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K19U 2478

Reg. No. : ....

Name : ....

III Semester B.Sc. Degree (CBCSS - Reg./Supple./Imp.) Examination, November - 2019

(2014 Admn. Onwards)

COMPLEMENTARY COURSE IN MATHEMATICS

3C03 MAT-BCA:MATHEMATICS FOR BCA-III

Time : 3 Hours Max. Marks : 40

SECTION-A

All the first **Four** questions are compulsory. They carry **1** mark each. **(4×1=4)**

1. Find the general solution of $y' = 2\sec 2y$.
2. Solve $y'' + 2y' + 5y = 0$.
3. The Laplace transform of the unit step function u(t-a) is _______.
4. Give the two dimensional Laplace equation.

SECTION-B

Answer any **seven** questions from among the questions 5 to 13. These questions carry **2** marks each. **(7×2=14)**

5. Solve $yy' + 4x = 0$, y(0)=3.
6. Test for exactness and solve (x-y) (dx-dy)=0.
7. Solve $\frac{d^4y}{dx^4} + 4y = 0$.
8. Find the particular integral of $(D^3+1)y = \sin(2x+3)$.
9. Solve the IVP $y'' + y' - 2y = 0$, y(0)=4, $y'(0) = -5$.
10. Find the Laplace transform of $e^{-3t}(\cos 4t + 3\sin 4t)$.
11. Find $L^{-1}\left(\frac{1}{(s+1)^3}\right)$.
12. Find the Fourier series to represent $f(x)=x^2-2$ when $-2 \le x \le 2$.
13. Solve $u_{xy}=u_x$ like an ODE.

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SECTION-C

Answer any **Four** questions from among the questions 14 to 19. These questions carry **3** marks each. **(4×3=12)**

14. Solve $(1+y^2)dx=(\tan^{-1}y-x)dy$.

15. Solve $(xy^3+y)dx+2(x^2y^2+x+y^4)dy=0$.

16. Solve $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}-3y=x^2\log x$.

17. Find $L\left(\frac{1-\cos 2t}{t}\right)$.

18. Find $L^{-1}\left(\frac{s^2}{(s^2+4)^2}\right)$ using convolution theorem.

19. Obtain the Fourier series of $f(x)=x^2$, $-\pi<x<\pi$. Hence show that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\ldots\ldots=\frac{\pi^2}{12}$.

SECTION-D

Answer any **Two** questions from among the questions 20 to 23. These questions carry **5** marks each. **(2×5=10)**

20. Solve $\frac{dy}{dx}+\frac{x}{1-x^2}y=x\sqrt{y}$.

21. Solve $\frac{d^2y}{dx^2}+4y=4\tan 2x$.

22. Solve $y''+2y'+5y=e^{-t}\sin t$, $y(0)=0$, $y'(0)=1$ by Laplace transform..

23. Find the solution of wave equation $\frac{\partial^2 u}{\partial t^2}=c^2\frac{\partial^2 u}{\partial x^2}$ subject to the boundary conditions $u(0,t)=0$, $u(L,t)=0$ for all $t\geq 0$ corresponding to the triangular initial deflection $f(x)=\begin{cases}\frac{2k}{L}x, & 0<x<\frac{L}{2}\\ \frac{2k}{L}(L-X), & \frac{L}{2}<x<L\end{cases}$ and initial velocity zero.