Reg. No. : ....

Name : ....

III Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.) Examination, November 2018
(2014 Admn. Onwards)
COMPLEMENTARY COURSE IN MATHEMATICS
3C03MAT-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. Find the general solution to $y' = x^2 y$.

2. Evaluate $W(\cos \omega x, \sin \omega x)$.

3. Find the Laplace transform of t^{n+1}.

4. Give the one-dimensional heat equation. $(4 \times 1 = 4)$

SECTION – B

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

5. Solve the initial value problem : $y' + y \tan x = e^{-0.01x} \cos x$, $y(0) = 0$.

6. Find the orthogonal trajectories of the family of curves, $x^2 y = c$.

7. Find the general solution to $xy' = \frac{1}{2} y^2 + y$.

8. Solve : $x^2y'' + \dfrac{3}{2}xy' - \dfrac{1}{2}y = 0$.

9. Find $f(t)$ if $\mathcal{L}(f)$ equals $\dfrac{1}{(s-3)(s+5)}$.

10. Find the Laplace transform of $5e^{-at}\sin \omega t$.

11. Find the Fourier series of the function.

$$f(x) = \begin{cases} 0 & \text{if } -2 < x < -1 \\ k & \text{if } -1 < x < 1 \\ 0 & \text{if } 1 < x < 2 \end{cases}.$$

12. Solve for $u = u(x, y)$: $u_{yy} = 4xu_y$.

13. Find the value of c in the one dimensional heat equation such that $u = e^{-x^2 t}\sin 4x$ is a solution to it. (7×2=14)

SECTION – C

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

14. Test for exactness and solve : $-ydx + xdy = 0$.

15. Find the basis of solutions of the ODE $(x^2 - x)y'' - xy' + y = 0$.

16. Solve by variation of parameters, $y'' - 2y' + y = e^x \sin x$.

17. Find the inverse transform of $\ln\left(1 + \dfrac{\omega^2}{s^2}\right)$.

18. Find the Fourier series of the function

$$f(x) = \begin{cases} 0 & \text{if } -L < t < 0 \\ E \sin \omega t & \text{if } 0 < t < L \end{cases}.$$

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

SECTION – D

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

20. Finding an integrating factor solve, .

    $(\cos xy + x/y)\, dx + (1 + (x/y) \cos xy)\, dy = 0.$

21. Solve the initial value problem :

    $y'' + 2y' + 10y = 17 \sin x - 37 \sin 3x,\ y(0) = 6.6,\ y'(0) = -2.2.$

22. Applying Laplace transform, solve the following system.

    $y_1' = -6y_1 + 4y_2 \quad y_1(0) = -2,$

    $y_2' = -4y_1 + 4y_2 \quad y_2(0) = -7.$

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