING PRACTICE:	**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
MECHANICAL ENGINEERING PRACTICE:	
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
STUDY EXPERIMENT: 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
GROUP B **(ELECTRICAL & ELECTRONICS ENGINEERING)**	
ELECTRICAL ENGINEERING PRACTICE	
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
ELECTRONICS ENGINEERING PRACTICE	
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.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**Information Technology (IT)**			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) Know about the basic structure of Indian constitution. ii) Know about our central government executive system of India iii) Know about our state government executive system of India iv) Learn the election system, amendments and emergency provisions given by the constitution. v) Know about the special constitutional provisions in India	
Course Outcome	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
	● Remember the Election system, Amendments and Emergency Provisions given by the constitution.	K2
	● Understand our Special Constitutional Provisions in India	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**	**PSO 2**
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
1. Continuous Assessment Test I, II & III 2. Assignment
Indirect
1. 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 FUCTION 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.drishtiias.com/

SEMESTER – III

	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/ AI&DS**				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.	
Course Outcome	At the end of the course, the student should be able to,	owledge level
	CO1: Demonstrate the mathematical reasoning and logics	K2
	CO2: Reformulate statements from common language to formal language	K5
	CO3: Posses knowledge in relations and lattices.	K3
	CO4: Solve recurrence relations by applying appropriate function.	K5
	CO5: Understand the concepts various algebraic Structures.	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** 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**	**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		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	**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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Programme	**B.E / B.Tech.**	Programme Code			Regulation		**2023**	
Department	**Information Technology**				Semester		**III**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT301	**Digital Systems Design**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is to

- Understand common forms of number representation, Boolean laws and logic minimization using Karnaugh Map.
- Understand the concepts of combinational logic circuits.
- Understand the concepts of sequential logic circuits.
- Understand the concepts of Asynchronous sequential circuits.
- Learn basic of digital memories and fundamental concepts used in programmable logic.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Realize the number representation, Different forms of Boolean law and logic minimization using K Maps.	**K2**
	CO2: Analyze and Reproduce the combinational logic circuits.	**K3**
	CO3: Analyze and Reproduce sequential logic circuits.	**K3**
	CO4: Understand the analysis and design procedures for asynchronous sequential circuits.	**K3**
	CO5: Characterize Boolean functions using programmable logics.	**K2**

Pre-requisites -

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**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	2										3	2
CO 2	3	2	2						1				3	2
CO 3	3	3	2	1					1				2	2
CO 4	3	2	2	1									3	2
CO 5	2	2	1	1									2	1

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	**Number Systems, Boolean Algebra and Minimization Techniques**	Periods	**9**

Number Systems & Boolean Algebra: Number systems review: Decimal– Binary– Octal– Hexadecimal, 1s and 2s Complements, Boolean postulates and laws – De-Morgan's theorem – Principle of Duality. **Logic Gates &Minimization of Boolean functions:** Logic Gates – Universal Gates - Karnaugh map minimization: Three, Four variables with Don't Care Entries -Implementations of logic functions using logic gates.			
Unit - II	**Combinational Logic Circuits**	Periods	**9**
Half Adder – Full Adder – Half Subtractor – Full Subtractor -Magnitude Comparator: 2 bit– Code Conversion: Gray to Binary, Binary to Gray, Binary to BCD, BCD to Excess 3 code, BCD to Gray, Binary to Excess 3 code definition – Multiplexers, Demultiplexers– Encoders, Decoders – Parity checker and generator			
Unit – III	**Sequential Logic Circuits**	Periods	**9**
Basic Architectural Distinctions between Combinational and Sequential circuits – Latch – Definitions of Level and Edge triggering – Flip flops: SR, JK, D and T – Counters: up counter, down counter, up-down counter, ripple counter – Registers: Shift registers, Universal shift register			
Unit - IV	**Asynchronous Sequential Logics**	Periods	**9**
Analysis and Design Procedure of Asynchronous Sequential Circuits — Reduction of State and Primitive Flow Tables — Race-free State Assignment — Hazards: Static Hazard, Dynamic Hazard, Essential Hazard.			
Unit – V	**Memory and Programmable Devices**	Periods	**9**
Introduction to basic memories: ROM – PROM – EPROM – EEPROM, RAM: Static and dynamic RAM – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) – Characteristics of Digital integrated circuits: propagation delay, fan-out and fan-in.			
		Total Periods	**45**

Text Books:	
1.	M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog", 6th Edition, Pearson Education, 2021.
2.	Charles H.Roth. "Fundamentals of Logic Design",6th Edition, Thomson Learning, 2013
REFERENCE BOOKS:	
1.	Digital Electronics - A Conceptual Approach [Print Replica] Kindle Edition, Technical Publication by D.A.GodseA.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/sequential-circuitsnotes/#:~:text=A%20sequential%20circuit%20refers%20to,form%20of%20the%20present%20state.
2.	https://www.youtube.com/watch?v=Wj01JfGEQT8
3.	https://www.tutorialspoint.com/digital_circuits/digital_circuits_sequential_circuits.html

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 , AI &Ds**			Semester		III		
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. know about the Parallelism concepts in Programming	
Course Outcome	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
	CO5: Interpret performance of different pipelined processors and multi core architectures.	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
CO 1	3	2	2							1		1	3	2
CO 2	2	3	1	2						1			2	2
CO 3	2	2	1	2				2		1			2	2
CO 4	2	2	2							1		2	3	2
CO 5	2	2	1		2			1		1		1	3	2

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

Content of the syllabus

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”, 10th Edition, Pearson Education, 2022.		
2.	John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier Publishers, 6th 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 – 637 205							
Programme	**B.E /B.Tech.**	Programme Code			Regulation	**2023**		
Department	**CSE, EEE,ECE,IT, CST, AI & DS**				Semester	**III**		
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							
Course Outcome	At the end of the course, the student should be able to,							K 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**
	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	-							

CO /POMapping
(3/2/1indicatesstrengthofcorrelation)3-Strong,2–Medium,1–Weak

COs	ProgrammeOutcomes(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

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
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, 1st Edition ,2016.
3.	R. Venkatesan and S. Lovelyn Rose,"Data Structures **",**2nd Edition, Wiley Publications,2019.
4.	Robert Sedgewick and Kevin Wayne, "Algorithms",4th Edition, Addison-Wesley, 2011.
5.	Peter Brass, "Advanced Data Structures", 1st 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

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam,Tiruchengode– 637205							
Programme	**B.E./ B.Tech.**	Programme code	**104**	Regulation	**2023**			
Department	**Information Technology**			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,							**KL**
	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	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

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”, 3rd 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

	VIVEKANANDHACOLLEGEOF ENGINEERINGFOR 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 student should 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

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

Indirect

1.Course –end survey

Content of the syllabus

Unit –I	**Introduction to Python**		**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 Databases**	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 .csvfile 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", 1st Edition, O'Reilly Publishers, 2019 for Units IV,V

Reference

1.	Martin C Brown, "Python: The Complete Reference", 4th 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/

	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,EEE,ECE, IT ,CST &AI &DS**				Semester	**III**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		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.	
Course Outcome	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**
	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	-	

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**	**PO5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	2	1	1	2			1	1	1	1	1	1	1
CO 2	3	2	1	1	2			1	1	1	1	1	1	1
CO 3	3	2	1	1	2			1	1	1	1	1	1	1
CO 4	3	2	1	1	2			1	1	1	1	1	1	1
CO 5	3	2	1	1	2			1	1	1	1	1	1	1

Course Assessment Methods

Direct
1. Prelab and Post Lab / Viva Questions 2. Record 3. End-Semester Examination
Indirect
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	**CO1**

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.	
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**
7. 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– 637205

Programme	**B.Tech.**	Programme code	**104**	Regulation	**2023**
Department	**Information Technology**			Semester	**III**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCP2	**Personality Development**	1	0	2	1	60	40	100

Course Objective

The student should be made to,

- Equip comprehensive understanding of various psychological and cognitive assessment tools
- Analyze, interpret, and apply these tools to improve personal and professional development
- Enhance communication
- Manage stress effectively

Course Outcome	At the end of the course, the student should be able to,	**Knowledge Level**
	CO1: Enhance Self-Awareness	K2
	CO2: Improve Communication Skills	K1
	CO3: Acquire Better Academic and Life Satisfaction	K2
	CO4: Enhance Problem-Solving Abilities	K3
	CO5: Effective Stress Management	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** 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		2	2	2
CO 2						2			2	2		2	3	3
CO 3						2			1	2		2	3	3
CO 4						2			2	1		2	3	3
CO 5						2			2	1		2	1	2

Course Assessment Methods

Direct

1. Self Assessment
2. Viva-Voce
3. End-Semester Examination

Indirect

1. Course -end survey

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/B.Tech**	Programme Code		Regulation	**2023**		
Department	**CSE/IT/CST/AI & DS**			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**
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 ($\overline{X}$ 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, 7th Edition, Wiley Students Edition, Wiley, 2020.		
2.	Ravichandran, J., Probability and statistics for Engineers, 1st 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.Tech.**	Programme Code	**104**	Regulation	**2023**		
Department	**INFORMATION TECHNOLOGY**			Semester	**IV**		

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT405	**Agile Software Engineering**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to • Learn the fundamental principles and practices associated with each of the agile development methods • Apply the principles and practices of agile software development on a projectof interest and relevance to the student. • Provide a good understanding of software design and a set of softwaretechnologies and APIs. • Understand the process of Kanban, Flow and Policies • Introduce the concepts, Techniques of Agile development and testing	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Apply the requirement engineering tasks, design concepts and analyze the various software development models for a given scenario	K4
	CO2: Outline agile principles and apply Scrum for project development	K2
	CO3: Create model applications using XP, Lean and Kanban practices	K4
	CO4: Outline the Concepts of Kanban, Flow and policies	K2
	CO5: Make use of various software testing techniques to test the software systems	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**	
CO 1	3	2	1										3	2	
CO 2	3	2	1										3	2	
CO 3	3	2	1										3	2	
CO 4	3	2	1										3	2	
CO 5	3	2	1										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	**Process Models, Analysis and Design**	Periods	**9**
Software process structure – Process models: Waterfall model – Incremental process models – Evolutionary process models - Requirements engineering - Requirements analysis - Scenario Based Modeling – Class-Based Modeling – Flow Oriented Models –Behavioral Models- Design Concepts			
Unit – II	**Agile Principles and Scrum**	Periods	**9**
Understanding the Agile Values – Agile Principles – Agile Project - Scrum and Self-Organizing Teams - Basic pattern for a Scrum Project – Rules of Scrum – Self-Organizing Teams - Scrum Values – Daily Scrum – Sprints, Planning and Retrospectives - Scrum Planning and Collective Commitment - User stories – Conditions of Satisfaction – Story Points and Velocity – Burn down Charts – Planning and Running a Sprint – Generally Accepted Scrum Practices – JIRA Tool.			
Unit – III	**XP and Incremental Design, Lean**	Periods	**9**
Primary Practices of XP – An effective mindset starts with the XP values – Understanding the XP principles – Feedback Loops - Lean Thinking – Commitment, Options Thinking and Set Based Development – Create Heroes and Magical Thinking – Eliminate Waste – Value Stream Map – Deliver as Fast As Possible – WIP Area Chart – Pull Systems			
Unit – IV	**Kanban, Flow and Policies**	Periods	**9**
The Principles of Kanban, Experimental Evolution - System, Code, Improving Your Process with Kanban, Visualize the Workflow, Limit Work in Progress, Measure and Manage Flow, Managing Flow with WIP Limits, Make Process Policies Explicit - Emergent Behavior with Kanban.			
Unit – V	**Software Testing Fundamentals**	Periods	**9**
Software testing strategies: Strategic approach – Issues – Test strategies for conventional and Object Oriented software –Validation and System testing – Debugging – Testing conventional applications: White box testing – Basis path testing – Control structure testing – Black box testing – Software configuration management – SCM repository – SCM process.			
		Total Periods	**45**

Text Books:	
1.	Roger S. Pressman & Bruce R. Maxim, "Software Engineering: A Practitioner‘s Approach", 7th Edition, McGraw-Hill Education, 2019.
2.	Andrew Stellman and Jennifer Greene, “Learning Agile: Understanding Scrum, XP, Lean and Kanban”, First Edition, O’Reilly Media Inc, 2015.
REFERENCE BOOKS	
1.	Hazza & Dubinsky, “ Agile Software Engineering, Series: Undergraduate Topics in Computer Science”, Springer, VIII edition, 2009
2.	Dingsoyr, Torgeir, Dyba, Tore, Moe, Nils Brede (Eds.), “Agile Software Development, Current Research and Future Directions”, Springer-Verilag Berlin Heidelberg, 2010
3.	Kevin C. Desouza, “Agile information systems: conceptualization, construction, and management”, Butterworth-Heinemann, 2007.
E-Resources	
1.	https://www.geeksforgeeks.org/software-engineering-agile-software-development/

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Programme	**B.E/B.Tech.**	Programme Code			**104**	Regulation	**2023**	
Department	**INFORMATION TECHNOLOGY**					Semester	**IV**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT407	**Database 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 • Understand a database system using ER diagrams, SQL and to emphasize the importance of normalization • 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 • Familiarize 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: Understand the basic concepts of Database Systems and Applications.	**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- Complex Attributes- Mapping Cardinalities – Reducing E-R Diagrams to Relational Schemas - Extended E–R Features.			
Unit – II	**SQL Fundamentals and Database Design**	Periods	**8**
SQL fundamentals – DML - DDL – DCL – TCL – DQL - Procedures, Functions, Triggers .Functional Dependencies – Atomic Domains – 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 – Log– Based Recovery, Recovery with Concurrent Transactions. Deadlock Handling – Recovery Concepts – Shadow Paging			
Unit – IV	**Implementation Techniques**	Periods	**9**
RAID – Data on External Storage- File Organization – Organization of Records in Files – Data Dictionary Storage – Column Oriented Storage– Indexing and Hashing – Ordered Indices - Cluster Indexes- Primary and Secondary Indexes -Static Hashing – Dynamic Hashing – Query Optimization			
Unit – V	**Advanced Topics**	Periods	**9**
Distributed Databases: Architecture - Data Storage - Transaction Processing- Query processing – Autonomy and Security in Distributed Databases - Current Trends in Distributed Database- Introduction to NoSQL: CAP Theorem – Sharding - MongoDB Implementation			
		Total Periods	**45**

TEXT BOOKS:	
1.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 7th Edition, McGraw Hill, 2021.
2.	M. Tamer Özsu Patrick Valduriez, "Principles of Distributed Database Systems" , 4th Edition, Springer , 2020.
3.	Michael Kaufmann, SQL and NoSQL Databases: Modeling, Languages, Security and Architectures for Big Data Management,2nd Edition ,Springer 2023.
REFERENCE BOOKS:	
1.	C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8 t h 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

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

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	3	3	2									1	2
CO 2	2	2	2	3									2	2
CO 3	2	2	3	2									3	2
CO 4	2	3	2	3									2	3
CO 5	2	3	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	**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‖, 4th 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		

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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
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'alphzbets et accents, les phrases en français, règles pour pronunciation, 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'ecole, Adjectives,Nationalitè , 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 ecourer la langue.

		Total Periods	**30**

Text Books

1.	Babusha Verma, Deepti Walia, "Idées méthod 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

	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
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 Heizen 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: Artickel, Masculine, Feminine & Neuter, Nomen, Kleuren, Zeiten; Jaherzeiten; 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", 2nd 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)

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Programme	**B.E. / B.Tech.**	Programme Code				Regulation		**2023**
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	Nil	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

Cos	Programme Outcomes (POs)												**CO/PSO Mapping** 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

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments /seminar/ Quiz/ Model Lab 3. End-Semester examinations
Indirect
1. Course - End survey

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 MANAGEMENT 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	
	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
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Elayampalayam, Tiruchengode – 637 205

Programme	**B.E./ B.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**Information Technology**		Semester		**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT408	**Database Systems Laboratory**	0	0	2	1	60	40	100

Course Objective	The student should be made to, • Learn and implement commands in knowledge on designing and creating relational database systems. • Learn the usage of nested and joint queries. • Knowledge on integrity constraints, triggers and PL/SQL programs in a database environment. • Understand design and implementation of typical database applications. • Familiar with the use of a front end tool for GUI based applicationdevelopment.

