

M.Com. DEGREE (C.S.S.) EXAMINATION, AUGUST 2014**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.**Weight 1 each.*

1. What are the limitations of Operations Research ?
2. What are the basic assumptions in solving the L.P.P. ?
3. Define 'slack' variable with an example.
4. What is an assignment problem ? Give two examples.
5. What is zero-sum-game ?
6. What is degeneracy in L.P.P. ?
7. What is waiting line theory ?
8. What is network analysis ?

(5 × 1 = 5)

Section B*Answer any five questions.**Weight 2 each.*

9. What is an unbalanced transportation problem ? How is it solved ?
10. What are the steps in solving an assignment problem ?
11. Explain MODI and stepping stone method of solving transportation problem.
12. Solve the following pay-off matrix :

	Player B		
Player A	5	2	3
	6	5	7
	-7	4	1

Turn over

13. The cost of a machine is Rs. 4,600 and installation charge is Rs. 1,500. The scrap value is only Rs. 100. The maintenance cost are :

Year	..	1	2	3	4	5	6	7	8
Maintenance cost	..	100	250	400	600	900	1250	1600	2000

When should the machine be replaced ?

14. Solve the following game :

		Player B	
		B_1	B_2
Player A	A_1	3	5
	A_2	4	1

15. Draw a network diagram to the following activities :

Activity	A	B	C	D	E	F
Predecessor	-	-	-	A, B	A, C	B, C

16. Solve the following problem graphically :

$$\text{Maximise } Z = 6x_1 + 4x_2$$

$$\text{subject to } 2x_1 + 1x_2 \leq 60$$

$$1x_1 \leq 25$$

$$x_2 \leq 35.$$

$$(5 \times 2 = 10)$$

Section C

Answer any **three** questions.

Weight 5 each.

17. Define Operations Research and explain its applications. What are the advantages and limitations ?
 18. Solve the following L.P.P. :

$$\text{Maximise } Z = 3x_1 + 5x_2 + 4x_3$$

$$\text{subject to } 2x_1 + 3x_2 \leq 8$$

$$2x_2 + 5x_3 \leq 10$$

$$3x_1 + 2x_2 + 4x_3 \leq 15$$

$$\text{where } x_1, x_2, x_3 \dots \geq 0.$$

19. ABC Limited has three production shops and products are distributed through five warehouses. The cost of product varies from shop to shop and transportation cost also varies. The cost of transportation is given below :

		Warehouse					
		1	2	3	4	5	
Shop	A	6	4	4	7	5	100
	B	5	6	7	4	8	125
	C	3	4	6	3	4	175
		30	80	85	105	70	

The cost of manufacture of the product at different production shops are :

Shop	Variable Cost	Fixed Cost
A	14	7000
B	16	4000
C	15	5000

Find the optimum quantity to be supplied from each shop to different warehouses at minimum total cost.

20. The following table gives the activities in a construction project :

Activity :	1-2	1-3	2-3	2-4	3-4	4-5
Duration :	20	25	10	12	6	10

- 1 Draw the network diagram and critical path.
- 2 Find free total and independent float.
- 3 Find the duration.

21. The belt snapping for conveyers in open cast mine occur at the rate of two per shift. There is only one hot plate available for vulcanising and it can vulcanise on an average 5 belts snap per shift. Find :

- (a) What is the probability that the hot plate is readily available when a belt snap ?
- (b) What is the average number in the system ?
- (c) What is the waiting time of an arrival ?
- (d) What is the average waiting time plus vulcanising time ?

Turn over

22. Find EMV for all A_1, A_2, A_3 acts from the table given below. Which is the optimum act ?

		Events		
		S_1	S_2	S_3
Strategies	A_1	2	8	15
	A_2	-3	10	20
	A_3	-10	20	35

$$P(S_1) = 0.4, P(S_2) = 0.3 \text{ and } P(S_3) = 0.3$$

$$(3 \times 5 = 15)$$