

Day : Thursday  
Date : 03-02-2022

W-22858-2021

Time : 02:00 PM-04:00 PM  
Max. Marks: 50

N.B.

- 1) Attempt any **THREE** questions from Section I and attempt any **TWO** questions from Section II.
- 2) Both the Sections should be written in the **SAME** answer book.
- 3) Figures to the right indicate full marks

SECTION-I

- Q.1** A house wife wishes to mix two types of food F1 and F2 in such a way that the vitamin contents of the mixture contain at least 8 units of vitamin A and 11 units of vitamin B. Food F1 costs Rs. 60/Kg and Food F2 costs Rs. 80/kg. Food F1 contains 3 units/kg of vitamin A and 5 units/kg of vitamin B while Food F2 contains 4 units/kg of vitamin A and 2 units/kg of vitamin B. Formulate this problem as a linear programming problem to minimize the cost of the mixtures. (10)

- Q.2** Determine an initial basic feasible solution of the following transportation problem by using Vogel's Approximation Method (VAM). (10)

		Destination				Supply
		D1	D2	D3	D4	
Source	S1	21	16	15	3	11
	S2	17	18	14	23	13
	S3	32	27	18	41	19
	Demand	6	6	8	23	

- Q.3** A computer centre has four expert programmers and needs to develop four application programmes. The head of the computer centre, estimates the computer time (in minutes) required by the respective experts to develop the application programmes as follows: (10)

		Programmes			
		A	B	C	D
Programmers	1	120	100	80	90
	2	80	90	110	70
	3	110	140	120	100
	4	90	90	80	90

Find the assignment pattern that minimises the time required to develop the application programmes.

- Q.4** Construct a network diagram and find Critical Path for the following data. **(10)**

<b>Activity</b>	<b>Immediate Predecessor</b>	<b>Duration</b>
A	-	3
B	-	5
C	B	3
D	A, C	4
E	D	8
F	C	2
G	F	4
H	F	2
I	B	5
J	H, E, G	3

- Q.5** Write short Notes (Any TWO) **(10)**

- a) Applications of Transportation Problems in Business
- b) Phases of Operations Research
- c) Program Evaluation and Review Technique (PERT)

#### SECTION- II

- Q.6** A toy company produces inexpensive tables and chairs. The production process for each is similar in that both require a certain number of hours of carpentry work and a certain number of labour hours in the painting department. Each table takes 4 hours of carpentry and 2 hours in the painting department. Each chair requires 3 hours of carpentry and 1 hour in the painting department. During the current production period, 240 hours of carpentry time are available and 100 hours in painting is available. Each table sold yields a profit of Rs. 70; each chair produced is sold for a Rs. 50 profit. Find the best combination of tables and chairs to manufacture in order to reach the maximum profit. **(10)**

- Q.7** A company has factories at F1, F2, and F3 that supply products to warehouses at W1, W2 and W3. The weekly capacities of the factories are 200, 160 and 90 units, respectively. The weekly warehouse requirements are 180, 120 and 150 units, respectively. The unit shipping costs (in rupees) are as follows: **(10)**

		<b>Warehouse</b>			
		W1	W2	W3	Supply
<b>Factory</b>	F1	16	20	12	200
	F2	14	8	18	160
	F3	26	24	16	90
	Demand	180	120	150	

Determine the Optimal Distribution for this company in order to minimize its total shipping cost.

- Q.8** The Bakery Shop keeps stock of a popular brand of cake. Previous experience shows the daily demand as given below: **(10)**

<b>Daily demand</b>	<b>Probability</b>
0	0.01
15	0.15
25	0.20
35	0.50
45	0.12
50	0.02

Consider the following sequence of random numbers:  
21, 27, 47, 54, 60, 39, 43, 91, 25, 20

Using this sequence, simulate the demand for the next 10 days. Find out the stock situation, if the owner of the bakery shop decides to make 30 cakes every day. Also estimate the daily average demand for the cakes on the basis of simulated data.

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