Seat No. : _______________

XX-120

Five Years M.B.A. Integrated(K.S.)
F.Y. M.B.A.
April-2013

BASIC MATHEMATICS

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

1. (i) Define Signum function and draw its graph. **4**

(ii) Explain Polynomial function and Transcendental function. **4**

(iii) Find the domain and range of the Real function. **5**

$$f(x) = \frac{x^2}{x^2 + 4}$$

(iv) (a) The daily supply is 50 units when price is ₹ 10 per unit. When the price per unit is increased to ₹ 12, supply increased to 70. Express the above as a linear function. **3**

(b) A garment manufacturer is planning production of new variety of shirts. It involves initially a fixed cost of ₹ 1.5 lacs and a variable cost of ₹ 150 for producing each shirt. If each shirt can be sold at ₹ 350, then find the break-even point. **4**

2. Attempt any **five** : **20**

(i) Check whether limit of the function $f(x) = \frac{|x-2|}{(x-2)}$ exists.

(ii) Evaluate $\lim\limits_{x \to 2} \left\{ \frac{1}{x-3} - \frac{2}{x^2 - 4x + 3} \right\}$.

(iii) Evaluate $\lim\limits_{x \to \infty} \frac{5x^3 - 6}{\sqrt{9 + 4x^6}}$.

(iv) Evaluate $\lim\limits_{x \to \infty} \left(1 + \frac{5}{3x}\right)^x$.

(v) Examine the continuity of the function

$$f(x) = \begin{cases} 3x - 2 & , x \le 0 \\ x + 1 & , x > 0 \end{cases}$$

at $x = 0$.

(vi) Examine the continuity of the function.

$$f(x) = \begin{cases} \dfrac{e^{1/x} - 1}{e^{1/x} + 1} & \text{, when } x \neq 0 \\ 0 & \text{, when } x = 0 \end{cases}$$

at $x = 0$

3. (a) Find $\dfrac{dy}{dx}$ for the following functions : **15**

(i) $y = \dfrac{1 + x^2}{1 - x^2}$

(ii) $y = e^x(x - 2)$

(iii) $y = \log (x \cos x)$

(b) Find $\sqrt{9.01}$ by using differentiation. **5**

4. (i) If $y = x^x$, find $\dfrac{d^2y}{dx^2}$ **5**

(ii) If $y = \log \left(x + \sqrt{1 + x^2}\right)$, then prove that $(1 + x^2)\, y_2 + xy_1 = 0$ **5**

(iii) Find the maximum and minimum values of the function

$$\frac{2}{3}x^3 + \frac{1}{2}x^2 - 6x + 8$$ **5**

(iv) A company notices that higher sales of a particular item which it produces are achieved by lowering the price charged. As a result the total revenue from the sales at first rises as the number of units sold increases, reaches the highest point and then falls off. This pattern of total revenue is described by the relation

$$y = 40{,}00{,}000 - (x - 2000)^2.$$

where y is the total revenue and x the number of units sold.

(a) Find, what number of units sold maximizes total revenue ?

(b) What is the amount of this maximum revenue ?

(c) What would be the total revenue if 2500 units were sold ? **5**

5. (i) Prove that $\begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{vmatrix} = 0$ **5**

(ii) Three shopkeepers A, B and C go to a store to buy stationary. A purchases 12 dozen note books, 5 dozen pens and 6 dozen pencils. B purchases 10 dozen note books, 6 dozen pens and 7 dozen pencils. C purchases 11 dozen note books, 13 dozen pens and 8 dozen pencils. A note books costs ₹ 25, a pen costs ₹ 10 and a pencil costs ₹ 5. Use matrix algebra to calculate each individuals bill. **5**

(iii) Food I has 3 units of Vitamin A, 9 units of Vitamin B and 12 units of Vitamin C. Food II has 6, 9 and 15 units respectively and Food III has 9, 0, 9 units respectively. 33 units of Vitamin A, 27 units of B and 60 of C are required. Find the amount of three foods that will provide exactly these amounts. Use matrix method. **10**