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BCA (Part-II) (Supp.) Examination, 2022

THEORETICAL FOUNDATION OF COMPUTER SCIENCE

(Differentiation and Integration)

Time Allowed : Three Hours

Maximum Marks : 50

Minimum Pass Marks : 20

Note : Attempt **all five** questions. All questions carry **equal** marks.

Unit-I

1. State and Prove Rolle's theorem.

Or

What is successive Differentiation? Explain with suitable example.

Unit-II

2. Explain Asymptotes with suitable example.

Or

Prove that radius of curvature at the point $(a\cos^3\theta, a\sin^3\theta)$ of the curve :

$x^{2/3} + y^{2/3} = a^{2/3}$ is 3 a $\sin\theta \quad \cos\theta$.

Unit-III

3. If $u = \sin^{-1}\dfrac{x+y}{\sqrt{x}+\sqrt{y}}$, then prove that

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{1}{2}\tan u.$$

Or

Find the directional derivative of $\phi = 3x^2yz - 4y^2z^3$ in the direction of the vector $3i - 4j + 2k$ at the point $(2,-1,3)$.

Unit-IV

4. Evaluate $\int \frac{2x+5}{\sqrt{x^2+3x+1}}\,dx$.

Or

Evaluate $\int_1^2 x^2 \log x \; dx.$

Unit-V

5. Evaluate $\int_0^3 \int_1^2 xy(1+x+y)\,dxdy.$

Or

Find the area of the Positive quadrant of the ellipse

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1.$$

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