Seat No.

OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Engineering Mathematics-III

Sub. Code: 63350/73203/77734

Day and Date: Tuesday ,16-12-2025 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

Instructions:

Special Inst.:
1) Attempt any Three questions from Q. no. 1 to 4.
2) Attempt any Three questions from Q. no. 5 to 8.
3) Figures to the right indicate full marks.
4) Use of non-programmable calculator is allowed.
5) Assume suitable data if necessary.

Q1) Solve **[12]**

a. Solve $(D^2 + 3D + 2)y = sin2x$ **[6]**

b. Solve $(D^3 - 7D - 6)y = (1 + x^2)\, e^{2x}$ **[6]**

Q2) Solve **[11]**

a. Fit a straight line $y = a + bx$ for the following data. **[5]**

x	0	5	10	15	20	25
y	12	15	17	22	24	30

b. Find the equation of line of regression y on x for the following data. **[6]**

x	40	34	28	30	44	38	31
y	32	39	26	30	38	34	28

Q3) Solve **[11]**

a. Evaluate using Laplace transform $\int_0^\infty e^{-2t}\ t\, cost\ dt.$ **[5]**

b. Find the inverse Laplace transform of $\frac{5s^2+8s-1}{(s+3)(s^2+1)}$ **[6]**

Q4) Attempt any Two of the following **[12]**

a. Solve $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x$ **[6]**

b. Fit the curve $y = ab^x$ to the following data. **[6]**

x	1	2	3	4	5	6	7	8
y	1	1.2	1.8	2.5	3.6	4.7	6.6	9.1

c. Using Laplace transform solve $(D^2 + 4D + 8)y = 1$ with $y(0) = 0$ and $y'(0) = 1$. **[6]**

Q5) Solve **[11]**

a. Show that the vector field $\bar{F} = (ysinz - sinx)\ i + (xsinz + 2yz)\ j + (xycosz + y^2)\ k$ is irrotational and find its scalar potential. **[6]**

b. Find the directional derivative of $\emptyset = x^2yz + 4xz^2$ at $(1, -2, 1)$ in the direction of $2i - j - 2k$. **[5]**

Q6) Solve **[12]**

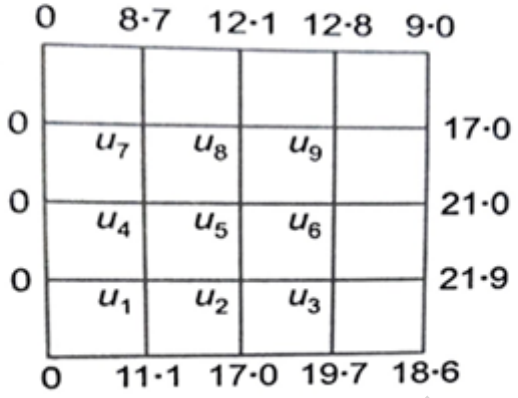
a. Obtain the Fourier series expansion for $f(x) = 4 - x^2$ in $(0, 2)$. **[7]**

b. Find the Fourier series for $f(x) = x$ in the interval $(-\pi, \pi)$. **[5]**

Q7) Attempt any one from the following. **[11]**

a.

Solve the Laplace equation $u_{xx} + u_{yy} = 0$ for following square mesh with boundary values as shown in the figure by Gauss-Seidel method. Carry out two iterations. **[11]**



b. Determine the solution of one-dimensional heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial t^2}$ under the boundary conditions $u(0,t) = 0, u(l,t) = 0$ and $u(x,0) = x$,$0 < x < l$ where l being the length of the rod. **[11]**

Q8) Attempt any Two from the following. **[12]**

a. Obtain the Fourier series expansion for f(x) $= \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \le x \le 0 \\ 1 - \frac{2x}{\pi}, & 0 \le x \le \pi \end{cases}$ **[6]**

b. Find the angle between the normals to the surfaces $x^2y + z = 3$ and $xlogz - y^2 + 4 = 0$ at the point $(-1,2,1)$. **[6]**

c. Using the method of separation of variables, Solve **[6]**

$$\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$$

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (1154) B.Tech. CBCS (73203) Engineering Mathematics-III Part 2 SEM 3

2] (101) Bachelor of Engineering (63350) Engineering Mathematics-III Part 2 SEM 3

3] (101) Bachelor of Engineering (77734) Engineering Mathematics-III Part 2 SEM 3