K24U 3437

Reg. No. : .....

Name : .....

**III Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, November 2024**
**(2019 to 2023 Admissions)**
**COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS**
**3C03 MAT-BCA : Mathematics for BCA – III**

Time : 3 Hours Max. Marks : 40

## PART – A

Answer **any 4** questions from this Part. **Each** question carries **1** mark. **(4×1=4)**

1. If f(x) has period p then find the period of f(nx).
2. For what values of the constant m will $y = e^{mx}$ be the solution of $y'' - 3y' - 10y = 0$.
3. Write the characteristic equation of $25\frac{d^2y}{dx^2} + y = \cos 7x$.
4. Write the standard form of Legendre's linear equation.
5. Find the Laplace transform of f(t) = cos2t.

## PART – B

Answer **any 7** questions from this Part. **Each** question carries **2** marks. **(7×2=14)**

6. Write down the Euler formula for calculating the Fourier coefficient.
7. Solve $y' + (x + 2)y^2 = 0$.
8. Verify that $y = \frac{2}{x}$ is a solution of the differential equation $xy' = -y$, for all $x \neq 0$.
9. Verify that $y = \tan(x + c)$ is a solution of $y' = 1 + y^2$.
10. Find the basis of the solution of the equation $\frac{d^2y}{dx^2} + y = 0$.
11. Evaluate $L^{-1}\left[\frac{2}{(s+4)^3}\right]$.

P.T.O.

12. Write the standard form of Euler-Cauchy equation. Give one example of it.

13. Find the Laplace transform of f(t) = cos3t cos2t.

14. Show that sum of two odd function is odd.

15. Find the Laplace transform of $f(t) = e^{at}\sin\omega t$.

PART – C

Answer **any 4** questions from this Part. **Each** question carries **3** marks. **(4×3=12)**

16. Prove that cos nx and cos mx $(n \neq m)$ are orthogonal on the interval $[-\pi, \pi]$.

17. Solve $xy' + y = xy^{\frac{3}{2}}$, $y(1) = 4$.

18. Solve $(x + 4)(y^2 + 1)dx + y(X^2 + 3x + 2)dy = 0$.

19. Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 2x + x^2$.

20. Solve $\frac{d^2y}{dx^2} + 25y = 2\sin 5x$.

21. Find the Laplace transform of the integral $\int_0^t te^{-4t}\sin 3tdt$.

22. Show that the Laplace transform is a linear operator.

PART – D

Answer **any 2** questions from this Part. **Each** question carries **5** marks. **(2×5=10)**

23. Obtain the half range Fourier cosine series for the function $f(x) = \cos x$ if $0 < x < \frac{\pi}{2}$ and $f(x) = 0$ if $\frac{\pi}{2} < x < \pi$ in the interval $(0, \pi)$.

24. Solve the initial value problem $\left(y + \sqrt{x^2 + y^2}\right)dx - xdy = 0$, $y(1) = 0$.

25. Solve $x^2y'' - 2xy + 2y = 0$, $y(1) = 1$, $y'(1) = 1$.

26. Use convolution theorem to find the inverse Laplace transform of $\frac{s}{(s-1)(s^2+4)}$.