Exam. Code: 0028
Sub. Code: 0925

1058
Bachelor of Computer Applications
2nd Semester
BCA-203: Mathematics in Computer Science-II
(Old: 2015-16)

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) Show that $f(x)=|x|$ is not differentiable at $x=0$.

(b) Differentiate $e^{\sqrt{x}}$ w.r.t. x from first principles.

(c) If $y=x+\sqrt{x^2+1}$, then prove that $\frac{dy}{dx}=\frac{y}{\sqrt{x^2+1}}$. (6+6+6)

II. (a) If $\sec\left(\frac{x+y}{x-y}\right)=1$, prove that $\frac{xdy}{dx}=y$

(b) If $x\sqrt{1+y}+y\sqrt{1-y}=0$, prove that $\frac{dy}{dx}=\frac{1}{(x+1)^2}=0$

(c) Verify Lagrange's mean value theorem for the function $f(x)=(x-3)(x-6).(x-9)$ on the interval $[3,5]$. (6+6+6)

UNIT – II

III. Evaluate:

(a) $\int\frac{5x^4+12x^3+7x^2dx}{x^2+x}$

(b) $\int\frac{\cos 4x-\cos 2x}{\sin 4x-\sin 2x}dx$

(c) $\int\frac{\left(x^4-x\right)^{1/4}}{x^5}dx$ (6+6+6)

IV. (a) If $f'(x)=x+b, f(1)=5, f(2)=13$, find f(x).

(b) Evaluate:

(i) $\int\frac{x+\sqrt{x+1}}{x+2}dx$

(ii) $\int x^3\sin(x^4)dx$. (6+9+3)

UNIT – III

V. Evaluate:

(a) $\int\left(e^{\log x}+\sin x\right)\cos x dx$

(b) $\int e^{-x}\cos x dx$

(c) $\int_1^2\left(\frac{x-1}{x^2}\right)e^x dx$ (6+6+6)

VI. (a) Using properties of definite integrals, evaluate $\int_1^2\left(\frac{f(x)}{f(x)+f(3-x)}\right)dx$

(b) Find the area bounded by the curve $y^2=4x$ and the lines y=2 and x=0. (6+12)

P.T.O.

UNIT – IV

VII. (a) Find the value of λ, a non zero scalar, if

$$\lambda\begin{bmatrix}1 & 0 & 2\\ 3 & 4 & 5\end{bmatrix}+\begin{bmatrix}1 & 2 & 3\\ -1 & -3 & 2\end{bmatrix}=\begin{bmatrix}4 & 4 & 10\\ 4 & 2 & 14\end{bmatrix}$$

(b) If AB=A and BA=B, then show that $A^2=A$, $B^2=B$.

(c) Evaluate

$$\begin{vmatrix}x+y & y+z & z+x\\ z & x & y\\ 1 & 1 & 1\end{vmatrix}$$

(6+6+6)

VIII. (a) If $A=\begin{bmatrix}2 & 3\\ 5 & -2\end{bmatrix}$, show that $19A^{-1}=A$.

(b) Solve the following system of equations by matrix method:

x+3y+4z=8;

2x+y+2z=5;

5x+y+z=7

(6+12)

UNIT-V

IX. (a) If $A=\begin{bmatrix}k & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0\\ 5 & 1\end{bmatrix}$, find the values of k for which $A^2=B$.

(b) Evaluate

$$\begin{vmatrix}1+x & 1-x & 1-x\\ 1-x & 1+x & 1-x\\ 1-x & 1-x & 1+x\end{vmatrix}$$

(c) If $f(x)=x^3+7x^2+8x-9$, find $f'(4)$

(d) If $x^{2/3}+y^{2/3}=1$, show that $\frac{dy}{dx}=-\left(\frac{y}{x}\right)^{1/3}$

(e) How fast is the area of a circle changing with respect to the radius of the circle, when the radius is 3 cm?

(f) Evaluate $\int\frac{(1+x)^2}{\sqrt{x}}dx$

(g) Show that $\int_0^1\frac{dx}{2x-3}=-\frac{1}{2}\log_e 3$

(h) Evaluate $\int_0^{\pi/2}\frac{\sqrt{\cos x}}{\sqrt{\cos x}+\sqrt{\sin x}}dx$

(i) Find the area bounded by the curves y=sinx between the ordinates $x=0, x=\pi$ and the x-axis.

(9×2)

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