



## BRAINWARE UNIVERSITY

Course – M.Com.

**Statistics & Mathematics for Business Research (MCM 103)**

(Semester – 1)

**Time allotted: 3 Hours**

**Full Marks : 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

### Group-A (Multiple Choice Questions)

**A) Choose the correct answer from the given alternatives of the following:**

A family consisting of five members is sitting on a bench. Arun is sitting next to Anita and Sunder is next to Bimla. Bimla is not sitting with Mohan. Mohan is on the left end of the bench and Sunder is on second position from the right hand side. Arun is on the right side of Anita and on the right side of Mohan. Arun and Sunder are sitting together.

- 1) Arun is sitting between
  - a) Arun & Bimla
  - b) Mohan & Bimla
  - c) Anita & Sunder
  - d) Sunder & Mohan
  
- 2) Mohan is sitting on the
  - a) extreme left
  - b) second place from the right
  - c) second place from the left
  - d) extreme right
  
- 3) Sunder is sitting between
  - a) Arun and Bimla
  - b) Arun & Mohan
  - c) Anita & Bimla
  - d) Mohan & Bimla
  
- 4) Who is sitting in the centre
  - a) Mohan
  - b) Arun
  - c) Sunder
  - d) Anita

- 5) Bimla is sitting on  
 a) extreme left side  
 b) second from the left side  
 c) third from the left side  
 d) extreme right side
- 6) The value of Spearman's rank correlation coefficient lies between  
 a) 0 and 1  
 b) 3 and -3  
 c) 1 and -1  
 d) None of these
- 7) Which of the following components is used for short-term forecast?  
 a) Cyclical  
 b) Trend  
 c) Seasonal  
 d) None of these
- 8) Which of the following components is used for long-term forecast?  
 a) Cyclical  
 b) Trend  
 c) Seasonal  
 d) None of these
- 9) Which of the following relationships is not correct ?  
 a)  $HM > GM < AM$     b)  $GM = AM + HM/2$     c)  $HM = (GM)^2 / AM$     d)  $HM < GM < AM$ .
- 10) Mode of 15, 12, 5, 13, 12, 15, 8, 8, 9, 9, 10, 15 is  
 a) 15                                      b) 12                                      c) 8                                      d) 9

**Group – B**  
**(Short Answer Type Question)**  
**Answer any three questions**

**3 x 5 = 15**

- 1) IF  $f(x) = a(x-b/a-b) + b(x-a/b-a)$ , show that  $f(a) + f(b) = f(a+b)$
- 2) Find the sum of the following series  $17+14+11$ ---to 20 terms
- 3) Differentiate with respect to  $x$  :  $y = \sin(\log x) + e^x + 5x^5 + 8$
- 4) The mean age of a combined group of men and women is 30 years. If the mean age of the group of men is 32 and that of the group of women is 27, find the percentage of men and women in that group.
- 5) If there are two variables in the observations prove that  $AM \cdot HM = GM^2$

**Group – C**  
**(Long Answer Type Question)**  
**Answer any three questions**

**3 x 15 = 45**

1) Study the following table to answer the questions

Expenditure of a company (in lakhs of rupees per annum over the given years)  
 (each answer carries 3 marks)

Item of Expenditure	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

A) The ratio between the total expenditure on Taxes for all the years and the total expenditure on fuel and transport for all the years respectively is approximately

i) 4:7 ii) 10:13 iii) 15:18 iv) 5:8

B) The total expenditure of the company over these items during the year 2000 is

i) Rs 544.44 lakhs ii) Rs 501.11lakhs iii) Rs 446.46lakhs iv) Rs 478.87lakhs

C) What is the average amount of interest per year which the company has to pay during this period?

i) 32.43 lakhs ii) 33.72lakhs iii) 43.18 lakhs iv) 36.66 lakhs

D) Total expenditure on these items in 1998 was approximately what percentage of the total expenditure in 2002?

i) 62% ii) 66% iii) 69% iv) 71%

E) The total amount of bonus paid by the company during the given period is approximately what per cent of the total amount of salary paid during this period?

i) 0.1% ii) 0.5% iii) 1% iv) 1.25%

2)

(5x3=15)

a) IF  $\psi(x) = \sqrt{2x^2 + 5x - 3}$  find  $\psi(1/2)$   $\psi(1)$   $\psi(-2)$

b) IF  $f(x) = a(x-b/a-b) + b(x-a/b-a)$ , show that  $f(a) + f(b) = f(a+b)$

c) If the fifth term of an AP is 30 and the twelfth term 65, find the sum of first 20 terms.

3) (5x3=15)

- a) Differentiate with respect to  $x$  :  $y = 3x^3 - 4x^2 - 8x + 5$
- b) The sum of three numbers in AP is 12 and the sum of their squares is 56 : find the numbers
- c) Find the Maxima and the Minima for the following functions: a)  $f(x) = 2x^3 + 3x^2 - 36x + 10$

4) a) The finish times for marathon runners during a race are normally distributed with a mean of 195 minutes and a standard deviation of 25 minutes.

- i) What is the probability that a runner will complete the marathon within 3 hours?
- ii) What proportion of the runners will complete the marathon between 3 hours and 4 hours?

b) What is Sampling? Discuss different types of probability sampling techniques. (8+7)

5) a) What is Time Series? Discuss the components of time series with suitable examples. (8+7)

b) From the following data calculate the 4-yearly moving average and determine the trend values.

Year	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Value	50	36.5	43	44.5	38.9	38.1	32.6	41.7	41.1	33.8