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Reg. No.....

Name.....

M.Com. DEGREE (C.S.S.) EXAMINATION, JUNE 2018

Second Semester

Faculty of Commerce

OR 02 C10—OPERATIONS RESEARCH

(2012 Admission onwards)

Time : Three Hours

Maximum Weight : 30

Section A

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

1. What is meant by two-person zero sum game ?
2. Define slack and surplus variable.
3. Bring out the mathematical formulation of Transportation problem.
4. What is Laplace criterion in decision-making ?
5. What is critical path ?
6. What is meant by models in OR ?
7. What is EPPI.
8. List any four assumption in linear programming.

(5 × 1 = 5)

Section B

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

9. For the game with the following pay-off matrix , determine the optimum startegies and value of the game :

$$\begin{array}{c} \\ \text{P1} \end{array} \begin{array}{c} \text{P2} \\ \begin{pmatrix} 5 & 1 \\ 3 & 1 \end{pmatrix} \end{array}.$$

Turn over

10. A fleet owner finds from his past records that the cost per year of maintain a truck whose purchase price is Rs. 1,60,000 are as follows :

Year	Maintenance cost	Resale price
1	8,000	1,45,000
2	9,000	1,32,000
3	10,500	1,22,000
4	13,000	1,14,000
5	15,000	1,09,000
6	20,000	90,000
7	25,000	70,000
8	30,000	50,000

Determine the age of replacement ?

11. Construct a network for the relationships of various activities in a project" :

Activity	:	A	B	C	D	E	F	G	H	I	J	K
Predecessor	:			A	B	B	C	D	E	H	G	FG

12. Solve the LPP Graphically

Minimize $Z = 3x_1 + 2x_2$

subject to constraints :

1) $5_{x_1} + x_2 \geq 10$,

2) $x_1 + x_2 \geq 6$,

3) $x_1 + 4_{x_2} \geq 12$,

4) $x_1, x_2 \geq 0$.

13. You are given the pay-off matrix :

States of nature	Probability	A1	A2	A3
S1	0.1	25	–10	–125
S2	0.7	400	440	400
S3	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

	D1	D2	D3	D4	Supply
O1	6	4	1	5	14
O2	8	9	2	7	16
O3	4	3	6	2	5
Required	6	10	15	4	35

15. Solve the following assignment in order to minimise the cost. Given below is the cost matrix when different operators are assigned to various machines :

Machines	Operators				
	I	II	III	IV	V
A	30	25	33	35	36
B	23	29	38	23	26
C	30	27	22	22	22
D	25	31	29	27	32
E	27	29	30	24	32

16. Explain Looping and Dangling errors.

(5 × 2 = 10)

Section C

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

17. A project has following information regarding the activities relation among them and time of completion of each activity. Determine the critical Path and minimum time for the completion of the project :

Activity	Precedence	Time (days)	Activity	Precedence	Time (days)
A	-	5	G	C	1
B	A	7	H	E,F	3
C	B	2	I	G,F	10
D	B	3			
E	C	1			
F	D	2			

Turn over

18. Solve the transportation problem :

Factory	Godowns						Stock
	1	2	3	4	5	6	
A	7	5	7	7	5	3	60
B	9	11	6	11	–	5	20
C	11	10	6	2	2	8	90
D	9	10	9	6	9	12	50
Demand	60	20	40	20	40	40	

It is not possible to transport any quantity from Factory B to Godown 5.

19. A manufacturer of jeans is interested in developing an advertising campaign conducted through different channel which will reach four different age groups. The following table give the estimated cost in paise per exposure for each group according to the medium employed. In addition , maximum exposure levels possible in each media are 80,60,40 million respectively. Also the minimum desired exposure within each age group namely 13-18, 19-25, 26-35 and 36 and above are 60,50,30 and 20 million. The objective is to minimise the cost of attaining the minimum exposure level in each group.

Media	Age Group			
	13-18	19-25	26-35	36 and above
TV	12	07	10	10
Radio	10	09	12	10
Magazine	14	12	09	12

Find the optimal solution.

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 :

		Player B				
		I	II	III	IV	V
Player A	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—2000 Units, B—10,000 units and C—2000 units per month. The estimated pay-off are :

		Profits		
		A	B	C
Type Of perfumes	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)