01 05452   **K19U 2476**

Reg. No. : ....

Name : ....

III Semester B.Sc. Degree (CBCSS - Reg./Supple./Imp.)
Examination, November - 2019
(2014 Admn. Onwards)
COMPLEMENTARY COURSE IN MATHEMATICS
3C03 MAT-ST:MATHEMATICS FOR STATISTICS-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. Test for exactness the equation $(x^3+3xy^2)dx + (3x^2y+y^3)dy = 0$.

2. Whether the functions 0 and tan x linearly dependent on the interval $|x| < \pi/4$.

3. The value of $L(t^4)$, when L denotes the Laplace transform, is _____.

4. Write the two dimensional wave 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 the equation $y' = 1 + y^2$.

6. Solve $4y'' + 4y' - 3y = 0$.

7. Find the orthogonal trajectories of $y = cx^2$.

8. Find the Laplace transform of e^{a-bt}.

9. Find the inverse transform of $\dfrac{-s-10}{s^2-s-2}$.

10. Solve the initial value problem $y'' + 4y' + 4y = 0$, $y(0)=1$, $y'(0) = 1$.

11. Find the smallest positive periods of cos2x and $\sin 2\pi x$.

12. Solve the partial differential equation $u_{xx} - u = 0$.

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13. Which of the following functions are even.

   a) $|x^3|$ b) xcosux   c) coshx   d) x|x|

SECTION-C

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

14. Solve the equation $y' + 2y = e^x(3\sin 2x + 2\cos 2x)$.

15. Solve the equation $x^2y'' - 3.5xy' - 2y = 0$.

16. Show that $y_p = e^{-3x}$ is a solution of the equation $y'' - y = 8e^{-3x}$. Hence find a general solution.

17. Using convolution find the inverse of $H(s) = \dfrac{1}{(s^2 + 1)^2}$.

18. Find the Fourier series of f(x)=x, $-\pi < x < \pi$.

19. Find the solution of the equation $u_x - u_y = 0$ by separating variables.

SECTION-D

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

20. Find an integrating factor and solve the initial value problem
   $2\sin(y^2)dx + xy\cos(y^2)dy = 0$, $y(2) = \sqrt{\pi/2}$.

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

22. Find the inverse transform of $\dfrac{s^2 - \pi^2}{(s^2 + \pi^2)^2}$.

23. Find the Fourier series of $f(x) = \begin{cases} x & \text{if} & -\frac{\pi}{2} < x < \frac{\pi}{2} \\ \pi - x & \text{if} & \frac{\pi}{2} < x < 3\frac{\pi}{2} \end{cases}$ state whether the function is even or odd.