(New)

B.A. (Honours) Examination, 2022
Semester - I (CBCS)
Subject: Economics
Course: CC-02
(Mathematical Methods for Economics - I)

Time: 3 Hours **Full Marks: 60**

Questions are of value as indicated in the margin
Answer any four (04) of the following questions

1. Solve the following equations: [5×3 =15]
   (a) $px^2 + qx + r = 0$, solve for x.
   (b) $Y = C + \bar{I}, C = a + bY$; solve for Y when $\bar{I} = 100,\ a = 100\ and\ b = 0.60$.
   (c) $1 + \frac{2x}{x^2+1} = 0$, solve for x.

2. Let A = [2, 4, 5, 6], B = [1, 2, 3, 4], C = [2, 3, 4] and D = [5, 6]; then find: [5×3 =15]
   (a) $(A \cup B) \cap C$
   (b) $(A \cap D) \cup B$
   (c) $A \cap B \cap C$
   (d) $(C \cup D) \cap (A \cup B)$
   (e) $A \cup B \cup C$

3. If $X(t) = \sqrt{t^2 - 2t + 4}$, then compute X(0), X(-3), X(t+1), X(-t) and X(t-1). [5×3 =15]

4. (a) If $y = Sin^2x$, then derive $\frac{dy}{dx}$ using the first principle.
   (b) Differentiate $y = e^{logsinx} + \frac{1}{x^2}$ with respect to x. [10+5]

5. Prove that if f(x) is differentiable at x = a, then f(x) is also continuous at x = a. Find the maximum or minimum value of the function $y = x^2 + 6x + 18$. [10+5]

6. Maximize $U = xy^2$ subject to: $50 = 2x + 4y$. State the first and second order conditions. [9+6]

7. Solve the following two equations both graphically and by using Cramer's rule: [8+7]
$$3x + 4y = 10$$
$$x - y = 1$$

8. Find the dot product of vectors P(1, 3, -4) and Q (3, -5, 2). Find the value of $\lim_{x\to\infty}\left(1 + \frac{1}{x}\right)^x$ [6+9]

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