Paper- 4: FUNDAMENTALS OF BUSINESS MATHEMATICS AND STATISTICS

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Full Marks: 100 **Time Allowed: 3 Hours**

Section – A

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

1. A sum of ` 1,000 is invested for 5 years at 12% interest per year. What is the simple interest? If the same amount had been invested for the same period at 10% compound interest per year. How much more interest would he get?
2. Solve $\sqrt{\frac{x}{x-1}}+\sqrt{\frac{1-x}{x}}=\frac{13}{6}$
3. The demand function faced by a firm is p = 500 – 0.2 x and its cost function is C = 25x + 10,000. Find the output at which the profits of the firm are maximum. Also find the price it will charge.

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

4. The ratio of work done by (x-1) men in (x+1) days to that of (x + 2) men in (x-1) days is 9:10 find the value of x.
5. If n(A) = 41, n(B) = 19 and n (A∩B) = 10find n(AUB)
6. Find $Lt_{x\to 0}\frac{a^x-b^x}{x}$

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

7. If $\frac{1}{3}A=\frac{1}{4}B=\frac{1}{5}$ then A:B:C is _____

   a) 4:3:5 b) 5:4:3 c) 3:4:5 d)20:15:12

8. 5 letters can be posted in 4 letter boxes in ___ ways

   a) 256 b) 1024 c) 625 d) None of these

9. The value of $\log_2(\log_5 625)$ is ___

   a) 2 b) 5 c) 10 d) 15

10. If f(x-1) = 2x-3 then f(x) is ___

    a) 2x - 1 b) 2x + 1 c) x - 2 d) 3x + 2

11. $\int (x+3)^6\,dx$ = _____

    a) $\frac{(X+3)}{5X}+C$ b) $\frac{(X+3)^7}{7}+C$ c) $\frac{(X+3)^5}{5}+C$ d)None of these

IV. Fill in the blanks [5 ×1= 5]

12. If $b\propto a^3$ and a increases in the ratio 3:2 then b increases in the ratio is ____
13. At the rate of 6% p.a. simple interest, a sum of `2,500 will earn how much interest by the end of 5 years?_____

14. If x = 8, y = 27 then value of $\left(x^{\frac{4}{3}} + y^{\frac{2}{3}} \right)^{\frac{1}{2}}$ is ___

15. If $y = 3^x$ then $\frac{dy}{dx}$ = ____

16. $\int 3x^2 dx$ = ____

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

17. The ratio of two numbers is 12:5. If antecedent is 60 then consequent is 30 ( )
18. The degree of the equation $3x^5 + xyz^2 + y^3$ is 3 ( )
19. A two digit number is 9 times the sum of the digits. However if 9 is deducted from it becomes 8 times the sum of the digits. The number is 81 ( )
20. IF f and g are two continuous functions of their common domain D then f/g is discontinuous on D ( )
21. Lt $x \to 0 \frac{e^{x-1}}{x} = 1$ ( )

VI. Match the following [5× 1 = 5]

22. The sub-duplicate ratio of 49:81 is ___		A) ½
23. A = [5 2] B = $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$ then AB =		B) $n + 1_{cr}$
24. For the line 3x – 2y = 5 if x = 2 then y = ____		C) 7: 9
25. $n_{cr} + n_{cr-1}$ =		D) 12
26. $\lim_{x \to 2} 3x + 6$ =____		E) (23)

VII. Answer the following in one or two steps [4*1] = 4

27. Construct the truth table for " p∧q "
28. Solve the in equation 4x + 4 < 2x +3
29. If $11_{cx} = 11_{cy}$ then find value of x + y?
30. Evaluate $\int_1^4 6\, dx$

Section – B

1. Answer any Nine questions of the following [9× 2 = 18]

Each question carries 2 marks

(i) For tabulation, 'caption' is
   a) The upper part of the table
   b) The lower part of the table
   c) The main part of the table
   d) The upper part of a table that describes the column and sub-column

(ii) The frequency distribution of a continuous variable is known as
   a) Grouped frequency distribution
   b) Simple frequency distribution
   c) a or b

d) a and b

(iii) The average marks scored by 50 students in a class were calculated to be 38. Later it was found, that marks of two students were wrongly copied as 34 and 23 instead of 43 and 32. Find correct average marks.

