K21U 2093

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (CBCSS – Sup./Imp.) Examination, November 2021
(2015 – '18 Admissions)
COMPLEMENTARY COURSE IN MATHEMATICS
3C03MAT – CS : Mathematics for Computer Science – III

Time : 3 Hours

Max. Marks : 40

SECTION – A

All the first **4** questions are **compulsory**. They carry **1** mark **each**.

1. Verify that $y = ce^{-x}$ is a solution of $y' + y = 0$.
2. Apply the operator $D^2 + 3D$ on $e^{-x} + e^{2x}$.
3. What is the inverse Laplace transform of the function $\frac{1}{s+3}$?
4. Examine whether $f(x) = |x^3|$ is odd, even or neither odd nor even.

SECTION – B

Answer **any 7** questions from among the **5** to **13**. These questions carry **2** marks **each**.

5. Solve $9yy' + 4x = 0$: $y(0) = 1$.
6. Find the integrating factor of $y' - 2y = 8e^x$.
7. Find the general solution of $y' - y = 0$.
8. Reduce to first order and solve $y'' = y'$.
9. Examine whether $f(x) = \sin x + \cos x$ is odd, even or neither odd nor even.

P.T.O.

10. Find a_0 of the Fourier series of $f(x) = \begin{cases} k & \text{if } \frac{-\pi}{2} < x < 0 \\ 0 & \text{if } 0 < x < \frac{\pi}{2} \end{cases}$

11. Find the inverse Laplace transform of $\frac{5s}{s^2 - 25}$.

12. Using the definition, find the Laplace transform of $2t + 3$.

13. Examine whether $f(x) = x|x|$ is odd, even or neither odd nor even.

SECTION – C

Answer **any 4** questions from among the **14** to **19**. These questions carry **3** marks **each**.

14. Show that the equation $2xydx + (x^2 + y^2)\, dy = 0$ is exact and hence solve.

15. Find the inverse Laplace transform of $\frac{3s + 7}{s^2 - 2s - 3}$.

16. Find the general solution of $(D^2 + 1)\, y = \ln\pi x - x^{-2}$, if $y_p = \ln\pi x$ is a particular solution.

17. Find the Fourier Cosine series of $f(x) = x^2$, $-\pi < x < \pi$.

18. Find a solution $u(x, y)$ of the equation $u_x - u_y = 0$ by separating variables.

19. Solve $x^2y'' - xy' + y = 0$.

SECTION – D

Answer **any 2** questions from among the **20** to **23**. These questions carry **5** marks each.

20. Find the orthogonal trajectories of the family of curves $x^2 - y^2 = c^2$.

21. Solve using Laplace transform $y'' + 9y = 5\sin 2t$, $y(0) = 0$, $y'(0) = 5$.

22. Solve $y'' + 2y' - 35y = 12e^{5x} + 37 \sin 5x$.

23. Find the Fourier series representation of x in the interval $[-\pi, \pi]$. Deduce that $1 - \frac{1}{3} + \frac{1}{5} - \ldots = \frac{\pi}{4}$.