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CS-60

BACHELOR OF COMPUTER APPLICATIONS (BCA) (PRE-REVISED)

Term-End Examination

June, 2019

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 Nos. 2 to 6. Use of calculator is permitted.*

1. (a) Compute the values of x and y lying between $0°$ and $180°$, if : 3

$$\sin(x - y) = \cos(x + y) = \frac{1}{2}.$$

(b) Find the modulus and argument of $z = \dfrac{1 + 3i}{3 + 4i}$. 3

(c) The mean of the first three terms is 14 and the mean of next two terms is 18. Find the mean of all the five terms. 3

(d) Determine the equation of a line passing through the point $(-1, -2)$ and with slope $\dfrac{4}{7}$. 3

(e) If the A. M. (Arithmetic Mean) and H. M. (Harmonic Mean) of two numbers are 9 and 4 respectively, then find out their G.M. (Geometric Mean). 3

(f) Determine the equation of a circle if its centre is $(8, -6)$ and which passes through the point $(5, -2)$. 3

(g) Find out the value of : 3

$$i^{57} + \frac{1}{i^{25}}.$$

[Here $i = \sqrt{-1}$]

(h) Evaluate : 3

$$\int_0^{\frac{\pi}{2}} \frac{(\sin x + \cos x)^2}{\sqrt{1 + \sin 2x}}\, dx.$$

(i) Prove that : 3

$$\frac{1 + \sin\theta}{1 - \sin\theta} = (\sec\theta + \tan\theta)^2.$$

(j) Evaluate $\lim_{x \to 2} \frac{3x^2 + 4x}{2x + 1}$. 3

(k) Find the root of quadratic equation : 3

$$3x^2 - 4x - 4 = 0.$$

(l) Determine the equation of a line passing through the points (3, 4) and (2, –1). 3

(m) Write Lagrange's mean value theorem and Rolle's theorem. 3

(n) Find the distance between the line $3x - 4y + 12 = 0$ and the point (4, 1). 3

(o) If $x^y = e^{x-y}$, then prove that : 3

$$\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}.$$

2. (a) In a group of persons, each one knows Hindi or Tamil. If 100 know Hindi, 50 know Tamil and 30 know both, how many persons are there in the group ? 3

(b) If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \ldots\ldots \text{to } \infty}}}$, then prove that : 3

$$\frac{dy}{dx} = \frac{\cos x}{2y - 1}.$$

(c) If $y = (\tan x)^{\log x}$, then find $\frac{dy}{dx}$. 4

3. (a) If $\cos \theta = \frac{3}{5}$, then find the value of $\frac{\sin \theta \tan \theta + 1}{2 \tan^2 \theta}$. 3

(b) What is the equation of the line which passes through $(4, -5)$ and is parallel to the line $3x + 4y + 5 = 0$. 3

(c) What is the eccentricity of the ellipse whose length of minor axis is equal to the distance between the two foci ? 4

4. (a) Evaluate : 3

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

(b) Evaluate : 3

$$\int x^{\frac{2}{3}} dx.$$

(c) If $\tan \theta + \sec \theta = p$, then prove that : 4

$$\sec \theta = \frac{p^2 + 1}{2p}.$$

5. (a) Find out the area of the region bounded by the curve $y = x - x^2$, between $x = 0$ and $x = 1$. 3

(b) The length of the shadow of a tree is $10\sqrt{3}$ m, when the angle of elevation of the sun is 60°. What is the length of the shadow of the tree when the angle of elevation of the sun in 30° ? 3

(c) Find the equation of the tangent of the circle $x^2 + y^2 = 9$ which are parallel to $3x + 4y = 0$. 4

6. (a) If $\frac{\log x}{\log 5} = \frac{\log 36}{\log 6} = \frac{\log 64}{\log y}$, what are the values of x and y ? 3

(b) Find the vertex, focus and directrix of the parabola : 3

$$4y^2 + 12x - 12y + 39 = 0.$$

(c) Find the equation of an ellipse whose focus is (1, 0), the directrix is $x + y + 1 = 0$, and eccentricity is equal to $\frac{1}{\sqrt{2}}$. 4