Exam. Code: 0028
Sub. Code: 1362

1057

Bachelor of Computer Applications (B.C.A.)-2nd Semester

BCA-203: Mathematics in Computer Science-II ***(Old)***

Time allowed: 3 Hours | Max. Marks: 90

NOTE: *Attempt five questions in all, including Question No. IX (Unit-V) which is compulsory and selecting one question each from Unit I-IV.*

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UNIT – I

I. (a) If $f(x)=\frac{3}{x}$, find $f^1(x)$ using the limit definition of the derivative.

(b) Find the derivative of f(x) from the first principle, where $f(x)=x\sin(x)$.

(c) Find $\frac{dy}{dx}$, if $y=x^{\sin(x)}$, $x>0$ (6+6+6)

II. (a) Find $\frac{dy}{dx}$, if $y+\sin(y)=\cos(x)$.

III. (b) Find the derivative of the function given by $f(x)=\sin(x^2)$.

(c) A function $f(x)=1-x^2+x^3$ is defined in the closed interval [-1,1]. Find the value of x, in the open interval (-1,1) for which the mean value theorem is satisfied. (6+6+6)

UNIT – II

IV. Find the following integrals: -

(a) $\int\frac{1-\sin(x)}{\cos^2(x)}dx$

(b) $\int\frac{x}{9-4x^2}dx$

(c) $\int\sin^{-1}(\cos x)dx$ (6+6+6)

V. Evaluate the following indefinite integrals: -

(a) $\int\frac{e^x(1+x)}{\cos^2(e^x x)}dx$

(b) $\int\sin^3(x)\cos^2(x)dx$

(c) $\int\frac{dx}{1+\tan(x)}$ (6+6+6)

UNIT – III

VI. (a) Find $\int x^2e^{x^3}dx$

(b) Find $\int\log(x)dx$

(c) Find $\int\frac{x\sin^{-1}(x)}{\sqrt{1-x^2}}dx$

P.T.O.

VI. (a) Evaluate $\int_{-1}^{2} |x^3 - x| dx$

(b) If f(a+b-x)=f(x), then find $\int_a^b xf(x)dx$

(c) Find the area of the region bounded by the curve $y=x^2$ and the line y=4. (6+6+6)

UNIT – IV

VII. (a) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, then show that $A^3 - 23A - 40I = O$

Where I is 3×3 identity matrix and
O is 3×3 zero matrix.

(b) Obtain the inverse of the following matrix:

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$ (9+9)

VIII. (a) Consider a system of linear equations:

$x - 2y + 3z = -1$

$x - 3y + 4z = 1$

$-2x + 4y - 6z = k$

Find the value of k for which the system has infinitely many solutions.

(b) If x, y, z are different and $\det \begin{bmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{bmatrix}$

then show that 1+xyz=0 (9+9)

UNIT – V

IX. (a) Is it true that $x = e^{\log(x)}$ for all real x?

(b) Differentiate e^{-x} with respect to x.

(c) State Rolle's theorem.

(d) List any two important properties of definite integrals.

(e) Show that $\int_2^3 x^2 dx = \frac{19}{3}$

(f) If $f(x) = \int_0^x t \sin(t) dt$, then find f(x).

(g) Show that $\int_{-1}^{1} 5x^4 \sqrt{x^5 + 1}\ dx = \frac{4\sqrt{2}}{3}$

(h) If a matrix has 18 elements, what are the possible orders it can have? What, if it has 5 elements?

(i) If $\det \begin{bmatrix} x & 2 \\ 18 & x \end{bmatrix} = \det \begin{bmatrix} 6 & 2 \\ 18 & 6 \end{bmatrix}$, then find x. (9×2)

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