



K20U1293

Reg. No. :

Name :

III Semester B.Sc. Degree (CBCSS – Sup./Imp.)

Examination, November 2020

(2014-'18 Admns.)

COMPLEMENTARY COURSE IN MATHEMATICS

3C03MAT (CS) : Mathematics for Computer Science – III

Time : 3 Hours

Max. Marks : 40

SECTION – A

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

1. Find the solution of $y'' = x^{-4}$.
2. Solve $(D^2 - a^2) y = 0$.
3. Write the linearity property of Laplace transform.
4. Write the two dimensional Laplace equation.

(4×1=4)

SECTION – B

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

5. Solve the equation $\frac{dy}{dx} + \frac{x}{y} = 0$.
6. Solve $\frac{dy}{dx} + \frac{y}{x} = x^2$, given that when $x = 1$, $y = 1$.
7. Solve $\frac{dy}{dx} = y \tan x - y^2 \sec x$.

P.T.O.

8. Solve $(D^2 - 7D + 6)y = e^{2x}$.
9. Find the general solution of $xy'' - 3xy' + 4y = 0$.
10. Find the Laplace transform of $\sin 2t \cdot \sin 3t$.
11. Evaluate $\int_0^{\infty} t e^{-2t} \sin t \, dt$, where $s = 2$.
12. Find the partial differential equation by eliminating arbitrary constants from $z = ax + by + a^2 + b^2$.
13. Solve the equation $4y = 4$. (7x)

SECTION - C

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

14. Show that the equation $\frac{xdy - ydx}{x^2} = 0$ is exact and solve it.
15. Find the orthogonal trajectories of the parabolas $y = cx^2$.
16. Solve the equation $x^2 y'' - 3.5 xy' - 2y = 0$.
17. Find the Laplace transform of $\frac{1 - e^t}{t}$.
18. Find the inverse transform of $\frac{3s + 7}{s^2 - 2s - 3}$.
19. Find the Fourier series of $f(x) = \begin{cases} x & \text{if } -\pi/2 < x < \pi/2 \\ 0 & \text{if } \pi/2 < x < 3\pi/2 \end{cases}$. (4x)



SECTION – D

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

20. Find the integrating factor of the differential equation $(x^2 - 3xy + 2y^2) dx + x(3x - 2y)dy = 0$ and solve the equation.
21. Solve the equation $y'' + 2y' + y = e^{-x} \cos x$ by the method of variation of parameters.
22. Solve by the method of Laplace transform $y'' + 2y' + 5y = e^{-t} \sin t$, given that $y(0) = 0$, $y'(0) = 1$.
23. Find the Fourier series of $f(x) = \begin{cases} k & \text{if } -\pi/2 < x < \pi/2 \\ 0 & \text{if } \pi/2 < x < 3\pi/2 \end{cases}$

and show that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} \dots = \frac{\pi}{4}$.

(2×5=10)
