Oct-22/BE/Insem-65

B.E. (Mechanical Engineering)
OPERATION RESEARCH
(2019 Pattern) (Semester - VII) (402045 D) (Elective - IV)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:
1) *Answer Q.1 or Q.2 and Q.3 or Q.4.*
2) *Answer in One answer books.*
3) *Figures to the right indicates full marks.*
4) *Assume suitable data if necessary.*

Q1) a)   Discuss the following characteristics related to game theory   **[5]**

     i)   Competitive game

     ii)   Pure and mixed Strategy

     iii)   Pay off matrix

     iv)   Value of game

     v)   Saddle point

   b)   A food products company is contemplating the introduction of a revolutionary new product with new packaging or replacing the existing product at much higher price (S1). It may even make a moderate change in the composition of the existing product, with a new packaging at a small increase in price (S2), or may a small change in the composition of the exisisting product, backing it with the word "New" and a negligible increase in price (S3). The three different possible states of nature or events are high increase in sales (N1), no change in sale (N2) and decrease in sale (N3). The marketing department of the company worked out the payoff's in terms of the yearly net profits for each of the strategies of three events. This is represented in the following table. Which startegy should be concerned executive choose on the basis of   **[10]**

     i)   Maxi-min criteria

     ii)   Maxi-max criteria.

     iii)   Mini-max criteria

     iv)   Laplace criteria

	States of nature		
Strategies	N1	N2	N3
S1	7,00,000	3,00,000	1,50,000
S2	5,00,000	4,50,000	0
S3	3,00,000	3,00,000	3,00,000

OR

Q2) a) Discuss various phases of solving Operation research (OR) problem. **[5]**

b) Solve the game whose payoff matrix is given below : **[10]**

Player B

		B1	B2	B3	B4
	A1	3	2	4	0
Player A	A2	3	4	2	4
	A3	4	2	4	0
	A4	0	4	0	8

Q3) a) Six jobs are to be process on three machines. The processing time is as follows, Find the optimal schedule so that the total elapsed time is minimized. **[12]**

Job	J1	J2	J3	J4	J5	J6
Machine M1 (Turning)	10	3	5	4	2	1
Machine M2 (Threading)	2	4	6	3	1	2
Machine M3 (Knurling)	8	6	7	9	7	7

b) Explain Kendall's notation for representing queuing models? **[3]**

OR

Q4) A repair shop attended by a single mechanic has an average of four customers an hour who bring small appliances for repair. The mechanic inspects them for defects and takes six minutes an average Arrivals are Poisson and service rate has the exponential distribution. **[8]**

You are required to :

i) Find the proportion of time during which there is no customer in the shop.

ii) Find the probability of finding at least one customer in the shop.

iii) What is the average number of customers in the system?

iv) Find the average time spent by a customer in the shop including service.

b) Processing time (in Minute) of six jobs on two machines are given below. Find out the sequence that minimizes the total elapsed time required to complete the tasks on two machines. **[7]**

Job	J1	J2	J3	J4	J5	J6
Machine M1	4	6	7	8	9	1
Machine M2	5	8	1	3	6	10

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