Goenka College of Commerce and Business Administration

M. Com. Semester : II   Internal Assessment : 2021

Subject: Operations Research, Paper: CC 203

Full marks: 15   **Time : 1 Hour**

Module: I

Answer any one question   7.5

1.(a) Find the optimal strategies and their probabilities for both the players A and B and game value for the following game problem with the payoff matrix given below:

B

		IB	IIB	IIIB	IVB
	IA	-5	2	1	6
	IIA	5	6	4	8
A	IIIA	4	0	1	-3

(b)   Three persons are being considered in three open positions. Each person has been given a rating for each position as shown in the following table:

Position

		I	II	III
	1	7	5	6
Person	2	8	4	7
	3	9	6	4

Assign each person to one and only one position in such a way that the sum of ratings for all three persons is maximum.

(c) Mention optimality criteria for the transportation problem. What is the condition for getting more than one solution in transportation problem?   3 + 3.5 + (0.5 +0.5)

2. (a) At a cattle breading firm it is prescribed that food ratio for animals must contain at least 14 units, 22 units and 1 unit of nutrients A, B and C respectively. Two different kind of foddersare available. Each unit weight of these two contains the following amounts of the three nutrients.

	Fodder- I	Fodder-2
A	2	1
B	2	3
C	1	1

It is given that at least 20 units of fodder-I and at most 10 units of fodder-2 must be purchased. It is given that the costs of unit quantity of fodder-I and fodder-2 are Rs.300 and Rs. 200 respectively. Formulate it as a L.P.P. in terms of minimizing the cost of purchasing the fodders for the above cattle breading firm.

(b)(i) Draw the network diagram for the project given below.

(ii) Also identify the critical path and minimum time in hours to complete the project.

Task	A	B	C	D	E	F	G	H	I	J
Predecessor activity	-	-	A	A	C	D	B	E,F	G	H,I
Duration in hours	8	6	14	5	11	7	11	4	18	10

3+ (2+2.5)

Module-II

Answer any one question   **7.5**

3. (a) Find the sequence that minimises the total time (in hours) required to complete the following jobs on three machines M_1, M_2, and M_3 in order M_1, M_2, M_3.

Machines	Jobs				
	A	B	C	D	E
M_1	5	7	6	9	5
M_2	2	1	4	5	3
M_3	3	7	5	6	7

(b) A Truck owner from his past experience, envisaged that the maintenance cost per year, of a truck whose purchase price is Rs. 1,50,000 and the resale value of the truck will be as follows:

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs,)	10,000	50,000	20,000	25,000	30,000	40,000	45,000	50,000
Resale Value (Rs.)	1,30,000	1,20,000	1,15,000	1,05,000	90,000	75,000	60,000	50,000

Determine at which time it is profitable to replace the truck.   (3.5+4=7.5)

4. (a) Discuss the Monte-Carlo technique of simulation.

(b) A dentist schedules all his patients for 35-minute appointments. Some of the patients takes more than 35 minutes some less, depending on the type of dentist work to be done. The following summary shows the various categories of work, their probabilities and time actually needed to complete the work:

Category of Service	Time required(minutes)	Probability of category
Filling	40	0.35
Crown	50	0.20
Cleaning	15	0.15
Extraction	40	0.15
Checkup	20	0.15

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as idleness of the doctor. Assume that all the patients show up at the clinic at exactly their schedule arrival time starting at 8:00 a. m. Use the following random numbers for handling the above problem: 38, 25, 90, 48, 75, 16, 64, 92.   (1.5+6=7.5)

END