NEW

2015

M B A

2nd Semester Examination

OPERATIONS RESEARCH

PAPER—MBA-205

Full Marks : 100

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Write the answers to Questions of each Half in separate books.

Question No. 1 & 2 are compulsory

Answer any other *four* questions from the rest.

1. Answer any *four* of the following questions :   4×5

    (a) How would you solve an assignment problem where two jobs are to be assigned to a particular individual ? Explain with an example.

(Turn Over)

(b) What are the different types of inventory cost ? How do they behave ?

(c) What do you mean by shadow price ? Where is it found in the Simplex Table ?

(d) What is the prime objective of a travelling salesman problem ? What assumptions are commonly made in solving such a problem ?   1+4

(e) 'All the activities on a critical path of a network are critical activities but all the activities on a non-critical path are not non-critical activities.' — Explain. Why are only critical activities crashed ?

(f) What is a Basic Feasible Solution in a transportation problem ? How can you resolve a problem with non-basic feasible solution ?   1+4

2. Answer any *four* of the following questions :   4×5

(a) While applying assignment technique what principle is followed for zero crossing in situation when there is no single zero in any row or column ? Will you change that principle for zero selection in similar situation ?

(b) Write a note on 'Time Estimation' in Network analysis.

(c) What are the basic limitations of graphical solution of a linear programming problem ?

(Continued)

(d) What do you understand by 'loop' in a transportation problem ? Explain with an example.

(e) What is traffic intensity ? If traffic intensity of a system is given to be 0·76, what percentage of time the system would be idle ?

(f) Choose the correct answer with reason :

'At EOQ-level, (i) the ordering cost and carrying cost are equal, (ii) ordering cost is more than carrying cost, (iii) carrying cost is more than ordering cost, (iv) ordering cost and carrying cost are not related in any way.'

3. Solve the following travelling salesman problem to minimise the distance (in km) travelled : 10

	A	B	C	D	E
A	–	14	26	27	17
B	8	–	18	20	9
C	12	13	–	20	14
D	16	19	24	–	18
E	14	15	25	27	–

4. (a) The annual demand for an item of inventory whose price is Rs. 10 per unit, is 2,400 units, ordering cost per order is Rs. 350 and inventory holding costs are 2% per month. The supplier offers a price discount of 7.5% if the quantity ordered is 400 units or more. The rate of discount will increase to 12.5% if the order is for 3,000 units or more. Find the economic order quantity and the corresponding annual total inventory cost.

   (b) Arrivals at a telephone booth are considered to be Poisson with an average time of 12 minutes between one arrival and the next. The length of the phone call is assumed to be distributed exponentially, with mean 5 minutes :

   (i) What is the probability that a person arriving at the booth will have to wait ?

   (ii) The telephone department will install a second booth when convinced that an arrival would expect waiting for at least 5 minutes for phone. By how much should the flow of arrivals increase in order to justify a second booth ?

   6+(1+3)

(Continued)

5. (a) Explain 'Maximin' and 'Minimax' principle in Game theory. From the following pay-off matrix of a game problem find the solution :

$$
A \begin{array}{c} \\ \end{array} \begin{bmatrix} 14 & 7 \\ 6 & 10 \end{bmatrix} \quad B
$$

(b) Describe with an example Vogel's Approximation Method for obtaining initial feasible solution of a transportation problem. 5+5

6. The following table gives data on normal time and cost and also crash time and cost for a project :

Activity	Time (Days)		Cost (Rs.)	
	Normal	Normal	Normal	Crash
1 — 2	8	6	100	200
1 — 3	4	2	150	350
2 — 4	2	1.	50	90
2 — 5	10	5	100	400
3 — 4	5	1	100	200
4 — 5	3	1	80	100

Assume that indirect cost per day is Rs. 60.

Draw the network, identify the critical path, crash the activities systematically and determine the optimum project completion time and cost.

1+1+7+1

7. A stereo equipment manufacturer can purchase two models — A & B, of 40 and 80 watts respectively of total music power each. Each model passes through three manufacturing divisions — 1, 2, and 3 where model A takes 4, 2·5, and 4·5 hours each and model B takes 2, 1, and 1·5 hours each. The three divisions have a maximum of 1,600, 1,200, and 1,600 hours every month respectively.

Model A gives a contribution of Rs. 400 each and B gives Rs. 100 each. Assuming abundant product demand, find out the optimum product mix and the maximum contribution using simplex method. 10

8. (a) Find the dual of the following problem :

Maximise $Z = 4x_1 + 2x_2$

Subject to : $x_1 - 2x_2 \geq 2$

$x_1 + 2x_2 = 8$

$x_1 - x_2 \leq 10$

where, $x_1 \geq 0$, x_2 is unrestricted.

(b) Distinguish between PERT and CPM in Network analysis. What are the different types of Floats ? Describe, with the help of an example, how you can compute them. 4+(2+4)

[Internal Assessment : 20]