

R2BM423

FYBBI
sem II

Duration: 2½ hrs.

Marks: 75

Q M
maths

12 April

Note:

1. All questions are compulsory
2. Figures to the right indicate full marks.
3. Use of simple calculator is allowed.

Q.1 (A) Fill in the blanks with the correct alternative (any eight):

08

1. A matrix of order $1 \times n$ is called a _____ matrix.
a. Unit b. row c. column d. square
2. Matrix whose no. of rows = no. of columns is called _____ matrix.
a. equal b. equivalent c. square d. transpose
3. If $|A| \neq 0$, then A is called _____ matrix.
a. singular b. non-singular c. triangular d. symmetric
4. Inverse ratio of 2:3 is _____
a. 3:2 b. 1:6 c. 6:1 d. 4:9
5. Ratio equivalent to 4:3 is _____
a. 12:9 b. 16:9 c. 8:9 d. 16:12
6. Order of matrix $A = \begin{bmatrix} 5 & 4 & 2 \\ 6 & 4 & 5 \end{bmatrix}$ is:
a. 2×2 b. 2×3 c. 3×2 d. 3×3
7. 15% of 1475 is _____
a. 212.25 b. 221.25 c. 122.25 d. 112.25
8. For the constraints containing sign \leq , area _____ the line is shaded.
a. below b. above c. middle d. on
9. In LPP $x_1, x_2 \geq 0$ is called _____ constraint.
a. negativity b. positivity c. non-negativity d. non-positivity
10. If we reject the null hypothesis when it is actually true, then the error is called _____.
a. Type I b. Type II c. Type III d. Type IV

Q.1 (B) State whether the following statements are true or false: (any seven)

07

1. A redundant constraint does not affect the feasible region.
2. The triplicate ration of 1:2 is 1:8
3. Percentage of fraction $\frac{3}{4}$ is 25%
4. Determinant of a non-singular matrix is always Zero.
5. For matrices A and B, $AB=BA$ always.
6. Determinant of a matrix exists if it is a square matrix.
7. A diagonal matrix is always a square matrix.

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8. Alternate hypothesis is denoted as H_0 .
9. Addition of matrices with different order is not possible.
10. Two matrices can be multiplied only if their orders are same.

Q.2 A. A manufacturer produces two types of steel trunks. He has two machines A and B. The first type of trunk requires 5 hours on machine A and 3 hours on machine B. The second type of the trunk requires 3 hours on machine A and 2 hours on machine B. Machine A and B can work at most for 24 hours and 15 hours per day respectively. He earns a profit of Rs.30 and Rs.25 per trunk of the first type and the second type respectively. Formulate the LPP to make the maximum profit. 08

B. Solve the given linear programming problem graphically: 07

Minimize: $Z = 20x + 10y$

Subject to:

$$x + 2y \leq 40,$$

$$3x + y \geq 30,$$

$$4x + 3y \geq 60,$$

$$x \geq 0, y \geq 0$$

OR

C. Solve the given linear programming problems graphically: 08

Maximize: $Z = 8x + y$

Subject to:

$$x + y \leq 40,$$

$$2x + y \leq 60,$$

$$x \geq 0, y \geq 0$$

D. A company manufactures two types of fertilizers, a liquid and a dry. The liquid fertilizer contains 2 units of chemical A and 4 units of chemical B per jar. Dry fertilizer contains 3 units of chemical A and 3 units of chemical B per jar. The cost of liquid and dry fertilizer per jar are Rs.3 and Rs.4 respectively. A farmer requires at least 90 units of chemical A and at least 120 units of chemical B. Formulate the problem as LPP to minimize the cost. 07

Q.3 A. Tejas, Rugved and Renuka invested Rs. 70,000, Rs.50,000 and Rs.80,000 respectively in a business. At the end of the year profit was Rs.40,000, which was distributed among them in proportion to their capitals. What was each partner's share of profit? 08

B. If $A = \begin{bmatrix} 2 & 3 & 5 \\ 4 & 6 & 4 \\ 1 & 3 & 2 \end{bmatrix}$, find $A^2 - 8A$ 07

OR

C. If $A = \begin{bmatrix} 3 & 6 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 \\ 4 & 5 \end{bmatrix}$ show that $A \times B \neq B \times A$. 07

D. i. If 28 marbles are sold for Rs.126, what amount would be charged for 34 marbles? 08

ii. $(x+12)$, $(x+4)$, $(x+5)$ and $(x-1)$ are in proportion. Find x .

Q.4 A. Find the inverse of the matrices given below, if exists. 08

i. $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ **ii.** $B = \begin{bmatrix} 5 & 6 \\ 3 & 4 \end{bmatrix}$

B. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ $B = \begin{bmatrix} -1 & -2 \\ 0 & 2 \end{bmatrix}$ $C = \begin{bmatrix} 0 & 6 \\ 8 & 7 \end{bmatrix}$, verify that $(A \times B) \times C = A \times (B \times C)$ 07

OR

C. Following table shows the probability distribution of a share's return measured in %. Find the expected return of the share. 07

State of the Economy	Probability	Return on Share (%)
Depression	0.2	-10
Recovery	0.4	-3
Prosperity	0.1	20
Recession	0.3	5

D. Find the inverse of the following matrix.

08

$$A = \begin{bmatrix} 2 & 3 & 1 \\ 2 & 4 & 1 \\ 3 & 7 & 2 \end{bmatrix}$$

Q.5 A. Write the steps involved in Graphical method of LPP.

07

B. Define the following:

08

- i. Square matrix
- ii. Triplicate ratio
- iii. Unit matrix
- iv. Duplicate ratio

OR

C. Attempt any Three:

15

1. Write a short note on Sampling.
2. Write a short note on Hypothesis.
3. Write a short note on Single index model.
4. Explain Expected value and variance.
5. Explain Covariance and correlation.
