CBCS-235

B. Sc. (Hon's) (CS) (First Semester) Examination, Dec. 2023

(CBCS Course)

COMPUTER SCIENCE

Paper : 102

(Calculus)

Time Allowed : Three hours

Maximum Marks : 60

Minimum Pass Marks : 21

Note : *Attempt all **five** questions from section A and any **three** question from section B. Distribution of marks is given with section.*

Section-'A'

(Short Answer Type Questions) $5 \times 6 = 30$

Note : *Attempt all five questions. **One** question from each unit is compulsory. Each question carries 6 marks.*

Unit-I

1. Define monotonic increasing, monotonic decreasing and oscillatory sequences with examples.

Or

Evaluate :

$$\int \frac{dx}{\left(1+x^2\right)\sqrt{\tan x}}$$

Unit-II

2. Evaluate :

$$\lim_{x\to 0} \frac{2^x - 1}{\sqrt{1+x}-1}$$

Or

Discuss different types of discontinuity.

Unit-III

3. Prove that the function $f(x)$ defined by

$$f(x) = \begin{cases} x\sin\frac{1}{x} & , \quad x \neq 0 \\ 0 & , \quad x = 0 \end{cases}$$

is continuous at origin but not differentiable at origin.

Or

Write geometrical interpretation of Lagranges mean value theorem.

Unit-IV

4. Expand $\log(1+x)$ by Maclauron's theorem.

Or

Prove that $y = x + \frac{1}{x}$ has one maxima and one minima.

Unit-V

5. Find radius of curvature of the curve

$$x = a\cos t, \; y = b\sin t$$

Or

Show that the curve $y = 2x - 3 + \frac{1}{x}$ is concave from below for all positive values of x.

Section-'B'

(Long Answer Type Questions) **3×10=30**

Note : Attempt any two questions. Each question carries 10 marks.

6. Prove that :

$$\int_0^{\pi/4} \log(1+\tan\theta)\, d\theta = \frac{\pi}{8}\log 2$$

7. Prove that the function $f(x)=|x|$ is continuous at $x=0$. Draw the graph of this function.

8. Verify Cauchy's mean value theorem for the functions x^2 and x^3 in the interval [1, 2].

9. Expand $\log\sin(x+h)$ in powers of h by Taylor's theorem.

10. Find all asymptotes of the curve

$$x^2y^2 - a^2(x^2+y^2) - a^3(x+y) + a^4 = 0$$