Seat No. : _______________

AA-157

April-2019

F.Y. M.B.A. Integrated, Sem.-II

Basic Mathematics

Time : 2:30 Hours] **[Max. Marks : 70**

Note : Log and Statistical tables will be provided on demand and use of scientific calculator is permitted.

1. (A) If $x = \text{f}(\text{y}) = \dfrac{\text{ay}+\text{b}}{\text{cy}-\text{a}}$, then prove that y = f($x$). **4**

OR

f : N → N and f(x) = $5^x - 2$. If the range of the function f is {3, 8, 13}, then find the domain of f.

(B) Solve the following : (any **2**) **10**

(1) The fixed cost in the production of bicycles is ₹ 2,00,000. The variable cost per unit is ₹ 1000. If the selling price of the bicycle is ₹ 1500, then find (i) Cost Function (ii) Revenue Function (iii) Break Even Point.

(2) f: R → R and g : R → R. If f(x) = $x^2 + 3z + 1$ and g(x) = $2x - 3$, then find fog, gof, fof and gog

(3) The demand function of sugarcane in the market is d = f(p) = $1605 - 5\text{p}^2$ Find the demand of sugarcane for price ₹ 5, 6 and 8 per kg respectively. At what price the demand of sugarcane will be zero ?

2. Solve the following : (any **two**) **14**

(1) Find $\lim\limits_{x\to 64} \dfrac{x^{\frac{2}{3}}-64}{x^{\frac{3}{2}}-512}$

(2) Find $\lim\limits_{x\to 0} \left(\dfrac{4-3x}{4+5x}\right)^{\frac{1}{x}}$

(3) Find $\lim\limits_{n\to\infty} \dfrac{4n+9}{18n^2-300}$.

3. Solve the following : (any **two**) **14**

(1) Find the derivative of $y = 1 + \dfrac{1}{1+\dfrac{1}{x}}$

(2) Find $\dfrac{dy}{dx}$ if $y = \dfrac{x}{1+x^2}$. Also find its value when $x = 2$.

(3) Find the derivative of $y = (3x^2 - 2)(x^2 + 7)$ with respect to x.

4. Solve the following : (any **two**) **14**

(1) Obtain maximum and minimum values of $y = x^3 + 6x^2 - 15x + 7$.

(2) The demand function of a commodity is $x = \dfrac{100-p}{2}$. Find the marginal revenue when the demand is 15 units.

(3) If $y = x^2 e^x$, then find $\dfrac{d^2y}{dx^2}$.

5. (A) Find the determinant value of $A = \begin{pmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{pmatrix}$. Prove that $A^2 = l_n$. **10**

(B) Solve the following : (any **2**) **4**

(1) If $A = \begin{pmatrix} 2 & 5 & 7 \\ 3 & -1 & 0 \\ 3 & 4 & 8 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 4 & 9 \\ 3 & -2 & -4 \\ -5 & 6 & 8 \end{pmatrix}$, then verify the following results.

(i) [KA + B]3 ↑T = A↑T + B↑T

(ii) [KAB] ↑T= B↑T A↑T

(2) Find the inverse of the matrix $A = \begin{pmatrix} 2 & 1 & -1 \\ 1 & 0 & -1 \\ 1 & 1 & 2 \end{pmatrix}$ and verify that $AA^{-1} = l_n$.

(3) Prove that $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ satisfies the equation $A^2 - 6A^2 + 9A - 4I = 0$. Also obtain A^{-1}.
