

**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur**  
**(GIET University)**



B. Tech (Second Semester - Regular) Examinations, April 2026

**25FYBS120B2 - APPLIED MATHEMATICS-II**

(Biotech)

Time: 3 hrs

Maximum: 60 Marks

**Answer ALL questions**  
**(The figures in the right-hand margin indicate marks)**

**PART – A**

**(2 x 5 = 10 Marks)**

Q.1. Answer **ALL** questions

- |                                                                                                                    | CO # | Blooms Level |
|--------------------------------------------------------------------------------------------------------------------|------|--------------|
| a. If the slope of a line passing through the points $(4, b)$ and $(2, -9)$ is 3, then find the value of b.        | CO1  | K1           |
| b. Find the limit of $\lim_{x \rightarrow \infty} \frac{2x^2+3x+1}{3x^2-5x+7}$ .                                   | CO2  | K1           |
| c. Evaluate $\int_0^{\pi/2} (\cos x - \sin x) dx$ .                                                                | CO3  | K2           |
| d. Find a vector in the direction of vector $\vec{a} = \hat{i} - 2\hat{j}$ that has magnitude 7 units.             | CO4  | K2           |
| e. The mean and median of a distribution are 28 and 24 respectively.<br>Find the mode and also find (Mean – Mode). | CO5  | K1           |

**PART – B**

**(10 x 5 = 50 Marks)**

Answer **ALL** the questions

- |                                                                                                                                                                   | Marks | CO # | Blooms Level |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|
| 2. a. Show that the line through $(1,5)$ and $(4,4)$ is perpendicular to the $(2,1)$ and $(3,4)$ . Also Find the angle between them.                              | 5     | CO1  | K3           |
| b. Show that the triangle with vertices $A(-3,1)$ , $B(5,4)$ and $C(0,-7)$ is isosceles and right angled, having area equal to $\frac{73}{2}$ sq. units.          | 5     | CO1  | K2           |
| (OR)                                                                                                                                                              |       |      |              |
| c. Find the equation of circle which passes through the points $(0,1)$ , $(1,0)$ and $(2,1)$ . Find its radius and co-ordinates of the centre.                    | 5     | CO1  | K3           |
| d. i. Find the equation of the circle whose diameter endpoints are $(1, 2)$ and $(3,4)$ .<br>ii. Find the equation of a circle with centre $(3, 4)$ and radius 6. | 5     | CO1  | K2           |
| 3.a. Differentiate the following functions w.r.t $x$ .                                                                                                            | 6     | CO2  | K3           |
| i. $\frac{\sin x}{x^2}$ ii. $\sqrt{\tan x + \cot x}$ iii. $\cos(\log x)^3$ .                                                                                      |       |      |              |
| b. Find $\frac{dy}{dx}$ . i. $\sqrt{\frac{1-\sin x}{1+\sin x}}$ ii. $\log(e^{nx} - e^{-nx})$ .                                                                    | 4     | CO2  | K2           |
| (OR)                                                                                                                                                              |       |      |              |
| c. Differentiating the following w.r.t $x$ .                                                                                                                      | 4     | CO2  | K3           |
| i. $\frac{\cos x}{\log x}$ ii. $\sqrt{e^{\sqrt{x}}}$                                                                                                              |       |      |              |
| d. Prove that $f(x) = 5x - 3$ is a continuous function at $x = 0$ and $x = 3$ .                                                                                   | 6     | CO2  | K2           |
| 4.a. Evaluate the integral i. $\int x^4(1+x^5)^3 dx$ ii. $\int x^2 e^x dx$ .                                                                                      | 5     | CO3  | K3           |
| b. Find $\int \frac{\sin x}{\sin(x+\alpha)} dx$                                                                                                                   | 5     | CO3  | K2           |

(OR)

5 CO3 K3

c. Find  $\int \frac{x}{(x+1)(x^2+9x+20)} dx$ .

5 CO3 K2

d. Evaluate i.  $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$  ii.  $\int_0^1 (2x+1)^4$

5 CO3 K2

5.a. Find the Correlation coefficient between the two variables X and Y.

5 CO4 K3

|   |    |    |    |    |    |    |
|---|----|----|----|----|----|----|
| X | 5  | 6  | 7  | 8  | 10 | 12 |
| Y | 15 | 18 | 24 | 26 | 27 | 32 |

b. Determine the Regression equations for the following data.

5 CO4 K2

|   |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|
| X | 10 | 12 | 13 | 16 | 17 | 20 | 25 |
| Y | 10 | 22 | 24 | 27 | 29 | 33 | 37 |

(OR)

c. The marks obtained by 30 students of Class XII of a certain school in a Mathematics paper consisting of 100 marks are presented in table below. Find the mean of the marks obtained by the students.

5 CO4 K2

|                    |       |       |       |       |       |        |
|--------------------|-------|-------|-------|-------|-------|--------|
| Class Interval     | 10–25 | 25–40 | 40–55 | 55–70 | 70–85 | 85–100 |
| Number of Students | 2     | 3     | 7     | 6     | 6     | 6      |

d. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household:

5 CO4 K3

|                    |     |     |     |     |      |
|--------------------|-----|-----|-----|-----|------|
| Family size        | 1–3 | 3–5 | 5–7 | 7–9 | 9–11 |
| Number of families | 7   | 8   | 2   | 2   | 1    |

6.a. Prove that the given points A, B, C are collinear using vector method:  $A(6, -7, -1)$ ,  $B(2, -3, 1)$  and  $C(4, -5, 0)$ .

5 CO5 K2

b. Find the scalar and vector Triple product of  $(2, 0, 3)$ ,  $(1, 1, 1)$  and  $(3, 1, 0)$ 

5 CO5 K2

(OR)

c. Find the directional derivative of  $F = x^2 y^2 z^2$  at the point  $(1, 1, 1)$  in the direction of  $\vec{a} (1, 2, 3)$ .

5 CO5 K2

d. Find the angle between the normals to the surfaces  $x^2 + y^2 + z^2 = 10$  and  $x^2 + 2y^2 + 3z^2 = 15$  at point  $P(2, 3, 4)$ .

5 CO5 K3

--- End of Paper ---