K21U 2094

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (CBCSS – Sup./Imp.) Examination, November 2021
(2015 – '18 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. Find the order and degree of the differential equation $(y')^2 + y = x^2 - 2$.
2. Define the Laplace transform of a function f(t).
3. Write the general form of one dimensional heat equation.
4. Verify that $y = e^{-3x}$ is a solution of $y'' - y = 8e^{-3x}$.

SECTION – B

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

5. Find the Laplace transform of $\cos^3(2t)$.
6. Solve $y' = x^2$.
7. Solve the initial value problem $y' = \frac{y}{x}$; $y(1) = 1$.
8. Find the integrating factor of $y' - 2y = 8e^x$.
9. Find the Laplace transform of tcos (3t).
10. Apply $(D + 5)^2$ to $\sin 3x + x$.
11. Find a_n of the Fourier series of $f(x) = \begin{cases} 1 & \text{if } -\pi < x < 0 \\ -1 & \text{if } 0 < x < \pi \end{cases}$.
12. Find a solution of $u_{xx} - u = 0$.
13. Verify that $u = x^3 + 3xt^2$ is a solution of the equation $u_{tt} = u_{xx}$.

P.T.O.

SECTION – C

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

14. Solve $2xyy' = y^2 - x^2$.

15. Find the Laplace transform of $e^{-3t} \sin^2 t$.

16. Solve $(D^2 - 1)\, y = 2x^2$.

17. Find the general solution of $y'' + y = 2x$, if $y_p = 2x$ is a particular solution.

18. Find the Fourier series expansion of $f(x) = 2x$, $-1 < x < 1$.

19. Find a solution $u(x, y)$ of the equation $2xu_x - 3yu_y = 0$ by separating variables.

SECTION – D

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

20. Solve $(3x^2y + e^y)dx + (x^3 + xe^y - 2y)dy$.

21. Solve using Laplace transform $y'' + 9y = 8 \sin t$, $y(0) = 0$, $y'(0) = 4$.

22. Find the general solution of $y'' - 3y' + 2y = 4x + e^{3x}$.

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