



K17U 1973

Reg. No. :

Name :

Third Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.)
Examination, November 2017
COMPLEMENTARY COURSE IN MATHEMATICS
(2014 Admn. Onwards)
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. Find the general solution to $yy' + 36x = 0$.
2. When do we say a second-order ODE is linear ?
3. Find the Laplace transform of $-8 \sin 0.2t$.
4. Give the one-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. Test for exactness and solve : $x^3 dx + y^3 dy = 0$.
6. Solve : $y'e^{\pi x} = y^2 + 1$.
7. Solve the initial value problem : $y'x \ln x = y$, $y(3) = \ln 81$.
8. Solve : $y'' + \pi y' = 0$, $y(0) = 3$, $y'(0) = -\pi$.
9. If $H(s) = \frac{1}{s(s-a)}$, find $h(t)$.
10. Solve the initial value problem, $y'' - \frac{1}{4}y = 0$, $y(0) = 4$, $y'(0) = 0$, using Laplace transforms.
11. Find the Fourier series of the function $f(x) = x + \pi$ if $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$.

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12. Solve for $u = u(x, y) : u_y = 2xyu$.
13. Find the value of c in the one dimensional heat equation such that $u = e^{-2kt} \cos 8x$ 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. Find the general solution to $-\pi \sin \pi x \cosh 3y \, dx + 3 \cos \pi x \sinh 3y \, dy = 0$.
15. Verify that $y_1(t) = e^t$ and $y_2(t) = te^t$ are solutions of $y'' - 2y' + y = 0$ for $t \in \mathbb{R}$. Do they constitute a fundamental set of solutions ? Justify.
16. Solve the initial value problem :
 $10y'' + 18y' + 5.6y = 0, y(0) = 4, y'(0) = -3.8$.
17. Using Laplace transform, solve : $y(t) + \int_0^t (t - \tau) y(\tau) \, d\tau = 1$.
18. Find the Fourier series of $f(x) = x^2$ in the interval $(0, 2\pi)$.
19. Find the type, transform to normal form and solve : $xu_{xx} - yu_{xy} = 0$. (4×3=12)

SECTION – D

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

20. Find the general solution to $y' \sin 2y + x \cos 2y = 2x$.
21. Solve : $(x^2 D^2 - 2xD + 2I) y = x^3 \sin x$.
22. Applying Laplace transform, solve the following system :
 $y_1' = -4y_1 - 2y_2 + t \quad y_1(0) = 5.75,$
 $y_2' = 3y_1 + y_2 - t \quad y_2(0) = -6.75$
23. Find :
 a) The Fourier cosine series and
 b) The Fourier sine series of the function f defined by $f(x) = 1; 0 < x < 2$. (2×5=10)