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B.C.A. (Part-III) Examination, 2022

THEORETICAL FOUNDATION OF COMPUTER SCIENCE

(Calculus and Geometry)

[Paper First]

Time Allowed : Three Hours

Maximum Marks : 50

Minimum Passing Marks : 20

Note : Attempt **any five** questions. **One** question from each unit is **compulsory**. **All** questions carry **equal marks**.

UNIT–I

1. State and prove fundamental theorem of Integral.

OR

2. If $f:[a,b]\to R$ is bounded then for any partition P of $[a,b]$, $L(P,f)$ and $U(P,f)$ are bounded.

UNIT– II

3. Find the maxima and minima of the function

$$f(x,y)=xy(a-x-y)$$

OR

4. Explain the properties of Lagrange's method undetermine multipliers.

UNIT– III

5. Test the convergence of the integral

$$\int_0^{\infty}\frac{\cos x}{1+x^2}dx$$

OR

6. What are improper integral ? Explain with example. Give at least one approach for testing these convergence.

UNIT– IV

7. Find the equation of the curve whose vertex is (0, 0, 3) and base is circle $x^2 + y^2 = 4,\ z = 0$.

OR

8. Define generations of curve. Discuss the condition for these mutually perpendicular generators.

UNIT– V

9. Prove that the equation $\frac{\ell}{r} = 1 - e\cos\theta$ and $\frac{\ell}{r} = -1 - e\cos\theta$ represent the same conic.

OR

10. Write short notes on :

    (a) Directrix

    (b) Cone and its equation

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