Roll No. .....

97602

BCA 1st Semester (Old) Examination–November, 2014

MATHEMATICS-I

Paper : BCA-102

Time : 3 hours ***Max. Marks : 75***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt any **five** questions. All questions carry equal marks.

1. (a) If $\cot 0 + \cos 0 = m$ and $\cot 0 - \cos 0 = n$, prove that $(m^2 - n^2) = 16mn$.

(b) To draw the graph of

$y = \text{cosec } x \; 0 \leq x \leq 360^o$

2. (a) Prove that :

$$\frac{\sin 8x \cos x - \sin 6x \cos 3x}{\cos 2x \cos x - \sin 3x \sin 4x} = \tan 2x$$

(b) Solve the equation :

$$\tan^{-1} 2x + \tan^{-1} 3x = \pi/4$$

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

(b) (i) $\lim\limits_{x \to 0} \frac{1 - \cos x}{2x^2}$

(ii) $\lim\limits_{x \to \pi/4} \frac{\operatorname{cosec}^2 x - 2}{\cot x - 1}$

4. Differentiate w.r.t x

(i) $\left(x + \frac{1}{x}\right)\left(x^2 - \frac{1}{x^2}\right)$

(ii) $(2x + 3)^5 (3 - x)^4$

(iii) $\sqrt{\frac{\sec x - 1}{\sec x + 1}}$

(iv) $\tan^{-1}\left(\frac{\sqrt{1 + x^2} + 1}{x}\right)$

5. (a) Determine the ratio in which the line $y - x + 2 = 0$ divides the line joining $(3, -1)$ and $(8, 9)$.

(b) Find the equations of sides of the triangle whose vertices are $(-2, 8)$, $(1, 2)$ and $(7, -1)$. Also the median through the first vertex.

6. (a) Find the equation of the line through $(2, 3)$ so that the segment of the line intercepted between the axes is bisected at the point.

(b) Find the co-ordinates of point on the line $x + y + 9 = 0$ whose distance from the line $x + 3y - 8 = 0$ is $3\sqrt{10}$.

7. (a) If $(x + iy)^3 = u + iv$, then show that

$$\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$$

(b) Find the square root of $5 - 12\,i$.

8. (a) Solve

$$\sqrt{\frac{x}{x+3}} - \sqrt{\frac{x+3}{x}} = 2$$

(b) If α, β are the roots of the equation $2x^2 - 5x + 7 = 0$, find the equation whose roots are $2\alpha + 3\beta$, $3\alpha + 2\beta$.
