CBCS SCHEME

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20MBA24

Second Semester MBA Degree Examination, Jan./Feb. 2023
Operations Research

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FOUR full questions from Q.No.1 to Q.No.7.***
2. ***Question No. 8 is compulsory.***

1 a. Define Operations Research. **(03 Marks)**

b. What are the different criteria for decision making under uncertainty? Explain. **(07 Marks)**

c. Use the graphical method to solve the following LP program:

Maximize, $Z = 6x_1 - 4x_2$

Subjected to the constraints $2x_1 + 4x_2 \leq 4$; $4x_1 + 8x_2 \geq 16$

$x_1, x_2 \geq 0$ **(10 Marks)**

2 a. What is degeneracy? **(03 Marks)**

b. Solve the following game, select the strategy for each player and value of the game to each player. **(07 Marks)**

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	1	7	3	4
	A_2	5	6	4	5
	A_3	7	2	0	3

c. A R & D department is developing a new power supply for a console television set. It has broken the jobs down into the following:

Job	Immediate predecessor	Time in days
A	-	5
B	A	7
C	B	2
D	B	3
E	C	1
F	D	2
G	C	1
H	E, F	3
I	G, H	10

(i) Draw the network diagram of activities involved in the project and indicate the critical path.

(ii) What is the minimum completion time for the project? **(10 Marks)**

3 a. What do you mean by 'pay off' in decision theory? **(03 Marks)**

b. Explain the methods for solving the operations research models. **(07 Marks)**

c. A bakery keeps a stock of popular brand of cake. Previous experience shows the daily demand pattern for the items associated with the probabilities, as given below:

Daily demand (number)	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days:
Random numbers : 25, 39, 65, 76, 12, 05, 73, 89, 19, 49.
Also estimate the daily average demand for the cakes on the basis of simulated data. **(10 Marks)**

4 a. What is Saddle Point? **(03 Marks)**

b. A company has two plants, each of which produces and supplies two products A and B. The plants can each work upto 16 hours a day in plant 1, it takes 3 hours to prepare and pack 1000 gallons of A and one hour to prepare and pack one quintal of B. In plant 2, it takes 2 hours to prepare and pack 1000 gallons of A and 1.5 hours to prepare and pack a quintal of B. In plant 1, it costs Rs.15000 to prepare and pack 1000 gallons of A and Rs.28000 to prepare and pack a quintal of B, whereas in plant 2, these costs are Rs.18000 and Rs.26000 respectively. The company is obliged to produce daily atleast 10000 gallons of A and 8 quintal of B.

Formulate this problem as an LPP model to find out as to how the company should organize its production so that the required amounts of the two products be obtained at the minimum cost. **(07 Marks)**

c. Obtain the initial basic feasible solution by Vogel's approximation method:

	D_1	D_2	D_3	D_4	Supply
S_1	1	2	1	4	30
S_2	3	3	2	1	30
S_3	4	2	5	9	40
Demand	20	40	30	10	

(10 Marks)

5 a. What do you mean by crashing of the project? **(03 Marks)**

b. A department of a company has 5 employees with 5 jobs to be performed. The time in hours that each man takes to perform each job is given in the matrix.

		Employees				
		I	II	III	IV	V
Job	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

How should the jobs be allocated, one per employee, so as to minimize the total man hours? **(07 Marks)**

c. Explain the methodology of operations research. **(10 Marks)**

6 a. What is a simulation model? **(03 Marks)**

b. What is a closed loop in transportation problem? How a closed loop is drawn? Explain. **(07 Marks)**

c. Solve the game whose payoff matrix is given below:

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	3	2	4	0
	A_2	3	4	2	4
	A_3	4	2	4	0
	A_4	0	4	0	8

(10 Marks)

7 a. What is linear programming? **(03 Marks)**

b. Explain the phases of project management. **(07 Marks)**

c. These are 7 jobs, each of which has to go through machines A and B in the order AB. Processing times in hours are as follows:

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence in which these jobs will minimize the total elapsed time T. Also find T and idle time for machines A and B. **(10 Marks)**

8 The following network diagram represents activities associated with a project:

Activities	A	B	C	D	E	F	G	H	I
Optimistic time, t_o	5	18	26	16	15	6	7	7	3
Pessimistic time t_p	10	22	40	20	25	12	12	9	5
Most likely time, t_m	8	20	33	18	20	9	10	8	4

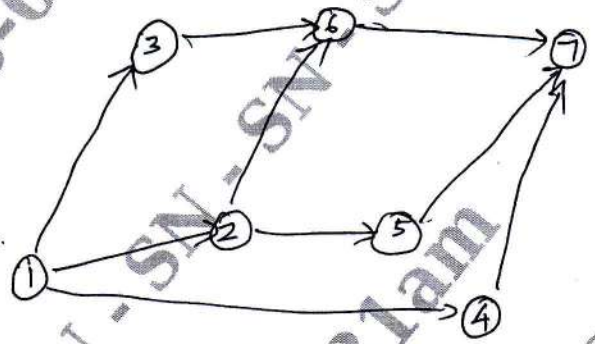

Fig.Q8

Determine the following:

(i) Expected completion time and variance of each activity.
(ii) The earliest and latest expected completion times of each event.
(iii) Critical path.
(iv) The probability of expected completion time of the project if the original scheduled time of completing the project is 41.5 weeks.
(v) The duration of the project that will have 95% chance of being completed. **(20 Marks)**

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