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: Implement PL/SQL programs for processing multiple SQL statements.	K4
	CO4: Create and manipulate data using NoSQL database	K3
	CO5: Design and Implement a Simple Projects using real life database applications	K3

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**	**PO5**	**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		3	2
CO 2	3	3	3	3	3					2	1		2	1
CO 3	3	2	2	3	3					2	1		3	1
CO 4	2	2	2	2	2					2	1		2	1
CO 5	3	3	2	2	3					2	1		2	2

Course Assessment Methods

Direct
1. Prelab and Post Lab / Viva Questions 2. Record 3. End-Semester Examination
Indirect
1. Course - end survey

Suggested List of Experiments	**CO's**

1.	Create a table called Employee & execute the following. Employee EMPNO,ENAME,JOB, MANAGER_NO, SAL, COMMISSION) a.Create a user and grant all permissions to the user. b.Insert any three records in the employee table contains attributes EMPNO,ENAME JOB, MANAGER_NO, SAL, COMMISSION 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**
2.	Consider the schema for Movie Database: ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by 'Hitchcock'. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by 'Steven Spielberg' to 5 Consider the schema for Movie Database: ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by 'Hitchcock'. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by 'Steven Spielberg' to 5 Consider the schema for Movie Database: ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by 'Hitchcock'. 2. Find the movie names where one or more actors acted in two or	**CO1**

	more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by 'Steven Spielberg' to 5 Consider the schema for Movie Database: ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by 'Hitchcock'. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by 'Steven Spielberg' to 5 Consider the schema for Movie Database: ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to a. List the titles of all movies directed by 'Hitchcock'. b. Find the movie names where one or more actors acted in two or more movies. c. List all actors who acted in a movie before 2000 and also in a movie after 2023 (use JOIN operation). d. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. e. Update rating of all movies directed by 'Steven Spielberg' to 5	
3.	Create a Library Management Systems using Database Design with an SQL Queries	**CO2**
4.	Create a database table, add constraints (primary key, unique, check, not null), insert rows, update and delete rows using SQL DDL and DML commands.	**CO2**
5.	Write a PL/SQL program to find the total and average of 6 subjects and display the grade	**CO3**
6.	Execute complex transactions and realize DCL and TCL commands.	**CO3**
7.	Create Document, column and graph based data using NoSQL database tools with CRUD Operations	**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) Personal Information System 3) Web based user Identification Systems 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), functionsfor enabling enterprise grade features. iii) Ability to showcase ACID Properties with sample queries with appropriate settings	**CO5**
	Total Periods	**30**
E-RESOURCES		
1.	https://www.javatpoint.com/	
2.	https://www.geeksforgeeks.org/	

SEMESTER – V

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode– 637205

Programme	**B.E. /B.Tech.**	Programme code	**104**	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**			Semester	**V**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT511	**Automata Theory and Compiler Design**	3	1	0	4	40	60	100

Course Objective

The student should be made to,

- Understand the fundamental concepts of formal languages and regular expressions.
- Identify the need of compiler and stages of compiler.
- Enumerate top down and bottom up parsing techniques used in compilation process.
- Understand Syntax directed translation scheme and different ways of representing Intermediate code.
- Issues in design of Code generation and different code optimization techniques.

Course Outcome

At the end of the course, the student should be able to,	**KL**
CO1: Employ finite state machines and regular expressions for modelling and solving computing problems.	K2
CO2: Classify compilation phases and construction of Derivation trees for the grammar.	K2
CO3: Construct the parsing tables using different types of parsing approaches.	K3
CO4: Apply Syntax directed translation for the given expression and identify different ways of representing Intermediate code.	K4
CO5: Analyze the issues in code generation and applying different code optimization techniques.	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	2										3	2
CO 2	3	2	2										2	2
CO 3	3	2	2										3	2
CO 4	3	2	2										3	1
CO 5	3	2	2										2	1

Course Assessment Methods

Direct

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

Indirect

1.Course – end survey

Content of the syllabus			
Unit –I	**INTRODUCTION TO AUTOMATA THEORY**	Periods	**13**
Introduction to Finite Automata: Central Concepts of Finite Automata – Alphabets, Strings, Languages. Deterministic Finite Automata - Formal Definition, Design of DFA, Nondeterministic Finite Automata - Formal Definition, Design of NFA. **Regular Expressions**: Introduction to Regular Expressions, Algebraic Laws for Regular Expressions, Conversion from NFA with €-transitions to NFA without €-transitions. Conversion from NFA to DFA and Minimization.			
Unit–II	**LEXICAL ANALYSIS**	Periods	**11**
Introduction to Compilers: Language Processing system, Phases of Compiler, Pass and Phases of Translation, Boot Strapping, Input Buffering. **Lexical Analysis:** Role of Lexical analyzer, Recognition of Tokens, Context Free Grammar, Derivations - Leftmost and Rightmost Derivations, Parse Tree, Ambiguity, Elimination of Left Recursion, Elimination of Left Factoring.			
Unit – III	**SYNTAX ANALYSIS**	Periods	**13**
Top Down Parsing: Types of Parsers, Calculation of First and Follow, Construction of LL(1) Parsing table, Recursive Descent Parser. **Bottom up Parsing:** Introduction, Classification of Bottom up parsing- LR Parser, Operator precedence Parser. Shift Reduce parser, Construction of parsing tables- LR(0), SLR(1), CLR(1), LALR(1).			
Unit– IV	**INTERMEDIATE CODE GENERATION**	Periods	**11**
Syntax-Directed Translation: Syntax-Directed Definition, Types of Attributes, Annotated parse tree, Syntax Directed Translation Scheme, SDT for Infix to Postfix. **Intermediate-Code Generation:** Introduction, Types of Intermediate code, Implementation of Three Address Code.			
Unit-V	**CODE OPTIMIZATION & CODE GENERATION**	Periods	**12**
Run-Time Environments: Source Language Issues, Storage Allocation Techniques, Activation Record. **Code Optimization:** Principal sources of Code optimization, Basic Blocks, Optimization of Basic Blocks, Loop optimization, DAG representation of Basic Block. **Code Generation:** Issues in design of Code Generation**,** Object code forms, Peephole Optimization.			
Total Periods			**60**

Text Books	
1.	John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", 3rd Edition, Pearson Education, 2008.
2.	Aho, Lam, Sethi, and Ullman, "Compilers: Principles, Techniques and Tools" Second Edition, Pearson, 2014.
References	
1.	Kamala Krithivasan, Rama R, "Introduction to Formal languages Automata Theory and Computation", Pearson Education, 2009.
2.	V Raghvan, "Principles of Compiler Design", Tata McGraw-Hill, 2017.
E-Resources	
1.	https://archive.nptel.ac.in/courses/106/105/106105190/
2.	https://byjus.com/gate/introduction-to-compiler-design-notes/

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Programme	**B.E. /B.TECH**	ProgrammeCode			Regulation	**2023**	
Department	**CSE & IT**				Semester	**V**	
CourseCode	Course Name	PeriodsPer Week			Credit	MaximumMarks	
		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. • Design applications for NLP that use Artificial Intelligence	
Course Outcome	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 (3/2/1indicatesstrengthofcorrelation)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**	**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. Assignments / Seminar
3. End Semester Examination

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.			
		Total Periods	**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./ 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
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 (3/2/1indicates 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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Programme	**B.E./B.Tech.**	Programme Code				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: • Learn the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and transmission of digital media • Learn data link layer concepts, design issues, and protocols and Local Area Networks • Learn the concepts of switching and ISDN and Acquire knowledge of Application layer, Presentation layer and Session Layer paradigms and protocols.	
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: Describe the functions of data link layer and explain the protocols and Explain the types of transmission media with real time applications	K2
	CO3: Describe the concept of data link control mechanisms and various protocols	K2
	CO4: Describe the concept of switching and its types	K3
	CO5: Explain the functions of Application layer, Presentation layer and session layer paradigms and Protocols	K3

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**
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	**NETWROK 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. Analyze the performance Distance Vector and Link State Routing Algorithm			
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.			
TextBooks			
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	
		3	0	0	3	40	60	100	

Course bjective	The student should be made to, • Understand the Architecture of 8086 Microprocessor. • Learn about general-purpose interfaces. • Understand the basics of 8051applications.	
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**	
	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									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
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Elayampalayam, Tiruchengode – 637 205

Programme	**B. Tech.**	Programme code	**104**	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**			Semester	**V**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT513	**Mini Project - I**	0	0	2	1	100	-	100

Course Objective

The student should be made to,

- Explore their field of knowledge, which includes a critical awareness of current problems and/or new insights at the forefront of that field.
- Understand of techniques applicable to their own area of professional practice.
- Demonstrate originality in the application of knowledge, together with a practical understanding.
- Demonstrate self-direction and originality in tackling and solving problems

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
CO1: Demonstrate a sound technical knowledge of their selected project topic.	K2
CO2:Apply engineering Knowledge, Skills and management principles to achieve project goal.	K3
CO3: Implement hardware and/or software tools with Test Solutions	K3
CO4: Test/verify the modules of implemented mini- project.	K2
CO5: Express the engineering activities with effective presentation, report and Evaluation metrics.	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** 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	3	2	2	3			2	2	2	3	3	3	3
CO 2	1	3	3	3	3	2	2	2	2	2	2	3	3	3
CO 3	1	3	3	2	3			2	2	2	2	3	2	2
CO 4				3	3			2	2	2	3	3	2	2
CO 5				1	3	3	3	2	2		2	3	2	3

Course Assessment Methods

Direct
1. Project Reviews 2. End-Semester Examinations
Indirect
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./B.Tech.**	Programme Code		**104**	Regulation		**2023**	
Department	**INFORMATION TECHNOLOGY**				Semester		**VI**	
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT614	**Internet Programming**	3	0	0	3	40	60	100
Course Objective	The main objective of this course is to: • Understand Web Basics concepts. • Learn Client Side Scripting language. • Know Server Side Scripting language. • Know form validation and usage of XML. • Learn Web service architecture and build network applications.							

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand the basics of Internet programming and develop HTML pages.	K3
	CO2: Understand how Client-Side Scripting is done using AJAX and PHP	K3
	CO3: Develop Simple Server-Side Applications using Servlet and Demonstrate database connectivity.	K3
	CO4: Recognize the need for various web servers and how sessions are managed in it.	K4
	CO5: Understand real world network applications and its functionalities.	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**
CO 1	3	2	1	1	2							2	3	3
CO 2	2	1	1		2							2	2	2
CO 3	3	2	1	1	2							2	3	3
CO 4	3	2	1	1	2							2	3	3
CO 5	3	2	1	1	2							2	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	**WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0**	Periods	**9**

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls – CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.			
Unit - II	**CLIENT SIDE PROGRAMMING**	Periods	**9**
Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions-Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL.			
Unit – III	**SERVER SIDE PROGRAMMING**	Periods	**9**
Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling-Understanding Cookies- Installing and Configuring Apache Tomcat Web Server DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example – JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.			
Unit - IV	**PHP and XML**	Periods	**9**
An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation-Regular Expressions – File handling – Cookies – Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).			
Unit – V	**INTRODUCTION TO AJAX and WEB SERVICES**	Periods	**9**
AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.			
		Total Periods	**45**
Text Books			
3.	Deitel and Deitel and Nieto, ―Internet and World Wide Web – How to Program‖, Prentice Hall, 5th Edition, 2022.		
References			
1.	Stephen Wynkoop and John Burke ―Running a Perfect Website‖, QUE, 2nd Edition,2021.		
2.	Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.		
3.	Jeffrey C and Jackson, ―Web Technologies A Computer Science Perspective‖, Pearson Education, 2011.		
4.	Gopalan N.P. and Akilandeswari J., ―Web Technology‖, Prentice Hall of India, 2011.		
5.	UttamK.Roy, ―Web Technologies‖, Oxford University Press, 2011.		
Tools Required			
2.	Codetandra/HackerRank/ HackerEarth / Any online Problem Solving Platforms		
E-Resources			
1.	https://www.geeksforgeeks.org/		
2.	https://www.programiz.com/internet-programming		
3.	https://www.cprogramming.com/		

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Programme	**B.E. / B.Tech.**	Programme Code	**104**	Regulation	**2023**			
Department	**INFORMATION TECHNOLOGY**			Semester	**VI**			
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT615	**Advanced Java Programming**	3	0	1	4	40	60	100

Course Objective

The Main Objective of the course is to

- Understand Object Oriented Programming concepts and basic characteristics of Java
- know the principles of packages, inheritance and interfaces
- Create Java Threads with Inter Thread Communication
- Analyze the File I/O and String handling concepts in JAVA
- Design and build simple Graphical User Interfaces

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
CO1: Gain knowledge on object oriented programming with java	K2
CO2: Develop the user defined packages , Interfaces and Exception Handling in Java	K3
CO3: Create multithreading and generic programs in java	K3
CO4: Implement the concept of streams ,files and String handling	K4
CO5: Design GUI applications using AWT	K4

Pre-requisites -

CO /POMapping
(3/2/1indicatesstrengthofcorrelation)3-Strong,2–Medium,1–Weak

COs	ProgrammeOutcomes(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
CO 2	3	3	3		3	-	-	-					3	2
CO 3	3	3	3	3	3	-	-	-					3	2
CO 4	3	3	3	3	3	-	-	-		2			3	2
CO 5	3	3	3	3	3	-	-	-					3	2

CO/PSO Mapping

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 OOP AND JAVA FUNDAMENTALS**	Periods	**9**

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File - Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -, Control Flow- Javadoc comments.

Unit - II	**ERRORS , EXCEPTION HANDLING AND INTERFACES**	Periods	**9**
Packages and Interfaces: Packages - Access Protection - Importing Packages- Interfaces Definitions and Implementations - Compile time errors –Run time errors – Exception Handling: Types - Try and Catch - Throw - Finally – User defined exceptions-interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes			
Unit – III	**MULTITHREADING AND GENERIC PROGRAMMING**	Periods	**9**
Java threads – Priorities – Synchronization – Thread class and Runnable interfaces – Creating threads – Multiple threads – Inter thread communication. Generic Programming : Generic classes – generic methods – Bounded Types – Restrictions and Limitations			
Unit - IV	**I/O ,STRING HANDLING**	Periods	**9**
I/O Basics – Streams – Byte streams and Character streams -Reading and Writing Console I/O – Reading and Writing Files. Strings: Basic String class, methods and String Buffer Class.			
Unit – V	**EVENT DRIVEN PROGRAMMING**	Periods	**9**
Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy			
		Total Periods	**45**

Text Books:	
1.	Herbert Schildt., “Java: The Complete Reference”, 13th Edition, McGraw Hill Education, New Delhi, 2024.
REFERENCE BOOKS :	
1.	Dietel and Dietel., “Java How to Program”, 11th Edition, Prentice Hall of India, New Delhi, 2017.
2.	Balagurusamy, E., “Programming with Java – A Primer”, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2023.
E-Resources :	
1.	www.javatpoint.com
2.	https://onlinecourses.nptel.ac.in/noc22_cs47/preview
3.	https://www.programiz.com/java-programming/online-compiler/

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Programme	**B.E. / B.Tech.**	Programme Code			Regulation		**2023**	
Department	**IT , CSE & CST**				Semester		**VI**	
Course Code	**Course Name**	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	ESE	Total	
U19CT616	**Internet of Things**	3	0	0	3	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 (3/2/1indicates 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**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
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

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 thickspeak, 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

	VIVEKANANDHACOLLEGEOF ENGINEERINGFOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205								
Programme	**B.E. /B.Tech.**	Programme code			Regulation	**2023**			
Department	**CSE, IT**				Semester	**VI**			
Course code	Course name	Periods per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
U23IT616	**MACHINE LEARNING ESSENTIALS ***	3	0	2	4	50	50	100	
Course Objective	The student should be made to, • Understand the foundations of various learning algorithm • Understand the context of supervised and unsupervised learning through real-life examples • Identify and apply Machine Learning algorithms to solve real world problems.								
Course Outcome	At the end of the course, the student should be able to,								**KL**
	CO1: Understand the concepts of learning models and how to evaluate the models generated from data set.								K2
	CO2: Synthesize concept of supervised learning classification techniques.								K2
	CO3: Analyze the concepts of Unsupervised learning.								K3
	CO4: Analyze the Performance of Various Machine Learning Algorithms.								K3
	CO5: Evaluate performance metrics of various real time applications.								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	2		2								3	2
CO 2	3	2	2		2								3	2
CO 3	3	2	2		2								3	2
CO 4	3	2	2		2								3	2
CO 5	3	2	2		2							2	3	2

