AH-117

April-2015

F.Y. M.B.A., Integrated

Basic Mathematics

Time : 3 Hours] **[Max. Marks : 100**

Instructions : (1) Write new questions on new page.
(2) Non-programmable scientific calculator can be used.

1. (a) Define Function. Also give types of a Functions. **10**

   (b) Solve following : (any **one**) **10**

   (i) A text book publisher finds that the production cost of each book is ₹ 30 and the fixed cost is ₹ 15,000. If each book can be sold for ₹ 45, then determine Break Even Point.

   (ii) A shopkeeper earns ₹ 380 in the first week, ₹ 660 in the second week and ₹ 860 in the third week. On plotting the points (1, 380), (2, 660) and (3, 860), the shopkeeper feels that a quadratic function may fit the data. Find the quadratic function that fits the data. Also estimate the earning of the fourth week.

2. (a) Solve following : (any **two**) **10**

   (i) $\lim\limits_{x \to 1} \dfrac{x^{\frac{5}{2}} - 1}{x^{\frac{3}{2}} - 1}$

   (ii) $\lim\limits_{x \to \infty} \left(1 + \dfrac{5}{3x}\right)^{x}$

   (iii) $\lim\limits_{x \to 1} \dfrac{x^3 + x^2 - 5x + 3}{x^3 - 6x^2 + 9x - 4}$

   (b) (i) Define Continuity. **10**

   (ii) Discuss the continuity of f(x) at $x = 4$

   $f(x) = \dfrac{\sqrt{x} - 2}{x - 4}$, $x \neq 4$

   $= \dfrac{1}{4}$, $x = 4$

3. Differentiate following with respect to x : (any **four**) **20**

    (1)   If $x = t \cdot e^t$, $y = 1 + \log t$ then find $\dfrac{dy}{dx}$

    (2) $y = (\cos x)^{\sin x}$

    (3) $xy + x + y - 2 = 0$

    (4) $y = x^2 \cdot e^x \cdot \log x$

    (5) $y = \log(11x^2 + 7x + 3)^{\frac{5}{2}}$

4. Solve following : (any **two**) **20**

    (1)   If $y = \dfrac{x}{\sqrt{1 + x^2}}$ then prove that $x^3 \cdot \dfrac{dy}{dx} = y^3$.

    (2)   A manufacturer produces x units per week at a total cost of ₹ $\dfrac{x^2}{2} - 800x - 400$. The demand law of the commodity is p $= 200 - \dfrac{x}{2}$. Find the profit function. How many units should be manufactured to get maximum profit ? Also obtain the maximum profit.

    (3)   A rectangle of area 400 sq. metres is to be constructed. Find its length and breadth so that its perimeter is minimum.

5. Solve following : (any **two**) **20**

    (1)   Prove following without expanding the determinants :

$$\begin{vmatrix} a + b + 2c & a & b \\ c & b + c + 2a & b \\ c & a & c + a + 2b \end{vmatrix} = 2(a + b + c)^3$$

    (2)   If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & X \\ 4 & Y \end{bmatrix}$ and $(A + B)^2 = A^2 + B^2$, find value of X and Y.

    (3)   A person buys 2 pineapples, 3 mangoes and 4 apples in ₹ 43. Another person buys 1 pineapple, 4 mangoes and 2 apples in ₹ 34 and a third person buy 5 pineapples, 2 mangoes and 3 apples in ₹ 66. Find price of each fruit using matrix inverse method.

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