a) 37.36 b) 39.00 c) 38.36 d) None of these

(iv) 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

(v) For a moderately skewed distribution of marks in statistics for a group of 100 students, the mean mark and median mark were found to be 50 and 40. What is the modal mark?

a) 15 b) 20 c) 25 d) 30

(vi) If the rank correlation coefficient between marks in management and mathematics for a group of student is 0.6 and the sum of squares of the differences in ranks in 66, what is the number of students in the group?

a) 10 b) 9 d) 8 d) 11

(vii) If two regression lines are: x + 3y = 7 and 2x + 5y = 12 then $\bar{x}$ and $\bar{y}$ are respectively.

a) (2, 1) b) (1,2) c) 8 d) 11

(viii) Which of the following set of function define a probability space on S = {A, B, C}

a) P (A) = 1/3, P (B) = ½, P (C) = ¼
b) P (A) = 1/3, P (B) = 0, P (C) = 2/3
c) Both a and b
d) Neither a nor b

(ix) If P(A) = ½, P(B) = 3/5 and the events A& B are independent then P(A∩B) is

a) 7/10 b) 3/10 c) 5/10 d) 9/10

(x) If in Binomial distribution np=9 and npq=2.25 then p and n are equal to is equal to

a) 0.25, 36 b) 0.75, 12 c) 1.9 d) None

(xi) What is the probability of making 3 correct guesses in 5 True-False answer type questions?

a) 0.3125 b) 0.5676 c) 0.6875 d) 0.4325

(xii) From the following data

Commodity	Base Year		Current Year	
	Price	Qty	Price	Qty
A	4	3	6	2
B	5	4	6	4
C	7	2	9	2
D	2	3	1	5

Then the factor reversal test is:

a) 59/52
b) 49/47
c) 41/53
d) 47/53

2. Answer any Nine question of the following [9×2 = 18]

Each question carries 2 marks

i) Mode of a distribution can be obtained form ____

ii) Find the number of observations between 250 and 300 from the following data

Value (Greater than)	200	250	300	350
Frequency	56	38	15	0

iii) The AM of 1, 3, 5, 6, x, 10 is 6. Find the value of x

iv) If a variable assumes the values 1, 2, 3…. 5 with frequencies as 1, 2, 3,….5 then what is the AM?

v) If the AM and GM for two numbers are 6.50 and 6 respectively then find HM.

vi) The regression equation are 8x-10y+66=0 and 40x – 18y = 214 find the coefficient of correlation.

vii) The correlation between height and intelligence is _____

viii) If P(A∩B) =0.60 and P(AUB) = 0.70 for two events A and B. Find P(A) + P(B)

ix) Given P(A) = ½, P(B) = 1/3, P(AB) = ¼. Find the value of P(A/B)

x) For a Poisson variate X, P(X = 1) = P(X = 2). What is the mean of X?

xi) A discrete random variable x follows uniform distribution and takes only the values 6, 8, 11, 12, 17. Find the probability of P(x = 8)

xii) From the following data

Group	A	B	C	D	E	F
Group Index	120	132	98	115	108	95
Weight	6	3	4	2	1	4

Find out general index .

Answer any FOUR of the following question [4 × 6 = 24]

3. From the following data determine the model value graphically.

Profit (`)	0-100	100-200	200-300	300-400	400-500	500-600
No. of shops	12	18	27	24	10	6

4. Find mean and median for the following series

Class interval	<50	50-75	75-100	100-125	125-150	> 150
Frequency	21	47	67	89	55	21

5. Compute co-efficient of variation for given data

X	0-10	10-20	20-30	30-40	40-50
F	5	15	30	65	80

6. Given the bivariate data

X	2	6	4	3	2	2	8	4
Y	7	2	1	1	2	3	2	6

Fit the regression line of y on x and hence find y if x = 20

7. Calculate Fisher's and Marshall Edgeworth Index No.'s for the following data

Commodity	2002		2003	
	P_0	Q_0	P_1	Q_1
A	5	10	4	12
B	8	6	7	7
C	6	3	5	4

8. A,B,C are aiming to shoot a balloon, A will succeed 4 times out of 5 attempts. The chance of B to shoot the balloon is 3 out of 4 and that of C is 2 out of 3. If the three aim the balloon simultaneously, then find the probability that attest two of them hit the balloon.