

M.Com. DEGREE (C.S.S.) EXAMINATION, AUGUST 2016**Second Semester**

Faculty of Commerce

OR 02 C10—OPERATIONS RESEARCH

(2012 Admissions)

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 'Operation Research'.
2. What do you understand by 'Model' ?
3. What is meant by 'linear programming' ?
4. Define the term 'Transportation Model'.
5. What is 'Decision Theory' ?
6. Describe the types of Decision making environment.
7. What is CPM ?
8. What do you understand by 'Work Breakdown Structure' ?

(5 × 1 = 5)

Section B

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

9. Discuss the scope of Operations Research in Modern Management.
10. Describe the Scientific method in Operations research.
11. What are the assumptions of linear programming ?
12. Use the graphical method to solve the following linear programming problem.

$$\text{Minimize } Z = 3x_1 + 2x_2$$

Subject to the constraints (i) $5x_1 + x_2 \geq 10$, (ii) $x_1 + x_2 \geq 6$, (iii) $x_1 + 4x_2 \geq 12$ and (iv) $x_1, x_2 \geq 0$.

Turn over

13. Obtain an initial basic feasible solution to the following 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 department head has four tasks to be performed and three subordinate, the subordinates differ in efficiency. The estimates of the time, each subordinate would take to perform, is given below in the matrix. How should be allocate the task one to each man, so as to minimize the total man hours ?

Tasks	Man		
	1	2	3
I	9	26	15
II	13	27	6
III	35	20	15
IV	18	30	20

15. A stall at a certain railway station sells for Rs. 5.00, a copy of daily news papers 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 net work diagram for the project.

(5 × 2 = 10)

Section C

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

17. Discuss the various phases in solving an operations problem.
18. Find all the feasible solution to the system of linear equations :
(i) $x_1 + 2x_2 + x_3 = 4$, and (ii) $2x_1 + x_2 + 5x_3 = 5$.
19. The following table shows all the information on the availability of supply to each warehouse, the requirements of each market and unit transportation cost [in Rs.] from each warehouse to each market.

Warehouse	Market					
		P	Q	R	S	Supply
	A	6	3	5	4	22
	B	5	9	2	7	15
	C	5	7	8	6	8
	Demand	7	12	17	9	45

The shipping clerk has worked out the following schedule from experience : 12 units from A and Q, 1 unit from A to R, 8 unit from A to S, 15 units from B to R, 7 units from C to P and 1 unit from C to R. Check and see if the clerk has the optimal schedule.

20. A company has four territories open, and four salesmen available for an assignment. The territories are not equally rich in their sales potential. It is estimated that typical salesman operating in each territories would bring in the following annual sales.

Territories	...	I	II	III	IV
Annual Sales (Rs.)	...	1,26,000	1,05,000	84,000	63,000

The four salesmen also differ in their ability. It is estimated that, working under the same conditions, their yearly sales would be proportionately as follows :

Salesman	...	A	B	C	D
Proportion	...	7	5	5	4

In the criterion are maximum expected total sales, the intuitive answer to the assign the best sales man to their richest territory, the next salesman to the second richest and so on :

Verify this answer by the assignment techniques.

21. A TV dealer finds that the cost of a TV in stock for a week is Rs. 30 and the cost unit shortage is Rs. 70. For one particular model of TV the probability distribution of weekly sales as follows :

Weekly sales	...	0	1	2	3	4	5	6
Probability	...	0.10	0.10	0.20	0.25	0.15	0.15	0.05

How many units per week should the dealer order ? Also find EVPL.

Turn over

22. The owner of a chain of fast — food restaurants is considering a new computer system for accounting and inventory control. A computer sent the following information about the computer system installation.

Activity	Description	Predecessors	Estimated Times Days		
			Optimistic	Most likely	Pessimistic
A	Select the computer Model	4	6	8
B	Design input/output system	A	5	7	15
C	Design monitoring system	A	4	8	12
D	Assemble computer hardware	B	15	20	25
E	Develop the main programme	B	10	18	26
F	Develop output/input routines	C	8	9	16
G	Create database	E	4	8	12
H	Install the system	D,F	1	2	3
I	Test and implement	G,H	6	7	8

Determine the critical path and compute the expected completion time.

(3 × 5 = 15)