Exam Date & Time: 30-Sep-2020 (10:00 AM - 01:45 PM)

PSG COLLEGE OF ARTS AND SCIENCE

Note: Writing 3hrs: Checking & Inserting Image : 30mins + Grace Time : 15mins

BSc DEGREE EXAMINATION MAY 2020
(Sixth Semester)

Branch - STATISTICS

CORE ELECTIVE-II - OPERATIONS RESEARCH - II [14STU23]

Marks: 75 **Duration: 225 mins.**

SECTION A

Answer all the questions.

1) What is pay-off matrix? (2)

2) What is two person zero-sum game? (2)

3) What are the two categories of replacement problem? (2)

4) When does replacement problem arise? (2)

5) Define Simulation. (2)

6) What are the types of simulation models? (2)

7) Define queue discipline. (2)

8) Define transient state. (2)

9) What is Network? (2)

10) Expand PERT and CPM. (2)

SECTION B

Answer all the questions.

11) Solve the following 2x2 game graphically: $\begin{pmatrix} 2 & 1 & 0 & -2 \\ 1 & 0 & 3 & 2 \end{pmatrix}$. (5)

a)

[OR]
b) Explain the Dominance property. (5)

12) a) 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) cost in rupees are found from experience to be as follows: (5)

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?

[OR]
b) How would you deal with replacement of equipments that deteriorates gradually? (5)

13) a) Explain the Monte-Carlo simulation procedure. (5)

[OR]
b) Customer arrive at a milk booth for the required service. Assume that inter-arrival and service times are constant and given by 1.8 and 4 time units respectively. Simulate the system and hand computations for 14 time units. What is the average waiting time per customer? What is the percentage idle time of the facility? (Assume that the system starts at t=0). (5)

14) a) Explain the operating characteristics of a queueing system. (5)

[OR]
b) A T.V. repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in and if the arrival of sets is approximately poisson with an average rate of 10 per 8-hour day. What is repairman's expected idle time each day? (5)

15) a) Write the rules for network construction. (5)

[OR]
b) Draw a network diagram for the following data. (5)

Activity:	A	B	C	D	E	F	G	H	I	J
Preceding activities:	None	A	A	B	A	B,E	C	D,F	G	H,I

SECTION C

Answer 3 out of 5 questions.

16) For the game with following payoff matrix, determine the optimum strategies and the value of the game: $\begin{pmatrix} 5 & 1 \\ 3 & 4 \end{pmatrix}$. (10)

17) A computer has a large number of electronic tubes. They are subject to mortality as given below: (10)

Period	1	2	3	4	5
Age of failure (hours)	0-200	201-400	401-600	601-800	801-1000
Probability of failure	0.10	0.26	0.35	0.22	0.07

If the tubes are group replaced, the cost of replacement is Rs.15 per tube. Group replacement can be done at fixed intervals in the night shift when the computer is not normally used. Replacement of individual tubes which fail in service costs Rs.60 per tube. How frequently should the tubes be replaced?

18) A confectioner sells confectionary items. Past data of demand per week (in hundred kilograms) with frequency is given below:

Demand / Week:	0	5	10	15	20	25
Frequency :	2	11	8	21	5	3

Using the following sequence of random numbers, generate the demand for the next 10 weeks. Also find the average demand per week. (10)

35	52	90	13	23	73	34	57	35	83	94	56	67	66	60

19) Describe the queueing model (M/M/C : ∞/FIFO). (10)

20) A small project consists of seven activities for which the relevant data are given below:

Activity	A	B	C	D	E	F	G
Preceding Activity	-	-	-	A,B	A,B	C,D,E	C,D,E
Activity Duration (Days)	4	7	6	5	7	6	5

(10)

(i) Draw the network and find the project completion time. And
(ii) Calculate total float for each activity and highlight the critical path.

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