K17U 1972

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.) Examination, November 2017
(2014 Admn. Onwards)
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. Solve : $y' = \cosh 4x$.
2. Find the Wronskian of the functions $e^t \sin t$ and $e^t \cos t$.
3. Find the Laplace transform of $t^4 - 6t^2$.
4. Find the fundamental period of $\cos \pi x$. **(4x1=4)**

SECTION – B

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

5. Find the orthogonal trajectories of the family of curves $y^2 = kx^3$.
6. Solve : $\frac{dy}{dx} = \frac{x^2}{y^2}$, $y(0) = 2$.
7. Solve : $\cos(x + y)dx + (3y^2 + 2y + \cos(x + y))dy = 0$.
8. Solve the initial value problem, $y'' - y = 0$, $y(0) = 6$, $y'(0) = -2$.
9. Find the inverse Laplace transform of $\frac{4s - 3\pi}{s^2 + \pi^2}$.
10. Applying Laplace transforms solve the initial value problem : $y' + 4y = 0$, $y(0) = 2.8$.

P.T.O.

11. Find the Fourier series of the following function which is assumed to have the period 2π.

$$f(x) = \begin{cases} 0 & \text{if } -\pi \le x < 0 \\ x & \text{if } 0 \le x < \pi \end{cases}.$$

12. Solve for $u = u(x, y) : u_y + 2yu = 0$.

13. Find the value of c in the one dimensional wave equation such that $u = 4x^2 + t^2$ is a solution to it.

(7×2=14)

SECTION – C

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

14. Find an integrating factor and solve $(e^{x+y} + ye^y)dx + (xe^y - 1)dy = 0$, $y(0) = -1$.

15. Solve the initial value problem : $y'' + 4y = 16 \cos 2x$, $y(0) = 0$, $y'(0) = 0$.

16. Solve : $x^2y'' - 4xy' + 6y = 0$, $y(1) = 1$, $y'(1) = 0$.

17. Using Laplace transforms solve, $y(t) - \int_0^t y(\tau)\sin(t - \tau)d\tau = t$..

18. Find the Fourier series of the function f of period 4 where $f(x) = \begin{cases} -x & \text{if } -1 < x < 0 \\ x & \text{if } 0 < x < 1. \\ 1 & \text{if } 1 < x < 3 \end{cases}$

19. Find the type, transform to normal form and solve : $u_{xx} - 4u_{xy} + 4u_{yy} = 0$. **(4×3=12)**

SECTION – D

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

20. Find all initial conditions such that $(x^2 - 4x)y' = (2x - 4)y$ has no solution, precisely one solution, and more than one solution.

21. Solve : $(D^2 - 2D + I)y = x^2 + x^{-2}e^x$.

22. Applying Laplace transform, solve the following system.

$y_1' + y_2 = 0$, $\quad y_1(0) = 1$

$y_1 + y_2' = 2 \cos t$, $\quad y_2(0) = 0$

23. Find (a) the Fourier cosine series and (b) the Fourier sine series of the function, $f(x) = \pi - x$; $0 < x < \pi$.