PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2017
(Sixth Semester)

Branch- STATISTICS

CORE ELECTIVE - II OPERATIONS RESEARCH - II

Time : Three Hours   Maximum : 75 Marks

SECTION-A (20 Marks)
Answer ALL questions
ALL questions carry EQUAL marks   (1 0 x 2 = 20)

1   Define two person zero sum game.
2   What is pay off matrix?
3   Under what situations an item need replacement.
4   What is group replacement?
5   What is simulation?
6   Mention any four reasons for applying simulation technique.
7   What is queueing theory?.
8   What is meant by steady and transient state?
9   State the reasons for incorporating dummy activities in a network diagram.
10   Define optimistic time, pessimistic time and most likely time.

SECTION - B (25 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks (5 x 5 = 2 5)

11 a   Explain the maxiniin - minimax principle in game theory.
                              OR
   b   Consider a game having the following pay off matrix. Determine whether
        it has a saddle point. If it does, determine the optimum strategy for each
        player according to the minimax criterion and find the value of the game.

                        Player B

		Bf	B2	B3
	Al	" 0	-4	-2
Player A	A 2	3	-5	1
	ᵃ3	-2	-1	6
	A₄	1	0	4

12   a Explain the concepts individual and group replacement policies.
                              OR   '
     b A firm is using a machine whose purchase price is Rs. 13,000. The
       installation charges amount to Rs. 3,600 and the machine has a scrap value
       of only Rs. 1,600, because the firm has a monopoly of this type of work.
       The maintenance cost in various years is given in the following table:

Year:	*	1	2	3	4	5	6	7
Cost (Rs.):		250	750	1,000	1,500	2,100	2,900	4,000

       The firm wants to determine after how many years should the machine
       be replaced on economic considerations, assuming that the machine
       replacement can be done only at the year ends.

13   a Explain event type simulation method.
                              OR
     b What are the advantages of simulation process?

Explain different types of service mechanism with an example.

OR

In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time, follows an exponential distribution and the service time distribution is also exponential'with an average 36 minutes. Calculate

(i) The mean queue size (line length), and

(ii) The probability that the queue size exceeds 10.

Describe different types of floats and their implications.

OR

A small assembly plant assembles PCs through 9 interlinked stages according to following precedence / process:

Stage from to	Duration (Hrs.)	Stage from to	Duration (Hrs.)
1-2	4'	4-6	10
1-3	12	5-7	10
1-4	10	6-7	•0
2-4	8	6-8	8
•2-5	•6-*'	7-8	10
-'3-6	8	8-9	6

Draw the network diagram. •

SECTION - C (30 Marks)
Answer any THREE Questions
ALL Questions Carry EQUAL Marks (3 x 10 = 30)

The following matrix represents the pay off to Pj in a rectangular game between two person Pi and P_2. *

$$\begin{vmatrix} 8 & 15 & -4 & -2 \\ 19 & 15 & 17 & 16 \\ 0 & 20 & 15 & 5 \end{vmatrix}$$

P2

By the notation of dominance, reduce the game to a 2 x 4 game and solve it graphically.

Fleet cars have increased their costs as they continue in service due to increased direct operating cost (gas and oil) and increased maintenance costs. The initial cost is Rs. 3,500, and the trade-in value drops as time passes until it reaches a constant value of Rs. 500.

Given the cost of operating, maintaining and the trade-in value, determine the proper length of service before cars should be replaced.

Years of service:	1	'2	3	4	.5
Year end trade-in value (Rs.):	1900	1050	'600	500	500
Annual operating cost (Rs.) :	•1500	1800	2100	2400	2700
Annual maintaining cost (Rs.) :	300	400	600	800	1000

Explain the steps involved in Monte - Carlo simulation technique.

Obtain the steady state equation f o r a (M / M / l : <» / FcFs) queuing model.

A project consists of a series of tasks A, B................ H, I with the following relationships.. A.< D, E ; B, D < F ; C < G; B, G < H ; F, G < I. With this construct the network diagram find also the minimum time of completion of the project, when the time (in days) of completion of each task is as •follows: •'

Task:	A	B	C	,	D	E	F	G	H	I
Time:	23	-8	20		16	24	18	19	4	10'