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 $\dfrac{3}{s^2 + 4}$.
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 : $y' - y = e^{2x}$.
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, $y = \dfrac{2x}{5 + kx}$.
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 $\dfrac{s+1}{s^2 + 2s + 10}$.
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 $(D^2 - 2D + 1)y = \dfrac{e^x}{x^3}$, 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)

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11. Find the Fourier series of the function $f(x) = x + \pi$ if $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$.

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