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D. K. M. COLEGE FOR WOMEN (AUTONOMOUS), VELL
SEMESTER EXAMINATION

APRIL– 2019 15CPMA2E

ELECTIVE : OPERATIONS RESEARCH

Time: 3Hrs.

Max.

SECTION –A (5 X 6=30)

Answer ALL the questions.

1. (a) Mr. X flies quite often from town A to town B. He can use the airport but if he takes it, there is a 0.08 chance that he will miss the flight. The standard fare is Rs.270 with a 0.96 chance of being on time for the flight. For Rs.350 he can take a taxi which will make 99 percent chance of being on time for the flight. If Mr. X can conclude a business transaction that will produce a profit of Rs. 10,000 if he is on time and a loss of Rs. 10,000 if he is late, which mode of transport should Mr. X use? Answer on the basis of expected monetary value.

(Or)

- b) You are given the following estimates concerning a research and development project:

Decision D_i	Probability of Decision D_i Given Research R $P(D_i R)$	Outcome Number	Probability of outcome x_i Given D_i Research R $P(x_i D_i)$
Develop	0.5	1	0.6
		2	0.3
		3	0.1
Do not Develop	0.5	1	0.0
		2	0.0
		3	1.0

Construct and evaluate the decision tree diagram for the above data. Show your Evaluation.

2. (a) Construct the network diagram comprising activities B, C, ..., Q and N. The constraints are satisfied:

(b) The demand for an item in a company is 18,000 units per year, and the cost of one item is Rs. 100. The item is produced at a rate of 3,000 items per month. The cost of one setup is Rs. 500/- and holding cost per unit per month is 15 paise. The shortage cost of one unit is Rs. 20/- per year. Determine the optimum manufacturing quantity and the number of shortages. Also determine the setup time and the time between setups.

4. (a) In a railway marshalling yard, good train arrives at the rate of 30 trains per day. The inter arrival time follows an exponential distribution and the service time is also as exponential with a mean of 36 minutes. Calculate:
- The expected queue size (line length).
 - Probability that queue size does not exceeds 10.

(Or)

(b) A super market has two girls ringing up sales at the counters. If the service time of a customer is exponential with a mean of 4 minutes, and if people arrive in a Poisson process at the rate of 10 an hour, find

- What is the probability of having an arrival has to wait for service?
- What is the expected percentage of idle time for each girl?

5. (a) The cost of a machine is Rs. 61,000 and its scrap value is Rs. 12,200 and its maintenance costs found from past experience are as follows:

Year	1	2	3	4	5	6
Running cost in rupees	200	500	800	1200	1800	2500

When should the machine be replaced?

(Or)

(b) A company is considering purchasing a new grinder, which will cost Rs. 10,000.

SECTION – B(3x15 =45)

Answer any THREE of the following questions.

6. A TV dealer finds that the cost of holding a TV in stock for a week is Rs. obtain new TV sets immediately tend to go to other dealers and he estimates that a customer who cannot get immediate delivery he loses an average of Rs. In a model of TV the probabilities of demand of 0,1,2,3,4 and 5 TV sets in a week are 0.05,0.10,0.20,0.30,0.20 and 0.15 respectively.

- a) How many televisions per week should the dealer order? Assume a lead time of one week between ordering and delivery.
- b) Compute EVPI.
- c) The dealer is thinking of spending on a small market survey to estimate the demand level. How much should he be willing to spend on such a survey?

7. A project consists of 8 activities with the following relevant information. Draw i) Draw the network diagram. ii) Find critical path. iii) Find expected duration and variance. iv) Calculate Duration.

Activity (i- j)	Optimistic time	Most Likely time	Pessimistic time
1 – 2	1	1	
1 – 3	1	4	
1 – 4	2	2	
2 – 5	1	1	
3 – 5	2	5	
4 – 6	2	5	
5 – 6	3	6	

8. The probability distribution of monthly sales of a certain item is as follows:

9. The arrivals at a telephone booth are considered to be following Poisson law with an average time of 10 minutes between one arrival and the next. Length of the service time is distributed exponentially with a mean of 3 minutes.

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

(ii) What is the average length of queue that forms from time to time?

(iii) The telephone department will install a second booth when conversion cost is Rs. 1000. How long would expect to wait at least three minutes for the phone.

10. The following table gives the cost of running a machine, the cost of which is Rs. 60,000 are given below.

Year	1	2	3	4
Resale Value(Rs)	42,000	30,000	20,400	14,400
Cost of Spares(Rs)	4,000	4,270	4,880	5,760
Cost of Labour(Rs)	14,000	16,000	18,000	21,000

Determine the optimum period for replacement of the machine.

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