K24U 3433

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, November 2024
(2019 to 2023 Admissions)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
3C03 MAT-CH : Mathematics for Chemistry – 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. What do you mean by an ordinary differential equation ?
2. Find the order of the ODE, $(y')^2 = \cos x$.
3. Show that $y_1 = e^x$ and $y_2 = e^{-x}$ are linearly independent functions.
4. Write the characteristic equation of $3\frac{d^2y}{dx^2} + 7\frac{dy}{dx} + 4 = 6\sin x$.
5. Find the Laplace transform of f(t) = sin3t.

PART – B

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

6. Verify that $y = ce^{-4x} + 0.35$ is a solution of $y' + 4y = 1.4$. Also find the particular solution when, y(0) = 2.
7. Solve the ODE $y' + (x + 2)y^2 = 0$.
8. Find the general solution of $y' - y = 5.2$.
9. Write the general form of Bernoulli equation.
10. Solve the differential equation $y'' + 3y' + 2y = 0$.
11. Solve the differential equation $y'' + y' = 0$.
12. Find a differential equation whose solution is sin3x.
13. Find the Laplace transform of f(t) = cosh 3t.

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

15. Write down the Euler formula for calculating the Fourier coefficient.

PART – C

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

16. Under what conditions for the constants a, b, k, l in (ax + by)dx + (kxly)dy = 0 exact ? Solve the exact ordinary differential equation.

17. Solve the differential equation $\frac{dy}{dx} = -\frac{2}{y} - \frac{3y}{2x}$.

18. Solve $y'' + 8y' + 25y = \sin 3x$.

19. Solve $y'' + 4y' + 4y = e^{-3x}$.

20. Find the inverse of the transform $L(f) = \frac{2s+16}{s^2-16}$.

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

22. Show that if f and g are two even functions then f + g is also an even function.

PART – D

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

23. Solve $y' + y = -\frac{x}{y}$.

24. Solve $x^2y'' + xy' + y = \log x + x$.

25. Solve the ODE $ty'' + (1 - t)y' + ny = 0$, using Laplace transform.

26. Find the Fourier series of the function $f(x) = \begin{cases} -k & \text{if } -2 < x < 0 \\ k & \text{if } 0 < x < 2 \end{cases}$, $p = 2L = 4$.

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