| CS-60 |

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Pre-Revised)
Term-End Examination
June, 2015

04203

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
$$z = \frac{1+3i}{3+4i}.$$
           15×3=45

   (b) Evaluate :
$$\int e^x \, dx$$

   (c) Prove that for any real quantity x, $x + \frac{1}{x} \geq 2$. When does the equality hold ?

   (d) Solve graphically $2x + 3y = 5$, $2y - x = 1$.

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

(f) Find the acute angle between the straight lines joining $(0, 0)$; $(1, 2)$ and $(1, 1)$; $(-1, 2)$.

(g) Find the centre and radius of the circle given by $x^2 + y^2 - 2x - 2y + 1 = 0$.

(h) If the extremities of the focal chord of a parabola are $(at_1^2, 2at_1)$ and $(at_2^2, 2at_2)$, then show that, $t_1 t_2 = -1$.

(i) Find the equation of a circle with centre as $(1, 1)$ and radius 2.

(j) Find the equation of a straight line passing through the two points $(0, 0)$ and $(1, 1)$.

(k) Evaluate :

$$\operatorname*{Lim}_{x \to 2} \frac{x^3 - 8}{x - 2}$$

(l) Evaluate :

$$\int_{-1}^{2} (x + 3) \, dx$$

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

(n) Show that the function $f : R \to R$ defined by $f(x) = 2x - 3 \ \forall \ x \in R$ is one-one.

(o) Prove that $f(x) = \sin 2x$ is a periodic function. Find the period.

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

$x + y = -1$, $3x - y = 9$

(b) Solve the equation :

$x^2 - 7x + 12 = 0$

(c) Use De Moivre's Theorem to find the values of $i^{1/2}$.

3. (a) Show that $(pq + rs)(pr + qs) \geq 4pqrs$, where p, q, r, s are positive real numbers. Under what condition on p, q, r and s would the equality hold ?　　　　**4**

(b) Find the equation of the straight line parallel to $2x + y + 1 = 0$, which passes through (1, 1).　　　　**3**

(c) Find the equation of the circle whose extremities of a diameter are (1, 2), (2, −1).　　　　**3**

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

(b) Sketch the ellipse :　　　　**3**

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

(c) Find the Cartesian form of the equation, $r = 3 \sin \theta$.　　　　**3**

5. (a) Evaluate : 4

$$\int_{0}^{\pi/2} (\cos x) \, dx$$

(b) Find $\dfrac{dy}{dx}$ if $y = \tan^{-1} \left(\dfrac{a + bx}{b - ax} \right)$. 4

(c) Prove that $f(x) = \sin x$ is an increasing function in the range $0 < x < \dfrac{\pi}{2}$. 2

6. (a) Find the equation of the plane through the point $(1, -2, 3)$ and parallel to the plane,

$$x - 3y + 2z = 0.$$ 3

(b) Find the equation of the lines passing through $(1, 3, -4)$ and perpendicular to the plane, $x - 3y + 2z = 4$. 4

(c) Find the equation of the sphere whose centre is at $(-2, 1, -3)$ and radius is 4. 3