

**COURSE: B. COM (P)**

**SEMESTER - II**

**PAPER: BUSINESS MATHEMATICS AND STATISTICS**

**ASSIGNMENT**

Question 1. Solve the following system of equations by Cramer's Rule .

$$x - 4y - z = 11$$

$$2x - 5y + 2z = 39$$

$$-3x + 2y + z = 1$$

Question 2. A large energy company produces electricity, natural gas, and oil. The production of a rupee's worth of electricity requires inputs of Rs. 0.30 from electricity, Rs. 0.10 from natural gas and Rs. 0.20 from oil. The production of a rupee's worth of natural gas requires inputs of Rs.0.30 from electricity, Rs.0.10 from natural gas and Rs.0.20 from oil. Production of a rupee's worth of oil requires inputs of Rs. 0.10 from each sector. Find the output for each sector that is needed to satisfy a final demand of Rs. 25 crore for electricity, Rs. 15 crore for natural gas and Rs. 20 crore for oil using matrix algebra.

Question 3. Fifty students appeared in an examination. The results of passed students are given below:

Marks	No. of students
40	6
50	14
60	7
70	5
80	4
90	4

The average marks for all the students are 52. Find out the average marks of students who failed in the examination.

Question 4. Compare arithmetic mean, geometric mean and harmonic mean and point out their relative merit and limitations.

Question 5. Compute mode from the following frequency distribution :

Marks	No. of students
50-59	5
60-69	20
70-79	40
80-89	50
90-99	30
100-109	6

Question 6 Compute the degree of relationship between price of share (X) and price of debentures over a period of 8 years by using Karl Pearson's formula

Years:	1996	1997	1998	1999	2000	2001	2002	2003
Price of Shares:	42	43	41	53	54	49	41	55
Price of debentures	98	99	98	102	97	93	95	94

### CLASS TEST

Question 1 The total cost of manufacturing three types of motor car is given by the following table:

Type of motor Car	Labour (hrs)	Materials (units)	Subcontracted Work (units)
Car A	40	100	50
Car B	80	150	80
Car C	100	250	100

Labour cost Rs 2 per hour, units of material cost Rs 1 each and unit of sub-contracted work cost Rs 3 per unit. Find the total cost of manufacturing 3000, 2000 and 1000 vehicles of type A, type B and type C respectively using matrices.

Question 2. A salesman has the following record of sales during three months for three items A, B and C which have different rates of commission.

Months	Sales of units			Total commission (In Rs.)
	A	B	C	
Jan.	90	100	20	800
Feb.	130	50	40	900
March	60	100	30	850

Find out the rates of commission (in Rs.) on items A, B and C respectively using Cramer's Rule (Determinant method).

Question 3 If the total manufacturing cost 'y' of making x units of a product is:  $y = 20x + 5000$ ,

- What is the variable cost per unit?
- What is the fixed cost?
- What is the total cost of manufacturing 4000 units?
- What is the marginal cost of producing 2000 units?

### Business Statistics

Question 4 The following table gives the age (in years) of employees of a firm. The modal age is 32 years. Find the missing frequency

Age in Years	20-25	25-30	30-35	35-40	40-45
No. of Employees	5	-	18	9	6

Question 5 From the data given below; find which series is more variable (Coefficient of Variation)

Variable	Series A	Series B
10-20	10	18
20-30	18	22

30-40	32	40
40-50	40	32
50-60	22	18
60-70	18	10

Question 6 Assume that quantity of agricultural production depends on the amount of rainfall. Find and fit a linear regression to the data given using method of least squares.

Rainfall (in mm) : 60 62 65 71 73 75 81 85 88 90
Agricultural Production (in tonnes) : 33 37 38 42 42 45 49 52 55 57

### MULTIPLE CHOICE QUESTIONS

1. The necessary diagram to compare among the various components or between a part and the whole is:

- (A) Bar diagram
- (B) Step diagram
- (C) Pie diagram
- (D) Histogram

2. A random variable X can take the values -1, 0 and 1 with respective probabilities 0.2, 0.5 and 0.3. The expected value of X is:

- (A) 0.3
- (B) 0.5
- (C) 0.2
- (D) 0.1

3. Consider the following data:

Marks in 0 – 9 10 – 19 20 – 29 30 – 39 40 – 49 Total

Mathematics

No. of students (f) 10 8 12 15 5 50

Frequency density of the second class is

(A) 0.8

(B) 8

(C) 1.2

(D) 1

4. The measure of central tendency of a statistical data which takes into account all the data

(A) Median

(B) Mean

(C) Mode

(D) Range

5. The A.M. of the numbers 1, 3, 5, .....  $(2n - 1)$  is

(A)  $n^2$

(B)  $n + 1$

(C)  $n$

(D)  $2n$

6. The Harmonic Mean (H.M.) of the series 1, 2, 4 is

(A) 5

(B) 7

(C)  $7/5$

(D)  $12/7$

7. The vertical axis of an ogive shows

- (A) Cumulative frequencies
- (B) Absolute frequencies
- (C) Frequency densities
- (D) Class boundaries

