K15U 0283

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree (CCSS – 2014 Admn. – Regular) Examination, November 2015
Complementary Course in Mathematics for B.C.A.
3C03 MAT-BCA : MATHEMATICS FOR BCA – III

Time : 3 Hours Max. Marks : 40

SECTION – A

All the first **4** questions are **compulsory**. They carry **1** mark **each**.

1. Solve : $(1 - x)\, dy - (3 + y)\, dx = 0$.
2. Find the general solution of $y'' + y = 0$.
3. Find the Laplace transform of $\cos 2\pi t$.
4. Write the two-dimensional wave 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 : $y' + y \sec x = \tan x$.
6. Show that the equation, $-\pi \sin \pi x \sinh y\, dx + \cos \pi x \cosh y\, dy = 0$ is exact and solve it.
7. Find the orthogonal trajectories of the family of curves, $y^2 = cx^3$.
8. Find the solution to the initial value problem, $y'' + y' - 2y = 0$, $y(0) = 0$, $y'(0) = 1$.
9. Using Laplace transform, solve the following initial value problem.

$$y'' - \frac{1}{4}y = 0,\ y(0) = 4,\ y'(0) = 0.$$

P.T.O.

10. Find the inverse transform of $\frac{3s-137}{s^2+2s+401}$.

11. Find the first order PDE, by eliminating the arbitrary constants a and b, satisfied by u where u (x, y) = (x + a) (y +b).

12. Determine whether $u(x, y) = x^2 + y^2$ is a solution to the PDE, $u_{xx} + u_{yy} = 0$.

13. Find the general solution to the PDE, $u_{yy} - u = 0$. **(7×2=14)**

SECTION – C

Answer **any 4** questions from among the questions **14** to **19**. These questions carry **3** marks **each**.

14. Solve the initial value probelm : $y' = e^{x^2} + 2xy$, $y(0) = 0$.

15. Solve : $y'' + 3y' + 2y = \cos 2x$.

16. Solve the initial value problem, $y'' + 3y' + 2.25\, y = -10e^{-1.5x}$, $y(0) = 1$, $y'(0) = 0$, by the method of undetermined coefficients.

17. Using convolution theorem, solve : $y'' + 4y = \sin 3t$, $y(0) = 0$, $y'(0) = 0$.

18. Find the type, transform to normal form and solve : $u_{xy} - u_{yy} = 0$.

19. Find the Fourier series of $f(x) = (\pi - x)/2$ in the interval $(0, 2\pi)$. **(4×3=12)**

SECTION – D

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

20. Find an integrating factor and solve, $(e^{x+y} + ye^y)\,dx + (xe^y - 1)\,dy = 0$, $y(0) = -1$.

21. Solve $y'' + y = \sec x$, by variation of parameters.

22. Write the following function using unit step function and find its transform.

$$f(t) = \begin{cases} 2 & \text{if } 0 < t < 1 \\ \frac{1}{2}t^2 & \text{if } 1 < t < \frac{1}{2}\pi \\ \cos t & \text{if } t > \frac{1}{2}\pi \end{cases}$$

23. Find (a) the Fourier cosine series and (b) the Fourier sine series of the function, $f(x) = x$; $0 < x < L$. **(2×5=10)**