K19U 2475

Reg. No. : ....

Name : ....

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

(2014 Admission Onwards)

COMPLEMENTARY COURSE IN MATHEMATICS

3C03 MAT-CH:MATHEMATICS FOR CHEMISTRY-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. Verify that $y=x^2$ is a solution of the differential equation $x\frac{dy}{dx}=2y$ for all x.

2. Solve $y''+4y=0$.

3. The Laplace transform of e^{at} is ________.

4. The fundamental period of sin x is ________.

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 initial value problem $y'=-2xy$, $y(0)=1$.

6. Solve the exact differential equation $[\cos x \tan y+\cos(x+y)]dx+[\sin x \sec^2 y+\cos(x+y)]dy=0$.

7. Solve $(D^2+5D+6)y=20e^{2x}$.

P.T.O

8. Find the integrating factor of the differential equation $(1+y^2)dx=[\tan^{-1}y-x]dy$.

9. Find the Laplace transform of $\sin^3 2t$.

10. Find the inverse Laplace transform of $\frac{6}{(s+3)^4}$.

11. Find the Fourier expansion of $f(x)=x$ in $-1< x < 1$.

12. Write the one-dimensional wave equation and the d'Alembert's solution of it.

13. Find the Fourier coefficient a_n for $f(x)= x \sin x$ in $0 < x < 2\pi$.

SECTION-C

Answer any **four** questions from among the questions 14 to 19. These questions carry **3** marks each. **(4x3=12)**

14. Solve the linear differential equation $x\frac{dy}{dx}+y=x^3y^6$.

15. Using the method of variation of parameters solve $y''-2y'+y=-e^x \sin x$.

16. Solve $(D^2+2D+1)y = \cos 2x$.

17. Find the Laplace transform of $\frac{\cos 2t-\cos 3t}{t}$.

18. Obtain the half range cosine series for $f(x)=x^2$ in $0 \le x \le \pi$.

19. Solve the partial differential equation $\frac{\partial u}{\partial x}=4\frac{\partial u}{\partial y}$ where u is a function of x and y.

SECTION-D

Answer any **two** questions from among the questions 20 to 23. These questions carry **5** marks each. **(2x5=10)**

20. Find the orthogonal trajectories of $x^2+y^2=2cx$.

21. Solve $x^2y''+4xy'+2y=e^x$.

22. Apply convolution theorem to evaluate the inverse Laplace transform of $\frac{s}{(s^2+a^2)^2}$.

23. A tightly stretched string with fixed end points x=0 and x=l is initially in a position given by $y=y_0\sin^3(\frac{\pi x}{l})$. If it is released from rest from this position, find the displacement y(x,t) in terms of Fourier coefficients of f(x).