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## First Semester MBA Degree Examination, July/August 2022

### Business Statistics and Analytics

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FOUR full questions from Q.No.1 to 7.  
2. Q.No. 8 is compulsory.**

- 1 a. Define the terms – “Mean”, “Median” and “Mode”. (03 Marks)  
 b. Calculate Karl Pearson’s coefficient of correlation for the following data:

|           |    |    |    |    |    |    |    |    |    |    |
|-----------|----|----|----|----|----|----|----|----|----|----|
| Age       | 30 | 32 | 35 | 40 | 48 | 50 | 52 | 55 | 57 | 61 |
| Sick Days | 1  | 0  | 2  | 5  | 2  | 4  | 6  | 5  | 7  | 8  |

- c. The daily wages of 1000 workmen are normally distributed with a mean of 70 and standard deviation of 5. Estimate the number of workers whose daily wages will be:  
 i) Between 69 and 72  
 ii) More than 75  
 iii) Between 65 and 68. (10 Marks)

- 2 a. Define time series and state its four components. (03 Marks)  
 b. A company has 3 operational departments (weaving, processing and packing) with capacity to produce 3 different types of clothes namely A, B and C yielding a profit of Rs.2, Rs.4 and Rs.3 respectively per meter. One meter of A requires 3 minutes in weaving, 2 minute in processing and 1 minute in packing. Likewise one meter of B requires 4 minutes in weaving, 3 minutes in processing and 3 minutes in packing. Similarly one meter C requires 4 minutes in weaving, 5 minutes in processing and 1 minute in packing. In a week, total run time in each of the department is 60, 40 and 80 hours for weaving, processing and packing formulate LPP to maximize the profit. (07 Marks)

- c. The table below shows motor registrations in a certain territory and sale of motor tyres for that period. Estimate the sale of tyres when the motor registrations are known to be 850 using the relevant line of regression. (10 Marks)

|                      |      |      |      |      |      |
|----------------------|------|------|------|------|------|
| Motor registrations  | 600  | 630  | 720  | 750  | 800  |
| Number of tyres sold | 1250 | 1100 | 1300 | 1350 | 1500 |

- 3 a. List the conditions for Binomial distribution to occur and write the formula (p.m.f.) in this distribution. (03 Marks)  
 b. Fit a straight line trend for the following data by the method of least squares and predict the value for the year 2020.

|               |      |      |      |      |      |      |      |      |
|---------------|------|------|------|------|------|------|------|------|
| Year :        | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Sales value : | 38   | 40   | 65   | 72   | 69   | 60   | 87   | 95   |

- c. For the following data, calculate Spearman’s Rank correlation after making adjustment for tied ranks:

|   |    |    |    |   |    |    |    |    |    |    |
|---|----|----|----|---|----|----|----|----|----|----|
| X | 48 | 33 | 40 | 9 | 16 | 16 | 65 | 24 | 16 | 57 |
| Y | 13 | 13 | 24 | 6 | 15 | 4  | 20 | 9  | 6  | 19 |

(10 Marks)

- 4 a. Differentiate between positive correlation and negative correlation. (03 Marks)  
 b. Between hours 2pm and 4pm, the average number of phone calls per minute coming into the switch board of a company is 2.35. Find the probability that during one particular minute, there will be at-least 2 phone calls. (07 Marks)  
 c. From prices of shares of X and Y given, find which is more stable in value:

|   |     |     |     |     |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| X | 35  | 54  | 52  | 53  | 56  | 58  | 52  | 50  | 51  | 49  |
| Y | 108 | 107 | 105 | 105 | 106 | 107 | 104 | 103 | 104 | 101 |

(10 Marks)

- 5 a. List any 3 differences between PERT and CPM. (03 Marks)  
 b. Define statistics. List the functions and limitations of statistics. (07 Marks)  
 c. Calculate seasonal indices by "ratio to moving average" method for the following data: (10 Marks)

| Year | Quarters |    |     |    |
|------|----------|----|-----|----|
|      | I        | II | III | IV |
| 2015 | 75       | 60 | 54  | 59 |
| 2016 | 86       | 65 | 62  | 80 |
| 2017 | 90       | 72 | 66  | 85 |
| 2018 | 100      | 78 | 72  | 93 |

- 6 a. Define linear programming. (03 Marks)  
 b. Find the values of mean, median and mode for the following data:

|     |       |        |         |         |         |         |         |         |
|-----|-------|--------|---------|---------|---------|---------|---------|---------|
| C-I | 93-97 | 98-102 | 103-107 | 108-112 | 113-117 | 118-122 | 123-127 | 128-132 |
| F   | 3     | 5      | 12      | 17      | 14      | 6       | 3       | 1       |

(07 Marks)

- c. Solve the following LPP graphically:

$$\text{Maximize } Z = 5x_1 + 7x_2$$

$$\text{Subject to } x_1 + x_2 \leq 4$$

$$3x_1 + 8x_2 \leq 24$$

$$10x_1 + 7x_2 \leq 35$$

$$x_1, x_2 \geq 0.$$

(10 Marks)

- 7 a. What is Dangling? (03 Marks)  
 b. Draw the network and find the critical path (arrow diagram) and the time taken to complete the following project:

|                 |   |   |   |      |      |         |         |
|-----------------|---|---|---|------|------|---------|---------|
| Activity        | A | B | C | D    | E    | F       | G       |
| Predecessor     | - | - | - | A, B | A, B | C, D, E | C, D, E |
| Duration (days) | 4 | 7 | 6 | 5    | 7    | 6       | 5       |

(07 Marks)

- c. A small project comprises 7 activities whose time estimates are listed below (time in weeks):

|       |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|
| Jobs  | 1-2 | 1-3 | 1-4 | 2-5 | 3-5 | 4-6 | 5-6 |
| $t_o$ | 1   | 1   | 2   | 1   | 2   | 2   | 3   |
| $t_m$ | 1   | 4   | 2   | 1   | 5   | 5   | 6   |
| $t_p$ | 7   | 7   | 8   | 1   | 14  | 8   | 15  |

- i) Draw project network, determine critical path and compute the expected project completion time.  
 ii) What is the probability that project will be completed in not more than 4 weeks later than expected time? (10 Marks)



- 8 Solve the following transportation problem using
- VAM for the IBFS
  - LCM for the IBFS.

|           |   | Market |    |    |    |
|-----------|---|--------|----|----|----|
|           |   | A      | B  | C  | D  |
| Warehouse | X | 12     | 18 | 6  | 25 |
|           | Y | 8      | 7  | 10 | 18 |
|           | Z | 14     | 3  | 11 | 20 |

Activity in warehouse : X = 200 units

Y = 500 units

Z = 300 units

Demand in Market: A = 180, B = 320, C = 100, D = 400.

(20 Marks)

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