

**BBE/D-21****24004****BUSINESS MATHEMATICS–I****Paper–BBA–104**

Time Allowed : 3 Hours]

[Maximum Marks : 80

**Note** : Attempt **five** questions in all. Question No. **1** is compulsory.**Compulsory Question**

1. (a) Evaluate :  $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 4}$ . 2
- (b) Prove that :  $1 + {}^3C_1 + {}^4C_2 = {}^5C_3$ . 2
- (c) If  $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ , then show that  $A^2 - 8A - 7I = 0$ . 3
- (d) Prove that  $(A \cup B)' = A' \cap B'$ . 3
- (e) If  $x = 2at^2$ ,  $y = 4at$ , then find  $\frac{dy}{dx}$ . 3
- (f) Using Binomial theorem, expand  $\left(\frac{2x}{3} - \frac{3}{2x}\right)^4$ . 3
2. (a) There are 210 members in a Club, 100 of them drink Tea and 65 drink Tea, but not coffee. Find :
- (i) How many drink Coffee ?
- (ii) How many drink Coffee, but not Tea ? 8
- (b) Prove that  $p \vee (q \wedge r) = (p \vee q) \wedge (p \vee r)$ . 8

3. (a) Solve the following equations :

$$\frac{2}{x} + \frac{3}{y} = 12; \quad \frac{4}{x} - \frac{5}{y} = 2. \quad 8$$

(b) Solve :  $\sqrt{3x^2 - 7x - 30} - \sqrt{2x^2 - 7x - 5} = x - 5.$  8

4. (a) How many different words can be formed from the letters of the word 'COMBINE' so that:

(i) vowels always remain together ?

(ii) no two vowels are together ?

(iii) vowels may occupy odd places ? 8

(b) The Co-efficients of 5th, 6th and 7th terms in the expansion of  $(1 + x)^n$  are in A.P. Find n. 8

5. (a) Examine the following function for continuity at  $x = 1$  : 8

$$f(x) = \begin{cases} 5x - 4 & , \quad 0 < x < 1 \\ 4x^2 - 3x & , \quad 1 \leq x < 2 \end{cases}$$

(b) If  $y = \sqrt{\frac{1-x}{1+x}}$ , prove that  $(1-x^2)\frac{dy}{dx} + y = 0.$  8

6. (a) Differentiate  $x^x + x^{1/x}$  w.r.t. x. 8

(b) Determine the local maximum and local minimum values for the function  $x^3 - 3x^2 - 9x - 7.$  8

7. (a) The demand for goods of an Industry is given by  $p^2 + q^2 = 25$  and supply by  $p = q + 1$ , where p is the price and q is the quantity demanded. Find the equilibrium price and quantity. 8

(b) Find the inverse of the following matrix :  $\begin{bmatrix} 1 & 2 & 3 \\ -3 & 5 & 0 \\ 0 & 1 & 1 \end{bmatrix}.$  8

8. (a) An Automobile company uses three types of Steel  $S_1$ ,  $S_2$  and  $S_3$  for producing three types of Cars  $C_1$ ,  $C_2$  and  $C_3$ . Steel requirements (in tonnes) for each type of Cars are given below : 8

Cars \ Steel	$C_1$	$C_2$	$C_3$
$S_1$	2	3	4
$S_2$	1	1	2
$S_3$	3	2	1

Using Cramer's rule, find the number of Cars of each type which can be produced using 29, 13 and 16 tonnes of Steel of three types respectively.

- (b) Solve the following system of equations by Matrix Inversion method :  
 $x + 2y = 4$ ,  $2x + 5y = 9$ . 8