

SET - II

Paper 4-Fundamentals of Business Mathematics and Statistics

Full Marks: 100

Time allowed: 3 Hours

Section - A
(Fundamentals of Business Mathematics)

I. Answer any two questions. Each question carries 5 marks [2 × 5 = 10]

1. A sum of money invested at C.I payable yearly amounts to ₹ 10,816 at the end of the second year and to ₹ 11,248.64 at the end of the third year. Find the rate of interest and the sum.
2. In a class containing 50 students, 15 play tennis, 20 play cricket and 20 play Hockey, 3 play Tennis and Cricket, 6 play Cricket and Hockey and 6 play Tennis and Hockey, 7 play no game at all. How many play Cricket, Tennis and Hockey?
3. Find two positive numbers whose product is 16 having minimum sum.

II. Answer any two questions. Each question carries 3 marks [2 × 3 = 6]

4. What sum of money will produce ₹ 28,600 as an interest in 3 years and 3 months at 2.5% p.a. simple interest?
5. Show that $\left(\frac{x^b}{x^c}\right)^a \times \left(\frac{c}{x^a}\right)^b \times \left(\frac{x^a}{x^b}\right)^c = 1$
6. Find the matrix 'X' where $AX = B$ and $A = \begin{pmatrix} 1 & 2 \\ 9 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & 12 \\ 13 & 52 \end{pmatrix}$

III. Choose the correct answer [5 × 1 = 5]

7. The ratio $\frac{5}{3} : 2\frac{1}{4}$ is -
(a) ratio of lesser inequality
(b) ratio of greater inequality
(c) 20 : 9
(d) 5 : 27
8. $\left[\log\left(\frac{a^2}{bc}\right) + \log\left(\frac{b^2}{ca}\right) + \log\left(\frac{c^2}{ab}\right)\right]$ is equal to -
(a) a
(b) 1
(c) 2
(d) abc

9. If ${}^n P_3 = 120$ then $n =$ ____
(a) 8
(b) 4
(c) 6
(d) None of these
10. If the numerator is multiplied by it becomes equal to 1 however if 2 is deducted from denominator it becomes equal to 1. The number is ____
(a) $5/7$
(b) $3/7$
(c) $5/8$
(d) $1/3$
11. If $A = \begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$ then transpose of the transpose of A = ____
(a) $\begin{pmatrix} 2 & 5 \\ 4 & 3 \end{pmatrix}$
(b) $\begin{pmatrix} 2 & 5 \\ 3 & 4 \end{pmatrix}$
(c) $\begin{pmatrix} 2 & 4 \\ 3 & 5 \end{pmatrix}$
(d) $\begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$

IV. Fill in the blanks [5 × 1 = 5]

12. $\left(\frac{1}{2} + \frac{1}{3}\right) : \left(\frac{1}{2} \times \frac{1}{3}\right) =$ _____
13. If A and B are two disjoint sets then $x(A \cup B)$ is equal to ____
14. If $64^x = 2\sqrt{2}$ then $x =$ ____
15. There are 10 points in a plane and among them 4 are collinear. The total number of triangles formed by joining them is ____
16. $\int \log x \, dx =$ _____

V. State whether the following statements are true or false [5 × 1 = 5]

17. The fourth proportional of ₹ 5, ₹ 3.50, 150gm is 125gms.
18. The statement "I am hungry I will eat something" is true or false.
19. The statement $\{2\} \in \{2, 3, 5\}$ is true or false.
20. The decimal part of the value of logarithm of a number is called mantissa.
21. $\int_0^1 e^x \, dx = e + 1$

VI. Match the following [5 × 1 = 5]

22. If $\frac{A}{3} = \frac{B}{4} = \frac{C}{9}$ then $A : B : C =$ ____ (A) 4
23. $\log_{1000} x = -\frac{1}{4}$ then $x =$ ____ (B) $\log_e \left(\frac{3}{2}\right)$
24. If $(n + 1)! = 20(n - 1)!$ then $n =$ ____ (C) $\frac{1}{10}$

25. $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{x} = \underline{\hspace{2cm}}$ (D) 1
26. If $A = \begin{pmatrix} x-2 & 4 \\ 3 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 4 \\ 3 & 5 \end{pmatrix}$ (E) 3 : 4 : 5
and $A = B$ then $x = \underline{\hspace{2cm}}$

VII. Answer the following in one (or) two steps [4 × 1 = 4]

27. Construct the truth table for $p \Leftrightarrow q$.
28. Two positive integers are such that the sum of first and twice the second is atmost 8 and their difference is atmost 2. Draw the graph of solution set.
29. Find $A_{2 \times 3}$ when $a_{ij} = i + 2j$
30. The average cost function (AC) for certain commodity is $AC = 2x - 1 + \frac{50}{x}$ in terms of output x . Find the Marginal Cost.