Course Assessment Methods

Direct

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

Indirect

1.Course –end survey

Content of the syllabus			
Unit –I	**INTRODUCTION TO MACHINE LEARNING**	Periods	**9**
Machine learning: What and why? - Examples of Machine Learning Applications - Types Of Machine Learning Supervised Learning - Machine Learning Process- The Curse of Dimensionality, Over fitting - Training, Testing, and Validation Sets-The Confusion Matrix & Basic Statistics-Bias-Variance Tradeoff.			
Unit–II	**REGRESSION AND CLASSIFICATION**	Periods	**9**
Linear and Non-Linear examples – Multi–Class & Multi-Label classification – Linear Regression – Multilinear Regression – Naïve Bayes Classifier – Decision Trees – ID3 – CART – Error bounds-K-NN classifier – Logistic regression – Perceptron's – Single layer & Multi-layer – Support Vector Machines.			
Unit – III	**UNSUPERVISED LEARNING**	Periods	**9**
Clustering basics (Partitioned, Hierarchical and Density based) - K-Means clustering – K-Mode clustering – Self organizing maps – Expectation maximization – Principal Component Analysis-Gaussian Mixture Models, Expectation-Maximization			
Unit– IV	**ENSEMBLE LEARNING & EVALUATION METRICS**	Periods	**9**
Bagging and Boosting (Random forests, Adaboost, XG boost inclusive) ROC Curves, Evaluation Metrics, Significance tests – Error correction in Perceptrons – F1 Score			
Unit-V	**MACHINE LEARNING IN PRACTICE AND APPLICATIONS**	Periods	**9**
Performance Measurement, Azure Machine Learning - Case Study of Applications: Image Recognition – Email spam and Malware Filtering – Online fraud detection- Medical Diagnosis.			
Total Periods			**45**
Suggested List of Experiments			
List of Experiments			**CO's**
1. Study and usage of R tool and Anaconda Jupiter in Python			CO1
2. Implementation of Python Libraries for ML application such as Pandas and Matplotlib. a) Create a Series using pandas and display b) Access the index and the values of our Series c) Compare an array using Numpy with a series using pandas d) Define Series objects with individual indices e) Access single value of a series f) Load datasets in a Data frame variable using pandas g) Usage of different methods in Matplotlib.			CO1
3. Implement a Bayesian classifier for a product sales data			CO2
4. Write a Program to demonstrate Logistic Regression using SCIKIT learn			CO2
5. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.			CO3
6. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.			CO3
7. Study Weka toolkit for demonstration of regression, classification and clustering models and Evaluation Metrics on it.			CO4
8. Implement gradient boosting (regression) and adaboost.M1 (binary classification). Then compare the performances of gradient boosting to other regression methods.			CO4
9. Write a program to recognize handwritten digit using any ML algorithms			CO5
10. Write a program to construct a Bayesian network considering medical data. Use this model to			CO5

	demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Python ML library classes/API.	
Note : Datasets for the above exercises available in Kaggle and UCI repository .		
Lecture 45: Practical 30; Total: 75		
Text Books		
1.	Ethem Alpaydin,"Introduction to Machine Learning‖, MIT Press, Prentice Hall of India, Fourth Edition 2020.	
2.	Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar "Foundations of Machine Learning‖, MIT Press, 2012.	
References		
1.	Charu C. Aggarwal, ―Data Classification Algorithms and Applications‖, CRC Press, 2014.	
2.	Christopher M. Bishop, ―Pattern Recognition and Machine Learning‖, Springer 2011 Edition.	
3.	Stephen Marsland, "Machine Learning: An Algorithmic Perspective", Chapman Hall/CRC Second Edition, 2014, ISBN: 978-1466583283.	
4.	Tom Mitchell, ―Machine Learning‖, McGraw Hill, 3rd Edition,1997.	
E-Resources		
1.	NPTEL - Swayam Course: Introduction to machine learning by Prof. Balaraman Ravindran, IIT Madras - https://onlinecourses.nptel.ac.in/noc20_cs29/preview	
2.	Coursera Courses: Machine Learning with Python by SAEED AGHABOZORGI	

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Programme	**B.E./B.Tech.**	Programme Code		**104**	Regulation	**2023**		
Department	**INFORMATION TECHNOLOGY**				Semester	**VI**		
CourseCode	Course Name	PeriodsPerWeek			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT617	**Internet Programming Laboratory**	0	0	2	1	60	40	100
Course Objective	The Main Objective of the course is to • Develop an ability to design and implement static and dynamic website. • Design interactive web pages using Scripting languages. • Learn server side programming using servlets, PHP and JSP with database connectivity. • Develop web pages using XML/XSLT							
Course Outcome	At the end of the course, the student should be able to,							**KL**
	CO1: Design and implement structured, well-formatted web pages using HTML5 and CSS.							K3
	CO2: Create dynamic features such as form validation, event handling, and interactive UI elements.							K3
	CO3: Develop server-side scripts using languages like PHP.							K4
	CO4: Develop web pages using XML/XSLT.							K4
	CO5: Develop a Web service architecture and build network applications.							K4
Pre-requisites	-							

CO/POMapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2–Medium,1-Weak												**CO/PSO Mapping**	
COS	ProgrammeOutcomes(POs)											PSOs	
	PO 1	**PO 2**	**PO 3**	**PO4**	**PO5**	**PO 6**	**PO7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	3	2	1	1	2			1	1	1	1	1	1	1
CO2	3	2	1	1	2			1	1	1	1	1	1	1
CO3	3	2	1	1	2			1	1	1	1	1	1	1
CO4	3	2	1	1	2			1	1	1	1	1	1	1
CO5	3	2	1	1	2			1	1	1	1	1	1	1

Course Assessment Methods

Direct
1. Prelab and PostLab / Viva Questions 2. Record 3. End-Semester Examination
Indirect
1. Course-end survey

Suggested List of Experiments	CO's
1.Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com the website should consist the following pages. Home page, Registration and user Login, User profile page, Books catalog, Shopping cart, Payment By credit card, order confirmation	**CO1**
2. Create a web page with the following. a. Cascading style sheets. b. Embedded style sheets. c. Inline style sheets. Use our college information for the web pages.	**CO1**
3. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript	**CO2**
. 4. Write programs in Java using Servlets: i. To invoke servlets from HTML forms ii. Session tracking using hidden form fields and Session tracking for a hit count	**CO2**
5. Write programs in Java to create three-tier applications using servlets for conducting online examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.	**CO3**
6. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.	**CO3**
7. Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.	**CO3**
8. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document.	**CO4**
9. i. Validate the form using PHP regular expression. ii. PHP stores a form data into database.	**CO4**
10. Write a web service for finding what people think by asking 500 people's opinion for any consumer product.	**CO5**
Total Periods	**45**

E-Resources:	
1.	https://www.programiz.com/ip-programming
2.	https://www.w3schools.com/html/default.asp
3.	https://www.codecademy.com/
Tools/Software Required:	
1.	Codetandra/HackerRank/HackerEarth/AnyonlineProblemSolvingPlatforms

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Programme	**B.E./ B.Tech.**	Programme Code		Regulation	**2023**		
Department	**IT , CSE & CST**			Semester	**VI**		
Course Code	**Course Name**	Periods Per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
U23CT620	**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	

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Programme	**B. Tech.**	Programme code	**104**	Regulation	**2023**			
Department	**INFORMATION TECHNOLOGY**			Semester	**VI**			
Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT618	**Mini Project - II**	0	0	2	1	100	-	100

Course Objective	The student should be made to, • Explore their field of knowledge, which includes a critical awareness of current problems and/or new insights at the forefront of that field. • Understand of techniques applicable to their own area of professional practice. • Demonstrate originality in the application of knowledge, together with a practical understanding. • Demonstrate self-direction and originality in tackling and solving problems	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Demonstrate a sound technical knowledge of their selected project topic.	K2
	CO2:Apply engineering Knowledge, Skills and management principles to achieve project goal.	K3
	CO3: Implement hardware and/or software tools with Test Solutions	K3
	CO4: Test/verify the modules of implemented mini- project.	K2
	CO5: Express the engineering activities with effective presentation, report and Evaluation metrics.	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**	**PSO 2**
CO 1	2	3	2	2	3			2	2	2	3	3	3	3
CO 2	1	3	3	3	3	2	2	2	2	2	2	3	3	3
CO 3	1	3	3	2	3			2	2	2	2	3	2	2
CO 4				3	3			2	2	2	3	3	2	2
CO 5				1	3	3	3	2	2		2	3	2	3

Course Assessment Methods

Direct
1. Project Reviews 2. End-Semester Examinations
Indirect
1. Course - end survey

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

Programme	**B.E./ B.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**			Semester	**VI**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23IT619	**Comprehensive Examination**	2	0	0	1	100	-	100

Course Objective

The Main Objective of the course is to

- introduce the fundamentals of programming using the C language and develop problem-solving abilities through structured logic and algorithms.
- .understand the architectural organization of computers, including instruction sets, memory hierarchy, and control units.
- equip students with foundational knowledge in databases, including modeling, query languages, and normalization techniques.
- provide an understanding of operating system concepts, such as process management, memory management, file systems, and concurrency. With compiler design analysis
- familiarize students with essential data Communication networks

Course Outcome	At the end of the course, the student should be able to,	K Level
	CO1:Develop and implement C programs for solving real-world computational problems using structured programming techniques.with an data structure algorithms with digital system design	K3
	CO2: Explain the working of computer systems, including CPU operations, memory interactions, and I/O mechanisms.	K3
	CO3: Design and manipulate relational databases, write complex SQL queries, and apply normalization for effective data storage.	K2
	CO4: Demonstrate knowledge of operating system functionalities**,** including process scheduling, deadlock handling, memory allocation, and file management with compiler design analysis	K4
	CO5: Demonstrate knowledge of data communication networks.	K2

Pre-requisites	PPS,DS,COA,DBMS,OS ,TOC / CD and DCA

CO /POMapping
(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	1	-	-	-	-	-	-	-	-	-	3	-
CO 2	3	3	2	-	-	-	-	-	-	1	-	-	2	-
CO 3	3	3	3	-	2	-	-	-	-	-	-	-	3	-
CO 4	2	2	2	-	-	-	-	-	-	1	-	-	2	-
CO 5	3	2	3	-	1	-	-	-	-	1	-	-	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	**Programming for Problem Solving , Data Structures & Digital systems Design**	Periods	**9**

Introduction to Programming Concepts**,** Basics of C Programming**,** Control Structures (Decision Making and Looping)**,** Arrays and Strings**,** Functions**,** Pointers**,** Structures and Unions**, and** Basics of File Handling**.** 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. –Boolean Algebra –Combinational and Sequential circuits – Minimization- Number representations and computer arithmetic (fixed and floating point)

Unit - II	**Computer Organization and Architecture**	Periods	**9**

Basic Structure of Computers, Data Representation and Number Systems, Arithmetic Algorithms and Logic Unit, Instruction Set Architecture and Assembly Language, Processor Organization and Control Unit Design, Memory Hierarchy including Cache and Virtual Memory, and Input-Output Organization and Peripheral Devices

Unit – III	**Database Management 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

Unit - IV	**Operating System and Automata Theory & Compiler Design**	Periods	**9**

Introduction to Operating Systems and their Functions, Process Management and CPU Scheduling, Threads and Concurrency, Memory Management Techniques including Paging and Segmentation, Virtual Memory, File Systems and Storage Management, Input/Output Systems, and Deadlocks – Detection, Prevention, and Avoidance Techniques. **Automata :** Regular expressions and finite automata. Context-free grammars and push-down automata- Regular and context-free languages, pumping lemma. Turing machines and undecidability- Lexical analysis, parsing, syntax-directed translation. Runtime environments- Intermediate code generation. Local optimisation, Data flow analyses: constant propagation, liveness- analysis, common sub expression elimination

Unit – V	**Data Communication Networks**	Periods	**9**

Data Communication : Concept of layering: OSI and TCP/IP Protocol Stacks- Basics of packet, circuit and virtual circuit switching- Data link layer: framing, error detection, Medium Access Control, Ethernet bridging- Routing protocols: 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.	E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education (India) Pvt. Ltd., New Delhi, 9th Edition, 2024
	Seymour Lipschutz, "Data Structures with C", Schaum's Outlines Series, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 1st Edition
	M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog", 6th Edition, Pearson Education, 2021.

2.	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)
3.	Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson Education, New Delhi, 7th Edition, 2016
4.	Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, "Operating System Concepts", Wiley India Pvt. Ltd., New Delhi, 10th Edition, 2025
	John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", 3rd Edition, Pearson Education, 2008.
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
4.	https://www.gatexplore.com/study-material

VERTICAL COURSES

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode– 637205						
Programme	**B.E. /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
U23ITV11	**Data Visualization**	3	0	0	3	40	60	100
Course Objective	The student should be made to, • Understand fundamentals of exploratory data analysis (EDA) • 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.						
Course Outcome	At the end of the course, the student should be able to,						**KL**
	CO1 :						K6
	CO2: Design and create data visualizations.						K5
	CO3: Conduct exploratory data analysis using visualization						K3
	CO4: Craft visual presentations of data for effective communication						K3
	CO5: Use knowledge of perception and cognition to evaluate visualization design alternatives						
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	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

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	**EXPLORATORY DATA ANALYSIS**	Periods	**9**
EDA fundamentals and significance- Classical vs Bayesian analysis -Software tools for EDA-Data transformation: merging, reshaping, pivoting-Grouping datasets, aggregation, pivot tables, cross-tabulations			
Unit-II	**CREATING BASIC DATA VISUALIZATIONS & CREATING MAPS**	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-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**
Definition and scope of Business Intelligence -Power BI Architecture- Installation and setup of Power BI Desktop-Introduction Power BI desktop and Power BI in Excel-Using data from Excel sheets- Data cleaning techniques: handling nulls, duplicates, data types- Real-time data feeds and log file processing			
Unit– V	**CREATING INTERACTIVE DASHBOARDS**	Periods	**9**
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.-Creating a Dashboard - Dashboard Title - Navigation Buttons - Dashboard Actions - Templates for visualizing Cloud data - Social Media Addiction Metrics Dashboard			
		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/		

	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
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	-							

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	-	-	-	-	-	-	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

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	**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
3.	Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar, "Introduction to Data Mining", 2nd Edition, Pearson, 2018, ISBN: 978-9332586445
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/

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(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
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
(3/2/1indicates 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	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	Computer Science and Technology				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	
	PO1	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

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Programme	**B.E./ B.Tech.**	Programme Code			Regulation		**2023**	
Department					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.

Course Outcome

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**
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

COs	Programme Outcomes (POs)												**CO/PSO Mapping** 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	-	-	-	-	-	-	-	-	-	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, Blue 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 ides, 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

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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
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

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	**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 Verdhan,(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		
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 implemention - 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

	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
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	**104**		Regulation		**2023**	
Department	**IT**				Semester		-	
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ITV12	**Data Science**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • establish a strong foundation in the principles and methodologies of data science • cultivate design thinking skills for developing scalable solutions • enhance the ability to design and implement analytical models • provide hands-on experience with programming tools and environments**,** fostering practical proficiency in data science workflows. • Empowering students with tools and techniques used in data science	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Make use of data science principles when developing applications	**K2**
	CO2: Apply machine learning methods to solve problems with large data	**K2**
	CO3: Experiment with Hadoop ,Spark platform and data streams for data science applications	**K2**
	CO4: Apply the data science process to solve real world problem Using NoSQL database and Graph database	**K3**
	CO5: Make use of text analytics and data visualization techniques for building solutions for Text mining and visualization problem.	**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** 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	-	-	-	-	-	-	-	-	-	3	2
CO 2	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 3	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 4	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 5	3	2	1	-	-	-	-	-	-	-	-	-	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	**INTRODUCTION TO DATA SCIENCE**	Periods	**9**
Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – introduction to NoSQL.			
Unit - II	**MODELING METHODS**	Periods	**9**
Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm, Naïve Bayes – Memorization Methods – Linear and logistic regression – unsupervised methods.			
Unit – III	**DATA STORAGE, PROCESSING AND DATA STREAMS**	Periods	**9**
Distributing Data Storage and Processing with Frameworks: Hadoop –Spark–CaseStudy: Assessing Risk with Loaning Money. **Data Streams:** Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream.			
Unit – IV	**DATA AND STORAGE API SERVICE**	Periods	**9**
NoSQL: Introduction: ACID–CAP Theorem–The BASE Principles of NoSQL Databases NoSQL Database Types–Case Study: What disease is that? **Graph Database:** Introducing Connected Data and Graph Databases – Connected Data Example: A recipe recommendation engine –Case Study : Real Time Sentiment Analysis.			
Unit – V	**TEXT MINING AND DATA VISUALIZATION**	Periods	**9**
Test Mining in Real World–Text Mining Techniques: Bag of Words–Stemming and Lemmatization – Decision Tree Classifier – Case Study: Classifying Reddit Posts. Documentation and deployment – producing effective presentations – Introduction to graphical analysis – plot() function – displaying multivariate data – matrix plots – multiple plots in one window - exporting graph using graphics parameters - Case studies.			
		TOTAL Periods	**45**
Text Books			
1.	Davy Cielen, Arno D. B. Meysman, Mohamed Ali,"Introducing Data Science – Big Data, MachineLearning and more, Using PythonTools", Firstedition,Manning Publications,2016		
2.	Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets" , Cambridge University Press,2012.		
References			
1.	"Data Science and Big data Analytics: Discovering, Analyzing, Visualizing and Presenting Data"- http://education.EMC.com/academicalliance. Kindle, EMC Education Services,2015.		
2.	JoelGrus,"Data Science from the Scratch", Second edition, O"Reilly,2019		
E-Resources			
1.	https://www.datacamp.com/		
2.	https://www.udacity.com/		
3.	https://owasp.org/		

VERTICAL - II

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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
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 .

