



K26U 1032

Reg. No. :

Name :

IV Semester B.Sc. Degree (CBCSS – OBE – Supplementary/Improvement)
Examination, April 2026
(2020 to 2023 Admissions)

COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
4C04MAT-ST : Mathematics for Statistics – IV

Time : 3 Hours

Max. Marks : 40

PART – A

Answer **any four** questions from this Part. **Each** question carries **1** mark.

1. Define the term Interpolating Polynomial.
2. With the usual notations, show that $\Delta^2 y_0 = y_2 - 2y_1 + y_0$.
3. Define forward difference operator.
4. State the Trapezoidal rule for Numerical Integration.
5. Find the order of the partial differential equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial u}{\partial x}$. (4×1=4)

PART – B

Answer **any seven** questions. **Each** question carries **2** marks.

6. Write the Lagrange's polynomial of degree two passing through the points (x_0, y_0) , (x_1, y_1) and (x_2, y_2) .
7. Define "Algebraic Functions". Give an example.
8. State the Taylor series for $y(x)$ around $x = x_0$.
9. Show that the equation $\sin x = \frac{x}{2}$ has a real root.

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10. Find the volume of the solid generated by revolving the region between the y-axis and the curve $x = 2/y$, $1 \leq y \leq 4$, about the y-axis.
11. Does the function $f(x, y) = 2y/x^3$ satisfies two-dimensional Poisson equation ? Justify your answer.
12. Evaluate $\int_0^1 \frac{dx}{1+x}$ by using Simpson's 1/3 rule.
13. Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ using Trapezoidal rule.
14. Describe the fourth order Runge-Kutta formula.
15. Show that $u = x^2 - y^2$ is a solution of the partial differential equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$. (7×2=14)

PART – C

Answer **any four** questions. **Each** question carries **3** marks.

16. The region bounded by the parabola $y = x^2$ and the line $y = 2x$ in the first quadrant is revolved about the y-axis to generate a solid. Find the volume of the solid.
17. Find the lateral surface area (which excludes the base area) of the cone formed by revolving the line segment $x = 1 - y$, $0 \leq y \leq 1$ about the y-axis.
18. Write a short note on Bisection method.
19. Find a positive root of $x - \cos x = 0$ by regula-falsi method.
20. Using Euler's method to find $y(0.1)$ given that $y' = \frac{y-x}{y+x}$, $y(0) = 1$.
21. Find an approximate value of $\sqrt{5}$ using Newton-Raphson method.
22. If u_1 and u_2 are solutions of $u_t = c^2 u_{xx}$ in some region R. Prove that $u = c_1 u_1 + c_2 u_2$ is also a solution of the above partial differential equation. (4×3=12)



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PART – D

Answer **any two** questions. **Each** question carries **5** marks.

23. Find the area of the surface that is generated by revolving the portion of the curve $y = x^3$ between $x = 0$ and $x = 1$ about the x-axis.
24. Using Lagrange's formula, find $f(6)$ given.

x	f(x)
2	18
5	180
7	448
10	1210
12	2028

25. Given $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0$. Find $y(0.2)$ and $y(0.4)$.
26. Solve $u_{tt} = c^2 u_{xx}$ using the method of separating variables. (2×5=10)