Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree (CBCSS*– Supplementary) Examination, November 2022
(2016 – 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. When is an equation $mdx + ndy = 0$ is exact ?

2. Verify that $y = 2x^2 - 6x + 7$ is a solution of $y'' + 3y' + 2y = 4x^2$.

3. Write the Laplace transform of t.

4. Write the general form of one dimensional wave equation.

SECTION – B

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

5. Solve $9yy' + 4x = 0$.

6. Find the differential equation corresponding to $xy = c$.

7. Solve the initial value problem $xy' + y = 0$; $y(2) = -2$.

8. Find the Laplace transform of $e^t (1 + t)^2$.

9. Find the Laplace transform of $\sin(2t) \sin(3t)$.

10. Apply the operator $(D + 1)(D - 2)$ to xe^{2x}.

11. Verify that $u = e^{2t} \cos x$ is a solution of the heat equation $u_t = -2u_{xx}$.

12. Find b_n of the Fourier series of $f(x) = \begin{cases} 1 & \text{if } -\pi < x < 0 \\ -1 & \text{if } 0 < x < \pi \end{cases}$

13. Find a solution of $u_{xx} + 4u = 0$.

SECTION – C

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

14. Find the orthogonal trajectories of $y = cx^2$, where c is an arbitrary constant.

15. Solve $y'' + y = \sec x$, by the method of variation of parameters.

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 Laplace transform of $t^2 \sin(2t)$.

18. Find the Fourier Cosine series of $f(x) = \pi - x$, $0 < x < \pi$.

19. Find a solution u(x, y) of the equation $y^2 u_x - x^2 u_y = 0$ by separating variables.

SECTION – D

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

20. Solve using Laplace transform $y'' + 2y' + 5y = e^{-1} \sin t$, $y(0) = 0$, $y'(0) = 1$.

21. Find the integrating factor of $y' - 2y = 8e^x$ and hence solve.

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

23. Solve $(D^2 - 2D + 1)y = e^x + x$.

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