Course Outcome	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**
	CO4: Apply 3D vision techniques for real time applications	**K3**
	CO5: Apply vision techniques to real time applications.	**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	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

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	**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
REFERENCE BOOKS:	
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/

	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	**-**	
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 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

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	**REASONIING 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
CO5: Interpret performance of different pipelined processors and multi core architectures.	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 2nd 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 Java‖, O'Reilly Media, 2015.
2	Nitin Indurkhya 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./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.	
Course Outcome	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
	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
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 InternationalEditions,1995.
2.	David E. Goldberg, "Genetic Algorithms-In Search, optimization and MachineLearning", Pearson Education.
E-Resources	
1.	https://www.sciencedirect.com/science/article/pii/S0898122102002742
2.	http://www.soukalfi.edu.sk/01_NeuroFuzzyApproach.pdf

	VIVEKANANDHACOLLEGEOFENGINEERINGFORWOMEN (AutonomousInstitution,AffiliatedtoAnnaUniversity,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
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: Understandthebasicideasabout 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 (3/2/1indicatesstrengthofcorrelation)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

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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
U23CTV27	**AI for Industrial Applications**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is

- 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 (3/2/1indicatesstrengthofcorrelation)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	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
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				Regulation	**2023**	
Department	**CSE,IT&CST**				Semester		-	
Course Code	**Course Name**	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Tot
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.							
Course Outcome	At the end of the course, the student should be able to,						Knowledge Level	
	CO1: Use machine learning and deep learning algorithms for health data analysis						K2	
	CO2: Apply the data management techniques for healthcare data						K3	
	CO3: Evaluate the need of healthcare data analysis in e-healthcare, telemedicine and other critical care applications						K4	
	CO4: Design health data analytics for real time applications						K5	
	CO5: Design emergency care system using health data analysis						K5	
Pre-requisites	-							

CO /PO Mapping (3/2/1indicatesstrengthofcorrelation)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	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
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

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Programme	**B.E. /B.Tech.**	Programme code	**107**	Regulation	**2023**
Department	**Computer Science and Technology**			Semester	**-**

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTV29	**Design of AI Products**	3	0	2	4	50	50	100

Course Objective

The Main Objective of the course is to

- Understand the fundamental concepts of Design of AI products.
- To implement data handling techniques for AI product development.
- Apply AI modeling and prototyping techniques suitable for real-world applications.
- Demonstrate skills for deploying and maintaining scalable and robust AI systems.
- Analyze ethical, UX, and regulatory aspects in AI productization and monetization.

Course Outcome	At the end of the course, the students will be able to,	**KL**
	CO1: Explore principles related to AI Design and to develop AI products	K2
	CO2: Implement data preprocessing and feature engineering techniques for AI product development.	K3
	CO3: Explore and apply AI techniques (NLP, CV, RL) using modeling and prototyping tools.	K3
	CO4: Develop and deploy scalable AI products using modern tools and frameworks.	K2
	CO5: Apply UX design, ethical principles and regulation in AI Productization	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**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	3	3	3	1	-	-	-	-	-	-	3	3	2
CO 2	3	3	3	3	3	1	1	1	2	-	-	3	3	3
CO 3	3	3	3	3	3	1	-	1	2	-	-	3	3	3
CO 4	3	3	3	3	3	1	-	-	2	-	-	3	3	3
CO 5	3	3	3	3	3	1	-	1	2	-	-	3	3	3

Course Assessment Methods

Direct

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

Indirect

1. Course - end survey

Content of the syllabus

Unit – I	INTRODUCTION TO AI PRODUCT DESIGN	Periods	9
Overview of Artificial Intelligence: History, evolution, and applications, AI Product Lifecycle: From ideation to deployment, Difference between AI system and traditional software systems, AI design thinking and product mindset, Stakeholder analysis: Users, customers, data scientists, developers, Problem formulation: Identifying AI-suitable problems, Case studies: AI products in various domains (e.g., healthcare, fintech, retail)			
Unit - II	**DATA-CENTRIC AI PRODUCT DESIGN**	Periods	**9**
Importance of data in AI products, Data sources: Structured, unstructured, sensor data, APIs, Data collection, cleaning, labeling, and annotation, Ethics in data sourcing and privacy, Feature engineering and data pipelines, Tools: Data versioning (e.g., DVC), labeling tools			
Unit – III	**MODELING AND PROTOTYPING AI SOLUTIONS**	Periods	**9**
Model selection based on problem type (classification, regression, clustering, NLP, CV),Training and validating models (supervised, unsupervised, reinforcement learning), Rapid prototyping using AutoML and pre-trained models (e.g., Hugging Face, OpenAI APIs), Performance metrics and evaluation (accuracy, precision, recall, F1, AUC), Trade-offs: Accuracy vs interpretability, bias vs fairness, Model explainability and interpretability (LIME, SHAP)			
Unit - IV	**DEPLOYMENT AND SCALABILITY OF AI PRODUCTS**	Periods	**9**
AI product deployment lifecycle: MVP to production, Model serving (Flask, FastAPI, TorchServe, TensorFlow Serving), Containerization and orchestration (Docker, Kubernetes), Monitoring and continuous learning, Edge AI and real-time inference, Security and robustness in AI systems			
Unit – V	**PRODUCTIZATION, UX, AND ETHICS IN AI**	Periods	**9**
Designing for AI: UX challenges in AI-driven interfaces, Human-centered AI design principles, Responsible AI: Fairness, transparency, and accountability, AI regulations and compliance (GDPR, AI Act), Monetizing AI products: Business models and go-to-market strategy, future trends in AI product design (generative AI, agents, foundation models)			
		Total Periods	**45**

Text Books

1.	Andriy Burkov, "Machine Learning Engineering", 2020, True Positive Inc.
2.	Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
3.	Ethem Alpaydin, "Introduction to Machine Learning", Prentice Hall of India, 2005.

References

1.	Hastie, Tibshirani, Friedman, "The Elements of Statistical Learning" (2nd ed)., Springer, 2008
2.	Stephen Marsland, "Machine Learning –An Algorithmic Perspective", CRC Press, 2009
3.	Christopher Bishop, "Pattern Recognition and Machine Learning" Springer, 2006

E-Resources

1.	https://nptel.ac.in/courses/106106139
2.	https://www.techtarget.com/searchenterpriseai/definition/machine-learning-ML
3.	https://www.geeksforgeeks.org/machine-learning
4.	Coursera: Machine Learning by Andrew Ng

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Elayampalayam, Tiruchengode – 637 205

Programme	**B.E. / 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
U23ITV29	**DEEP LEARNING**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is

- To acquire knowledge on the basics of neural networks.
- To implement neural networks using computational tools for variety of problems.
- To explore various deep learning algorithms

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
CO1: apply Artificial Neural Network concepts to solve real world problems	K2
CO2: solve simple real world problems using deep neural networks	K3
CO3: demonstrate the concepts of RBF and Boltzman machines to solve real world problems	K3
CO4: explicate the concepts of RNN models and apply it for solving Natural Language problems	K4
CO5: exemplify the concepts of CNN models and apply it for solving computer vision related problems	K4

Pre-requisites -

CO /POMapping
(3/2/1indicatesstrengthofcorrelation)3-Strong,2–Medium,1–Weak

COs	ProgrammeOutcomes(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
CO 2	3	3	3		3	-	-	-					3	2
CO 3	3	3	3	3	3	-	-	-					3	2
CO 4	3	3	3	3	3	-	-	-		2			3	2
CO 5	3	3	3	3	3	-	-	-					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	**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		

VERTICAL - III

	VIVEKANANDHACOLLEGEOF ENGINEERINGFORWOMEN (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		
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	-	

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	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

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**
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 Management‖, 6th edition,2019		
3.	Stuart Mc Clure, Joel Scrambray, George Kurtz, -Hacking Exposed‖, McGraw Hill, 2019		
4.	Matt Bishop,- Computer Security Art and Science‖, Pearson/PHI, 2021		
5.	SanilNadkarniFundamentals of Information Security‖1st 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	**Computer Science and Engineering**			Semester	-			
Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CSV32	**Cyber Security**	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	-	

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	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

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, PRINCIPLESAND 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		

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

Programme	**B.E./B.Tech.**	Programme Code		Regulation	**2023**
Department	**INFORMATION TECHNOLOGY**			Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ITV31	**Web Application Attacks**	3	0	0	3	50	50	100

Course Objective

The student should be made to,

- provide the importance of Web Security
- discuss the fundamentals of web application authentication and session management
- study and practice fundamental techniques in developing secure web based applications
- identify and find the vulnerabilities of web based applications and to protect those applications from attacks
- examine the exploiting and preventing of path traversal vulnerability

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: understand common vulnerabilities plaguing today's web applications	K2
	CO2: understand security-related issues in web based systems and applications..	K2
	CO3: understand the fundamental security mechanisms of a Web-based system	K2
	CO4: Develop and deploy customized exploits that can bypass common defenses	K5
	CO5: evaluate a web based system with respect to its security requirements.	K4

e-requisites -

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

Cos	Programme Outcomes (POs)												**CO/PSO Mapping** 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		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	**WEB APPLICATION TECHNOLOGIES**	Periods	**9**
Introduction – Evolution of web applications – Web application security – Core defense mechanisms – Handling user access – Handling user input – Handling attackers – Managing the application – The OWASP top ten list Web Application Technologies : Web functionality – Encoding schemes – Mapping the Application – Enumerating the content and functionality – Analyzing the application – Bypassing client side controls : Transmitting data via the client – Capturing user data – Handling client side data securely – Input Validation, Blacklist Validation – Whitelist Validation – The Defence-in-Depth Approach – Attack Surface Reduction Rules of Thumb			
Unit – II	**WEB APPLICATION AUTHENTICATION AND SESSION MANAGEMENT**	Periods	**9**
Web Application Authentication : Authentication Fundamentals- Two factor and Three Factor authentication – Password Based, Built in HTTP, single sign-on Custom Authentication- Secured Password based authentication: Attacks against password, Importance of password complexity – Design flaws in authentication mechanisms – Implementation flaws in authentication mechanisms – Securing authentication Session Management: Need – Weaknesses in Session Token Generation – Weaknesses in Session Token Handling – Securing Session Management.			
Unit – III	**WEB SECURITY PRINCIPLES**	Periods	**9**
Web Security Principles: Origin Policy, Exceptions Cross Site Scripting, Cross site Forgery Scripting; File Security Principles: Source code Security, Forceful Browsing, Directory Traversals Classifying and Prioritizing Threats Origin Policy			
Unit – IV	**WEB APPLICATION VULNERABILITY**	Periods	**9**
Web Application Vulnerability: Understanding vulnerabilities in traditional client server application and web applications, client state manipulation, Cookie based attacks, SQL injection, cross domain attack (XSS/XSRF/XSSI) http header injection. SSL vulnerabilities and testing – Proper encryption use in web application – Session vulnerabilities and testing – Cross-site request forgery			
Unit – V	**EXPLOITING SYSTEMS**	Periods	**9**
Exploiting Systems: Path traversal – Finding and exploiting path traversal vulnerability – Preventing path traversal vulnerability – Information disclosure – Exploiting error messages – Securing compiled applications – Buffer overflow vulnerability – Integer vulnerability – Format string vulnerability			
		Total Periods	**45**

Text Books	
1.	B. Sullivan, V. Liu, and M. Howard, Web Application Security, A Beginner's Guide. New York: McGraw-Hill Education, 2011.
2.	D. Stuttard and M. Pinto, The Web Application Hacker's Handbook: Discovering and Exploiting Security Flaws, 2nd ed. Indianapolis, IN: Wiley, John & Sons, 2011.
References	
1.	W. Hanqing and L. Zhao, Web Security: A Whitehat Perspective. United Kingdom: Auerbach Publishers, 2015.
2.	M. Shema and J. B. Alcover, Hacking Web Apps: Detecting and Preventing WebApplication Security Problems. Washington, DC, United States: Syngress Publishing, 2014.
E-Resources	
1.	https://www.w3schools.com/cybersecurity/cybersecurity_web_applications_attacks.php
2.	https://www.codespindle.com/Ethical/web_application_attacks.html

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Programme	**B.E./B.Tech.**	Programme code			Regulation	**2023**		
Department					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 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
(3/2/1indicates 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	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

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, 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 & C2Conline 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		

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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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
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
	CO5: Build an application using Hyperledger	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**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	2	2	1	2	1	1	1	1	1	1	2	2	3
CO 2	3	3	2	2	2	1	1	2	1	1	1	2	3	2
CO 3	3	2	3	2	3	1	1	2	1	1	2	2	3	2
CO 4	3	2	3	2	3	1	1	1	2	2	2	2	3	2
CO 5	3	2	3	2	3	2	1	1	2	2	3	2	3	3

Course Assessment Methods Direct

1. Continuous Assessment TestI, 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/

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Elayampalayam, Tiruchengode– 637205

Programme	**B.E. / B.Tech**	Programme code	**104**	Regulation	**2023**
Department	**IT**			Semester	-

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ITV32	**Biometric System**	3	0	0	3	40	60	100

Course Objective

The student should be made to,
- Understand the basics of Biometrics and its functionalities
- Learn the role of biometric in the organization
- Expose the concept of IRIS and sensors
- Expose the context of Biometric Applications
- Learn to develop applications with biometric security

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand the biometric recognition for the organization.	K2
	CO2: Design of biometric recognition for the organization.	K3
	CO3: Develop simple applications for privacy.	K3
	CO4: Understand the need of behavioural biometric in the society	K4
	CO5: Understand the need of biometric in the society	K3

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**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	2	2	1	2	1	1	1	1	1	1	2	2	3
CO 2	3	3	2	2	2	1	1	2	1	1	1	2	3	2
CO 3	3	2	3	2	3	1	1	2	1	1	2	2	3	2
CO 4	3	2	3	2	3	1	1	1	2	2	2	2	3	2
CO 5	3	2	3	2	3	2	1	1	2	2	3	2	3	3

Course Assessment Methods Direct
1. Continuous Assessment TestI, II&III
2. Assignments / Seminar/Quiz
3. End-Semester examinations

Indirect
1.Course -end survey

Content of the syllabus

Unit -I	**INTRODUCTION**	Periods	**9**

Person Recognition – Biometric systems –Biometric functionalities: verification, identification – Biometric systems errors - The design cycle of biometric systems – Applications of Biometric systems – Security and privacy issues

Unit–II	FINGER PRINT AND FACIAL RECOGNITION	Periods	9
FINGERPRINT : Introduction – Friction ridge pattern- finger print acquisition :sensing techniques ,image quality –Feature Extraction –matching –indexing. FACE RECOGNITION: Introduction –Image acquisition: 2D sensors ,3D sensors- Face detection- Feature extraction -matching.			
Unit – III	**IRIS AND OTHER TRAITS**	Periods	**9**
Design of an IRIS recognition system-IRIS segmentation- normalization – encoding and matching- IRIS quality –performance evaluation –other traits- ear detection –ear recognition –gait feature extraction and matching – challenges- hand geometry –soft biometrics.			
Unit– IV	**BEHAVIORAL BIOMETRICS**	Periods	**9**
Introduction –Features- classification of behavioral biometrics –properties of behavioral biometrics – signature –keystroke dynamics –voice- merits –demerits –applications- error sources-types –open issues –future trends.			
Unit-V	**APPLICATIONS AND TRENDS**	Periods	**9**
Application areas: surveillance applications- personal applications –design and deployment -user system interaction-operational processes – architecture –application development –design validation disaster recovery plan-maintenance-privacy concerns.			
		Total Periods	**45**

References

1.	James wayman,Anil k.Jain ,Arun A.Ross ,Karthik Nandakumar, ―Introduction to Biometrics‖, Springer, 2011
2.	John Vacca "Biometrics Technologies and Verification Systems" Elsevier 2007
3.	James Wayman,Anil Jain,David MAltoni,DasioMaio(Eds) "Biometrics Systems Technology",Design and Performance Evalution.Springer 2005
4.	Khalid saeed with Marcin Adamski, Tapalina Bhattasali, Mohammed K. Nammous, Piotr panasiuk, mariusz Rybnik and soharab H.Sgaikh, ―New Directions in Behavioral Biometrics‖, CRC Press 2017

E-Resources

1.	Biometrics Lecture Notes: Overview, Types, & Applications - Studocu

	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		
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
	C02: 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

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	**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 Guide‖, 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		

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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
U23CSV38	**Security and Privacy in Cloud**	3	0	0	3	40	60	100

Course Objective	The student should be made, • 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	
Course Outcome	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
	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	

