PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2017
(Sixth Semester)
Branch- **STATISTICS**

<u>CORE ELECTIVE - II - OPERATIONS RESEARCH-II</u>

Time : Three Hours   Maximum : 75 Marks

<u>SECTION-A (20 Marks)</u>
Answer **ALL** questions
ALL questions carry EQUAL marks   (10x2 = 20)

1   Define player in game theory.
     When a given strategy is said to be nominated?
3   State the classification of replacement problems.
4   Give the equation for the total cost incurred if the equipment is used for n years.
5   State the methods of generation of random numbers.
6   What is the usage of simulation?
7   Define Service Channel.
8   Write the symbolic form of quenching model with specifications.
9   Define an activity.
10   Write the formula for probability of completing the project by scheduled time.

<u>SECTION - B (25 Marks)</u>
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a   The payoff matrix of a game is given below. Find the solution of the game to A and B.

$$
\begin{array}{ccccc}
 & & B & & \\
-4 & -2 & -2 & 3 & 1 \\
1 & 0 & -1 & 0 & 0 \\
-6 & -5 & -2 & -4 & 4 \\
3 & 1 & -6 & 0 & -8
\end{array}
$$

OR

b   For any 2x2 two person zero sum game without any saddle point, having payoff matrix for player A as

		Player B	
		Bi	B_2
Player A	A,	an	&12
	A2.	&21	&22

Find the optimal mixed strategies and value of the game.

12 a   Explain replacement of items briefly.

OR

b A Scooter costs Rs.6,000 when new. The running cost and salvage value(sale price) at the end of the year is given below. If the interest rate is 10% per year and running costs are assumed to have occurred at mid year, find when the scooter should be replaced.

Year	1	2	3	4	5	6	7
Running cost (Rs.)	12,000	1,400	1,600	1,800	2,000	2,400	3,000
Salvage Value (Rs.)	4,000	2,666	2,000	1,500	1,000	600	60

Cont...

13 a In the mixed congruential recursive equation $x_{n+1}=ax+b$(modulo m), what should be the value of m so that the random numbers generated one between 0 and 40? Generate a string of 3 such numbers.

OR

b Explain Monte Carlo simulation steps.

14 a A self service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming poisson distribution for arrival rate and exponential distribution for service time. Find (i) Average number of customers in the system (ii) Average time a customer spends in the system.

OR

b Explain operating characteristics of a Queuing system.

15 a Duration of various activities of a project are given in the table below:

Project Activity	A	B	C	D	E	F	G	H	I
Duration no. of days	23	8	20	16	-24	18	19	4	10

The order of the activities are as; A<D, E ; B,D<F;C<G;B,G<H;F,G<...

OR

b Explain the rules of construction of a Network.

SECTION - C (30 Marks)
Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3x10 = 30)

16 Solve the following 2x5 game by graphical method.

			Player B				
			1	2	3	4	5
Player	x_1	1	-5	5 .	0	-1	8
A	$x_2=T-Xi$	2	8	-4	-1	6	-5

17   Explain individual and group replacement problem.

18   Explain Simulation in detail.

19   Workers come to tool storeroom to receive special tools for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in poisson distribution. The average service time is 40 seconds. Determine (i)average queue length (ii)average length of non-empty queues (iii) average no. of workers in system including the worker being attended (iv) mean waiting time of an arrival (v)average waiting time of an arrival (worker) who waits.

20   The time estimates (in weeks) for the activities of a PERT network are given below.   ^

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
to	1	1	2	1	2	2	3
tjn	1	4	2	1	5	5	6
	7	7	8	1	14	8	15

(a) Draw the project network and identify all the paths through it.
(b) Determine the expected project path.

Z–Z–Z   END