



K16U 2114

Reg. No. :

Name :

Third Semester B.Sc. Degree (CBCSS – Reg./Supple./Imp.) Examination,
November 2016

(2014 Admn. Onwards)

**COMPLEMENTARY COURSE IN MATHEMATICS FOR COMPUTER
SCIENCE**

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 : $y' + y^4 \sin x = 0$.

2. Find the Wronskian of the functions, $y_1 = e^t \sin t$ and $y_2 = e^t \cos t$.

3. Find the inverse Laplace transform of $\frac{3}{s^2 + 4}$.

4. Write the one-dimensional heat equation.

(4×1=4)

SECTION – B

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

5. Solve : $y' - y = e^{2x}$.

① 6. Solve : $-\pi \sin \pi x \sinh y \, dx + \cos \pi x \cosh y \, dy = 0$.

7. Find the orthogonal trajectories of the family of curves, $y = \frac{2x}{5 + kx}$.

8. Find a differential equation whose general solution is $y = c_1 e^{2t} + c_2 e^{-3t}$.

9. Find the inverse Laplace transform of $\frac{s + 1}{s^2 + 2s + 10}$.

② 10. Find the Laplace transform of $5e^{-at} \sin \omega t$.

P.T.O.



11. Find the Fourier series of the function $f(x) = x + \pi$ if $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$.
12. Solve for $u = u(x, y) : u_{xy} = -u_x$.
13. Show that $u = \sin 8x \cos 2t$ is a solution to the one-dimensional wave equation. (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, $(y + x) dy = (y - x) dx$.
15. Find the real general solution to $x^2 y'' + 0.6 xy' + 16.04y = 0$.
- ② 16. Solve the initial value problem, $y'' + 0.4y' + 9.04y = 0$, $y(0) = 0$, $y'(0) = 3$.
17. Applying Laplace transforms solve, $y(t) - \int_0^t (1 + \tau) y(t - \tau) d\tau = 1 - \sinh t$.
18. Find the type, transform to normal form and solve : $xu_{xx} - yu_{xy} = 0$.
19. Find the Fourier series of $f(x) = x^2$ in the interval $(-\pi, \pi)$. (4×3=12)

SECTION – D

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

20. Suppose that in Winter the daytime temperature in a certain office building is maintained at 70°F. The heating is shut off at 10 pm and turned on again at 6 am. On a certain day the temperature inside the building at 2 am was found to be 65°F. The outside temperature was 50°F at 10 pm and had dropped to 40°F by 6 am. What was the temperature inside the building when the heat was turned on at 6 am?

- ① 21. Solve $(D^2 - 2D + 1)y = \frac{e^x}{x^3}$, by the method of variation of parameters.
- ② 22. Use the Laplace transform to solve the initial value problem, $y'' - 2y' + 2y = \cos t$; $y(0) = 1$, $y'(0) = 0$.
23. Find (a) the Fourier cosine series and (b) the Fourier sine series of the function,

$$f(x) = \begin{cases} 1 & 0 < x < 1 \\ 2 & 1 < x < 2 \end{cases}$$

(2×5=10)