8. The basis of classification according to differences in time is called

- (A) Ordinal classification
- (B) Temporal classification
- (C) Spatial classification
- (D) Qualitative classification

9. The frequencies of three class intervals 54 – 58, 59 – 63, 64 – 68 of a distribution are respectively 4, 8 and 12. The frequency density of the 2nd class is

- (A) 1
- (B) 1.2
- (C) 1.6
- (D) 2

10. The mean of five observations 5, 10, 15, 20, 25 is

- (A) 19
- (B) 16
- (C) 17
- (D) 15

11. The variance of two observations 10 and 17 is

- (A) 12.25

(B) 12

(C) 1.225

(D) 13

12. If a variable  $x$  takes the values 12 and 24 with equal frequencies, then mean of  $x$  is

(A) 36

(B) 18

(C) 22

(D) 28

13. The quartile deviation of the following data 12, 10, 17, 14, 19, 21, 27, 30, 32, 38, 34 is

(A) 11

(B) 18

(C) 9

(D) 16

14. For a frequency distribution mean = 68.2; median = 69 and coefficient of skewness of

the distribution is  $-0.6$ . The variance of the distribution is

(A) 9

(B) 25

(C) 36

(D) 16

15. If  $r$  be the correlation coefficient between two variables  $x$  and  $y$ ,  $b_{xy}$  and  $b_{yx}$  being the

two regression coefficients, then

(A)  $r = b_{xy} b_{yx}$

(B)  $r = b_{xy} \times b_{yx}$

***bx***

(C) ***r***

***by***

***bx***

(D) ***r***

***bx***

16. If two regression equations  $x + 5y = 13$  and  $3x - 2y = 5$ , then the mean values of  $x$  and  $y$  are respectively.

(A) (2, 3)

(B) (3, 2)

(C) (4, 5)

(D) (5, 4)

17. If the A.M of 14, 16,  $x$ , 25, 21 be 19, then the value of  $x$  is

(A) 16

(B) 19

(C) 12

(D) 21

18. The G.M of 3 and 24 with weight 2 and 1 respectively is

(A) 8

(B) 4

(C) 6

(D) 9

19. The mean deviation about median of 28, 7, 16, 14, 24, 15, 34, 30 is



- (A) 8
- (B) 6
- (C) 10.5
- (D) 12

20. The coefficient of skewness of a distribution is 0.4. Its S.D and mean are respectively 8 and 30. The mode of the distribution is

- (A) 26
- (B) 26.2
- (C) 26.4
- (D) 26.8

21. If  $\sigma_y^2$ ,  $b_{yx} = 0.48$ ,  $r = 0.6$ , then is  $\sigma_x$

- (A) 5
- (B) 7
- (C) 9
- (D) 6.5

22. If A and B be two mutually exclusive events and  $P(A) = 3/4$ ;  $P(A \cup B) = 5/6$  then  $P(B)$  is

- (A)  $2/3$
- (B)  $3/5$
- (C)  $5/12$
- (D)  $1/12$

23. The mode for the series 2, 5, 7, 6, 3, 7, 4, 7, 9, 2 is

- (A) 6
- (B) 2

(C) 7

(D) 9

24. The median of the numbers 94, 33, 86, 68, 32, 80, 48 and 70 is

(A) 68

(B) 69

(C) 64

(D) 70

25. The mean deviation of the observations 3, 5, 9, 1 and 2 about their median is

(A) 2.4

(B) 2.2

(C) 3

(D) 2.8

26. If the sum of squares of the deviations of 10 observations taken from mean 50 is 250,  
then C.V is

(A) 10%

(B) 12%

(C) 20%

(D) 15%

27. If the relation between two variables  $x$  and  $y$  be  $5x + 7y = 28$  and median of  $y$  be 3,  
then the median of  $x$  is

(A) 1.4

(B) - 4.2

(C) 3

(D) 13/7

28. For a symmetric distribution, skewness is

(A) 0

(B) 1

(C) -1

(D) 0.5

29. If  $\text{cov}(x, y) = 0.6$ ,  $\sigma_x^2 = 2$ ,  $\sigma_y^2 = 1$ , then  $r_{xy}$  is

(A) 0.1

(B) 0.3

(C) 0.2

(D) 0

30. The value of the correlation coefficient lies between

(A) 0 and 1

(B) - 1 and 1

(C) -1 and 0

(D) - 0.5 and 0.5

### Answers

1. (C)

2. (D)

3. (A)

4. (B)

5. (C)

6. (D)

7. (A)

8. (A)

9. (D)

10. (D)

11. (A)

12. (B)

13. (C)

14. (D)

15. (A)

16. (B)

17. (B)

18. (C)

19. (A)

20. (D)

21. (A)

22. (D)

23. (C)

24. (B)

25. (B)

26. (A)

27. (A)

28. (A)

29. (A)

30. (B)