



K23U 3437

Reg. No. :

Name :

**III Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/
Improvement) Examination, November 2023
(2019 to 2022 Admissions)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
3C03MAT-BCA : Mathematics for BCA – III**

Time : 3 Hours

Max. Marks : 40

PART – A

Answer **any four** questions. **Each** question carries **1** mark.

1. Give an example of second order initial value problem.
2. Solve $y' + \sin x = 0$.
3. Let $y_1 = x^3$, $y_2 = x^2$. Find the Wronskian $W(y_1, y_2)$.
4. Find the Laplace transform of $f(t) = \cos 2t$.
5. Define even function. Give an example.

PART – B

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

6. Solve $y' = -2xy$, $y(0) = 1$.
7. Find the integrating factor of $-y dx + x dy = 0$.
8. Verify that the functions $y_1 = e^{-x} \cos x$ and $y_2 = e^{-x} \sin x$ are linearly independent.
9. Find the general solution of $y'' - y' = 0$.
10. Factor $P(D) = D^2 - 3D - 40I$ and solve $P(D)y = 0$.

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11. Find the Laplace transform of $f(t) = \sinh at$.
12. Find $\mathcal{L}^{-1}\left[\frac{1}{(s-1)^4}\right]$.
13. Find $\mathcal{L}(te^{-t} \sin t)$.
14. Let $H(s) = \frac{1}{(s^2 + w^2)^2}$. Find $h(t)$.
15. If $f(x)$ and $g(x)$ have period p , then show that $h(x) = f(x) + g(x)$ also has period p .

PART - C

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

16. Show that the equation is $2xy \, dx + x^2 \, dy = 0$ exact and solve it.
17. Solve the Bernoulli equation $y' = y - y^2$.
18. Solve the initial value problem $y'' + y' - 2y = 0$, $y(0) = 4$, $y'(0) = -5$.
19. Find $\mathcal{L}(t^2 \cos t)$.
20. Find the Laplace inverse of $\frac{3s - 137}{s^2 + 2s + 401}$.
21. Solve the initial value problem $y'' - 3y' + 2y = 4t$, $y(0) = 1$, $y'(0) = -1$ using Laplace transform.
22. Show that if f and g are two even functions then $f + g$ is also even function.

PART - D

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

23. Solve $y' + y \tan x = \sin 2x$, $y(0) = 1$.
24. Solve $y'' - 4y' + 4y = \frac{6e^{2x}}{x^4}$ by the method of variation of parameters.
25. Using Laplace transform solve $y'' - y' - 6y = 0$, $y(0) = 11$, $y'(0) = 28$.
26. Find the Fourier series representation of the periodic function $f(x) = |x|$ in $[-\pi, \pi]$ with $f(x + 2\pi) = f(x)$. Also deduce that $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \dots$