

END TERM EXAMINATION

SECOND SEMESTER [BBA] JULY 2023

Paper Code: BBA-104**Subject: Decision Techniques for Business****Time: 3 Hours****Maximum Marks: 75****Note: Attempt any five questions.**

- Q1 (a) In a group of 1000 wage earners the monthly wages of 4% are below Rs. 60 and those of 15% are under Rs.62.50, 15% earned Rs. 95 and over, and 5% get Rs. 100 and over. Find the median wage. (7)
- (b) The means of two samples of series of 50 and 100 respectively are 54.4 and 50.3 and standard deviations are 8 and 7. Obtain the mean and standard deviations of the sample size 150 obtained by combining the two samples. (8)
- Q2 (a) Determine the median wage graphically from the following data: (7)

| Wages | No. of workers | Wages | No. of workers |
|-----------|----------------|-----------|----------------|
| 700-800 | 4 | 1100-1200 | 12 |
| 800-900 | 6 | 1200-1300 | 7 |
| 900-1000 | 10 | 1300-1400 | 3 |
| 1000-1100 | 16 | | |

- (b) For the following data of the frequency of visit of customers in a shop in the month of April, year 2017, starting from 1st to 30th (Row wise), (8)

| | | | | |
|---|---|---|---|---|
| 3 | 4 | 1 | 4 | 4 |
| 4 | 2 | 3 | 4 | 4 |
| 5 | 9 | 4 | 2 | 5 |
| 7 | 8 | 7 | 1 | 3 |
| 8 | 6 | 8 | 6 | 6 |
| 9 | 9 | 9 | 5 | 5 |

- (i) Draw a frequency table and find the dates on which customer are more frequent.
- (ii) Find the average number of visit in this month.
- (iii) Which of the week showing more favorable visit for the customers?
- Q3 (a) Prove that the Standard deviation is independent of any change of origin but is dependent on the change of scale. (7)
- (b) Find the standard deviation and coefficient of variation from the following data: (8)

| Wages | No. of workers | Wages | No. of workers |
|---------------|----------------|---------------|----------------|
| Up to Rs. 110 | 12 | Up to Rs. 150 | 157 |
| Up to Rs. 120 | 30 | Up to Rs. 160 | 202 |
| Up to Rs. 130 | 65 | Up to Rs. 170 | 222 |
| Up to Rs. 140 | 107 | Up to Rs. 180 | 230 |

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- Q4 (a) Given standard deviation with respect to data X is 3 and regression equations are: (7)

$$4X - 5Y + 33 = 0,$$

$$20X - 9Y - 107 = 0.$$

- Find
- (a) A.M. of data X
 - (b) A.M. of data Y
 - (c) Standard deviation of data Y
 - (d) Correlation coefficient.

- (b) From the following table, find correlation coefficient between age and playing habit of students: (8)

| | | | | | | |
|-------------------------|-----|-----|-----|-----|-----|----|
| Age (years): | 15 | 16 | 17 | 18 | 19 | 20 |
| No. of students: | 250 | 200 | 150 | 120 | 100 | 80 |
| Regular players: | 200 | 150 | 90 | 48 | 30 | 12 |

- Q5 (a) Define Regression. Why are there two regression lines? Under what conditions can there be only one regression line? (7)
- (b) A consulting firm is preparing a study on consumer behavior. The company collected the following data in thousand rupees to determine whether there is a relationship between consumer income and consumption levels: (8)

| | | | | | | |
|-------------------------|-----|-----|-----|-----|-----|-----|
| Consumer No. | 1 | 2 | 3 | 4 | 5 | 6 |
| Income(Rs.) | 300 | 350 | 320 | 400 | 295 | 315 |
| Consumption(Rs.) | 250 | 275 | 270 | 300 | 269 | 290 |

Calculate correlation coefficient for the above data. Write your comments about the correlation coefficient' value

- Q6 (a) Solve the following LPP by graphical method: (7)
- Minimize $Z = 4x + y$

Subject to the constraints: $3x + y = 3$, $4x + 3y \geq 6$, $x + 2y \leq 4$ and $x, y \geq 0$.

- (b) Write the dual to the following LPP : (8)
- Maximize $Z = 20x_1 + 15x_2 + 18x_3 + 10x_4$
- Subject to the constraints: -

$$4x_1 - 3x_2 + 10x_3 + 4x_4 \leq 60$$

$$x_1 + x_2 + x_3 = 27$$

$$-x_2 + 4x_3 + 7x_4 \geq 35$$

$x_1, x_2, x_3 \geq 0$ and x_4 : unrestricted in sign

- Q7 Maximize $Z = 80x_1 + 60x_2 + 30x_3$ (15)

Subject to constraints: $10x_1 + 4x_2 + 5x_3 \leq 2000$

$$2x_1 + 5x_2 + 4x_3 \leq 1009$$

$$x_1, x_2, x_3, \geq 0$$

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Q8 Given below is a transportation table taken from the solution process for a transportation problem:

| Factories | | Distribution Centres | | | |
|-----------|----|----------------------|--------|--------|---|
| | | 1 | 2 | 3 | 4 |
| A | | | (5000) | | |
| | 10 | 8 | 7 | 12 | |
| B | | | (4500) | (1500) | |
| | 12 | 13 | 6 | 10 | |
| C | | (7000) | (500) | (1500) | |
| | 8 | 10 | 12 | 14 | |

Answer the following questions, giving brief answers: (15)

- (i) Is this solution feasible?
- (ii) Is this solution degenerate?
- (iii) Is this solution optimal? If not, find the optimal solution.
- (iv) Does the problem have alternative optimal solution?

Q9 A company has 4 machines to be assigned to 4 of the 5 workers available for the purpose. The expected production from each machine operated by each worker is given below: (15)

| Machine | Workers | | | | |
|---------|---------|----|----|----|----|
| | A | B | C | D | E |
| I | 40 | 46 | 48 | 36 | 48 |
| II | 48 | 32 | 36 | 29 | 44 |
| III | 49 | 36 | 41 | 38 | 45 |
| IV | 30 | 46 | 49 | 44 | 47 |

Suggest optimum assignment of workers to machines.

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