CBCS SCHEME

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20MBA24

Second Semester MBA Degree Examination, Dec.2023/Jan.2024
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.***
3. ***Use of Statistical Table is permitted.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. What is Job Sequencing? **(03 Marks)**

b. Discuss the scope, advantages and limitations of Operation Research. **(07 Marks)**

c. Solve the following assignment model problem to find maximum profit :

Jobs	Machines				
	A	B	C	D	E
1	6	2	5	3	6
2	2	5	8	7	7
3	9	3	5	4	6
4	4	7	6	8	5

(10 Marks)

2 a. What do you mean by Quantitative approach to decision making models? **(03 Marks)**

b. Explain the steps involved in the process of simulation models. **(07 Marks)**

c. Solve the following LPP graphically :
Minimize $Z = 200x_1 + 400x_2$
Subjected to constraints $x_1 + x_2 \geq 200$
$x_1 + 3x_2 \geq 400$
$x_1 + 2x_2 \leq 350$
$x_1 , x_2 \geq 0.$ **(10 Marks)**

3 a. What are 2 – Person zero sum games? **(03 Marks)**

b. Write the general structure of transportation and explain the procedure to find IBFS by North – West Corner Method. **(07 Marks)**

c. A Company manufactures around 200 bikes depending on various factors, the daily production has been varying from 196 to 204 bikes, whose probability distribution is as given below :

Production / day	196	197	198	199	200	201	202	203	204
Probability	0.05	0.09	0.12	0.14	0.2	0.15	0.11	0.08	0.06

The truck transporting bikes can accommodate 200 bikes. Simulate the process to find out :
i) What will the average number of bikes, waiting in the factory?
ii) What will be the average number of empty spaces in the truck?
Run the simulation for 15 days using the random numbers – 82, 89, 78, 24, 53, 61, 18, 45, 04, 23, 50, 77, 27, 54, 10. **(10 Marks)**

4 a. What do you mean by degeneracy in transportation problem? **(03 Marks)**

b. Explain the concept of decision tree analysis with an example. **(07 Marks)**

c. Solve the following game : **(10 Marks)**

Player B

Player A	Strategies	B1	B2	B3	B4	B5
	A1	2	2	1	-2	-3
	A2	4	3	4	-2	0
	A3	5	1	3	3	3

5 a. What do you mean by crashing in Project Management? **(03 Marks)**

b. Explain the concept of job sequencing and elucidate the steps involved in sequencing 2 jobs on m – machines. **(07 Marks)**

c. For the following transportation problem , find IBFS by VAM. The matrix provides the details of Unit profits for a combination of origin and destination. **(10 Marks)**

Factories		M1	M2	M3	Supply
	F1	8	10	10	152
	F2	9	9	11	164
	F3	8	12	12	154
	Demand	144	204	82	

6 a. Write the structure of LPP and mention the components of LPP. **(03 Marks)**

b. Explain the concept of decision making under uncertainty. **(07 Marks)**

c. Draw the network diagram and find the critical path for following activities : **(10 Marks)**

Activity	A	B	C	D	E	F	G	H	I	J	K
Duration (Days)	13	8	10	9	11	10	8	6	7	14	18
Predecessor	-	A	B	C	B	E	D,F	E	H	G,I	J

7 a. What is Simulation? **(03 Marks)**

b. Two nutrients P and Q are found in two different foods F_1 and F_2. One unit of food F_1 contains 2 units of P and 5 units of Q. One unit of F_2 contains 4 units of P and 2 units of Q. One unit of F_1 and F_2 costs Rs 30 and Rs 25 respectively. It is estimated that a normal human being requires 40 units of P and 25 units of Q per day. Formulate this as LPP. **(07 Marks)**

c. Solve the following game graphically : **(10 Marks)**

Player B strategies

Player A strategies

$$\begin{array}{c} \\ A_1 \\ A_2 \end{array} \begin{array}{c} \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\ \begin{bmatrix} 8 & 4 & -2 \\ -2 & -1 & 3 \end{bmatrix} \end{array}$$

8 **CASE STUDY (Compulsory) :**

A project consisting of eight activities has the following characteristics. The table provides the precedence relationship of activities with three time estimates. Time schedules are in weeks.

Activity	Predecessor	Optimistic Time	Pessimistic Time	Most likely Time
A	-	2	12	4
B	-	10	26	12
C	A	8	10	9
D	A	10	20	15
E	A	7	11	7.5
F	B, C	9	9	9
G	D	3	7	3.5
H	E, F, G	5	5	5

Questions :

a. Draw the Network diagram. **(09 Marks)**
b. Determine the critical path. **(02 Marks)**
c. Calculate the project variance and project standard deviation. **(05 Marks)**
d. What is the probability that the project is completed within 30 weeks? **(04 Marks)**

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