K21U 1838

Reg. No. : ....

Name : ....

III Semester B.Sc. Degree CBCSS (OBE) Reg./Sup./Imp. Examination, November 2021
(2019-2020 Admission)
Complementary Elective Course in Mathematics
3C03 MAT-BCA : MATHEMATICS FOR BCA – III

Time : 3 Hours

Max. Marks : 40

PART – A

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

1. Is $y = -\dfrac{c}{x}$ (c an arbitrary constant) is a solution of the ODE $xy' = y$ for all $x \neq 0$?

2. Write characteristic roots of $y'' + 3y' + 2y = 0$.

3. Write the Laplace transform of te^{-2t}.

4. Find a_0 for the Fourier series of $f(x) = x^3$ defined on $[-1, 1]$.

5. What is the Euler formula for calculating b_n of Fourier series of function $f(x)$ defined on $[-\pi, \pi]$?

PART – B

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

6. Solve $xy' = -y$.

7. Check whether the equation $\cos(x + y)dx + (y^2 + 2y + \cos(x + y))dy = 0$ exact or not ?

8. Solve $y' + y \tan x = \sin 2x$, $y(0) = 1$.

9. Solve $y' = Ay + By^2$.

P.T.O.

10. Find general solution to $y'' + y = 0$.

11. Solve $y'' + 4y' + 4y = 2e^{-t}$.

12. Find the Laplace transform of unit step function $u(t-a) = \begin{cases} 0 & \text{if } t < a \\ 1 & \text{if } t > a \end{cases}$

13. Find the inverse Laplace transform of $\dfrac{3s-10}{s^2+2s+40}$.

14. Find the Fourier series of the function $f(x) = x^2$ if $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$.

15. Find Fourier series for the following function

$f(x) = |x|, \; -\pi < x < \pi$

PART – C

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

16. Solve $(2 + 3x^2y^2)dx + 2x^3ydy = 0$.

17. Solve $(x^2 + y^2)dx - 2xydy = 0$.

18. Solve $y'' - y' - 6y = e^{3t} + 5$.

19. Solve $x^2y'' + xy' - y = 16x^3$.

20. Solve the initial value problem $y'' + 6y' + 8y = 0$, $y(0) = 1$ and $y'(0) = 1$ using Laplace transform.

21. Find the Fourier series of

$$f(t) = \begin{cases} 0 & \text{if } -\dfrac{\pi}{\omega} < t < 0 \\ E\sin\omega t & \text{if } 0 < x < \dfrac{\pi}{\omega} \end{cases}$$

22. Find Laplace transform of $f(t) = \cos 2t + \sin 2t$.

PART – D

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

23. Find the general solution to the initial value problem.

    $(e^{(x+y)} + ye^y)dx + (xe^y - 1)dy = 0$; $y(0) = -1$.

24. Solve :

    a) $y'' + 4y' + 4y = e^{-x}\cos x$.

    b) $y'' + 5y' + 6y = e^{-3x}$.

25. Write the following function using unit step functions and find its Laplace transform.

    $$f(t) = \begin{cases} 2 & \text{if } 0 < t < 1 \\ \dfrac{1}{2}t^2 & \text{if } 1 < t < \dfrac{\pi}{2} \\ \cos t & \text{if } t > \dfrac{\pi}{2} \end{cases}$$

26. Find the Fourier series of

    $$f(x) = \begin{cases} x & \text{if } -\pi < x < 0 \\ \pi - x & \text{if } 0 < x < \pi \end{cases}$$

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