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	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 Cloud‖,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	**104**	Regulation	**2023**		
Department	**IT**			Semester			
Course Code	Course name	Periods per week			Credit	Maximum Marks	
U23ITV33	**Cyber Forensics and Incident Response**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Course Objective	The student should be made , • To define an incident relating to Cyber Security. • To recognize an Incident • To analyze protocols on Crime Scene Investigations. • To understand Computer Crime Scenarios.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Acquire and analyze digital evidence from compromised systems	KL2
	CO2: Identify the workflows of Incident	KL3
	CO3: Classify the incidences and recovery of system	KL3
	CO4: Apply forensic tools to investigate incidents	KL3
	CO5: Analyze the behavior of system in various malware attacks	KL3
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	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	**INCIDENT RESPONSE DEFINITIONS**	Periods	**9**
Definitions of incident response and forensic analysis, relation of incident response to the rest of cyber security operations, incident response phases - preparation, identification, containment, eradication, recovery, follow-up, indicators of compromise (IOC)			
Unit-II	**INCIDENT WORKFLOWS**	Periods	**9**
Incident workflows, guidelines, incident handling forms, principles of malware analysis, log analysis, threat intelligence, vulnerability management, penetration testing, digital forensics, incident ticketing systems, incident documentation templates. Identification: Detection, incident triage, information gathering and reporting, incident classification, indicators of compromise (IOC)s.			
Unit – III	**INCIDENT RESPONSE AND HANDLING PROCESS**	Periods	**9**
Incident Response and Handling Process, Identification, Incident Recording, Initial Response, Communicating the Incident, Containment, formulating a Response Strategy, Incident Classification, Incident Investigation, Data Collection, Forensic Analysis, Evidence Protection, Notify External Agencies, Eradication, System Recovery, Incident Documentation, Incident Damage and Cause assessment, Review and Update the Response Policies			
Unit– IV	**TECHNICAL FORENSICS TOOLS AND TECHNIQUES**	Periods	**9**
Hard disks, removable media and file systems, Windows forensics, duplication/imaging of forensic data, recovering deleted files and hidden or deleted partitions, steganography and image forensics, log analysis, password crackers, network device forensics, packet capture analysis, email tracking, mobile forensics, investigation of attacks, common tools (Encase, FTK, etc.)			
Unit– V	**APPLICATIONS AND CASE STUDY**	Periods	**9**
Real-world incident response scenarios-Investigating insider threats-Responding to ransomware attacks-Forensic analysis of phishing campaigns-Handling cloud-based incidents-Securing and analyzing compromised endpoints Case study : Government website defacement and data breach, Malware outbreak in a financial institution, Cloud storage misconfiguration and data leak.			
		Total Periods	**45**
References			
1.	Jason T. Luttgens and Matthew Pepe," Incident Response & Computer Forensics, O'reilly, Third Edition" 2014		
2.	Eighton Johnson," Computer Incident Response and Forensics Team Management: Conducting a Successful Incident Response", 2014.		
3.	John Sammons," The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics", Elsevier, August 2011.		
4.	Cory Altheide and Harlan Carvey," Digital Forensics with Open-Source Tools", Imprint Press, 2011.		
5.	David Lilburn Watson and Andrew Jones," Digital Forensics Processing and Procedures",2012.		
E-Resources			
1.	Incident Response in Digital Forensics | A Begineers-Friendly Guide - Web Asha Technologies		

VERTICAL -IV

	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
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							

	At the end of the course, the students should be able to,	Knowledge level
Course Outcome	**CO1:**Understand the design challenges in cloud	K1
	CO2:Apply the concept of virtualization and its types	K2
	CO3: Be familiar with virtualization of hardware resources and Docker	K3
	CO4: Analyze security challenges in the cloud environment	K4
	CO5: Identify the core issues of cloud computing	K4
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	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

Course Assessment Methods

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

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**

TEXT BOOKS:	
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.
REFERENCE BOOKS	
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

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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
U23ITV42	**Distributed Systems**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is 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

COs	Programme Outcomes (POs)												**CO/PSO Mapping** 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 Phase Locking – 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 – Transaction with Replicated Data – Architectures 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

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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
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 pplication requirement and the Sensing methods	K2
	CO2: Analyze the Memory and I/O Management and handling of nterrupts.	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 Distributed Embedded System	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** 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	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. Assignments / Seminar/Quiz
3. End-Semester examination

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 mechanism – 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-Resources:

1.	https://www.digimat.in/nptel/courses/video/108102045/L01.html

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
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.

Course Outcome	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
	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 -

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	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	2

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		

	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
U23ITV45	**Parallel Programming**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to • Understand the architecture and evolution of Graphics Processing Units (GPUs) and General-Purpose GPU (GPGPU) computing. • Develop efficient GPU kernels and understand thread hierarchies and launch configurations. • Implement synchronization techniques and concurrent data structures. • Apply streams and asynchronous processing for performance gain • Work on real-world case studies in image processing, graph algorithms, simulations, and deep learning.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Analyze and improve memory usage and performance across different memory types	K3
	CO2: Implement parallel algorithms like prefix sum and reduction efficiently	K3
	CO3: Debug and profile GPU programs using tools such as Nsight Systems and Visual Profiler	K3
	CO4: Manage asynchronous tasks and data transfers using CUDA streams and events	K3
	CO5: Apply GPU programming techniques to real-world applications in image processing, simulations, and deep learning	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	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	**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			**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
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

Pre-requisites: Operating system concepts, Data structures and algorithms, Basics of communication, Microprocessor fundamentals.

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	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-Resources	
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			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
	CO5: Design and model infrastructures.							
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	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

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, Fog IoT 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 IoT Based System with Fog Computing, Fog Computing Services in Smart E-Health Gateways, Discussion of Connected Components. Fog			
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.	Flavio Bonomi, Rodolfo Milito, Jiang Zhu, Sateesh Addepalli, ―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		

	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
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.							
Course Outcome	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
	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 (3/2/1 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	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
CO 5	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 WorkMail			
		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

	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
U23ITV49	**Industry 4.0**	3	0	0	3	40	60	100

Course Objective	**The Main Objective of the course is** • To understand the fundamental concepts and evolution of Industry 4.0 and its enabling technologies. • To explore the role of smart manufacturing, IoT, and cyber-physical systems in modern industries. • To analyze the application of big data, artificial intelligence, and machine learning in industrial processes. • To gain insights into automation, robotics, and human-machine interaction for smart factories. • To evaluate the future trends, challenges, and societal impacts of Industry 4.0 technologies.	
Course Outcome	At the end of the course, the student should be able to,	K Level
	CO1: Recall and understand the key principles and technologies of Industry 4.0, including IoT, IIoT, and cyber-physical systems	K1
	CO2: Apply IoT, IIoT, and digital twin technologies to design and implement smart manufacturing systems	K2
	CO3: Analyze and apply big data and AI techniques for predictive maintenance, process optimization, and quality control in industrial settings	K3
	CO4: Integrate automation, robotics, and advanced technologies into industrial operations, ensuring safety, efficiency, and productivity	K3
	CO5: Evaluate the impact of Industry 4.0 technologies on sustainability, workforce transformation, and future innovations in various sectors	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**
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	**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

VERTICAL - V

	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
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	

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

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 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

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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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	Tot
U23ITV52	**Image Processing**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- Learn concepts of degradation function and restoration techniques.
- To study the image compression and segmentation techniques.
- To become familiar with image representation and description.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.	K1
	CO2: Operate on images using the techniques of smoothing, sharpening and enhancement.	K2
	CO3: Understand the restoration concepts and filtering techniques.	K2
	CO4: Learn the basics of segmentation, features extraction, compression and recognition methods for color models.	K2
	CO5: Comprehend image compression concepts.	K3

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 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	3	3	2	2	2	-	-	-	-	3	3	2
CO 2	3	3	3	2	2	2	-	-	-	-	2	3	2
CO 3	3	3	3	2	2	2	-	-	-	-	2	2	1
CO 4	3	3	3	2	2	2	-	-	-	-	2	2	1
CO 5	3	3	3	2	2	2	-	-	-	-	2	2	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	**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	
Course Outcome	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
	CO3: Author 2D and 3D creative and interactive presentations for different target multimedia applications.	K3
	CO4: Use different standard animation techniques for 2D, 21/2 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
(3/2/1indicates strength of correlation)3-Strong,2–Medium,1–Weak

COs	Programme Outcomes(POs)												**CO/PSO Mapping** 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 AUTHORING**	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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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
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	-	

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**	**PSO1**	**PSO2**
CO 1	2	3	2	-	1	2	-	-	1	2	2	1
CO 2	2	1	-	3	1	1	-	-	1	1	2	-
CO 3	2	2	1	2	-	1	-	2	-	1	1	2
CO 4	1	-	2	-	2	3	-	-	1	-	-	1
CO 5	3	2	1	2	-	1	-	-	1	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 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.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
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 (3/2/1indicatesstrengthofcorrelation)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	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-Keyword 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 (3/2/1indicatesstrengthofcorrelation)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**	**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", 1st 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 Immersive Technology" -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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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
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
	CO5: Recognize new developments in compression and how they are used today.	K3
Pre- requisites	Computer Organization, Probability and Statistics	

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	3	2	1									2	2
CO 2	3	3	2	1									2	2
CO 3	3	3	3	2	1								3	3
CO 4	3	3	3	2	1								3	3
CO 5	3	3	3	2	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	**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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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
U23ITV59	**Visual Effects**	3	0	0	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.

Course Outcome

At the end of the course, the student should be able to,	Knowledge level
CO1: To implement animation in 2D / 3D following the principles and techniques.	K1
CO2: To use CGI, color and light elements in VFX applications.	K2
CO3: To create special effects using any of the state of the art tools.	K3
CO4: To apply popular visual effects techniques using advanced tools.	K4
CO5: To use compositing tools for creating VFX for a variety of applications.	K4

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	3	3	3	3	1	-	-	-	1	2	1	1	3	3
CO 2	1	3	3	2	1	-	-	-	3	2	2	2	1	1
CO 3	2	3	3	2	1	-	-	-	1	2	1	2	2	2
CO 4	3	3	2	2	3	-	-	-	3	3	2	2	2	3
CO 5	1	2	1	1	2	-	-	-	1	3	2	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	**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, 1st Edition, 2022.
2.	Steve Wright, Digital Compositing for film and video, Routledge, 4th Edition, 2017.
3.	John Gress, Digital Visual Effects and Compositing**,** New Riders Press, 1st 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, 1st 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/

VERTICAL – VI

	VIVEKANANDHACOLLEGEOF ENGINEERINGFORWOMEN (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	
U23CSV61	**Robotic Process Automation**	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	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO 1: Understand what RPA is and how it differs from other automation types	K1
	CO 2: List the benefits of RPA and name popular RPA platforms	K1
	CO 3: Understand how to store and handle data persistently using CSV and Excel files	K2
	CO 4: Model the workflow of different scrapping methodologies.	K3
	CO 5: Understand how to handle exceptions in a program and Learn to troubleshoot errors and find solutions effectively	K3
Pre- requisites	Basic Programming Concepts	

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	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

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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
U23CSV62	**Quantum Computing**	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	-	

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	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

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 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

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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
U23CSV63	**Cognitive Science**	3	0	0	3	40	60	100
Course Objective	The student should be made , • 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
(3/2/1indicates 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**	**PO1**	**PO 1**	**PO12**	**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/.		

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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
	CO5: Explain various method for designing and modeling for industrial applications.	K3

Pre-requisites: Basic concepts and understanding of 3D printing.

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	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. ContinuousAssessmentTestI, II&III
2. Assignments / Seminar/Quiz
3. End-Semesterexaminations

Indirect

1.Course -end survey

Conten tof 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.3dprinteros.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

	VIVEKANANDHACOLLEGEOFENGINEERINGFORWOMEN (AutonomousInstitutionAffiliatedtoAnnaUniversity,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
U23CSV65	**Generative AI**	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

Course Outcome	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
	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 (3/2/1indicatesstrengthofcorrelation)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**
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,2023,1st 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.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
U23ITV61	**Prompt Engineering**	2	0	2	3	40	60	100

Course Objective	The Main Objective of the course is to • Fundamental concepts of Large Language Models (LLMs), their architectures, and the importance of prompt engineering in leveraging their capabilities. • Understand the principles of effective prompt design, focusing on clarity, specificity, context, and constraints. • Explore advanced prompting strategies including few-shot prompting, Chain-of-Thought reasoning, and adversarial prompt handling. • create prompts tailored to specific tasks such as summarization, classification, sentiment analysis, and creative generation. • Deploying prompt-based systems in production environments with a focus on scalability, cost, and ethical considerations.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Describe the structure and functionality of LLMs (GPT, PaLM, LLaMA) and demonstrate basic prompt crafting	K2
	CO2: Design, test, and refine basic prompts using zero-shot, one-shot, and instruction-based techniques.	K3
	CO3: Implement and evaluate advanced prompting methods such as CoT, Tree-of-Thought, and self-consistency	K3
	CO4: Design and apply prompts for diverse tasks including knowledge extraction, data augmentation, and creative writing.	K3
	CO5: configure prompt parameters (temperature, tokens, rate limits), deploy LLMs responsibly, and address ethical concerns like bias and misuse.	K4
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** 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	2		2					1			3	2
CO 2	3	2	2		2					1			3	2
CO 3	3	2	2		2					1			3	2
CO 4	3	2	2		2					1			3	2
CO 5	3	2	2		2					1			3	2

Course Assessment Methods

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

Content of the syllabus			
Unit – I	**Foundations of Prompt Engineering**	**Periods**	**9**
Overview of Large Language Models (LLMs): GPT, ChatGPT, PaLM, LLaMA - prompt engineering and why it matters- Real-world applications and platforms (OpenAI API, Hugging Face, LangChain) - Hands-on: crafting basic prompts and using APIs			
Unit - II	**Basic Prompt Design**	**Periods**	**9**
Principles: clarity, specificity, context, constraints - Prompt types: zero-shot, one-shot, instruction-based - Iterative prompt refinement & debugging - Hands-on exercises: designing, testing, and refining prompts			
Unit – III	**Prompting**	**Periods**	**9**
Few-shot prompting & Chain-of-Thought (CoT) prompting - Tree-of-Thought, Self-Consistency, Step-back prompting - Prompt injection & adversarial prompting strategies- Human-in-the-loop refinement and auto-prompt generation			
Unit - IV	**Task-Specific Prompting**	**Periods**	**9**
Prompts for summarization, classification, sentiment analysis - Creative generation: stories, scripts, poetry, email expansion - Knowledge extraction & data augmentation			
Unit – V	**Prompt Engineering in Production & Ethics**	**Periods**	**9**
- Working with APIs: temperature, tokens, stop sequences, rate limits - Deployment considerations: scaling, latency, cost - Ethical AI, bias mitigation, responsible prompting, and limitations - Current trends: art/design generation, LLM-based agents, prompt agents			
		Total Periods	**45**

Text Books:	
1.	James Phoenix , Mike Taylor, "Prompt Engineering for Generative AI: Future-Proof Inputs for Reliable AI Outputs", O`reilly Publishers, 2024.
2.	John Berryman & Albert Ziegler, "Prompt Engineering for LLMs: The Art and Science of Building Large Language Model–Based Applications", O`reilly Publishers, 2024.
REFERENCE BOOKS	
1.	Chip Huyen , *"AI Engineering: Building Applications with Foundation Models",* O`reilly Publishers, 2024.
2.	Areej Elsayary, "Prompt Engineering and Generative AI Applications for Teaching and Learning", IGI Global Publishers, 2025
E-Resources	
1.	https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/
2.	https://cloud.google.com/discover/what-is-prompt-engineering

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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
U23CSV67	**MERN Stack Development**	3	0	0	3	40	60	100

Course Objective

The student should be made ,

- 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 authenticaton.	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

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**	**PO5**	**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

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	**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)		
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)		
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		

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Elayampalayam, Tiruchengode– 637205

Programme	**B.E./ B.Tech.**	Programmecode	**104**	Regulation	**2023**
Department	**IT**			Semester	**-**

Coursecode	Coursename	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ITV52	**UI / UX Design**	2	0	2	3	40	60	100

Course Objective

The student should be made to,

- Understand the scope, relevance, and impact of user interface and user experience in digital product development.
- Explain the importance of UX research in the design process.
- Develop comprehensive information architecture including site maps, user flows, and task flows
- Navigate and utilize Figma for wireframing and prototyping at various fidelities.

