

Business Mathematics-I

Time Allowed : 3 Hours

Maximum Marks : 80

Note : **Question No. 1 is compulsory.** Attempt five questions in all, All questions carry equal marks.

Compulsory Question

1. (a) Write the set of all positive prime numbers and set of even positive integers. Also write their intersection. 1

- (b) Solve the linear equation

$$2x - 5 = \frac{x}{2} - 7$$

- (c) Prove that $(2n)! = 2(n)! (2n-1)!$

- (d) Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$ 2

- (e) Write derivative of $\log_a x$ 1

- (f) Evaluate $[a \ b] \cdot \begin{bmatrix} c \\ d \end{bmatrix}$

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?

- (b) Prove by truth table

$$\sim(p \Rightarrow q) = \sim(\sim p \vee q) \quad 8$$

3. (a) The demand and supply laws are given by

equations $4q + 9p = 48$ and $p = \frac{1}{9}q + 2$. Find

equilibrium price and quantity. What additive

tax will cause the price to increase by $\frac{4}{5}$ per

unit ?

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(b)

4. (a) How many arrangements can be made of the letters of the word 'Arrangement' ? In how many of these the vowels occur together ?

(b) Using binomial theorem find value of $(623)^{1/2}$.

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5. (a) Examine the continuity of function

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

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- (b) If $y = e^x + e^{-x}$, then prove that $\frac{dy}{dx} = \sqrt{y^2 - 4}$

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6. (a) If $x^p y^q = (x + y)^{p+q}$, then prove that $\frac{d^2y}{dx^2} = 0$.

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- (b) Show that a closed right circular cylinder of given total surface and maximum volume that such that its height is equal to the diameter of base.

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7. (a) Let $f(x) = x^2 - 5x + 6$. Find $f(A)$ if

$$A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$$

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- (b) Find A^{-1} (inverse of A) by using elementary row

transformation where $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$.

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8. (a) Solve the following system of equations by Cramer's Rule.

$$x + y = 1$$

$$x + z = -6$$

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

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- (b) Solve the following system of equations by matrix method :

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$$x + y + z = 6$$

$$x - y + z = 2$$

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

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