K23U 3742

Reg. No. : ....

Name : ....

III Semester B.Sc. Degree (CBCSS – Supplementary) Examination, November 2023
(2017 – 2018 Admissions)
COMPLEMENTARY COURSE IN MATHEMATICS
3C03MAT – BCA – Mathematics for BCA – III

Time : 3 Hours   Max. Marks : 40

SECTION – A

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

1. Solve $\dfrac{dy}{dx} = -xy$.

2. Give an example of second order linear non-homogeneous differential equation.

3. Write the convolution property of Laplace transform.

4. Give an example of a odd function.

SECTION – B

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

5. Find general solution of $(2ydx + dy)e^{2x} = 0$.

6. Solve $\dfrac{dy}{dx} + \dfrac{y}{x} = \dfrac{y^2}{x}$.

7. Solve the equation $\dfrac{dy}{dx} - y = x$ by the method of variation of parameter.

8. Check whether the solutions $y_1 = \cos \omega x$ and $y_2 = \sin \omega x$ of the differential equation $y'' + \omega^2 y = 0$ are linearly independent.

9. Solve $y'' + 3y = 0$, given $y(0) = 2$, $y'(0) = 3\sqrt{3}$.

P.T.O.

10. Solve $xy'' + 4y' = 0$.

11. Find $L(\sinh^2 2t)$.

12. Show that $u = x^2 - y^2$ is a solution of two dimensional Laplace equation.

13. Solve the partial differential equation $u_{xy} = u_x$.

SECTION – C

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

14. Solve $(2x - 4y + 5)y' + x - 2y + 3 = 0$.

15. Solve $y\dfrac{d^2y}{dx^2} + \left(\dfrac{dy}{dx}\right)^2 = 0$.

16. Evaluate $L^{-1}\left(\dfrac{3s + 7}{s^2 - 2s - 3}\right)$.

17. Evaluate $L((t - 1)\, u(t - 1))$.

18. Express $f(x) = \pi - x, 0 \le x \le \pi$ as cosine series.

19. Solve $u_{xx} + u_{xy} - 2u_{yy} = 0$ using the transformation $v = x + y$ and $z = 2x - y$.

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 $y^2 + 2xy - x^2 = c$.

21. Solve $(z - 2)^2 y'' + 5(z - 2)y' + 3y = 0$.

22. Using Laplace transform, solve $y'' + 4y = \sin 2t$ given $y(0) = 3$, $y'(0) = 4$.

23. Find Fourier series for x in $[-\pi, \pi]$, and deduce that $\dfrac{\pi}{4} = 1 - \dfrac{1}{3} + \dfrac{1}{5} - \dfrac{1}{7} + \dots$