Course Outcome	At the end of the course, the students will be able to,	**KL**
	CO1: Compare UI and UX design, and explain their individual and combined importance in product development.	K2
	CO2: Use Figma as a professional design tool to create low-fidelity to high-fidelity wireframes, prototypes, and design systems.	K2
	CO3: Define clear problem statements based on user data and research insights, and translate them into actionable design strategies.	K3
	CO4: Apply the Design Thinking process to solve real-world design problems and create user-centric solutions.	K4
	CO5: Develop a professional portfolio showcasing UI/UX projects.	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	2	3				1			2	3	3	
CO 2	3	2	2	2	3				1			2	3	3	
CO 3	3	2	2	2	3				1			2	3	3	
CO 4	3	2	2	2	3				1			2	3	3	
CO 5	3	2	2	2	3				1			2	3	3	

Course Assessment Methods

Direct

1. Continuous Assessments I,II,III
2. Assignments / Charts / Quiz
3. End-Semester examination

Indirect

1.Course -end survey

Content of the syllabus			
Unit -I	**Fundamentals of UI/UX Design & UX Research**	Periods	**08**
What is UI Design?-What is UX Design?-Scope and Importance of User Interface/ User Experience design-Design Thinking Process-Portfolio Overview-Introduction to Figma-What is UX Research and Why is it Important?-Qualitative and Quantitative Research-Cognitive Biases in Design			
Unit–II	**Define Problem statement & Design Strategy & Information Architecture**	Periods	**08**
Data Analysis and Looking for Consistency-Defining Problem –Statements-Creating User Personas-Empathy Mapping and User Journey Mapping-Competitive Analysis-Affinity Mapping-Card sorting, Information Architecture-User flows, Task flows, Site map.-UX Laws & Principles: Holocaust: Gestalt UX Laws Heuristic Evaluation			
Unit – III	**Design tools: An Overview with a Focus on Figma Wireframing & Prototyping**	Periods	**10**
Overview of the tools used in the industry standard-Figma Interface Overview-Project Setup and Basic Design Elements-Sharing and Exporting Designs-Prototyping in Figma-Paper Prototyping-Low Fidelity, Mid Fidelity-Moodboard, Style Guide-High Fidelity wireframes -Interactive Prototypes using Figma			
Unit– IV	**Principles of visual design & UI elements Micro-Interactions, & Responsive Design**	Periods	**12**
Design Systems in Figma-Accessibility in UI Design-Typography, Iconography, and Visual Language-Layouts, Grids, and UI Components-Designing Responsive Layouts-Breakpoints and Layout Adjustments-Fluid grids and flexible layouts -Micro-Interactions in UI/UX-Creating Micro-Interaction Prototypes in Figma			
Unit-V	**Usability Testing & Final Handoff Final Project and Portfolio Building**	Periods	**07**
Usability Testing Techniques (A/B Testing and Guerrilla Testing)-Interpretation of Usability Testing Responses-Design Handoff to Developers (Figma Files)- Building interactive prototypes-Conducting usability tests and iterating designs-Creating style guides for consistency-Designing a full design project-Portfolio Best Practices-Presenting Projects on both Dribbble and Behance.			
		Total Periods	**45**

Text Books	
1.	"The Design of Everyday Things" by Don Norman A must-read for understanding human-centered design and usability.
2.	"Information Architecture for the Web and Beyond" by Peter Morville & Louis Rosenfeld Best for understanding content structure, IA, and navigation
3.	"Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days" by Jake Knapp For quick prototyping and testing with design sprints.
4.	"Refactoring UI" by Adam Wathan& Steve Schoger Visual design tips, UI component structure, and practical design thinking.

E-Resources	
1.	https://www.guvi.in/courses-video/?course=nodejsvvkuniv
2.	https://dribbble.com
3.	https://maze.co/roles/product-designers
4.	https://www.optimalworkshop.com/
5.	https://www.lookback.com/usability-testing-with-lookback

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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 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

Signature of the BoS Chairman

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 ELECTIVES

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

Programme	**B.E/B.Tech.**	Programme Code	**104**	Regulation	**2023**
Department	**IT**			Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ITOE1	**IT Essentials**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is

- To understand computer system basics, including components, networking, and server types.
- To learn HTML5, CSS3 fundamentals, and styling techniques for web design.
- To learn JavaScript fundamentals, including variables, functions, objects, and event handling techniques.
- To learn ReactJS fundamentals, including components, state management, routing, and error handling.
- To explore cellular network generations, information systems, privacy, and social networking applications.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: understand the basic concepts of hardware, data communications and networking.	K1
	CO2: create dynamic website/web-based applications using HTML5, and CSS3.	K2
	CO3: understand the syntax, semantics, and dialects of the JavaScript programming language.	K2
	CO4: get familiar with the use of functional components, state components, lifecycle, and routing in ReactJS.	K3
	CO5: identify the fundamental concepts of mobile communications and key issues in the design of commonly used applications.	K4

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	2	2	2	2	2	-	-	-	-	-	2	2	3	3
CO 2	3	3	2	2	3	-	-	-	-	-	-	2	3	3
CO 3	3	3	3	2	3	-	-	-	-	-	-	2	3	2
CO 4	3	2	3	2	3	-	-	-	2	-	2	2	3	2
CO 5	2	2	2	2	3	-	-	-	-	-	2	2	2	2

Course Assessment Methods

Direct
4. Continuous Assessment Test I, II & III 5. Assignment 6. End-Semester examinations
Indirect
2. Course - end survey

Signature of the BoS Chairman

Content of the syllabus

Unit – I	**Hardware and Network Essentials**	Periods	**9**
Basics of Computer System - Motherboard – Processors – Memory & Storage - Computer Ports - Memory hierarchy - I/O devices – Servers – Types of Servers – Web Server – Database Server – Communication Medium – Fundamentals of Computer Networking – Types of Computer Networks – Network Topologies – Network Standards: OSI Model, TCP/IP Model – Network Components.			
Unit – II	**Web And Scripting Essentials**	Periods	**9**
Internet Basics – Browser Fundamentals – Introduction to HTML5 – HTML5 Tags – HTML5 Forms – HTML Graphics - HTML Media - Cascading Style Sheets (CSS3) Fundamentals - CSS Properties - CSS Styling (Background, Text Format, Controlling Fonts) - Working with Lists and Tables - CSS ID and Class – Box Model – Positioning.			
Unit – III	**Javascript**	Periods	**9**
Introduction to JavaScript – Variables – Datatypes – Type Conversions - Comparisons - Assignments - Conditional Branching – Loops – Arrays - Functions – Built-in functions and methods – Function Expressions – Arrow Function Objects – Promises - async/await - Modules – Error Handling – DOM tree – Bubbling and capturing - Event delegation - Capturing - Bubbling - Events.			
Unit – IV	**Front – End Essentials**	Periods	**9**
ReactJS Introduction - React JSX - Understanding Components and Props – Props – React State – Component Lifecycle - React Hooks - Event Delegation - React Forms - React CSS - React Router - Handling errors in React applications.			
Unit – V	**Mobile and Application Essentials**	Periods	**9**
Generations of Cellular Networks – GSM - Introduction to Information Systems – Personal Information System – Ethics and Privacy – Information Retrieval System – Relevance feedback – Information retrieval system evaluation - Social Networking Applications.			
		Total Periods	**45**

Text Books:	
1.	James Kurose and Keith Ross, “Computer Networking: A Top-Down Approach”, Eighth Edition, 2021.
2.	Niederst Robbins, Jennifer, “Learning Web Design: A Beginner’s Guide to HTML, CSS, JavaScript, and Web Graphics”, Fifth Edition, O’Reilly Media, 2018.
3.	Greg Lim, Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js App, 2021.
4.	Jochen Schiller, “Mobile Communications”, Pearson Education, Second Edition, 2012.
5.	R. Kelly Rainer, Casey G. Cegielski, Brad Prince, “Introduction to Information Systems”, Fifth Edition, Wiley Publication, 2014.
REFERENCE BOOKS	
1.	Nabendu Biswas, MERN Projects for Beginners: Create Five Social Web Apps Using MongoDB, Express.js, React, and Node, Apress, 2021.
2.	Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, A Press Publisher, 2019.
E-Resources	
1.	https://www.geeksforgeeks.org/

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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
U23ITOE2	**Machine Learning**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is

- To understand the need for machine learning for various types of problem solving.
- To know the mathematics involved in various machine learning algorithms.
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning.
- To learn about probabilistic models in machine learning.
- To learn about Neural Networks and Deep Learning.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Explain the basic concepts of machine learning.	K1
	CO2: Analyze linear and non-linear techniques for classification problems.	K2
	CO3: Apply unsupervised and reinforcement algorithms.	K3
	CO4: Analyze probabilistic and evolutionary approaches for the given problems.	K4
	CO5: Analyze importance of neural networks and deep learning.	K4

Pre-requisites -

CO /PO Mapping
(3/2/1indicates strength of correlation)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**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO 1	3	1	2	1	1	2	-	-	1	2		1	2	1
CO 2	3	3	2	3	2	1	-	-	1	1		1	2	1
CO 3	2	2	3	3	1	2	-	2	-	1		1	2	2
CO 4	1	2	1	-	2	3	-	-	1	-		1	2	1
CO 5	2	3	2	1	3	1	-	-	1	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 Machine Learning**	Periods	**9**

Machine Learning–Types of Machine Learning : Supervised Learning, Unsupervised Learning – Machine Learning process- Testing machine learning algorithms - Parametric Vs non-parametric models - Mathematical Basics for Machine Learning : Probability and Statistics for Machine Learning

Unit - II	SUPERVISED LEARNING METHODS	Periods	9
Regression: Introduction - Linear Regression - Least Squares - Under fitting and Overfitting – Cross Validation - Lasso Regression - Logistic Regression; Classification: Linear and Non-linear models - - Support Vector Machines - Kernel Methods; K-Nearest Neighbors.			

Unit – III	UNSUPERVISEDAND REINFORCEMENT LEARNING	Periods	9
Clustering- K-means – Mixtures of Gaussians – Vector Quantization –Dimensionality Reduction, Linear Discriminant Analysis, Principal Components Analysis, Independent Components Analysis - Reinforcement Learning : Q learning, Deterministic and Nondeterministic Rewards and Actions Temporal Difference Learning - Markov Decision Process.			
Unit - IV	**PROBABILISTIC GRAPHICAL MODELS AND EVOLUTIONARY LEARNING**	Periods	**9**
Graphical Models – Undirected Graphical Models : Markov Random Fields – Directed Graphical Models : Bayesian Networks – Conditional Independence properties – Markov Random Fields, Hidden Markov Models – Conditional Random Fields(CRFs) .			
Unit – V	**NEURAL NETWORKS AND DEEP LEARNING**	Periods	**9**
Neural Networks: The Brain and the Neuron - Perceptron learning algorithm; Multi-Layer Perceptron: Back propagation algorithm -Deep Learning: Introduction - Convolution Neural Networks - Recurrent Neural Networks – Stochastic Neurons : the Boltzmann Machine – Deep Belief Networks.			
		Total Periods	**45**

Text Books:	
1.	Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Chapman and Hall, CRC Press, Second Edition, 2014.
2.	Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Third Edition, 2014
3.	Tom M Mitchell, "Machine Learning", McGraw Hill Education, 2013.
REFERENCE BOOKS	
1.	Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", First Edition, Cambridge University Press, 2012.
2.	Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", First Edition, Wiley, 2014.
3.	Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
E-Resources	
1.	https://www.geeksforgeeks.org/machine-learning/
2.	https://www.javatpoint.com/machine-learning

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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
U23ITOE3	**Data Science and Analytics**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Building the fundamentals of data science. • Imparting design thinking capability to build big-data • learn about Clustering technologies • Examine the Algorithms for Massive Data Problems. • Empowering students with tools and techniques used in data science	
Course Outcome	At the end of the course, the student should be able to,	**Knowledge Level**
	CO1: Make use of data science principles when developing applications	K2
	CO2: Apply machine learning methods to solve problems with large data	K2
	CO3: Experiment with Clustering technologies for data science applications	K2
	CO4: Apply the data science process to solve real world problem using Streaming, Sketching, and Sampling	K3
	CO5: Make use of text analytics techniques for building solutions for text mining problem	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 PSOs**	
CO1	**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**
CO2	3	2	1										3	2
CO3	3	2	1										3	2
CO4	3	2	1										3	2
CO5	3	2	1										3	2
COs	3	2	1										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	**Introduction to data science**	**Periods**	**9**
Benefits of Data Science – Facets of Data – Data Science Process –Big Data Ecosystem and Data Science–Example using Hadoop. The Data Science Process: Overview – Defining Research Goals – Retrieving Data – Data Preparation – Exploratory Data Analysis – Building Models – Building Applications.			
Unit – II	**Machine learning and handling big data**	**Periods**	**9**
Applications for Machine Learning in Data Science – Machine Learning in Data Science Process – The Modeling Process. Handling Large Data: Problems in Handling Large Data – General Techniques – Programming Tips – Case Studies.			
Unit – III	**Clustering**	**Periods**	**9**
Introduction-k-Means Clustering-Finding Low-Error Clusterings-Spectral Clustering-Approximation Stability-High-Density Clusters-Kernel Methods-Recursive Clustering based on Sparse Cuts.			
Unit – IV	**Algorithms for Massive Data Problems: Streaming, Sketching, and Sampling**	**Periods**	**9**
Frequency Moments of Data Streams: Number of Distinct Elements in a Data Stream-Number of Occurrences of a Given Element-Frequent Elements-The Second Moment.**Matrix Algorithms using Sampling**:Matrix Multiplication using Sampling-Implementing Length Squared Sampling in Two Passes-Sketch of a Large Matrix			
Unit – V	**Text Mining and Text Analytics**	**Periods**	**9**
Test Mining in Real World – Text Mining Techniques: Bag of Words – Stemming and Lemmatization – Decision Tree Classifier –Case Study: Classifying Reddit Posts.			
		Total Periods	**45**

Text Book:	
1.	"Foundations of Data Science". Avrim Blum, John Hopcroft, and Ravindran Kannan, 2018
2.	Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science – Big Data, Machine Learning and more, Using Python Tools", First edition, Manning Publications, 2016.
References:	
1.	"Data Science and Big data Analytics: Discovering, Analyzing, Visualizing and Presenting Data"- http://education.EMC.com/academicalliance. Kindle,EMC Education Services,2015.
2.	Joel Grus, "Data Science from the Scratch", Second edition, O"Reilly,2019
E-Resources:	
1.	https://www.datacamp.com/
2.	https://www.udacity.com/
3.	https://nathancarter.github.io/MA346-course-notes/_build/html/chapter-1-intro-to-data- science.html
4.	https://owasp.org/

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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
U23ITOE4	**Cyber Threat Intelligence**	3	0	0	3	40	60	100

Course Objective

The Main Objective of the course is to

- Provides the skills in cyber security in view of cyber Threats Intelligence.
- Understand the threat environment.
- Learn about Collecting and generating Intelligence
- Provide techniques for handling cybercrime, organizational implications .

Course Outcome	At the end of the course,the students should be able to,	Knowledge level
	CO1:Understand the Cyber threat Intelligence	K1
	CO2:Understand the threat Environment how it facing vulnerabilities.	K1
	CO3: Explain the Security intelligence program.	K2
	CO4: Describe about collecting and generating intelligence	K3
	CO5: Identify the cyber threats and applications	K4

Pre- requisites Network protocols and architecture

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	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	1	-	2	1	-	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	**Introduction To Cyber Threat Intelligence**	Periods	**9**

Introduction-Intelligence-Cyber threat- Cyber Threat Intelligence-Threat Intelligence Life cycle-History of threat Intelligence-Developing Cyber threat Intelligence-Threat Environment- Threat Classification - Risk and Vulnerability
- Human Vulnerabilities .

Unit -II	**Threat Environment**	Periods	**9**

Threat Environment- Threat Classification - Risk and Vulnerability - Human Vulnerabilities - Configuration Vulnerabilities- Software Vulnerabilities- Threat Actors- TTPs – Tactics, Techniques, and Procedures- Threat Landscape- Attack Vectors, Vulnerabilities, and Exploits- The Kill Chain- Thinking Like a Threat Actor.

