M.Com. DEGREE (C.S.S.) EXAMINATION, JUNE 2019

Second Semester

Faculty of Commerce

OR02C10—OPERATIONS RESEARCH

(2012 Admission onwards)

Time : Three Hours   Maximum Weight : 30

Section A

Answer any **five** *questions.*
Each question carries 1 *weight.*

1. What is Hungarian Assignment method ?

2. Define saddle point.

3. What is free float ?

4. What is duality in LP ?

5. What is Markov Analysis ?

6. Explain NWCM.

7. What is analog models ?

8. What are Dummy activities ?

$(5 \times 1 = 5)$

Section B

Answer any **five** *questions.*
Each question carries 2 *weight.*

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 × 2 games.

12. Describe the phases in Operation Research.

Turn over

13. The cost per year of running a machine is given below. The purchase price of the machine is Rs. 30,000. Determine when the replacement will be due ?

Year	:	1	2	3	4	5	6	7
Running cost	:	5,000	6,000	7,000	9,000	11,500	14,000	17,000
Resale value	:	15,000	7,500	3,750	1,875	1,000	1,000	1,000

14. Solve the game by applying dominance principle :

		B		
		1	7	2
A		6	2	7
		5	1	5

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 :

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

(5 × 2 = 10)

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 :

Activity	Estimated duration (weeks)		
	Optimistic	Most likely	Pessimistic
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 :

    1   Draw the project network.

    2   Find the expected duration and variance of each activity.

    3   Calculate the variance and standard deviation of project length.

19. A department head has four subordinates and four task need to be performed. The subordinates 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 :

	Men			
Task	E	F	G	H
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 ?

20. Use the simplex method to solve LPP :

Maximise $Z = 7_{x1} + 5_{x2}$
subject to the constraints : (a) $x_1 + 2x_2 < 6$ (b) $4x_1 + 3x_2 < 12$ (c) $x_1, x_2 > 0$.

Turn over

21. A company is spending Rs. 1,000 on transportation of its units from three plants to four distribution centres. The supply and demand of units , with unit cost of transportation are given as :

		D_1	D_2	D_3	D_4	Availability
	P_1	19	30	50	12	7
	P_2	70	30	40	60	10
Plant	P_3	40	10	60	20	18
Requirements		5	8	7	15	

Distribution center

What will be maximum saving by optimum scheduling ?

22. A computer contains 10,000 resistors. When any *one* of the resistor fails, it is replaced. The cost of replacing a single resistor is Re. 1 only. If all the resistors are replaced at the same time , the cost per resistor would reduce to Re. 35. The percent surviving by the end is as follows :

Month	:	0	1	2	3	4	5	6
% surviving	:	100	97	90	70	30	15	0

What is the optimum plan ?

$(3 \times 5 = 15)$