

G 17003015



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Reg. No.....

Name.....

M.Com. DEGREE (C.S.S.) EXAMINATION, JULY 2017

Second Semester

Faculty of Commerce

OR 02C 10 OPERATIONS RESEARCH

(2012 Admission onwards)

Time : Three Hours

Maximum Weight : 30

Section A

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

1. Define the term 'Operations Research'.
2. Define 'ISO Profit line'.
3. What is 'Model' ?
4. What is meant by 'MODI method' ?
5. What is 'Decision Theory' ?
6. Define the term 'Pay-off Matrix'.
7. What is 'Backward Pass Method' ?
8. Define the term 'CPM'.

(5 × 1 = 5)

Section B

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

9. What are the features of Operations Research Approach ?
10. Describe the necessity of Operations Research in Industry.
11. Explain the structure of linear programming model.
12. Use the graphical method to solve the following linear programming problem.

$$\text{Minimize } Z = 6x_1 - 4x_2$$

subject to the constraints

$$(i) 2x_1 + 4x_2 \leq 4 ; (ii) 4x_1 + 8x_2 \geq 16 ; \text{ and } (iii) x_1, x_2 \geq 0.$$





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13. Use Vogel's Approximation method of obtain an initial basic feasible solution of the transportation problem :

		D	E	F	G	Available
A	...	11	13	17	14	250
B	...	16	18	14	10	300
C	...	21	24	13	10	400
Requirement	...	200	225	275	250	

14. A departmental head has four subordinates, and four tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His estimates of the time each man would take to perform each task, is given in the matrix below.

		Tasks				Man			
						E	F	G	H
A	...	18	26	17	11				
B	...	13	28	14	26				
C	...	38	19	18	15				
D	...	19	26	24	10				

How should the tasks be allocated, one to a man, so as to minimize the total man hours ?

15. A stall at a certain railway station sells for Rs. 5.00, a copy of daily newspapers for which it pays Rs. 4.00. Unsold papers are return for a refund of Rs. 3.50. Daily sales and corresponding probabilities are as follows :

Daily Sales	...	500	600	700
Probability	...	0.50	0.30	0.20

How many copies should it order each day to get maximum expected profit ?

16. An assembly is to be made from two parts X and Y. Both parts must be turned a lathe and Y must be polished whereas X need not be polished. The sequence of activities together with their predecessors is given below.

Activity	Description	Predecessor Activity
A	Open work order	—
B	Get materials for X	A
C	Get materials for Y	A
D	Turn X on lathe	B
E	Turn Y on lathe	B, C
F	Polish Y	E
G	Assemble X and Y	D, F
H	Pack	G

Draw a network diagram for the project.

(5 × 2 = 10)





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Section C

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

17. What are the steps involved in Operations Research?
18. Show using matrix-vector notation, that the following system of linear equations has degenerate solutions:

$$(i) \quad 2x_1 + x_2 - x_3 = 2.$$

$$(ii) \quad 3x_1 + 2x_2 + x_3 = 3.$$

19. A dairy firm has three plants located in the state. The daily milk production at each plant is as follows:

Plant	1	2	3
Milk supply	6	1	10

Each day, the firm must fulfill the needs of its four distribution centers. Minimum requirements at each centre are as follows:

Centre	1	2	3	4
Milk supply	7	5	3	2

Cost in hundreds of rupees of shipping one million litre from each plant each distribution centre is given in the following table:

Plant	Distribution Centre			
	D_1	D_2	D_3	D_4
P_1	2	3	11	7
P_2	1	0	6	1
P_3	5	8	15	9

Find the initial basic feasible solution for given problem by using (a) North-west corner rule;
(b) Least cost method.

20. The following table shows all the necessary information on the available supply from each warehouse, the requirements of each market and the unit transportation cost in rupee from each warehouse of each market.

Warehouse	Market				
	A	B	C	D	Supply
I	6	3	5	4	22
II	5	9	2	7	15
III	5	7	8	6	8
Demand	7	12	17	9	

Turn over





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The shipping clerk was worked out the following schedule from experience : 12 units from I to B, 1 unit from I to C, 9 units from I to D, 15 units from II to C, 7 units from III to A and 1 unit from III to C. Check if the clerk has made the optimal schedule.

21. A milk man buys milk Rs. 25 per litre and sales Rs. 25 per litre. Unsold milk has to be thrown away. The dairy demand has the following probability distribution.

<i>Demand</i>	:	46	48	50	52	54	56	58	60	62	64
<i>Probability</i>	:	0.01	0.03	0.06	0.10	0.20	0.25	0.15	0.10	0.05	0.05

If each day's demand is independent for previous day's demand, how many litres should be order every day ?

22. A publisher has a contract with an author to publish a textbook. The activities associated with the production of the textbook are given below. The author is required to submit to the publisher a hard copy and a computer file of the manuscript. Develop the associated network for the project.

<i>Activity</i>	<i>Predecessor[s]</i>	<i>Duration [weeks]</i>
Manuscript proof reading by author	...	3
Sample pages preparation	...	2
Book cover design	...	4
Art work preparation	...	3
Author's approval of edited manuscript and sample pages	... A, B	2
Book formatting	... E	4
Author's review of formatted pages	... F	2
Author's review of art work	... D	1
Production of printing plate	... G, H	2
Book production and binding	... C, I	4

(3 x 5 = 15)

