K22U 3637

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, November 2022
(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
3C03 MAT-CS : Mathematics For Computer Science – III

Time : 3 Hours Max. Marks : 40

PART – A

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

1. Find the order of the ODE $y'' + \pi y^3 = 0$.
2. Write the characteristic equation of $25\frac{d^2y}{dx^2} + y = \cos 7x$.
3. Find the Laplace transform of f(t) = cos2t.
4. Find the inverse Laplace transform of $\frac{1}{s^2+9}$.
5. If f(x) has period p then find the period of f(nx).

PART – B

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

6. Check the exactness of $y' = 1 + y^2$.
7. Find the integrating factor of ydx – xdy = 0.
8. Verify that y = tan(x + c) is a solution of $y' = 1 + y^2$.
9. Find the basis of the solution of the equation $\frac{d^2y}{dx^2} + y = 0$.
10. Find the Wronskian of cosx and sinx.

P.T.O.

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

12. Is L[f(t) g(t)] = L[f(t)]L[g(t)] ? Explain.

13. State the convolution theorem of Fourier transform.

14. Find the Fourier transform of f(x), where f(x) = 3 if $-2 \leq x \leq 2$ and f(x) = 0, otherwise.

15. Solve $u_{xy} = -u_x$.

PART – C

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

16. Solve the initial value problem $y' + y\tan x = \sin 2x$, $y(0) = 1$.

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

18. Solve $\frac{d^2y}{dx^2} - 13\frac{dy}{dx} + 12y = e^{-2x}$.

19. Find the inverse transform of $\frac{(3s - 137)}{(s^2 + 2s + 401)}$.

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

21. Show that the Fourier transform is a linear operator.

22. Express $f(x) = \frac{1}{2}$, if $0 < x < \pi$ and f(x) = 0, if $x > \pi$.

PART – D

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

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

24. Solve $y'' - 3y' + 2y = 2x^2 + e^x + 2xe^x + 4e^{3x}$.

25. If L[f(t)] = F(s), then show that $L[f(t - a)\, u(t - a)] = e^{-as} F(s)$.

26. 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 $(0, \pi)$.
