DEPARTMENT OF MATHEMATICS
TEST EXAMINATION 2020
PAPER-III

F.M:-80   TIME:-2 H 30 MIN

Group-A

A. Answer any four questions. $1 \times 4 = 4$

1. Define a convex set.

2. If any variable of the primal problem be unrestricted in sign then what will be the nature of the corresponding dual constraint?

3. when a slack variable is introduced in a L.P.P?

4. What is a pay off matrix?

5. When an unbounded solution occur in an simplex problem?

B. Answer any three question. $2 \times 3 = 6$

1. Prove that hyperplane is a convex set.

2. Determine I.B.F.S to the following T.P using matrix minima method

	D_1	D_2	D_3	D_4	
O_1	5	3	6	2	19
O_2	4	7	9	1	37
O_3	3	4	7	5	34
	16	18	31	25	

3. Write down the dual of the following problem:

$$\text{Minimize } z = 30x_1 + 36x_2$$

Subject to,

$$x_1 + x_2 \geq 5$$
$$2x_1 + 3x_2 \geq 2$$
$$-2x_1 + x_2 \geq 2, \; x_1, x_2 \geq 0$$

4. Solve the following game by maxmin minimax principle:

Player B

		B_1	B_2	B_3
	A_1	4	-2	1
Player A	A_2	3	4	2
	A_3	-3	4	0

C. Answer any five questions: $6 \times 5 = 30$

1. $x_1 = 1, x_2 = 2, x_3 = 1$ is a feasible solution of the following set of linearly independent equations.

$$2x_1 + 3x_2 + 5x_3 = 13$$
$$3x_1 - x_2 + 3x_3 = 4$$

Reduce the F.S. to a B.F.S.

2. Solve by graphical method the following problem:

$$\text{Maximize } z = 4x_1 + 3x_2$$

Subject to,

$$3x_1 + 4x_2 \leq 12$$
$$2x_1 + 5x_2 \leq 10$$
$$x_1 + x_2 \geq 1, \; x_1, x_2 \geq 0$$

3. Solve the following problem by Big- M method:

Maximize $z = 3x_1 + 5x_2$

Subject to,

$x_1 + 2x_2 \geq 8$

$3x_1 + 2x_2 \geq 12$

$5x_1 + 6x_2 \leq 60, x_1, x_2 \geq 0$

4. Solve the following problem by two phase method:

Maximize $z = 4x_1 + x_2$

Subject to,

$x_1 + 2x_2 \leq 3$

$4x_1 + 3x_2 \leq 6$

$3x_1 + x_2 = 3, x_1, x_2 \geq 0$

5. Determine the B.F.S of the following unbounded transportation problem:

	D_1	D_2	D_3	D_4	
O_1	14	19	11	20	10
O_2	19	12	14	17	15
O_3	14	16	11	18	12
	8	12	16	14	

6. find the optimal assignment cost of the following cost matrix:

	A	B	C	D
I	9	12	10	10
II	5	12	7	9
III	4	6	7	8
	8	4	5	5

7. Prove that in a linear programming problem dual of dual is primal itself.

D. Answer any one question. $10 \times 1 = 10$

1. i) Solve the following game using mixed stratigies.

Player B

		B_1	B_2
Player A	A_1	4	-1
	A_2	-2	3

ii) Solve the following 2×4 game by graphical method

Player B

		B_1	B_2	B_3	B_4
Player A	A_1	2	2	3	-1
	A_2	4	3	2	6

2. i) Solve the following game using mixed stratigies.

Player B

		B_1	B_2
Player A	A_1	2	3
	A_2	4	-1

ii) Solve the following 2×4 game by graphical method

Player B

		B_1	B_2	B_3	B_4
Player A	A_1	3	2	-1	4
	A_2	2	5	6	-2

Group-B

A. Answer any four questions. $1 \times 4 = 4$

1. State Baye's theorem.

2. Find the mode of the following data: 2,5,98,6,57,34,2,7, 6,5,5,87

3. What is frequency polygon?

4. If $Var(X) = 5$ then find $Var(2X + 3)$

5. Find the mean deviation of the numbers 3,4,5,6,7 about the mean.

B. Answer any three question. $2 \times 3 = 6$

1. If $P(A) = \frac{1}{4}, P(B) = \frac{2}{5}$ and $P(A \cup B) = \frac{1}{2}$ then find $P(A \cap B^c)$.

2. The standard deviation of a set of 30 items is 9.5. find the standard deviation if every term is decreased by 5.

3. Draw a pie chart to represent the daily production expenditure of a factory given below:

Raw material expenditure	20000
Expenditure on wages	30000
Direct expenditure	15000
Extra expenditure	25000

4. Prove that $Var(X) = E(X^2) - \{E(X)\}^2$.

C. Answer any four questions: $5 \times 4 = 20$

1. The mean and S.D of 20 items were found to be 12 and 6 respectively. On checking it was discovered that items which should correctly read as 11 and 21 had been wrongly taken as 15 and 27 respectively. Find the correct values of mean and S.D.

2. Find the S.D of the following frequency distribution:

Weekly wages	141-150	151-160	161-170	171-180	181-190	191-200	201-210
No of workers	5	8	15	25	20	17	10

3. Find the median of the following frequency distribution:

Marks	0-10	10-30	30-60	60-70	70-90
No of distribution.	14	25	30	5	10

4. Find the correlation coefficient and the line of regression of the following data:

X	21	22	23	24	25	26	27
Y	16	15	17	18	19	20	21

5. Find the coefficient of skewness of the following data:

Range	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	6	11	21	35	30	22	11