Seat No. : _____

NB-142

December-2015

F.Y.M.Sc. (CA & IT)

Mathematical Concepts

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

1. Attempt any **four :** **20**

   (1) Find a point on X-axis that is equidistant from A(2, 3) and B(1, 5).

   (2) Find the incentre of the triangle with vertices (3, 0), (0, 4) and (3, 4).

   (3) Measure of the angle between two lines is $\pi/4$ and one of the lines has slope 1/3. Find the slope of the other line.

   (4) Find the points of trisection of the line segment joining (4, 5) and (13, –4).

   (5) Find the equation of the line inclined at an angle of measure $\pi/4$ with X-axis and passing through (1, 2).

2. Attempt any **four :** **20**

   (1) Express the following as a product :

   (i) $\sin 2\theta + \sin 4\theta$

   (ii) $\sin 2\theta - \sin 4\theta$

   (2) Find the range of $\cos\theta + \sin(\theta - \frac{\pi}{6})$

   (3) Solve the equation $\cos\theta + \sin\theta = 1$

   (4) Prove that $\sin\left(\frac{\pi}{4} + \theta\right)\sin\left(\frac{\pi}{4} - \theta\right) = \frac{1}{2}\cos 2\theta$

   (5) If $A + B + C = \pi$, prove that

   $\cos 2A + \cos 2B + \cos 2C = -1 - 4\cos A \cos B \cos C$.

3. Attempt any **five :** **20**

   (1) Find $\frac{d}{dx} e^x \sec x \operatorname{cosec} x$

   (2) Find $\frac{d}{dx}\frac{\log x}{x^2}$

(3) Find $\frac{d}{dx} \cos(\sin(3x^2 + 2x + 1))$

(4) Find $\frac{d}{dx} x^x$

(5) Find $\lim_{x \to 1} \frac{x^2 + 2x - 3}{x^3 - x}$

(6) Find $\lim_{x \to 0} \frac{2x + \sin 3x}{x + \tan 5x}$

4. Attempt any **four :** **20**

(1) Find $\int (2t - 1)\sqrt{t^2 - t + 5}\, dt$

(2) Find $\int \frac{dx}{5 + 4\cos x}$

(3) Find $\int x \cos 2x\, dx$

(4) Find $\int \sin^4 x \cos^3 x\, dx$

(5) Find $\int \frac{dx}{(x - 1)(x + 2)}$

5. Attempt any **four :** **20**

(1) Find the Mc Laurin's series for $\sin x$.

(2) Find $\int_1^2 x \log x\, dx$.

(3) Solve the following differential equation

$xy(y + 1)\, dy = (x^2 + 1)\, dx$

(4) Verify whether $y = \cos^{-1} x$ is a solution of $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$

(5) Find the area bounded by the curve $y = x^2$ and the line $y = 4$.