Seat No.

OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Engineering Maths - III

Sub. Code: 63338/73197/77769

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 full questions from each section.**
2. Figures to the right indicate full marks.
3. Use of non- programmable scientific calculator is allowed.

Q1) **Solve the following.** **[12]**

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

b) Solve $(D^2 + D + 1)y = \sin 2x$ **[6]**

Q2) **Solve the following.** **[11]**

a) Find the angle between the surfaces, $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$ **[5]**

b) Find the directional derivative of $\emptyset = 2x^3y - 3y^2z$ at P(1, 2, −1) in the direction of Q (3, −1, 5).In what direction from P is the directional derivative maximum? **[6]**

Q3) **Solve the following.** **[11]**

a) Obtain the equation of line of regression of cost on age from the following table giving the age of car of certain make and the annual maintenance cost. **[5]**

Age of car(x)	2	4	6	8
Maintenance(y)	1	2	2.5	3

b) Fit a straight line to the following data: **[6]**

x	1	2	3	4	6	8
y	2.4	3	3.4	4	5	6

Q4)

Attempt any two from the following. **[12]**

a) The deflection of a strut of length l with one end (x=0) built in and the other supported and subjected to end thrust P, satisfies the differential equation $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R(l-x)}{P}$, where $a^2 = \frac{P}{EI}$ Find the equation of the deflection curve. Given that $\frac{dy}{dx} = y = 0$ when x=0. **[6]**

b) Find the directional derivative of the function F(x, y, z) = $x^2 + xy + z^2$ at the point A(1, −1, −1) in the direction of the line AB where B has co-ordinates (3, 2, 0). **[6]**

c) Using the method of least squares fit a curve of the form $y=ab^x$ to the following data. **[6]**

x	1	2	3	4
y	4	11	35	100

Q5) **SECTION-II** **[12]**

Solve the following.

a) If the mean and variance of a Binomial distribution are 4 & 2 respectively, find the probability of **[6]**

(i) Exactly 2 successes (ii) less than 2 successes (iii) atleast 2 successes

b) A company produces condensers and supply them in the packs of 5 condensers each. If 1.5% of the condensers produced by the company are defective, using Binomial probability distribution find: **[6]**

(i) Probability that a pack selected at random from the production line is free from defective condensers.

(ii) A pack selected at random from the production line contain atmost one defective condenser.

Q6) **Solve the following.** **[11]**

a) Find the laplace transform of $\frac{e^{-3t}sin4t}{t}$ **[5]**

b) Evaluate using laplace transform $\int_0^\infty e^{-3t}t \cdot sint\, dt$ **[6]**

Q7) **Solve the following.** **[11]**

a) Evaluate $\int_{-3}^{3} x^4\, dx$ by using Trapezoidal rule taking 6 equal sub intervals. **[5]**

b) Evaluate $\int_4^{5.2} log_e x\, dx$ using Simpson's $(\frac{3}{8})^{th}$ rule by dividing the interval [4, 5.2] into 6 equal parts. **[6]**

Q8)

Attempt any two of the following. **[12]**

a) Marks obtained by a student are normally distributed with mean 55 and standard Deviation 5. If 1000 students appear in an examination **[6]**

(i) how many students will get marks more than 40?

(ii) how many students will get marks in between 45 to 50?

[Given: Area under normal curve from z = 0 to z = 3 is 0.4987, area under normal curve from z = 0 to z = 2 is 0.4773, area under normal curve from z = 0 to z = 1 is 0.3413]

b) Find inverse laplace transform of $\frac{2s+3}{(s+1)^2(s+2)}$ **[6]**

c) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Weddle's rule by dividing the interval into 6 equal sub intervals. **[6]**

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] (101) Bachelor of Engineering (77769) Engineering Maths - III Part 2 SEM 3

2] (1154) B.Tech. CBCS (73197) Engineering Maths - III Part 2 SEM 3

3] (101) Bachelor of Engineering (63338) Engineering Maths-III Part 2 SEM 3