

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2019
(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 (10x2 = 20)

- 1 Define Strategy.
- 2 What is value of the Game?
- 3 What are the two categories of replacement problem?
- 4 What is Group Replacement Policy?
- 5 Define Simulation.
- 6 Write any two reasons for applying simulation technique to O.R. problems.
- 7 List out the types of service facilities available in queueing system.
- 8 Define steady state.
- 9 What is network scheduling?
- 10 Define free float.

SECTION - B 125 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 5 = 25)

- 11 a Determine whether the following two person zero-sum game is strictly determinable.

		Player B	
		B ₁	B ₂
Player A	A ₁	5	0
	A ₂	0	2

OR

- b For the game with the following payoff matrix, determine the optimum strategies and the value of the game.

		P ₂	
		5	1
P ₁	3	4	

- 12 a Explain Replacement policy when value of money does not change with time.

OR

- b Let the value of money be assumed to be 10% per year and suppose that machine A is replaced after every 3 years whereas machine B is replaced after every six years. The yearly costs of both the machines are given below:

Year	1	2	3	4	5	6
Machine A	1,000	200	400	1,000	200	400
Machine B	1,700	100	200	300	400	500

Determine which machine should be purchased.

- 13 a Describe the concept of Event type simulation.

OR

- b Explain the steps involved in Monte - Carlo simulation..

- 14 a 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 the following : (i) the mean queue size (line length), and (ii) the

Describe the operating characteristics of a Queueing System.

Construct the network diagram comprising activities B,C.....,Q and N such that the following constraints are satisfied:

B<E, F; C<G, L; E,G<H; L,H<I; L<M; H<N; H<J;I,J<P;P<Q

The notation X<Y means that the activity X must be finished before Y can begin.

OR

What are the rules of network construction?

SECTION - C (30 Marks)

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

Solve the following game using dominance property

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

Describe Replacement of items whose maintenance costs increase and the value of money also changes with time.

The occurrence of rain in a city on a day is dependent upon whether or not it rained on the previous day. If it rained on the previous day, the rain distribution is :

Event	No rain	1cm rain	2cm rain	3cm rain	4cm rain	5cm rain
Probability	0.50	0.25	0.15	0.05	0.03	0.02

If it did not rain on the previous day, the rain distribution is :

Event	No rain	1cm rain	2cm rain	3cm rain
Probability	0.75	0.15	0.06	0.04

Simulate the city's weather for 10 days and determine by simulation the total days with out rain as well as the total rainfall during the period. Use the following random numbers for simulation:

67 63 39 55 29 78 70 06 78 76

Assume that for first day of the simulation it had not rained the day before.

Describe (M/M/1) : (N/FIFO) queue system.

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

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

(i) Draw the network and find the project completion time.

(ii) Calculate total float for each of the activities and highlight the critical path.

Z-Z-Z

END