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CS-60

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

Term-End Examination

December, 2018

00363

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 questions no. 2 to 6. Use of calculator is permitted.*

1. (a) It is given that, $z_1 = r_1 (\cos \theta_1 + i \sin \theta_1)$, $z_2 = r_2 (\cos \theta_2 + i \sin \theta_2)$ and $z = z_1 z_2$. Prove that $|z| = r_1 r_2$.

(b) Evaluate

$$\int \cot x \, dx$$

(c) For a, b, c being real, prove that

$$(a + b + c)^3 \geq 27 abc$$

(d) Solve graphically

$$2x + 5y = 9;$$

$$x - y = 1$$

(e) Find $\frac{dy}{dx}$ in terms of x, when, $x = ct$, $y = \frac{c}{t}$.

(f) Find the equation of the straight line passing through the origin and parallel to $2x + 3y = 4$.

(g) Find the equation of the circle, the extremities of a diameter of which are (1, 1) and (2, 3).

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

(i) Find the eccentricity of the ellipse :

$$9x^2 + 16y^2 = 25$$

(j) Evaluate :

$$\int_0^{\pi} \sin^2 x \, dx$$

(k) Evaluate :

$$\lim_{x \to 0} \frac{\sin 3x}{\tan 2x}$$

(l) Show that, $f(x) = \sin^2 x$ is a periodic function.

(m) Define the following in roster form :

$A = \{1, 4, 9, 16, 25, 36, 49, 64, 81\}$

$B = \{1, 8, 27, 64\}$

(n) Transform to polar equation

$$x^2 - y^2 = 2ay$$

(o) Find the direction cosines of a line which makes equal angles with the co-ordinate axes. *15×3=45*

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

$$x + 2y = 3, \quad 2x + y = 3.$$

(b) Form the quadratic equation whose product and sum of roots are 6 and 5 respectively. 2

(c) Find the square root of 'i'. 4

3. (a) If $xy = 36$, find the least value of $(x + y)$. 3

(b) Find the equation of the straight line parallel to $3x + 4y + 5 = 0$ and passing through the point $(-2, -3)$. 3

(c) If the extremities of the focal chord of the parabola, $y^2 = 4ax$ are $(at_1^2, 2at_1)$ and $(at_2^2, 2at_2)$, prove that $t_1t_2 = -1$. 4

4. (a) Find the equation of the tangent to the ellipse, 5

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \text{ at } (x_1, y_1)$$

(b) Prove that the equation,

$$x^2 + 6xy + 9y^2 + 4x + 12y - 5 = 0$$

represents a pair of parallel straight lines and find the distance between them. 5

5. (a) Show that the two circles, *4*

$$x^2 + y^2 + 2x - 14y + 1 = 0$$

and $x^2 + y^2 - 8x + 10y + 5 = 0$

touch each other externally.

(b) Evaluate *2*

$$\int_0^1 x^2 \, dx$$

(c) Find $\frac{dy}{dx}$,

when

$$y = \tan^{-1}\left(\frac{\cos x + \sin x}{\cos x - \sin x}\right).$$ *4*

6. (a) Show that the triangle formed by the points $(-1, -3, 4)$; $(-2, 1, -4)$ and $(3, -11, 5)$ is isosceles. *4*

(b) Show that the distance of the origin from the plane,

$6x - 3y + 2z - 14 = 0$ is 2 units. *3*

(c) Find the centre and the radius of the sphere,

$3x^2 + 3y^2 + 3z^2 + 2x - 4y - 2z - 1 = 0$ *3*