



K22U 3637

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/  
Improvement) Examination, November 2022

(2019 Admission Onwards)

COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS

3C03 MAT-CS : Mathematics For Computer Science – III

Time : 3 Hours

Max. Marks : 40

PART – A

Answer **any four** questions from this Part. **Each** question carries **1** mark. **(4×1=4)**

1. Find the order of the ODE  $y'' + \pi y^3 = 0$ .
2. Write the characteristic equation of  $25 \frac{d^2y}{dx^2} + y = \cos 7x$ .
3. Find the Laplace transform of  $f(t) = \cos 2t$ .
4. Find the inverse Laplace transform of  $\frac{1}{s^2 + 9}$ .
5. If  $f(x)$  has period  $p$  then find the period of  $f(nx)$ .

PART – B

Answer **any 7** questions from this Part. **Each** question carries **2** marks: **(7×2=14)**

6. Check the exactness of  $y' = 1 + y^2$ .
7. Find the integrating factor of  $ydx - xdy = 0$ .
8. Verify that  $y = \tan(x + c)$  is a solution of  $y' = 1 + y^2$ .
9. Find the basis of the solution of the equation  $\frac{d^2y}{dx^2} + y = 0$ .
10. Find the Wronskian of  $\cos x$  and  $\sin x$ .

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11. Write the standard form of Euler-Cauchy equation. Give one example of it.
12. Is  $L[f(t)g(t)] = L[f(t)]L[g(t)]$ ? Explain.
13. State the convolution theorem of Fourier transform.
14. Find the Fourier transform of  $f(x)$ , where  $f(x) = 3$  if  $-2 \leq x \leq 2$  and  $f(x) = 0$ , otherwise.
15. Solve  $u_{xy} = -u_x$ .

PART – C

Answer **any 4** questions from this Part. **Each** question carries **3** marks. **(4×3=12)**

16. Solve the initial value problem  $y' + y \tan x = \sin 2x$ ,  $y(0) = 1$ .
17. Solve  $(x + 4)(y^2 + 1)dx + y(x^2 + 3x + 2)dy = 0$ .
18. Solve  $\frac{d^2y}{dx^2} - 13\frac{dy}{dx} + 12y = e^{-2x}$ .
19. Find the inverse transform of  $\frac{(3s - 137)}{(s^2 + 2s + 401)}$ .
20. Find the Laplace transform of the integral  $\int_0^t te^{-4t} \sin 3tdt$ .
21. Show that the Fourier transform is a linear operator.
22. Express  $f(x) = \frac{1}{2}$ , if  $0 < x < \pi$  and  $f(x) = 0$ , if  $x > \pi$ .

PART – D

Answer **any 2** questions from this Part. **Each** question carries **5** marks. **(2×5=10)**

23. Solve the initial value problem  $\left( y + \sqrt{x^2 + y^2} \right) dx - xdy = 0$ ,  $y(1) = 0$ .
24. Solve  $y'' - 3y' + 2y = 2x^2 + e^x + 2xe^x + 4e^{3x}$ .
25. If  $L[f(t)] = F(s)$ , then show that  $L[f(t - a)u(t - a)] = e^{-as}F(s)$ .
26. Obtain the half range Fourier cosine series for the function  $f(x) = \cos x$  if  $0 < x < \frac{\pi}{2}$  and  $f(x) = 0$  if  $\frac{\pi}{2} < x < \pi$  in the interval  $(0, \pi)$ .