BRAINWARE UNIVERSITY
Course – MBA
Business Mathematics & Statistics (MBA 105)
(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)

Choose the correct answer from the following alternatives: **(10x1=10)**

1. The mean of 25 observations is 36. The mean of first 13 observations is 32 and that of last 13 observations is 39. What is the value of 13th observation?
   a. 20   b. 23   c. 32   d. 40

2. Which of the following provides a measure of central location for the data?

   a. standard deviation
   b. mean
   c. variance
   d. range

3. The hourly wages of a sample of 130 system analysts are given below.

   mean = 60   range = 20   mode = 73   variance = 324   median = 74

   The coefficient of variation equals
   a. 0.30%
   b. 30%
   c. 5.4%
   d. 54%

4. The variance of a sample of 169 observations equals 576. The standard deviation of the sample equals
   a.   13
   b.   24
   c.   576
   d.   28,461

5. If the Pearson correlation co-efficient R is equal to 1 then:
   a. There is a positive relationship between the two variables.
   b. There is no relationship between the two variables.
   c. There is a perfect positive relationship between the two variables.
   d. There is a negative relationship between the two variables.

6. If R^2 is calculated to be 0.98 how confident would you be in using the line of best fit for prediction?

   a. The relationship is too weak to predict
   b. Not Confident
   c. Very Confident
   d. The relationship is random and thus cannot be predicted

7. Coefficient of Correlation values lies between
   a. -1 and +1
   b. 0 and 1
   c. -1 and 0
   d. none of these

8. If $y = xe^x$, then dy/dx is
   a. $e^x (1 + x)$
   b. e^x
   c. X
   d. (1+x)

9. If $^nC12 = {}^nC6$ value of n is
a. 12   b. 14   c. 16   d. 18

10. If $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$ then $|A|$ = ?
   a. 2   b. 3   c. 4   d. 5

Group – B
(Short Answer Type Question)   (**3 x 5 = 15**)
Answer any three questions

1. If A= $\begin{bmatrix} 1 & 6 & 5 \\ 2 & 3 & 1 \\ 0 & 2 & 4 \end{bmatrix}$ Find out the Determinant A.

2. Find the coefficient of x^2 in the expansion of $(x/2 + 2/ x)^8$

3. Use Cramer's Rule (determinants) to solve : $2x – 3y = -4$, $5x + 7y = 1$

4. A sample of 100 observations had mean 64 and s.d. 7·5. Two observations whose values were 14 and 18 were wrongly recorded as 24 and 24. Make necessary correction of mean and s.d.

5. Discuss the types of Time Series Data.

Group – C
(Long Answer Type Question)   (**3 x 15 = 45**)
Answer any three questions

1. a) A survey among hotels in the city reveals the figures below :   (7+8)

No. of customers	0 — 20	20 — 40	40 — 60	60 — 80	80 —100	100 —120
No. of days	5	15	40	30	10	25

Calculate i) the upper and lower quartile   ii) quartile deviation

b) Calculate the missing frequencies f_1 and f_2 :

Class :	0 — 20	20 — 40	40 — 60	60 — 80	80 — 100
Frequency :	19	f_1	32	f_2	19

Mean = 50, N = 120

2. a) In the following table are recorded data showing the test scores made by 10 salesman on an intelligence
   test and their weekly sales: (7+8)

Salesman	1	2	3	4	5	6	7	8	9	10
Test Score	50	70	55	60	80	85	90	92	64	72
Sales	25	60	45	50	55	20	75	30	48	62

Calculate Spearman's rank correlation coefficient between intelligence and efficiency in salesmanship.

b) Calculate the price index number using Fisher's formula for the following data:

COMMODITY	1973		1984	
	PRICE	QUANTITY	PRICE	QUANTITY
A	6	70	8	120
B	8	90	10	100
C	12	140	16	280

3. a) The sum of three in AP is 18 and their product is 192. Find the numbers.
   b) Insert 6 arithmetic mean between 2 and 16.
   c) The sum of three numbers in GP is 28 and their product is 512. Find the numbers. (5+5+5)

4. a) From the following data calculate the trend equation by least squre method. Also find the trend value of
   the year 1970. (10)

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

b) With what Characteristic component of time series should each of the following be associated? (5)
   a) An upturn in business activity
   b) Fire Loss in a factory
   c) Withdrawal of bank deposits by 15th March for tax payment
   d) General Increase in sale of TV sets.
   e) Increase in garment sales in October.

5. a) If $A = \begin{bmatrix} 6 & -3 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -5 & 1 \\ 8 & 0 \end{bmatrix}$, then show that $(AB)^{-1} = B^{-1} A^{-1}$ (8+7)

   b) Show that the matrix $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 4A + 3I = 0$. Hence obtain A^{-1}