Day : Saturday

Time : 10:00 AM-01:00 PM

Date : 10/12/2022

W-15412-2022

Max. Marks : 60

N.B.:
1. Attempt Any Three Questions from Section – I. Each Question carries 10 marks.
2. Attempt Any Two Questions from Section – II. Each Question carries 15 marks.
3. Both the sections should be written in the Same answer book.
4. Use of non – programmable calculator is allowed.
5. Allowed to use graph paper wherever necessary.

Section – I

Q. 1

Find solution using graphical method.

MAX z = 10x1 + 6x2

subject to

$5x1 + 3x2 \le 30$

$x1 + 2x2 \le 18$

and $x1, x2 \ge 0$

Q. 2

Find an initial basic feasible solution for given transportation problem by using Vogel's approximation method

	D₁	D₂	D₃	D₄	Supply
S₁	11	13	17	14	250
S₂	16	18	14	10	300
S₃	21	24	13	10	400
Demand	200	225	275	250	

Q. 3

A department has five employees with five jobs to be performed. The time (in hours) each men will take to perform each job is given in the effectiveness matrix.

		Employees			
		I	II	III	IV
Jobs	A	11	17	8	16
	B	9	7	12	6
	C	13	16	15	12
	D	14	10	12	11

How should the jobs be allocated, one per employee, so as to minimize the total man-hours?

Q. 4

A tyre shop keeps stock of particular brand of tyres. Previous experience indicates the daily demand as given below.

Demand/Day	0	10	20	30	40	50
Probability	0.01	0.15	0.20	0.50	0.12	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. Also estimate the average demand for the tyres on the basis of simulated data.

Q. 5 Write short Notes (Any Two)

a) Significance of Operations Research

b) Applications of Operations Research

c) Floats

Section – II

Q. 6
A company owns two flour mills A and B, which have different production capacities for high, medium and low quality flour. The company has entered a contract to supply flour to a firm every month with at least 8, 12 and 24 quintals of high, medium and low quality respectively. It costs the company Rs 2000 and Rs 1500 per day to run mill A and B respectively. In one day, Mill A produces 6, 2 and 4 quintals of high, medium and low quality flour respectively, Mill B produces 2, 4 and 12 quintals of high, medium and low quality flour respectively. Formulate the linear programming model to minimize the cost.

Q. 7

Four factories, A, B, C and D produce sugar and the capacity of each factory is given below:
Factory A produces 10 tons of sugar and B produces 8 tons of sugar, C produces 5 tons of sugar and that of D is 6 tons of sugar. The sugar has demand in three markets X, Y and Z. The demand of market X is 7 tons, that of market Y is 12 tons and the demand of market Z is 4 tons. The following matrix gives the transportation cost of 1 ton of sugar from each factory to the destinations. Find the Optimal Solution for least cost transportation cost.

	X	Y	Z	Availability
A	4	3	2	10
B	5	6	1	8
C	6	4	3	5
D	3	5	4	6
Requirement	7	12	4	

Q.8

An established company has decided to add a new product to its line. It will buy the product from a manufacturing concern, package it, and sell it to a number of distributors that have been selected on a geographical basis. Market research has already indicated the volume expected and the size of sales force required. The steps shown in the following table are to be planned.

Activity	Predecessor Activity	Duration (days)
A	-	14
B	A	4
C	B	2
D	C	1
E	A	2
F	E	3
G	E	2
H	E	4
I	H,L	3
J	K	12
K	D,F,G	4
L	J	2
M	H,L	2

(a) Draw an arrow diagram for the project.
(b) Indicate the critical path.

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