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**D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS),**  
**SEMESTER EXAMINATIONS**  
**APRIL – 2018**  
**ELECTIVE: OPERATIONS RESEARCH**

**Time : 3 Hrs**

**SECTION-A (5 x 6 = 30)**

**Answer ALL questions.**

1. (a) Define decision theory and explain the essential elements in decision theory.  
(Or)

(b) Under an employment promotion programming, it is proposed to allow buses during off-peak hours. The vendor can purchase the newspaper at a rate of 25 paise per copy against the selling price of 40 paise. Unsold copies result in a loss. A vendor has estimated the following probability distribution for the number of copies demanded.

Number of copies demanded	15	16	17	18
Probability	0.04	0.19	0.33	0.26

How many copies should he order so that his expected profit will be maximized?

2. (a) A project schedule has the following characteristics.

Activities	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-9
Time (weeks)	4	1	1	1	6	5	4	8	6

Construct the network. Compute E and L for each event and find the critical path.

(Or)

(b) Write the basic difference between PERT and CRM.

3. (a) An aircraft company uses rivets at an approximate customer rate of 2000 per month. The rivets cost Rs.30 per kg and the company personnel estimate that it costs Rs. 1000 per month to store the rivets. The company is considering a supplier who offers a discount of 5% on the purchase price of the rivets if the company orders in quantities of 10000 kg or more. Should the company order in quantities of 10000 kg or more?

4. (a) If for a period of 2 hours in a day (8 – 10 A.M.) trains arrive at the yard and service time continues to remain 36 minutes, then calculate for this period
- (i) the probability that the yard is empty,
  - (ii) average queue length on the assumption that the line capacity is for 10 trains only.

(Or)

(b) Explain queue discipline with a suitable example.

5. (a) Let the value of the money be assumed to be 10% per year and suppose machine A is replaced every four years whereas machine B is replaced every six years. The yearly costs of the machines are given as under:

Year	1	2	3	4	5	6
Machine A	1000	200	400	1000	200	400
Machine B	1700	100	200	300	400	500

Determine which machines should be purchased.

(Or)

- (b) A pipeline is due for repairs. It will cost Rs.10000 and lasts for three years. A new pipeline can be laid down at a cost of Rs.30000 and lasts for 10 years. The cost of capital to be 10% and ignoring salvage value, which alternative should be chosen?

### SECTION-B (3 x 15 = 45)

Answer any THREE of the following questions.

6. A glass factory specializing in crystal is developing a substantial backlog of orders. It is considering three courses of action : (S<sub>1</sub>) arrange for sub-contracting, (S<sub>2</sub>) expand production facilities. The correct choice depends largely upon future demand which is uncertain. By consensus, management ranks the respective probabilities as 0.10, 0.30, 0.40, 0.20.

7. The following table gives data on normal time and cost and crash time and

- (a) Draw the network and identify the critical path
- (b) What is the normal project duration and associated cost?
- (c) Find out total float for each activity
- (d) Crash the relevant activities systematically and determine the

Activity	Normal		Crash	
	Time(weeks)	Cost(Rs.)	Time(weeks)	Cost(Rs.)
1-2	3	300	2	
2-3	3	30	3	
2-4	7	420	5	
2-5	9	720	7	
3-5	5	250	4	
4-5	0	0	0	
5-6	6	320	4	
6-7	4	400	3	
6-8	13	780	10	
7-8	10	1000	9	
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Indirect costs are Rs.50 per week.

8. Given the following data for an item of uniform demand, instantaneous demand, no stock-out facility: Annual demand = 800 units, cost of an item = Rs.40, ordering cost = Rs. 10, holding cost = 40%, back order cost = Rs. 10.

Find out

- (a) minimum order quantity
- (b) maximum inventory level
- (c) maximum number of back orders