Unit – III	**Applying Intelligence**	Periods	**9**
The Intelligence Programme- The Intelligence Cycle- The Intelligence Cycle- Situational Awareness- Goal Oriented Security and Threat Modelling- Strategic, Operational, and Tactical Intelligence- Example – Lazarus Group- Sources of Intelligence - Example – Shamoon.			
Unit -IV	**Collecting and Generating Intelligence**	Periods	**9**
Hierarchy of Evidence - Example – Smoking Tobacco Risk - Understanding Intelligence- Third Party Intelligence Reports- Generating Intelligence-F3EAD Cycle- D3A Process- Transforming Data into Intelligence- Sharing Intelligence- Measuring the Effectiveness of Generated Intelligence.			
Unit – V	**Applications and future Threats**	Periods	**9**
Emerging Technologies-Example – Maroochy Shire Incident-Health Care-Emerging Attacks-Threat Actor Evolutions -Criminal Threat Actors - Nation State Threat Actors-Emerging Workforc.			
		Total Periods	**45**
TextBooks:			
1.	Martin Lee ,Oxford UK, Cyber Threat Intelligence, John Wiley & Sons, Inc., Hoboken, 2023 Canada.		
REFERENCEBOOKS			
1.	Christopher Ahlberg, The Threat Intelligence Handbook, Second Edition Published by: Cyber Edge Group, LLC,2019		
E-Resources			
1.	https://www.slideshare.net/slideshow/threats-intelligence-and-analysis-pptx/267460963		

	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
U23ITOE5	**Offensive Security Essentials**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • understand the basics of computer based vulnerabilities. • explore different foot printing, reconnaissance and scanning methods. • expose the enumeration and vulnerability analysis methods. • understand hacking options available in Web and wireless applications. • explore the options for network protection. • practice tools to perform ethical hacking to expose the vulnerabilities.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: To express knowledge on basics of computer based vulnerabilities	K2
	CO2: To gain understanding on different foot printing, reconnaissance and scanning methods.	K3
	CO3: To demonstrate the enumeration and vulnerability analysis methods	K3
	CO4: To gain knowledge on hacking options available in Web and wireless applications.	K2
	CO5: To acquire knowledge on the options for network protection.	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** 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	1	1					3		2		3	2
CO 2	3	2	1	1	1				2				3	2
CO 3	2	2	1	1		2						2	3	2
CO 4	3	2	1	1	3				2			2	3	2
CO 5	3	2	1	1					1	1		2	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	**Basics of Ethical Hacking**	Periods	**9**
Ethical Hacking Overview - Role of Security and Penetration Testers .- Penetration-Testing Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing .- Network and Computer Attacks - Malware - Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security			
Unit - II	**Information Gathering, Target Enumeration and Port Scanning Techniques**	Periods	**9**
Active , Passive and Sources of information gathering - Copying Websites Locally –Traceroute – NeoTrace - Cheops-ng -Intercepting a Response –WhatWeb –Netcraft - Basic Parameters -Xcode Exploit Scanner - Interacting with DNS Servers –Nslookup – DIG - Fierce, Zone Transfer with Host Command and Automation - DNS Cache Snooping-Attack Scenario -Automating Attacks - SNMP –Problem - Sniffing Passwords - SolarWinds Toolset -Sweep, Brute Force and Dictionary – Tools -Attack – Enumeration - Intelligence Gathering Using Shodan - Target enumeration and Port Scanning Techniques.			
Unit – III	**Wireless & Web Hacking**	Periods	**9**
Wireless Hacking - Requirements -Aircracking- Hidden SSIDs - Monitor Mode - Monitoring Tool- Beacon Frames on Wireshark,Airodump-ng- Wireless Adapter in Monitor Mode - Determining the Target - Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng- Capturing Packets and Four-Way Handshake. Web Hacking:Attacking the Authentication - Brute Force and Dictionary Attacks - Types of Authentication - Crawling Restricted Links - Testing for the Vulnerability - Authentication Bypass with Insecure Cookie Handling - SQL injection - XSS –DOM based XSS,BeEF – CSRF - Bypassing CSRF and BeEF with XSS.			
Unit – IV	**System Hacking**	Periods	**9**
Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – Wardriving- Wireless Hacking - Tools of the Trade .			
Unit – V	**Network Protection Systems**	Periods	**9**
Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems - NetworkBased and Host-Based IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honeypots.			
		Total Periods	**45**

Textbooks:	
1.	Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
2.	Rafay Baloch, "Ethical Hacking and Penetration Testing Guide", 1stEdition, CRC Press, 2015
References:	
1.	The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, Dafydd Stuttard and Marcus Pinto, 2011.
2.	Black Hat Python: Python Programming for Hackers and Pentesters, Justin Seitz , 2014
E-Resources:	
1.	http://www.informatica64.com/foca.aspx.
2.	http://www.tenable.com/products/nessus.
3.	http://www.wireshark.org.

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Programme	**B.Tech..**	Programme Code			Regulation	**2023**		
Department	**INFORMATION TECHNOLOGY**				Semester			
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ITOE6	**Object Oriented Programming**	2	0	2	3	40	60	100

Course Objective	The main objective of this course is to: • understand Object Oriented Programming concepts and basic characteristics of Java • know the principles of packages, inheritance and interfaces • define exceptions and use I/O streams • develop a java application with threads • design and build simple Graphical User Interfaces	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Describe the basic concepts of OOP and fundamentals in Java.	K3
	CO2: Implement the principles of packages, inheritance and interfaces	K4
	CO3: Develop Java applications using exception handling techniques and I/O operations	K4
	CO4: Write Java applications using multithreading, collections and generics concepts.	K4
	CO5: Design interactive GUI based applications using the concepts of event handling and JavaFX component.	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**
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

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 OOP AND JAVA FUNDAMENTALS**	Periods	**9**

Object Oriented Programming concepts – Characteristics of Java –Java Source File – Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – Access specifiers – Comments, Data Types, Variables, Operators, Control Flow, Methods, Static members – Arrays–Strings– JavaDoc comments.

Unit - II	**INHERITANCE AND INTERFACES**	Periods	**9**

Constructors in java – Packages – Inheritance – Super classes– Sub classes –Protected members– Constructors in sub classes– the Object class – Abstract classes and methods– Final methods and classes – Interfaces – Defining an interface, Implementing interface, Differences between classes and interfaces and extending interfaces

Unit – III	**EXCEPTION HANDLING AND I/O**	Periods	**9**

Exceptions – Exception hierarchy – Throwing and catching exceptions – Built–in exceptions,Creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files.

Unit - IV	**COLLECTIONS, MULTITHREADING AND GENERICS**	Periods	**9**

The Collections Framework: Collections Overview – The Collection Interface: The List Interface– The Set Interface– The Collection Classes: The ArrayList Class – The LinkedList Class –Accessing a Collection via an Iterator – The For–Each Alternative to Iterators. Multithreading:Differences between multi–threading and multitasking, Thread life cycle, Creating threads,Synchronizing threads, Inter–thread communication, Daemon threads, Thread groups. Generic Programming: Generic classes – Generic Methods.

Unit – V	**JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS**	Periods	**9**

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls– ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane.Menus – Basics – Menu – Menu bars – MenuItem

Total Periods	**45**

Text Books

1. Herbert Schildt, ―Java The Complete Reference, Tenth Edition, McGraw Hill Education,2019
2. Herbert Schildt, ―Introducing JavaFX 8 Programming, First Edition, McGraw Hill Education, New Delhi, 2015

References

1. Cay S. Horstmann, Gary Cornell, ―Core Java Volume –I Fundamentals, Ninth Edition, Prentice Hall, 2013.
2. Paul Deitel, Harvey Deitel, ―Java SE 8 for programmers, Third Edition, Pearson, 2015.
3. Steven Holzner, ―Java 2 Black book, Dreamtech press, 2011.
4. Timothy Budd, ―Understanding Object–oriented programming with Java, Updated Edition,Pearson Education, 2000.
5. E Balagurusamy, ―Programming with Java, McGraw Hill Education, 2019.

E-Resources

1. https://www.geeksforgeeks.org
2. https://www.programiz.com
3. https://www.cprogramming.com/

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	**IT**			Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23ITOE7	**Creative UI / UX Design**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to • To survey the Content information based on people needs • To train the students to acquire knowledge in UI & UX design • To acquire knowledge in components of UI & UX design • To survey the various UI systems • To understand the user experience design techniques	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Understand the user needs and requirements to build an effective User Interface.	K1
	CO2: Implement UI design principles in the creation of a User Interface.	K3
	CO3: Design and implement perfect layouts for UI design to develop real world UX product.	K3
	CO4: Analyze various types of User Interface systems.	K4
	CO5: Create User Interfaces by applying Design Principles and evaluate the UI design.	K4
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	1	3	3	3	2	-	-	-	-	-	1	2	3	2
CO 2	1	3	3	3	2	-	-	-	-	-	1	2	3	2
CO 3	1	3	3	3	2	-	-	-	-	1	1	2	3	2
CO 4	1	3	3	3	2	-	-	1	-	1	1	2	3	2
CO 5	1	3	3	3	2	-	-	1	2	2	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	**Introduction**	Periods	**9**

Design Thinking – Divergent- Convergent-Lateral -Context- Know your Audience – Research: Ways to Understand Context and Goals- direct Observation-Surveys-Personas-The Patterns: Cognition and Behaviour Related to Interface Design-Self Exploration-Gratification-Organizing the Content: Information Architecture and Application Structure-Meet the Goals of People and the Organization.

Unit – II	**Design Fundamentals**	Periods	**9**
Understanding the Information and Task Space–Navigation Models: Hub and spoke-fully connected- multilevel-pyramid-flat navigation-Patterns-clear Entry Points-Menu pages- - Signposts-Way finding- Layout of screen Elements- Visual Style and Aesthetics-Visual Design for Enterprise Applications-Laws governing UI.			
Unit – III	**Display and Elements**	Periods	**9**
Types of Display – Actions and Commands – Pinch-Buttons-Drop-Down Menus-Action-Hover-Keyboard action-Direct Manipulation-Showing Complex Data – Forms and Controls – Labels - Menus - Tabs - Buttons - Accordion - Carousel - Breadcrumbs — pagination-Scrollers-Two Panel Selection-Text input fields- Builder and Editors-UX writing Tools.			
Unit – IV	**UI Systems**	Periods	**9**
UI Frameworks – Smart Systems- Connected Devices – Anticipatory Systems-Assistive Systems-Natural User Interfaces- Challenges and Opportunities of Model Design-Screen Design - Text Display – Representing Physical Environment – Location – Social Influence – Various Design Pattern-Desktop Applications-Mobile Interfaces.			
Unit – V	**UX Design**	Periods	**9**
User Research-Interviews-Persons--Content Strategy-Transition-Design Principles-Site Maps and Task Flows-Sketching-Wireframes and Annotations-Prototyping-Design Testing With Users-Transition- Measuring UX Content Effectiveness-Analytics.			
		Total Periods	**45**

Text Books:	
1.	Uijun Park , "Introduction to Design Thinking For UX Beginners" ,Wiley 2023
2.	Joel Marsh, " UX for Beginners", O'Reilly,2022
3.	Jenifer Tidwill , Charles Brewer and Aynne Valencia , "Designing Interfaces: Patterns for Effective Interaction Design " Third Edition, O'Reilly Publications,2020
4.	Jeff Johnson , "Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules" Third Editions, Elsevier publication, 2020.
REFERENCE BOOKS	
1.	Jon Yabionski, " Laws of UX using Psychology to design Better Products & services" O'Reilly, 2021
2.	Torrey Podmajersky, "Strategic Writing for UX", O'Reilly Medis, inc, 2019
3.	Ben shneiderman, Catherine Plaisant, Marine Cohen and Steven M.Jacobs, "Designing the User Interface-Strategies for Effective Human Computer Interaction", Fifth Edition, Pearson, 2012
4.	Russ Unger and Carolyn Chandler, "A Project Guide to UX Design: For User Experience Designers in the Field or in the Making",Second Edition, New Riders Publishers,2012
E-Resources	
1.	https://www.geeksforgeeks.org/

CAREER TRACK COURSES

	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	**Information Technology**			Semester	**IV**			
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

COs	Programme Outcomes (POs)												**CO/PSO Mapping** 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, 6th Edition
References	
1.	Donald F Kuratko, "Entrepreneurship – Theory, Process and Practice", Cengage Learning, 2016. 10th 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/

	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	**BT,CSE,ECE,EEE,IT,CST,BME, AI&ML, Agri, AI&DS &CIVIL**			Semester	**5**		

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCE2	**Product Innovation, Commercialization, and Finance**	3	0	0	3	40	60	100

Course Objective	The student should be made , • To understand the principles of product innovation and its significance in entrepreneurship. • To understand the processes involved in scaling and commercializing innovative products. • To learn how to assess financial needs, management and secure funding for entrepreneurial ventures. • To learn how to maintain financial records and interpret financial statements. • To learn effective purchase management techniques to control costs and optimize resources.	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Students will be able to explain the significance of product innovation in entrepreneurship.	K2
	CO2: Students will be able to describe the process of commercializing a new product and create a basic commercialization plan.	K2
	CO3: Students will be able to apply financial assessment methods to determine the funding needs of a venture.	K3
	CO4: Students will be able to interpret basic financial statements and accounting records.	K2
	CO5: Students will be able to prepare a budget for an entrepreneurial venture and manage purchases effectively.	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** 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	3	2	3		3	1	1	2	3	2		
CO 2	3	3	2	1	3		2	1	1	2	3	2		
CO 3	3	3	1	1	2		1	1	1	2	3	2		
CO 4	3	3		1	3		1	1	1	2	3	2		
CO 5	3	3		1	3		1	1	3	2	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	**Product Innovation**	Periods	**6**
Introduction to Product Innovation - Ideation and Concept Development - Market Research and Validation - Product Design and Prototyping - Innovation Management - Case Studies in Product Innovation			
Unit – II	**Commercialization Strategies**	Periods	**6**
Introduction to Commercialization- Go-to-Market Strategies - Sales and Promotion Strategies - Marketing and Branding - Pricing Strategies - Commercialization Case Studies			
Unit – III	**Entrepreneurial Finance**	Periods	**6**
Introduction to Entrepreneurial Finance - Funding Sources for Startups- Financial Planning and Budgeting - Financial Statements and Analysis- Valuation of Startups- Exit Strategies			
Unit – IV	**Accounting for Entrepreneurs**	Periods	**6**
Introduction to Accounting Principles – Book keeping and Record Keeping - Cost Management and Analysis - Taxation and Compliance - Financial Reporting- Auditing and Controls			
Unit - V	**Budget and Purchase Management**	Periods	**6**
Introduction to Budgeting-Characteristics of Sound Budget- Fixed Budget-Production Budget-Sales Budget-Flexible-Zero base budget Budgeting and budgetary control- ROI Purchase Management: Role of Purchase department- Vendor Selection-Purchase-Document related to purchase-Invoice Generation-material Inward and outward			
		Total Periods	**30**

Text Books	
1.	Thomas N. Duening , Robert A. Hisrich , Michael A. Lechter "Technology entrepreneurship : Taking Innovation to the Marketplace" 3rd edition
2.	Blank, S., & Dorf, B. (2012). The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company
References	
1.	James. C., Vanhorn, "Fundamentals of Financial Management" PHI, 2012
2.	R. Kesavan , C. Elanchezhian ,T. Sunder Selwyn "Engineering Economics and Financial Accounting" Laxmi Publications; First Edition (1 January 2016)
3.	Maheshwari SN "Management Accounting and Financial Control" Sultan Chand & Sons 2015
4.	Barringer, B. R., & Ireland, R. D. (2015). Entrepreneurship: Successfully Launching New Ventures.
E-Resources	
1.	https://asana.com/resources/product-development-process
2.	https://www.xcubelabs.com/blog/the-ultimate-guide-to-product-development-from-idea-to-market
3.	https://mark-bridges.medium.com/50-case-studies-exploring-pricing-strategy-across-various-products-and-industries-2254a7b30c80
4	https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBAA3011.pdf
5	https://ncert.nic.in/textbook/pdf/keac101.pdf
6	https://icmai.in/upload/Students/Syllabus2016/Inter/Paper-10-April-2021.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	**BT,CSE,ECE,EEE,IT,CST,BME, AI&ML, Agri, AI&DS &CIVIL**				Semester	**6**		
Course Code	**Course Name**	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCE3	**Intellectual Property Rights**	1	0	0	1	40	60	100

Course Objective	The student should be made to, • Know about Intellectual property rights and classification. • Understand about Patents, Registration & Procedure and other information • Learn about Copyrights, Registration & Procedure and other information • Understand about Trademark, Registration & Procedure and other information • Know about other forms of IP, Registration & Procedure and other information	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Explain the different types of intellectual property rights and their classifications.	K2
	CO2: Demonstrate the knowledge of types of inventions that can be patented and the rights conferred by a patent.	K2
	CO3: Explain the concept of copyright and its importance in protecting creative works.	K2
	CO4: Demonstrate knowledge of the process for registering a trademark and the legal enforcement of trademark rights	K3
	CO5: Identify and explain other forms of intellectual property, such as trade secrets, industrial designs, and geographical indications.	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** 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	1	1		2		
CO 2	1			3	2			2	1	1		2		
CO 3	1			3	2			2	1	1		2		
CO 4	1			3	2			2	1	1		2		
CO 5	1			3	2			2	1	1		2		

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Seminar/Quiz

Indirect

1. Course - end survey

Content of the syllabus			
Unit - I	**Introduction**	Periods	**6**
Introduction and need for Intellectual Property Rights- Types of Intellectual Property Rights - Patent, Copyright, Trademark, Design, Geographical Indication- Trade secret.-TRIPS and other treaties.			
Unit – II	**Patents**	Periods	**6**
Patents-Elements of patentability: Novelty, Non Obviousness (Inventive Steps), Industrial Application – Non-Patentable Subject Matter- Registration Procedure, Rights and Duties of Patentee, Assignment and license, Restoration of lapsed Patents, Surrender and Revocation of Patents.			
Unit – III	**Copyright**	Periods	**6**
Nature of Copyright – Subject matter of Copyright: original literary, dramatic, musical, artistic works; Cinematograph films and sound recordings – Registration Procedure, Term of protection, Ownership of copyright, Assignment and license of copyright.			
Unit – IV	**Trademark**	Periods	**6**
Concept of trademarks – Different kinds of trademarks (Brand names, Logos, Signatures, Symbols, Well known marks, certification marks and service marks) – Non Registrable Trademarks – Registration of Trademarks – Rights of holder and assignment and license of marks.			
Unit - V	**Other forms of IP**	Periods	**6**
Design: Meaning and Concept of Novel and Original Design - Procedure for Registration- Effect of Registration and term of Protection **Geographical Indication(GI):** Meaning and Difference between GI and trademarks- Procedure for Registration- Effect of Registration and term of Protection- overview of IP laws in India-WIPO			
		Total Periods	**30**

