[5801] - 204
F.Y. B.Com.
124A : BUSINESS MATHEMATICS & STATISTICS - II
(CBCS 2019 Pattern) (Semester-II)

Time : 2½ Hours]   *[Max. Marks : 70*
Instructions to the candidates:
    1)   *All questions are compulsory.*
    2)   *Use of simple calculator is allowed.*
    3)   *Figures to the right indicate full marks.*

Q1) A)   Fill in the blanks: (any 5)   **[5]**

    a)   Transpose of a rectangular matrices is a _____
        (rectangular matrices, diagonal matrices, square matrices)

    b)   Linear programming model which involves funds allocation of limited investment is classified as _____
        (ordination budgeting model, capital budgeting, fund investment models)

    c)   In simple linear regression the numbers of unknown constants are _____
        (One, Two, Three)

    d)   Index numbers are expressed in _____
        (ratios, squares, percentages)

    e)   An Index number is used _____
        (To measures change in policies, To measures change in environment, To measures change in variables over a period of time)

    f)   Regression analysis _____
        (measures time, establishes cause and effects, measures efficiency)

B)   State the following statements are 'True' or 'False': (any five)   **[5]**

    a)   The term "determinant" and "matrices" have the same meaning.

    b)   The following constraints are linear $x + 2y \leq 20$ and $2x + y \leq 40$.

    c)   One can always find the determinant of a Matrix.

    d)   Correlation measures the strength of the association between two variables.

    e)   There are no limitations of Index number.

    f)   Index number is an economic barometer.

Q2) Solve any three from the following. **[15]**

a) Write down the matrices of the following sets of equations. State their orders.

   i) $x + 2y - z = 2$

   $2x - 5y + 6z = 3$

   ii) $x + z = 4$

   $x + y + z = 6$

   $2y + z = 5$

b) Two different kinds of foods A and B are being considered to form a weekly diet. The minimum weekly requirements of fats, carbohydrates and proteins are 18, 24 and 24 units respectively. One kg of food A contains 4, 16 and 8 units of fats, carbohydrates and proteins respectively. One kg of food B contains 12, 4 and 6 units of fats, carbohydrates and proteins respectively. The prices of food A is ₹4 per kg and that of B is ₹3 per kg. Find the quantity food A and B to be purchased so that the total cost is minimum and the requirement is fullfilled.

   Formulate the problem as L.P.P.

c) Calculate Price Index numbers for the following data for the year 2019 taking 2018 as base year as per Laspeyre's Index number.

Commodity	Year 2018		Year 2019	
	Price	Quantity	Price	Quantity
A	20	8	40	6
B	50	10	60	5
C	40	15	50	10
D	20	20	20	15

d) What is the meaning of 'Matrices'? Explain the types of Matrices.

e) What is the meaning of 'Correlation'? State the methods to measure correlation.

Q3) Solve any three from the following. **[15]**

a) Evaluate the following Determinant

   Let $D = \begin{vmatrix} 4 & -3 & 2 \\ 1 & 2 & 1 \\ 3 & 1 & -2 \end{vmatrix}$

b) Show that the following L.P.P. by graphical method.

Maximize $Z = 2x + y$

Subject to $x + y \leq 30$

$2x + y \leq 40$

$x, y \geq 0$

c) Calculate the Index number using Fishers method for the following data.

Years	1980		1985	
Commodities	Price	Quantity	Price	Quantity
Rice	3	5	4.5	6
Coconut oil	24	2	18	3
Tea	20	1	35	2
Washing Powder	10	4	16	4
Sugar	3.5	4	6	5

d) Explain the concept of Regression. Discuss the Regression line.

e) Write Note on 'Construction of Index Numbers'.

Q4) Solve any three from the following. **[15]**

a) Find the inverse of following Matrices:

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

b) A small farmer builds two types of garden shed. Type A requires 2 hours of machine time and 5 hours of craftsman time. Type B requires 3 hours of machine time and 5 hours of craftsman time. Each clay there are 60 hours of machine time and 80 hours of craftsman time available. The profit on each type of A shed is ₹160 and each type of B shed is ₹184.

Formulate L.P.P. assuming that all garden sheds are sold.

c) A study of wheat prices at Mumbai and Kanpur yield the following data.

Particulars	Mumbai	Kanpur
Arithmetic Mean	₹ 35	₹ 36
Standard deviation	₹ 0.326	₹ 0.207

Correlation coefficient between the prices at Mumbai and Kanpur is 0.774. Estimate the price at Kanpur if the price at Mumbai is ₹ 40 using the above data.

d) Define the linear programming problems. State the key terms in L.P.P.

e) Explain the concept and use of Price Index Number.

Q5) a) Following are the value of import of raw Material and export of finished product in suitable units. **[10]**

Export	10	11	14	14	20	22	16	12	15	13
Import	12	14	15	16	21	26	21	15	16	14

Calculate the coefficient of correlation between the Import and Export values.

b) Multiplication of Matrices. **[5]**

$$\text{Let } A = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 & -1 \\ 4 & -2 & 5 \end{bmatrix}$$

OR

Given the following data:

Particulars	Marks in Mathematics	Marks in English
Mean	80	50
Standard Deviation	15	10

The correlation coefficient between marks in Mathematics and English is - 0.4.

Estimate the marks in Mathematics obtained by student who scored 60 marks in English.

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