K18U 1902

Reg. No.: .....

Name: .....

III Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.) Examination, November 2018
(2014 Admn. Onwards)
Complementary Course in Mathematics
3C03MAT – CH : MATHEMATICS FOR CHEMISTRY – III

Time : 3 Hours Max. Marks : 40

SECTION – A

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

1. Give the standard form of a first order linear ODE.
2. Find $W(x, xe^x)$.
3. What is the Laplace transform of cosh at ?
4. Determine whether the function f assumed to be periodic of period 2π, is even or odd where $f(x) = e^{-4x}$; $-\pi < x < \pi$. **(4×1=4)**

SECTION – B

Answer **any 7** questions from among the questions **5** to **13**. These questions carry **2** marks **each**.

5. Find the orthogonal trajectories of the family of curves, $y = 4x + c$.
6. Solve : $y' - y = e^{2x}$.
7. Find the general solution to $y' \sin \pi x = y \cos \pi x$.
8. Solve : $y'' + 6y' + 5y = 0$, $y(0) = 4$, $y'(0) = -1$.
9. Using Laplace transform, solve : $y(t) - \int_0^t y(T)\,dT = 1$.
10. Find the inverse Laplace transform of $\frac{10}{2s + \sqrt{2}}$.

P.T.O.

11. Find the Fourier series of the following function which is assumed to have the period 2π.

$$f(x) = \begin{cases} 0 & \text{if } -\pi \le x < 0 \\ 1 & \text{if } 0 \le x < \pi \end{cases}.$$

12. Verify that u = cos2ysinh2x is a solution to the two dimensional Laplace equation.

13. Find all solutions u = u(x, y) of the equation $u_{xy} = xy$. **(7×2=14)**

SECTION – C

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

14. Solve : $y' \tan x = 2y - 8, y\left(\frac{1}{2}\pi\right) = 0$.

15. Find a general solution to $y'' + 3y' + 2y = 30e^{2x}$.

16. Solve : $x^2y'' - 4xy' + 6y = 0, y(1) = 1, y'(1) = 0$.

17. Find the Laplace transform of $e^{-3t} \cos \pi t$.

18. Find the Fourier series of the function f of period 2 where

$$f(x) = \begin{cases} 1 + x & \text{if } -1 < x < 0 \\ 1 - x & \text{if } 0 < x < 1 \end{cases}.$$

19. Find the type, transform to normal form and solve : $u_{xx} + u_{xy} - 2u_{yy} = 0$. **(4×3=12)**

SECTION – D

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

20. Test for exactness and solve : $(x^4 + y^2)\,dx - xydy = 0, y(2) = 1$.

21. Solve by variation of parameters, $(D^2 - 1)\,y = 1/\cosh x$.

22. Solve the following initial value problem by Laplace transform :

$y'' - 6y' + 5y = 29 \cos 2t, y(0) = 3.2, y'(0) = 6.2$.

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