Section – B
(Fundamentals of Business Statistics)

VIII. Answer any Nine questions of the following [9 × 2 = 18]
Each question carries 2 marks

1. (Class frequency) / (Width of the class) is defined as
 - (a) Frequency density
 - (b) Frequency distribution
 - (c) Both
 - (d) None
2. The mean height of 8 students is 152 cm. Two more students of heights 143 cm and 156 cm join the group. New mean height is equal to
 - (a) 153
 - (b) 152.5
 - (c) 151.5
 - (d) 151
3. In Ogive, obscissa corresponding to ordinate $N/2$ is
 - (a) Median
 - (b) 1st quartile
 - (c) 3rd quartile
 - (d) None
4. The variables x and y are related by $5x+6y=70$ and median of x is 8. What is the median of y ?
 - (a) 4
 - (b) 4.5
 - (c) 6
 - (d) 5
5. What is the modal value for the numbers 4, 3, 8, 15, 4, 3, 6, 3, 15, 3, 4.
 - (a) 3
 - (b) 4
 - (c) 15
 - (d) None of these
6. If x and y are related as $4x + 3y + 11 = 0$ and mean deviation of x is 2.70. What is mean deviation of y ?
 - (a) 7.20
 - (b) 14.40
 - (c) 3.60
 - (d) None of these
7. $(Q_3 - Q_1) / (Q_3 + Q_1)$ is
 - (a) Coefficient of Quartile deviation
 - (b) Coefficient of Mean deviation
 - (c) Coefficient of Standard deviation

- (d) None
8. The value of correlation coefficient lies between
- (a) -1 and +1
 - (b) -1 and 0
 - (c) 0 and 1
 - (d) None
9. If the coefficient of correlation between two variables is -0.2, then the coefficient of determination is
- (a) 0.4
 - (b) 0.02
 - (c) 0.04
 - (d) 0.16
10. A, B and C are three mutually exclusive and exhaustive events such that $P(A)=2 P(B) = 3 P(C)$. What is $P(B)$?
- (a) $6/11$
 - (b) $6/22$
 - (c) $1/6$
 - (d) $1/3$
11. If a card is drawn at random from a pack of 52 cards, what is the chance of getting a Spade or an ace?
- (a) $4/13$
 - (b) $5/13$
 - (c) 0.25
 - (d) 0.20
12. Two dice are thrown together. The probability that 'the event the difference of no.s. shown is 2' is
- (a) $2/9$
 - (b) $5/9$
 - (c) $4/9$
 - (d) $7/9$

IX. Answer any Nine questions of the following
Each question carries 2 marks

[9 × 2 = 18]

1. If the median of 5, 9, 11, 3, 4, x, 8 is 6. Find the value of x.
2. If the first quartile is 104 and quartile deviation is 18. Find the third quartile.
3. If $\bar{X} = 56.2$, $Z = 55$; Find M
4. An aeroplane covers the four sides of a square at varying speeds of 500, 1000, 1500, 2000 km per hour respectively. What is the average speed of the plane around the square.
5. In a Moderately Asymmetrical Distribution. Compute M.D. and Q.D. Given S.D. = 50
6. Calculate S.D. for first 10 natural nos.

7. Given Mean = 50, C.V = 40%, Karl Pearson's Coefficient of Skewness = - 0.4. Find standard deviation and Mode.
8. If two regression coefficients $b_{xy} = 0.87$ and $b_{yx} = 0.49$, find 'r'.
9. Two cards are drawn from a well shuffled pack of playing cards. Determine the probability that both are aces.
10. The probability that A can solve a problem is $\frac{2}{3}$ and that B can solve is $\frac{3}{4}$. If both of them attempt the problem, what is the probability that the problem get solved?
11. Two dice are thrown at a time and the sum of the numbers on them is 6. Find the probability of getting the number 4 on anyone of the dice.
12. If three dice are thrown simultaneously, then the probability of getting a score of 5 is

X. Answer any FOUR of the following questions

[4 × 6 = 24]

1. Draw Pie diagram to represent the data

Item	Food	Rent	Clothing	Fuel	Education	Miscellanies
Expenditure	240	125	66	57	42	198

2. Compute coefficient of Mean Deviation from Mean for following data:

X	0-4	4-8	8-12	12-16	16-20	20-24	24-28	28-32
F	4	9	23	55	62	30	12	5

3. Find Karl Pearson Co-efficient of Correlation for the following

Marks in Economics	48	60	72	62	56	40	39	52	30
Marks in Accountancy	62	78	65	70	38	54	60	32	31

4. Find Quantity Index No. from following data i) Laspeyre's, ii) Paasche's iii) Dorbish and Bowley's

	2001		2005	
	Quantity	Value	Quantity	Value
A	5	40	6	60
B	5	30	5	40
C	6	24	6	30
D	5	10	10	40

5. Find the trend values by using 3 yearly moving averages method

Year	2007	2008	2009	2010	2011	2012	2013
Sales (₹'000)	33	35	60	67	68	82	90

6. A cricket club has 15 members of which only 5 can bowl. If the names of 15 members are put into a box and 11 names are drawn at random, then the probability of obtaining 11 member team containing exactly three bowlers is: