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 $P(D)y = 0$.

P.T.O.

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 $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots$