Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY/ JUNE 2025

Date: 04-06-2025 **Time:** 01:00 pm – 04:00 pm

School: SOE	**Program:** B. Tech. Petroleum Engineering	
Course Code : MAT2030	**Course Name:** Fundamentals of Operation Research	
Semester: IV	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**
Marks	26	26	56	12

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks.				**10Q x 2M=20M**
1	Define Operations Research?	2 Marks	L1	CO1
2	Write the equation to find the coordinates of the constraints in LPP using Graphical Method?	2 Marks	L1	CO1
3	List two major applications of OR in decision making.	2 Marks	L1	CO1
4	Define Transportation Problem.	2 Marks	L1	CO2
5	What is the assignment problem, and how is it different from the transportation problem?	2 Marks	L1	CO2
6	Explain travelling salesman problem in assignment problem.	2 Marks	L1	CO2
7	What are the three phases of networking?	2 Marks	L1	CO3
8	List the time estimates in the PERT.	2 Marks	L1	CO3
9	Define Merge and Burst Events.	2 Marks	L1	CO3
10	Define saddle point.	2 Marks	L1	CO4

Part B

Answer the Questions. Question No. 11 is compulsory. **Marks 1x10M= 10M**

11.	State various phases of Operations Research and explain in brief.	10 Marks	L3	CO1

Part C

Answer the Question. **Total Marks= 70M**

12.	A Manufacturer produces 3 models I, II and III of a certain product using raw materials A and B. The following table gives the data. Formulate this problem as a Linear programming model.	10 Marks	L3	CO1

Raw Material	Requirement per Unit			Availability
	I	II	III	
A	2	3	5	4000
B	4	2	7	6000
Min Demand	200	200	150	---
Profit / Unit	30	20	50	---

Or

13.	A company manufactures three products P1, P2 and P3. The profits are 30, 20, and 40. Company has two machines M1 and M2. Processing time in minutes for each machine on each product on the total time availability on each machine are given in the following table	10 Marks	L3	CO1

Machine	Machine minutes required			Total Time Availability
	P1	P2	P3	
M1	4	3	5	2000
M2	2	2	4	5000

Company must manufacture at least 100 P1's and at least 200 P1's and 50P3's but not more than 150P1's. Setup LP model for the given problem.

14.	Find the initial solution for the given transportation problem by any two methods of your choice.	10 Marks	L3	CO**2**

	D1	D2	D3	D4	Supply
O1	11	13	17	14	250
O2	16	18	14	10	300
O3	21	24	13	10	400
Demand	200	225	275	250	

Or

15.	Find an optimal solution for the transportation methods using any two methods of your choice	10 Marks	L3	CO2

	D1	D2	D3	D4	Supply
O1	6	1	9	3	70
O2	11	5	2	8	55
O3	10	12	4	7	70
Demand	85	35	50	45	

16.	Find the Optimal solution using Assignment Problem.	10 Marks	L3	CO2

	A	B	C	D	E
P	160	130	175	190	200
Q	135	120	130	160	175
R	140	110	155	170	185
S	50	50	80	80	110
T	55	35	70	80	105

Or

17.	Solve the assignment problem by Hungarian method	10 Marks	L3	CO2

	A	B	C	D
P	8	26	17	11
Q	13	28	4	26
R	38	19	18	15
S	19	26	24	10

18.	A company has six jobs A to F. All the jobs have to go through two machine M1 and M2. The time required for the jobs on each machine in hours is given below. Find the optimum sequence that minimizes the total elapsed time.	10 Marks	L3	CO3

	A	B	C	D	E	F
Machine I	1	4	6	3	5	2
Machine II	3	6	8	8	1	5

Or

19.	We have five jobs each of which must go through the machines A, B and in the order ABC. Determine the sequence that will mini mise the total elapsed time.	10 Marks	L3	CO3

	1	2	3	4	5
Machine A	5	7	6	9	5

		Machine B	2	1	4	5	3			
		Machine C	3	7	5	6	7			

20.	Solve the following payoff matrix, determine the optimal strategies and the value of game. Player B: 6, -3 Player A: -3, 0	10 Marks	L3	CO4
	or			
21.	Solve the following game and determine the value of the game Player B: 2, 5 Player A: 4, 1	10 Marks	L3	CO4

22.	A small maintenance project consists of the following jobs whose precedence relationships are given below Activity: 1-2, 1-3, 2-4, 3-4, 3-5, 4-9, 5-6, 5-7, 6-8, 7-8, 8-10, 9-10 Time (Days): 4, 1, 1, 1, 6, 5, 4, 8, 1, 2, 5, 7 From the following information, you are required to a) Construct a network diagram. b) Compute the earliest and latest event time. c) Determine the critical path and project duration. **d)** Compute total and free float for each activity.	20 Marks	L3	CO3
	Or			
23.	Four jobs 1, 2, 3 and 4 are to be processed on each of the five machines A, B, C, D, and E in the order ABCDE. Find the total minimum elapsed time if no passing of jobs is permitted, Also find the idle time for each machine	20 Marks	L3	CO3

Machine / Jobs	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