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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 ?

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                              (1)   P.T.O.

(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 paisa 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?

(c) Solve the following LPP :

Minimize $Z = 3X + 2Y$

Subject to the following constraints :

$$5X + Y \geq 10$$

$$X + Y \geq 6$$

$$X + 4Y \geq 12$$

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.

(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.

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?