Hall Ticket Number:

NRIA23

23A2200103

IIB.Tech.II Semester Regular Examinations

OPTIMIZATION TECHNIQUES

(Common to CSE, IT, CSE (AIML), CSE (DS), AIML&CSE-RL)

Time: 3Hours **Max.Marks:70**

Question paper contains two parts A and B.
Part A is compulsory
Part B consists of 5Units. Answer any one full question from each unit.

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	PARTA	**10X2M=20M**	
Q.No.	**Questions**	**Marks**	**BTL**
1.a)	Define objective function.	**2M**	**1**
b)	Define infeasible solution.	**2M**	**1**
c)	What is meant by a balance transportation problem?	**2M**	**2**
d)	Briefly explain about unbalanced assignment problem.	**2M**	**2**
e)	Define Gantt chart.	**2M**	**1**
f)	Explain about PERT model.	**2M**	**2**
g)	Define Economic Order Quantity (EOQ).	**2M**	**1**
h)	What is break-even analysis?	**2M**	**2**
i)	Define payoff matrix.	**2M**	**1**
j)	Can a game have multiple Nash Equilibria? Explain briefly.	**2M**	**2**

	PARTB	**5x10M=50M**	
Q.No.	**Questions**	**Marks**	**BTL**
	UNITI		
2. a)	Write few applications of operations research.	**5M**	**2**
b)	Solve the LPP graphically, $Max\ z = 3x_1 + 9x_2$, subjected to the constraints$x_1 + 4x_2 \leq 8,\ x_1 + 2x_2 \leq 4, for\ all\ x_1, x_2 \geq 0.$	**5M**	**3**
	OR		
3. a)	Draw the algorithm flow chart of simplex method.	**5M**	**2**
b)	Solve the LPP using Simplex method,$Max\ z = x_1 + x_2$, subjected to the constraints $2x_1 + 3x_2 \leq 6,\ x_1 + 7x_2 \leq 14, for\ all\ x_1, x_2 \geq 0.$	**5M**	**3**
	UNITII		
4. a)	Write the various steps involved in finding the initial basic feasible solution in Vogel's method.	**5M**	**2**

b)	Find Initial basic feasible solution to the following transportation problem by matrix Minima Method	**5M**	**3**

	D_1	D_2	D_3	D_4	D_5	Supply
O_1	10	2	3	15	9	35
O_2	5	10	15	2	4	40
O_3	15	5	14	7	15	20
O_4	20	15	13	25	8	30
Demand	20	20	40	10	35	125

OR

5. a)	Explain the steps involved in the MODI method to find check the optimality in the transportation problems.	**5M**	**2**
b)	Find the optimal assignment cost for the given data	**5M**	**3**

Jobs	Machines				
	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

UNITIII

6. a)	What are the limitations of sequencing models	**5M**	**2**
b)	There are 5 jobs, each of which has to go through the machines A and B in the order AB. The processing times (in hours) are given as	**5M**	**3**

Job	J_1	J_2	J_3	J_4	J_5
Machine A	2	4	5	7	1
Machine B	3	6	1	4	8

Determine a sequence of these jobs that will minimize the total elapsed time T.

Also obtain: i) the minimum elapsed time;

and ii) the idle time for each of the machines

OR

7. a)	What are the limitations of PERT?	**5M**	**2**
b)	The following details are available regarding a project:	**5M**	**3**

Activity	Predecessor Activity	Duration (Weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

Determine the critical path, the critical activities and the project Completion time.

UNITIV

8. a)	Explain the concept of inventory management and its importance in operations research.	**5M**	**2**
b)	Differentiate between deterministic and probabilistic inventory models. Provide examples of each.	**5M**	**3**

OR

9. a)	Discuss the assumptions of Break-Even Analysis.	**5M**	**2**
b)	Derive the Break-Even Point formula and explain each component in detail. Provide an example for better understanding.	**5M**	**3**

UNITV

10. a)	Solve the following pay-off matrix. $\begin{bmatrix} 3 & 2 & 4 & 0 \\ 2 & 4 & 2 & 4 \\ 4 & 2 & 4 & 0 \\ 0 & 4 & 0 & 8 \end{bmatrix}$	**5M**	**3**
b)	In game theory how many strategies are there and explain the terms briefly.	**5M**	**2**

OR

11. a)	Write few advantages of Decision – Making under uncertainty.	**5M**	**2**
b)	A company is considering three investment projects. The returns from each project under different market conditions are as follows:	**5M**	**3**

Investment	**Good Market (₹)**	**Moderate Market (₹)**	**Poor Market (₹)**
Project A	100,000	60,000	10,000
Project B	80,000	70,000	50,000
Project C	90,000	40,000	5,000

Using the **Maximin Criterion**, which project should the company Choose?

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Part A is compulsory
Part B consists of 5 Units. Answer any one full question from each unit.