Text Books	
1.	K. V. Nithyananda" Intellectual Property Rights: Protection and Management" Cengage Learning India -2019 ISBN: 9789386668578
2.	Neeraj Pandey, Khushdeep Dharni "Intellectual Property Rights" PHI Learning Pvt. Ltd., 2014
References	
1.	Deborah E Bouchoux "Intellectual Property : The Law of Trademarks, Copyrights, Patents and Trade Secrets" Cengage Learning India
2.	Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013
3.	Prabuddha Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, McGraw Hill Education, 2011
4.	Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: LexisNexis.
E-Resources	
1	https://www.nitap.ac.in/storage/pdf/f63d0ea9127821f83a5a4ad9f1531be8-10-04-11of%20IPR.pdf
2	https://www.copyright.gov.in/Documents/Copyrightrules1957.pdf
3	https://www.bdu.ac.in/cells/assets/docs/ipr/course/resources/IPR-Course-Chapter2.pdf
4	https://thelegalschool.in/blog/types-of-trademark
5	https://dst.gov.in/sites/default/files/E-BOOK%20IPR.pdf

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution Affiliated to Anna University, Chennai)
Elayampalayam,Tiruchengode– 637205

Programme	**B.Tech.**	Programme code	**104**	Regulation	**2023**
Department	**Information Technology**			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

COs	Programme Outcomes (POs)												**CO/PSO Mapping** 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

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	**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”, 3rd 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

	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	**V**			
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCG1	**History&Culture of India and Indian Geography**	2	0	0	1	**40**	**60**	**100**

Course Objective	The main objective of the course is to * To gain insight into the chronological development of Indian civilization from ancient to modern times. *To appreciate the diverse cultural heritage of India, including art, architecture, literature, and music. *To study the socio-economic structures and changes over different periods. *To explore the evolution of political systems and administrative structures in India. *To understand the major religious movements and philosophies that originated in India.	
Course Outcomes	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Gain an in-depth understanding of the Indus Valley Civilization, including its social, economic, and political structures.	K2
	CO2: Appreciate the cultural and technological advancements during the Indus Valley Civilization and the Gupta period.	K2
	CO3: Analyze archaeological evidence and historical records to understand the significance of these civilizations.	K4
	CO4: Understand the reasons for the decline of these civilizations and their influence on later periods.	K2
	CO5: Discuss the impact of infrastructure development on regional growth and planning.	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** 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	2			1			3	2	1
CO 2	3	2				1	2			2			3	1	1
CO 3	3	3		2		2	2			1			3	3	2
CO 4	3	2		1		2	2					2	3	2	2
CO 5	3	2	3	1		2	2				2		2	2	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	**HISTORY AND CULTURE OF INDIA-1**	**Periods**	**6**
Indus Valley Civilization, Guptas			
Unit –II	**HISTORY AND CULTURE OF INDIA-2**	**Periods**	**6**
Delhi Sultans, Mughals and Marathas, South Indian History			
Unit –III	**INDIAN GEOGRAPHY-1**	**Periods**	**6**
Physical Features- Monsoon, rainfall, weather and climate. Water resources rivers			
Unit –IV	**INDIAN GEOGRAPHY-2**	**Periods**	**6**
Soil, Minerals and Natural resources. Forest and Wildlife. Agriculture pattern			
Unit –V	**INDIAN GEOGRAPHY-3**	**Periods**	**6**
Transport. Communication. Population density and distribution in Tamil Nadu and India			
		Total Periods	**30**

Text Books	
1.	G. Venkatesan, Cultural History of India, Varthamanan Pathipagam, 2018 (in Tamil)
2.	K.L. Khurana, History of India: Earliest times to 1526 A.D., Lakshmi Narain Agarwal, Agra
3.	L.P. Sharma, History of Ancient India, Konark Pub. Pvt. Ltd., New Delhi, 2008
4.	R.N Dubey and B.S Negi- Economic and Commercial Geography of India. 13th edition, Kitab Mahal published in 1970
5.	T.C Sharma and O.Coutinho-Economic and commercial Geography of India Paper, published by Sangam Books Ltd in 1997.

References	
1.	R.C. Majumdar, et. al., An Advanced History of India, MacMillan, Delhi, 1974
2.	R.S. Sharma, India's Ancient Past, Oxford University Press, New Delhi, 2017.
3.	L.P. Sharma, History of Medieval India, 1000-1740 A.D., Konark Pub. Pvt. Ltd., New Delhi,1997
4.	Satish Chandra, History of Medieval India, Orient Blackswan, New Delhi, 2017
5.	Gopal Singh – Geography of India is published by Atma Ram & Sons,1979.

E-Resources	
1.	https://www.britannica.com/topic/Gupta-dynasty
2.	https://www.britannica.com/place/Delhi-sultanate
3.	https://www.britannica.com/topic/Maratha-people
4.	https://cwc.gov.in/
5.	https://www.egyankosh.ac.in/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**B.E.**	Programme Code		Regulation	**2023**		
Department	**Common to All**			Semester	**VI**		

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCG2	**Indian economy and Freedom struggle in India & Tamilnadu.**	2	0	0	1	**40**	**60**	**100**

Course Objective	The main objective of the course is to * Understand the structure and characteristics of the Indian economy. * Identify and categorize the various sources of revenue for the Indian government. * Analyze the challenges and opportunities in the distribution of financial resources. *Explore the concept of National Renaissance in the context of Indian history. *Evaluate the impact of regional movements on the national freedom struggle.	
Course Outcomes	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand the processes involved in the formulation and implementation of economic policies in India	K2
	CO2: Assess the role of the Finance Commission in fiscal federalism and resource distribution.	K4
	CO3: Evaluate the mechanisms for resolving fiscal disputes between Union and State governments.	K3
	CO4: Understand the concept of National Renaissance and its significance in Indian history.	K3
	CO5: Identify key leaders and events from Tamil Nadu that played a significant role in the independence movement.	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**	**PSO 1**	**PSO 2**	**PSO 3**
CO 1	1	3	1	1		2	1			1	2	1	2	1	2
CO 2	1	3	1	1		2	1			1	2	1	2	1	2
CO 3	1	3	1	1		2	1			1	2	1	2	1	2
CO 4		1	1	1		3	1			1		1	1		1
CO 5		1	1	1		3	1			1		1	1		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	**INDIAN ECONOMY-1**	**Periods**	**6**
The nature of Indian Economy-Five-year plan models – an assessment-Planning Commission-Niti Ayog			
Unit –II	**INDIAN ECONOMY-2**	**Periods**	**6**
Sources of revenue – Reserve Bank of India-Finance Commission			
Unit –III	**INDIAN ECONOMY-3**	**Periods**	**6**
Resource sharing between Union and State Governments-Goods and Services Tax			
Unit –IV	**FREEDOM STRUGGLE IN INDIA**	**Periods**	**6**
National Renaissance-Early uprising against British Rule-Indian National Congress			
Unit –V	**FREEDOM STRUGGLE IN TAMILNADU**	**Periods**	**6**
The role of Tamil Nadu in the freedom struggle-Different modes of Agitation in Tamil Nadu and movements			
		Total Periods	**30**

Text Books	
1.	Nitin Singhania, Indian Economy, McGraw Hill, Noida,2022
2.	Dutt R. & K.P.M. Sundharam, Indian Economy, S. Chand & Company Ltd,2021.
3.	Mishra &Puri, Indian Economy, Himalaya Publishing House, 2023.
4.	Bipan Chandra, History of Modern India, Orient Blackswan, New Delhi 2019.
5.	Bipan Chandra, et al., India's Struggle for Independence, Penguin Books, New Delhi, 2016.
ferences	
1.	Sankaran, S, Indian Economy, Marathi Granth Sangrahalaya, 2022.
2.	Agarwal,A.N.Indian Economy, Wiley India Pvt. Ltd,2021.
3.	G. Venkatesan, History of Modern Tamil Nadu 1600-2011, VC Publications, Rajapalayam,2013.
Resources	
1.	https://www.indiabudget.gov.in/economicsurvey/
2.	https://www.niti.gov.in/
3.	https://fincomindia.nic.in/commission-reports
4.	https://www.nipfp.org.in/home-page/
5.	https://dsal.uchicago.edu/

	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	**V**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCH1	**HIGHER STUDIES IN ABROAD & INDIA**	2	0	0	1	**40**	**60**	**100**

Course Objective

The main objective of the course is to

- Gain comprehensive knowledge of the higher education systems, admission processes, and key requirements in both India and abroad.
- Identify top universities worldwide and understand the financial aspects of overseas education, including costs, funding options, and scholarships.
- Acquire in-depth understanding of the GRE and GMAT, including their importance.
- Learn the significance of TOEFL and IELTS for non-native English speakers, assessment patterns, and the key areas of reading, speaking, and writing.
- Understand the importance, syllabus, and assessment patterns of the GATE exam, including the weightages in different domains and the general aptitude and subject-specific requirements for successful performance.

Course Outcome	At the end of the course, the student should be able to	Knowledge Level
	CO1: To categorize the higher education in abroad and India.	
	CO2: Analyze the selection and scholarship in various countries.	
	CO3: Analyze GRE & GMAT Selection process and Assessment.	
	CO4: Analyze TOEFL & IELTS Selection process and Assessment.	
	CO5: Analyze GATE Selection process and Assessment.	

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									1	1		2			
CO 2									1	1		2			
CO 3	3								1	1		2			
CO 4	3								1	1		2			
CO 5	3								1	1		2			

Course Assessment Methods

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

Content of the syllabus			
Unit – I	**OVERVIEW OF HIGHER STUDIES**	Periods	**6**
Higher Education in abroad: Introduction-Admission process- Identification & Procedure - SOP-LORDesirable Characteristics - Introduction to Proficiency test-Higher education in India & Examinations.			
Unit - II	**SELECTION & SCHOLARSHIP**	Periods	**6**
Top Universities in world- Cost of overseas education- Funding & Scholarships-Case studies Higher Education in USA, UK, France, Singapore, Germany, Norway, Sweden, Australia & Netherland			
Unit – III	**GRE & GMAT**	Periods	**6**
GRE & GMAT: Importance of GRE & GMAT- Syllabus- Assessment pattern- Analytical reasoningQuants-Verbal-Integrated Reasoning-Analytical writing assessment			
Unit - III	**TOEFL & IELTS**	Periods	**6**
Importance of TOEFL & IELTS - Syllabus-Assessment Pattern-Reading-Speaking –Writing			
Unit - V	**GATE**	Periods	**6**
Importance of GATE- Syllabus -Assessment Pattern- Weightages in the different domain-General Aptitude- Candidate selected subject			
		Total Periods	**30**

Text Books	
1.	B.S.Warrier, “Studying Abroad”, 1st edition, Tata Mcgraw Hill Education Private Limited, 2011.
2.	Dr.T.P.Sethumadhavan, “Study abroad”, 1st edition, I Rank : An Imprint of DC Books publishers, 2013.
References	
1.	“GATE 2025 General Aptitude & Engineering Mathematics”, Pearson Education, 2024.
2.	Jandhyala B.G. Tilak, "Higher Education in India: In Search of Equality, Quality and Quantity", 1st edition, Orient Blackswan, 2013.
3.	ONeal, Anthony, “The graduate survival guide”, Brentwood, Tennessee : Ramsey Press, the Lampo Group, LLC, 2017.
4.	Christine T. Ennew, David Greenaway, “The Globalization of Higher Education”, 1st edition, Palgrave Macmillan London, 2012.
5.	Abhishek Kumar, “The Ultimate Guide to Scholarships for Indian Citizens Planning to Study Abroad”, 1st edition , Abiprod Pty Ltd, 2016.
6.	Magoosh, Chris Lele, Mike Mcgarry, “GRE Prep by Magoosh”, Rtc Publishing, 2016.
E-Resources	
1.	Websites: Ministry of Education (India), University Grants Commission (UGC), All India Council for Technical Education (AICTE).
2.	Websites: QS World University Rankings, Times Higher Education, Studyportals, EducationUSA.
3.	Specific to Higher Studies Abroad : **StudyPortals** (studyportals.com), **The Princeton Review** (princetonreview.com), **IELTS Official** (ielts.org), **ETS GRE** (ets.org/gre)
4.	Specific to Higher Studies in India : **Shiksha** (shiksha.com), **India Education** (indiaeducation.net), **National Digital Library of India** (ndl.iitkgp.ac.in).

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Programme	**B.E. /B.Tech**	Programme Code			Regulation	**2023**		
Department	**Common to All**				Semester	**VI**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCH2	**SOCIAL NETWORKING FOR HIGHER STUDIES**	2	0	0	1	40	60	100

Course Objective

The main objective of the course is to:

- Understand the fundamentals of networking, its benefits, and the distinction between quality and quantity in professional networking for career growth.
- Gain practical knowledge of digital networking tools such as LinkedIn, Facebook, Twitter, Google+, and open learning networks to enhance professional connections.
- Develop strong interpersonal and communication skills, including empathy, active listening, and networking etiquette, to build meaningful professional relationships.
- Learn effective networking strategies, including business communication, emotional intelligence, and copyright considerations, to create a successful networking plan.
- Explore the impact of digital footprints, long-term networking strategies, and case studies related to overseas education and scholarships, enabling students to leverage networking for academic and career advancements.

Course Outcomes

At the end of the course, the student should be able to	Knowledge Level
CO1: To explain the fundamentals of networking, its benefits, and the importance of quality networking in professional and academic growth.	K2
CO2: To utilize digital networking tools such as LinkedIn, Facebook, Twitter, and Google+ for professional connections and career opportunities.	K3
CO3: To analyze and apply effective listening skills, empathy, and networking etiquette for building strong professional relationships.	K4
CO4: To develop interpersonal and business communication skills, understand emotional intelligence, and create a networking plan for career development.	K3
CO5: To assess digital footprints, implement long-term networking strategies, and evaluate case studies on overseas education and scholarships.	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									1	2		2		
CO 2					3				1	2		2		
CO 3									1	2		2		
CO 4									1	2		2		
CO 5									1	2		2		

Pre-requisites | -

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**	Periods	**6**
Networking, Benefits, Quality vs Quantity in Networking, Networking for new opportunities, Networking for Professional Partnership, Local and In-person networking			
Unit - II	**DIGITAL NETWORKING**	Periods	**6**
Tools for Online Networking – Linkedin, Facebook, Twitter, Google+, LMS, Open Learning Networks.			
Unit – III	**EMPATHIZING**	Periods	**6**
Art of Listening, Empathy, Listening Models, Networking etiquette, Digital Storytelling, Lead Generation			
Unit - III	**COMMUNICATION**	Periods	**6**
Interpersonal Skills, Personality and Emotional Intelligence, Business Communication, Copyrights, Networking Plan			
Unit - V	**DIGITAL FOOTPRINTS**	Periods	**6**
Introverts & Extroverts, Maintain Your Connections, Long-Term Networking Strategies, Case Studies-Scholarship for higher education in various countries –Case study			
		Total Periods	**30**

Text Books

1.	Andrea R Nirenberg"Essentials of Business networking" Tips, Tools and Tactics you can use, Pearson Education
2.	Miriam Salpter "Social Networking for career success "Learning express, Newyork
3.	Andrea R Nirenberg "Network like you means it" handbook for business and personal networking
4.	Elizabeth A Segal "Social Empathy-Art of understanding others" Columbia University press, New York

References

1.	S.P.Bakshi, "Objective English" Arihant Publications.
2.	Peter W Cardon "Business Communication" Tata Mcgraw Hill Publications, Third edition

E-Resources

1.	https://www.udemy.com/course/networking101/
2.	https://learndigital.withgoogle.com/digitalunlocked/course/effective-networking
3.	https://www.linkedin.com/learning/professional-networking
4.	https://alison.com/course/personal-business-networking-skills-for-maximum-success
5.	https://www.edx.org/professional-certificate/uwashingtonx-english-for-businessnetworking

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	**Information Technology**		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.

Course Outcome

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	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	3	

Course Assessment Methods

Direct

4. Continuous Assessment Test I, II & III
5. Assignments / Seminar/Quiz
6. End-Semester Examinations

Indirect

1.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 3rd 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	**Information Technology**				Semester		**VI**	
Course Code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U23CTCP5	**Integrated Reasoning and Pseudo Code**	2	0	0	1	40	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
	CO5: Enhance Logical and Analytical Reasoning Skills for Complex Problem Solving.	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**	**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 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	**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 3rd 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