

K23U 3436

Reg. No. :

Name :

III Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/
Improvement) Examination, November 2023
(2019 to 2022 Admissions)

COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
3C03 MAT-CS : Mathematics for Computer Science – III

Time : 3 Hours

Max. Marks : 40

PART – A

Answer any 4 questions. Each question carries 1 mark.

1. Show that $y = c/x$ is a solution of the differential equation $xy' = -y$, $x \neq 0$.
2. Write the general solution of the differential equation $y'' = y$.
3. State existence and uniqueness theorem for initial value problem.
4. Find the Laplace transform $f(t) = \cosh at$.
5. Write one dimensional heat equation. (4×1=4)

PART – B

Answer any 7 questions. Each question carries 2 marks.

6. Solve the initial value problem $y' = -2xy$, $y(0) = 1.8$.
7. Find the particular solution of $xy' + y = 0$, $y(4) = 6$.
8. Find the general solution of $4y'' - 4y' - 3y = 0$.
9. Find the Wronskian of functions $y_1 = x^3$ and $y_2 = x^2$.
10. Find the Laplace transform of $f(t) = e^{at}\sin wt$.
11. State convolution theorem in Laplace transform.

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12. Find the inverse transform of $F(s) = \frac{s}{s^2 + a^2}$.
13. Show that $u(x, y) = A(y)e^x + B(y)e^{-x}$ is the solution of the partial differential equation $u_{xx} - u = 0$.
14. Find the fourier series of the function $f(x) = x^2$, $0 < x < 2\pi$ and $f(x + \pi) = f(x)$.
15. Prove that the product of two odd function is even function. (7×2=14)

PART – C

Answer **any 4** questions. **Each** question carries **3** marks.

16. Solve the initial value problem $(\cos y \sinh x + 1) dx - \sin y \cosh x dy = 0$, $y(1) = 2$.
17. Solve $y'' + 3y' + 2y = 12x^2$.
18. Solve by method of variation of parameters $y'' + y = \sec x$.
19. Find the inverse transform of $F(s) = \frac{1}{s(s^2 + w^2)}$.
20. Solve the Volterra integral equation $y(t) - \int_0^t y(\tau) \sin(t - \tau) d\tau = t$.
21. Find the fourier series of the function $f(x) = x + \pi$ if $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$.
22. Find the Fourier cosine series of $f(x) = \sin x$, $0 < x < \pi$. (4×3=12)

PART – D

Answer **any 2** questions. **Each** question carries **5** marks.

23. Find an integrating factor and solve the initial value problem $(e^{x+y} + ye^y)dx + (xe^y - 1)dy = 0$, $y(0) = -1$.
24. Solve the Euler cauchy equation $x^2y'' - 5xy' + 9y = 0$.
25. Solve the initial value problem $y'' - y' - 6y = 0$, $y(0) = 11$, $y'(0) = 28$ using Laplace transform.
26. Find the Fourier coefficients of the function $f(x) = \begin{cases} -k, & \text{if } -\pi < x < 0, \\ k, & \text{if } 0 < x < \pi, \end{cases}$ and $f(x + 2\pi) = f(x)$. (2×5=10)