

Roll No.

Total No. of Pages : 03

Total No. of Questions : 07

B.B.A. (Sem.-1)
BUSINESS MATHEMATICS
Subject Code : BB-102
Paper ID : [C0202]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY.
2. Attempt any FOUR questions from SECTION-B.

SECTION-A (10 × 2 = 20 Marks)

- (a) If five times the 5th term of an A.P. is equal to six times the 6th term, show that 11th term is zero.
- (b) Which term of the series $18 - 12 + 8 \dots$ is $\frac{512}{729}$?
- (c) A sum amounts to Rs. 8820 in two years and Rs. 9261 in three years. Find the rate of compound interest.
- (d) Prove that $\log \frac{75}{16} - 2 \cdot \log \frac{5}{9} + \log \frac{32}{243} = \log 2$.
- (e) Find the value of 'r' if the coefficients of $(2r + 4)^{\text{th}}$ and $(r - 2)^{\text{th}}$ terms in the expansion of $(1 + x)^{18}$ are equal.
- (f) Find the domain of the function $\frac{1}{\sqrt{(x-1)(2-x)}}$.
- (g) Evaluate the limit, $\lim_{x \rightarrow 0} \frac{3}{(1-4x)^x}$.
- (h) Prove that $\frac{d}{dx} (5^{2 \log x} 5) = 2x, x > 0$.

- (i) Find the values of x for which the function $f(x) = |7x-3|$ is maximum/minimum.
- (j) Find the values of ' m ' for which the equation $x^2 - 2x(1 + 3m) + 7(3 + 2m) = 0$ has equal roots.

SECTION-B

(4 × 10 = 40 Marks)

2. (a) Using Cramer's Rule, solve the following system of equations for x , y and z .

$$\frac{2}{x} - \frac{3}{y} + \frac{3}{z} = 10$$

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 10$$

$$\frac{3}{x} - \frac{1}{y} + \frac{2}{z} = 13$$

- (b) Solve the given equations for x , y and z by Gauss Elimination method.

$$x + 2y - z = 6$$

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

$$4x + 3y + z = 9 \quad (5,5)$$

3. (a) Discuss the continuity of the function

$$f(x) = \begin{cases} \frac{2}{5-x} & , \quad x < 3 \\ 5-x & , \quad x \geq 3 \end{cases} \text{ at } x = 3$$

- (b) Sum the series $\cdot 7 + \cdot 77 + \cdot 777 + \dots$ to n terms. (5,5)

4. (a) There are 15 points in a plane, no three of which are in a straight line excepting four, which are collinear. Find the number of (i) straight lines (ii) triangles formed by joining them.

- (b) Find the term independent of ' x ' in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^9$.

5. (a) Prove the logical expression

$$p \rightarrow (q \wedge r) = (p \rightarrow q) \wedge (p \rightarrow r).$$

- (b) Find $\frac{dy}{dx}$ where $y = a^x + x^a + a^a + x^x - \log_x x$. (5,5)

6. (a) $y = x^{-x} + (1+x)^{\frac{1}{x}}$, find $\frac{dy}{dx}$.

- (b) Define a set.

State and prove De Morgan's Laws. (5,5)

7. (a) If $y = f(x) = \frac{2x+3}{5x-2}$, prove that $f(y) = x$.

- (b) If $x\sqrt{1+y} + y\sqrt{1+x} = 0$,

Show that $\frac{dy}{dx} = -(1+x)^{-2}$. (5,5)