

(Following Paper ID and Roll No. to be filled in your  
Answer Books)

Paper ID : 270228

Roll No.

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M.B.A.

Theory Examination (Semester-II) 2015-16

OPERATION RESEARCH

Time : 3 Hours

Max. Marks : 100

Section-A

1. Answer the following questions in not more than 30 words each. (2×10=20)

- (a) 'The decision analysis refers to logical and quantitative analysis of all facts that influence a decision'. Discuss.
- (b) What is scope of operation research.
- (c) Explain North West Corner Rule.
- (d) Explain primal-dual relationship of linear programming.
- (e) What is a decision tree ?
- (f) What is replacement ?
- (g) What is two person zero-sum game ?

- (h) Describe Kendall's notation for representing queuing model.
- (i) 'A project network can have only one critical path'. Comment.
- (j) 'Crashing of a project always leads to decrease in both time and total cost'. Elucidate.

### Section-B

2. This section will have 8 questions of 10 marks each. The candidate needs to attempt any 5 questions. The question may be kept for 250 words of about 15 minutes each. (10×5=50)

- (a) What is sensitivity analysis? Discuss its significance from managerial viewpoint.
- (b) A book stall agent at Mumbai VT railway station sells Rs. 4 a copy of daily newspaper for which repays Rs. 2.50. Old papers are returned for a refund of 50 paise a copy. The daily sales and corresponding probabilities are as follow :

Daily Sales	500	600	700	800
Probability	0.3	0.4	0.2	0.1

How many copies should be order each day?

(2)

- (c) Solve the following LPP :

$$\text{Minimize } Z = 3X + 2Y$$

Subject to the following constraints :

$$5X + Y \geq 10$$

$$X + Y \geq 6$$

$$X + 4Y \geq 12$$

$$\text{and } X \geq 0, Y \geq 0$$

- (d) For the game with pay off matrix

	Player A		
Player B	-1	2	- 2
	6	4	- 6

Determine the best strategies for player A and B and value of game for them.

(3)

P.T.O.

(e) Solve the following optimal assignment problem :

Persons	Jobs			
	I	II	III	IV
A	2	5	3	4
B	1	6	2	5
C	5	2	3	1
D	6	4	2	1

- (f) Explain how to process 2 jobs through m machines.
- (g) The customers arrive at a one window drive in a bank according to Poisson distribution with a mean of 10 per hour. The service time per customer is exponential with a mean of 5 minutes. The space in front of the window including for the serviced customer can accommodate a maximum of 3 customers. Others can wait outside this space.
- (i) What is the probability that an arriving customer will have to wait outside the indicated space?
- (ii) How long is an arriving customer expected to wait before the service is started?
- (h) A firm is considering replacement of a machine whose cost price is Rs. 12,200 and the scrap value Rs. 200.

(4)

The running (maintenance and operating) costs in rupees are found from experience to be as follows :

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

### Section-C

**This section will have 3 questions of 15 marks each. The candidates should attempt any two questions of 15 marks each. (15×2=30)**

3. A small scale unit is in a position to manufacture three products A, B and C. Raw material required per piece of product A, B and C is respectively 2 kgs, 1 kg and 2 kgs and the total daily availability of the raw material is 50 kgs. The raw material is processed on machines by the labour force and on a day the availability of machine hours is 25 while the availability of labour hours in a day is 26. The time required per unit production of the three products are given below:

Product	Machine hour	Labour hour
A	1/2	1
B	3	2
C	1	1

(5)

P.T.O.

The net per unit contribution from product A, B and C respectively are Rs. 25, Rs. 30 and Rs. 40. What should be the optimal daily production?

4. Find an optimal solution to following transportation problem :

Origin	Destination				Supply
	A	B	C	D	
X	2	2	2	1	30
Y	10	8	5	4	70
Z	7	6	6	8	50
Demand	40	30	40	40	

5. A project consists of eight independent activities. Time estimates (in weeks) are :

Activity	Predecessor	Time Estimates		
		Optimistic	Most Likely	Pessimistic
A	-	1	3	5
B	-	2	3	4
C	-	3	4	5
D	A	2	9	10
E	C	4	5	6
F	B, D, E	5	6	13
G	A	2	4	6
H	C	1	3	6

What is the expected time to complete the project?

(6)