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	PARTA	**10X2M=20M**	
Q.No.	**Questions**	**Marks**	**BTL**
1.a)	Define unbounded solution.	**2M**	**1**
b)	Explain degeneracy in simplex method.	**2M**	**2**
c)	What is meant by a unbalance transportation problem?	**2M**	**1**
d)	Briefly explain about balanced assignment problem.	**2M**	**2**
e)	What is the main purpose of a Gantt Chart?	**2M**	**1**
f)	Explain about CPM model.	**2M**	**2**
g)	What are the assumptions of the EOQ model?	**2M**	**1**
h)	Define the break-even point.	**2M**	**1**
i)	What is a dominant strategy?	**2M**	**1**
j)	Define Nash Equilibrium.	**2M**	**1**

	PARTB	**5x10M=50M**	
Q.No.	**Questions**	**Marks**	**BTL**
	UNITI		
2.a)	Explain the concepts of slack, surplus, and artificial variables in the context of Linear Programming.	**5M**	**2**
b)	Solve the LPP using graphical method, $Max\ z = 8x + y$ Subjected to the constraints$x + y \leq 40, 2x + y \leq 60\ for\ all\ x, y\ \geq 0$.	**5M**	**3**
	OR		
3.a)	Explain the graphical method of solving a Linear Programming problem with an example.	**5M**	**2**
b)	Solve the LPP using graphical method, $Max\ z = 2x_1 + x_2$, subjected to the constraints $x_1 + 2x_2 \leq 10,\ x_1 + x_2 \leq 6, for\ all\ x_1, x_2 \geq 0$.	**5M**	**3**

UNITII

4.a) Write the procedure in detail to find initial basic feasible solution by Matrix minima method. **5M** **2**

b) Find the initial basic feasible solution by North west corner rule **5M** **3**

	D_1	D_2	D_3	D_4	D_5	D_6	Supply
O_1	1	2	1	4	5	2	30
O_2	3	3	2	1	4	3	50
O_3	4	2	5	9	6	2	75
O_4	3	1	7	3	4	6	20
Demand	20	40	30	10	50	25	175

OR

5.a) Discuss about the optimality criteria in the transportation model. **5M** **2**

b) Solve the assignment problem by Hungarian method **5M** **3**

Jobs	Machines			
	A	B	C	D
I	10	5	13	15
II	3	9	18	3
III	10	7	3	2
IV	5	11	9	7

UNITIII

6.a) Write any five applications of sequencing models. **5M** **2**

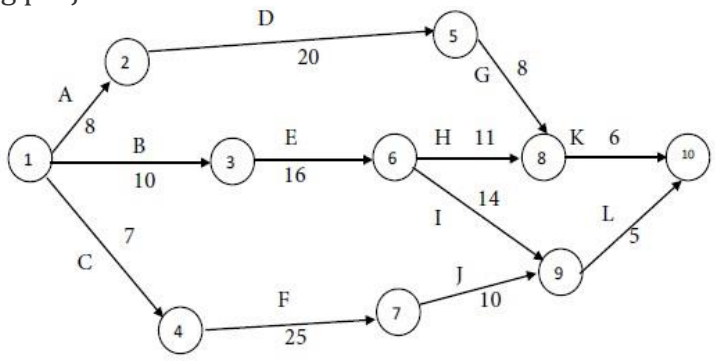
b) **5M** **3**

Find an optimal sequence for the following sequencing problem of four jobs and five machines when passing is not allowed, of which processing time (in hours) is given below:

Job	Machine				
	A	B	C	D	E
1	7	5	2	3	9
2	6	6	4	5	10
3	5	4	5	6	8
4	8	3	3	2	6

Also find the total elapsed time.

OR

7.a)	What are the advantages of PERT.	**5M**	
b)	Find out the completion time and the critical activities for the following project:  	**5M**	**3**
	UNITIV		
8.a)	What are the assumptions in Economic Order Quantity model?	**5M**	**2**
b)	Discuss the role of safety stock in inventory management. How is it calculated?	**5M**	**2**
	OR		
9.a)	Discuss the limitations of Break-Even Analysis.	**5M**	**2**
b)	How does Break-Even Analysis assist in pricing and cost control decisions? Provide practical examples.	**5M**	**3**
	UNITV		
10.a)	Solve the following pay-off matrix $\begin{bmatrix} 30 & 40 & -80 \\ 0 & 15 & -20 \\ 90 & 20 & 50 \end{bmatrix}$	**5M**	**3**
b)	Explain in detail about the Minimax and Maximin principles.	**5M**	**2**
	OR		
11.a)	Write few limitations of Decision – Making under uncertainty.	**5M**	**2**
b)	A company has three possible investment projects, and the returns are shown below under different market conditions. **Investment** / **Good Market (₹)** / **Moderate Market (₹)** / **Poor Market (₹)** **Project X** / 150,000 / 80,000 / 20,000 **Project Y** / 200000 / 50,000 / 30,000 **Project Z** / 120000 / 100,000 / 50,000 Using the **Maximax Criterion**, which project should the company choose?	**5M**	**3**

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