K22U 2801

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree (CBCSS – Supplementary) Examination, November 2022
(2016 – 18 Admissions)
COMPLEMENTARY COURSE IN MATHEMATICS
3C03 MAT-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. Show that $(1 + 4xy + 2y^2)dx + (1 + 4xy + 2x^2)dy = 0$ is exact.

2. Find the general solution of $y'' - 3y = 0$.

3. What is the inverse Laplace transform of $\dfrac{1}{s^3}$?

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 $y' = 1 + y^2$.

6. Represent the family of all circles through the origin and tangent to the y-axis in the form $f(x, y, c) = 0$.

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7. Solve $(1 + x^2)y' = 1 + y^2$.

8. Verify that $u = e^x \cos y$ is a solution of the two dimensional Laplace equation $u_{xx} + u_{yy} = 0$.

9. Find the inverse Laplace transform of $\dfrac{1}{s(2s + 1)}$.

10. Find the Laplace transform of $4e^{5t} + 6t^3 - 3\sin 4t$.

11. Find the solution of $y'' - 5y' + 6y = 0$.

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

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

SECTION – C

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

14. Solve the exact equation $(x^3 + 3xy^2)dx + (y^3 + 3x^2y)dy = 0$.

15. Solve $y'' + y = \operatorname{cosec} x$, by the method of variation of parameters.

16. Using convolution, find the inverse Laplace transform of $\dfrac{s^2}{(s^2 + 1)(s^2 + 4)}$.

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

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

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

SECTION – D

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

20. Find the integrating factor and solve $2\sin(y^2)dx + xy\cos(y^2)dy = 0$.

21. Find the Fourier series representation of x^2 in the interval $[-\pi, \pi]$. Deduce that
$$\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots = \frac{\pi^2}{6}.$$

22. Solve using Laplace transform $y'' + 4y = \sin 2t$, $y(0) = 3$, $y'(0) = 4$.

23. Solve $(D^2 + 1)y = 10e^x \sin x$.

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