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Reg. No.....

Name.....

**M.Com. DEGREE (C.S.S.) EXAMINATION NOVEMBER 2020**

**Second Semester**

Faculty of Commerce

OR02C10—OPERATIONS RESEARCH

Time : Three Hours

Maximum Weight : 30

**Section A**

*Answer any five questions.*

*Each question carries a weight of 1.*

1. What is duality in LP ?
2. What is Markov Analysis ?
3. Explain NWCM.
4. What is analog models ?
5. What are Dummy activities ?
6. What is meant by two-person zero sum game ?
7. Define slack and surplus variable.
8. Bring out the mathematical formulation of Transportation problem.

(5 × 1 = 5)

**Section B**

*Answer any five questions.*

*Each question carries a weight of 2.*

9. Explain Optimistic and Pessimistic time in PERT.
10. How the problem of degeneracy arises in transportation ? Explain how one overcome it ?
11. Explain the solution procedure for  $2 \times 2$  games.
12. Describe the phases in Operation Research.

**Turn over**





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13. You are given the pay-off matrix :

<i>States of nature</i>	<i>Probability</i>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>
S <sub>1</sub>	0.1	25	- 10	- 125
S <sub>2</sub>	0.7	400	440	400
S <sub>3</sub>	0.2	650	740	750

Calculate and tabulate the EMV and conclude which of the acts can be chosen.

14. Apply North West corner rule to determine the initial basic solution :

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	<i>Supply</i>
O <sub>1</sub>	6	4	1	5	14
O <sub>2</sub>	8	9	2	7	16
O <sub>3</sub>	4	3	6	2	5
<i>Required</i>	6	10	15	4	35

15. AB Ltd. manufactures two products A and B. To manufacture one unit of A, two units of material X and 4 units of material Y are required. To manufacture one unit of B, three units of X and two units of Y is required. As the raw material X is in short supply, not more than 16 units of X can be used. Atleast 16 units of material Y must be used in order to meet committed sales of A and B. Cost per unit of material X and Y are Rs. 2.5 and Rs. 25 respectively. You are required to formulate mathematical model and solve it for minimum cot graphically.

16. Using the following cost matrix determine the job assignment :

	<i>Job</i>					
	1	2	3	4	5	
<i>Mechanic</i>	A	10	3	3	2	8
	B	9	7	8	2	7
	C	7	5	6	2	4
	D	3	5	8	2	4
	E	9	10	9	6	10

(5 × 2 = 10)





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**Section C**

*Answer any **three** questions.  
Each question carries a weight of 5.*

17. Discuss the application of MODI in determine the optimum solution.
18. A small project is composed of seven activities whose time estimates are listed in the table as follows :

<i>Activity</i>	<i>Estimated duration (weeks)</i>		
	<i>Optimistic</i>	<i>Most likely</i>	<i>Pessimistic</i>
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	2	8
2 – 5	1	1	1
3 – 5	2	5	14
4 – 6	2	5	8
5 – 6	3	6	15

You are required to :

- (a) Draw the project network.
  - (b) Find the expected duration and variance of each activity.
  - (c) Calculate the variance and standard deviation of project length.
19. A department head has four sub-ordinates and four task need to be performed. The sub-ordinates differ in efficiency and the tasks differ in their intrinsic difficulty. His estimate of the time each man would take to perform each task is given in the matrix below

<i>Task</i>	<i>Men</i>			
	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
A	36	52	34	22
B	26	56	28	52
C	76	38	36	30
D	38	52	48	20

How should the task be allotted to men so as to minimise the total man hours ?

**Turn over**





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20. Following is the pay-off matrix for player A, applying Dominance property obtain optimum strategies for both the players and determine the value of the game :

		<i>Player B</i>				
		I	II	III	IV	V
<i>Player A</i>	I	2	4	3	8	4
	II	5	6	3	7	8
	III	6	7	9	8	7
	IV	4	2	8	4	3

21. A company wishes to launch and sale 3 types of perfumes A – 2,000 Units, B – 10,000 units and C – 2,000 units Per month. The estimated pay off are :

		<i>Profits</i>		
		A	B	C
<i>Type of perfumes</i>	A	250	15	10
	B	40	20	5
	C	60	25	3

Estimate which type can be chosen under maximax, maximum, maximum and Laplace Method.

22. “Operations research increases the creative and judicious capabilities of a decision maker” comment.

(3 × 5 = 15)

