

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 60003

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025

Third Semester

Information Technology

P23ITE13 – OPTIMIZATION TECHNIQUES

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	How do you detect an unbounded solution in the simplex procedure?	2	K1	CO1
2.	Comment on the statement “The feasible region of an optimization problem is convex”	2	K1	CO1
3.	What is multistage decision problem?	2	K1	CO2
4.	Define the following terms. a. Optimal policy b. Optimal decision rule	2	K1	CO2
5.	List out the three basic steps in managing a project.	2	K2	CO3
6.	Write the formula to calculate crash cost slope.	2	K2	CO3
7.	How will you formulate penalty function?	2	K1	CO4
8.	Differentiate equality and inequality constraints.	2	K2	CO4
9.	List out the Constituents of a Queuing system.	2	K2	CO5
10.	Recall the characteristics of queue discipline.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

- | Q.No. | Questions | Marks | KL | CO |
|--------|---|-------|----|-----|
| 11. a) | Using Two– phase simplex method to solve the following linear programming problem: Maximize $Z = 2x_1 + 2x_2 + 4x_3$
Subject to $2x_1 + x_2 + x_3 \leq 2$, $3x_1 + 4x_2 + 2x_3 \geq 8$, $x_1, x_2, x_3 \geq 0$ | 13 | K1 | CO1 |

(OR)

- | | | | | |
|----|---|----|----|-----|
| b) | Solve the following L.P.P using two phase simplex method.
Minimize $Z = 5x_1 - 6x_2 - 7x_3$
Subject to the constraints
$x_1 + 5x_2 - 3x_3 > 15$
$5x_1 - 6x_2 + 10x_3 \leq 20$
$x_1 + x_2 + x_3 = 5$
$x_1, x_2, x_3 > 0$ | 13 | K1 | CO1 |
|----|---|----|----|-----|

- | | | | | |
|--------|--|----|----|-----|
| 12. a) | Formulate a Integer programming model for the problem given below: | 13 | K2 | CO2 |
|--------|--|----|----|-----|

A calculator company produces a handheld calculator and a scientific calculator. Long-term projections indicate an expected demand of at least 150 scientific and 100 handheld calculators each day. Because of limitations on production capacity, no more than 250 scientific and 200 handheld calculators can be made daily. To satisfy a shipping contract, a minimum of 250 calculators must be shipped each day. If each scientific calculator sold, a result in a 20 rupees loss, but each handheld calculator produces a 50 rupees profit. In order to optimize the net profit, each type should be manufactured by the company on daily basis.

(OR)

- | | | | | |
|--------|---|----|----|-----|
| b) | Illustrate the working principle of branch and bound method with suitable example. | 13 | K2 | CO2 |
| 13. a) | Describe the process of time-cost optimization algorithm with suitable illustrations. | 13 | K3 | CO3 |

(OR)

- | | | | | |
|----|---|----|----|-----|
| b) | The following data are available for a project. | 13 | K3 | CO3 |
|----|---|----|----|-----|

Activity	Duration (days)	Proceeding activity
A	5	-
B	6	A
C	5	B
D	4	A
E	3	D
F	4	C,E

- i. Compute the earliest event time and least event time using network diagram. (3)
- ii. Determine the critical path and total project duration. (5)
- iii. Compute the total float for each activity. (5)
14. a) Compare and Contrast constrained and unconstrained problems with suitable example. 13 K4 CO4
- (OR)
- b) Examine the necessary and sufficient conditions for constrained problems using your own example. 13 K4 CO4
15. a) Analyze and explain the operating characteristics of a Queuing System. 13 K4 CO5
- (OR)
- b) Write short notes on K4 CO5
- i. Single channel model 6
- ii. Multiple Service Channels 7

PART – C

(1 x 15 = 15 Marks)

- | Q.No. | Questions | Marks | KL | CO |
|--------|---|-------|----|-----|
| 16. a) | A Commercial bank has 3 cash paying assistants customers are found to arrive in a Poisson fashion at an average rate of 6/hr for business transaction. The service time is found to have an E.D with a mean of 18 mins. The customers are processed on FCFS basis. Find out the following | 15 | K4 | CO5 |
| | i. Average time a customer spends in the system (5) | | | |
| | ii. Average queue length (5) | | | |
| | iii. How many hours a week can a cash paying assistant spend with the customers. (5) | | | |
| | (OR) | | | |
| b) | The crash and normal duration and cost are given below: | 15 | K3 | CO3 |

Activity	Normal		Crash	
	Duration	Cost	Duration	Cost
1-2	4	140	1	230
1-3	3	140	1	160
1-4	3	200	1	240
2-5	5	100	2	200
3-6	2	50	1	80
4-6	10	150	9	180
5-6	7	200	5	250

Calculate the different minimum cost schedules by compressing the project duration by one unit at a time.