No. of Printed Pages : 4

CS-60

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Pre-Revised)

Term-End Examination

December, 2015

CS-60 : FOUNDATION COURSE IN MATHEMATICS IN COMPUTING

Time : 3 hours *Maximum Marks : 75*

Note : *Question no. **1** is **compulsory**. Attempt any **three** questions from question no. **2** to **6**. Use of calculator is permitted.*

1. (a) Find the modulus and argument of $\frac{1+i}{7+24i}$. *15×3=45*

(b) Evaluate :

$$\int \cos x \, dx$$

(c) If G and H are the geometric and harmonic means between two positive numbers, prove that $G > H$.

(d) Solve graphically :
$x + 2y = 5$, $y - x = 1$.

(e) Find $\frac{dy}{dx}$, when $y = 3x + 2$.

(f) Obtain the equation of the straight line passing through the origin and perpendicular to $3x + 4y = 5$.

(g) Find the equation of the circle whose centre is (1, 2) and radius is 5.

(h) Find the equation of the parabola whose focus is at (a, 0) and whose directrix is $x + a = 0$.

(i) Find the eccentricity of the ellipse : $3x^2 + 4y^2 = 12$.

(j) Find the angle between the pair of straight lines represented by $2x^2 - xy - y^2 = 0$.

(k) Determine

$$\int_0^{\pi} \sin 3x \, dx.$$

(l) Determine.

$$\lim_{\theta \to 0} \frac{1 - \cos\theta}{\theta^2}.$$

(m) Prove with symbols having usual meaning, that $A \cup \phi = A$.

(n) Examine whether or not the function $f : R \to R$ defined by $f(x) = x^2 \ \forall \ x \in R$ is one-one.

(o) Prove that $f(x) = \tan 3x$ is a periodic function. Find the period.

2. (a) Solve using Cramer's Rule : *4*

$x - y = 1,\ 2x + 3y = 12.$

(b) Solve the equation :

$2x^2 - 3x + 1 = 0.$ *2*

(c) Use De Moivre's Theorem to find the values of $\cos 3\theta$ and $\sin 3\theta$. *4*

3. (a) If the sum of two positive numbers is fixed, prove that their product is greatest when they are equal. *3*

(b) Find the equation of the straight line passing through the origin and the point (1, 1). *3*

(c) Show that the straight line $4x + 3y - 31 = 0$ touches the circle, $x^2 + y^2 - 6x + 4y - 12 = 0$ and find the point of contact. *4*

4. (a) Find the condition that $y = mx + c$ is a tangent to the parabola $y^2 = 4ax$. *4*

(b) Find the equation to the normal at the point (x_1, y_1) to the circle, $x^2 + y^2 = a^2$. *4*

(c) Convert the equation : $x^2 + y^2 = 4y$ into polar form. *2*

5. (a) Prove that $\sin x$ is a continuous function in the range, $0 < x < \pi$. *3*

(b) Differentiate $\sin^{-1} \frac{2x}{1+x^2}$ with respect to $\cos^{-1} \frac{1-x^2}{1+x^2}$. *4*

(c) Evaluate :

$$\int x^2 \, dx.$$ *3*

6. (a) Show that the triangle formed by the points A(3, 5, – 4); B(– 1, 1, 2) and C(– 5, – 5, – 2) is isosceles. *3*

(b) Show that the points A(–2, 0, 3); B(3, 10, – 7) and C(1, 6, – 3) are collinear. *3*

(c) Find the equation of the sphere with centre at (2, –2, 3) and passing through (7, –3, 5). *4*
