



**C23-CHPC-CHPP-EE-EEVT-CHOT-102**

**23087**

**BOARD DIPLOMA EXAMINATION, (C-23)**

**MARCH/APRIL—2026**

**COMMON - FIRST YEAR EXAMINATION**

**ENGINEERING MATHEMATICS-I**

*Time : 3 hours ]*

*[ Total Marks : 80*

**PART—A**

3×10=30

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **three** marks.

1. Find the domain and range of the real function  $f(x) = \frac{1}{x}$ .
2. Resolve  $\frac{1}{(x-5)(x-3)}$  into partial fractions.
3. If  $A = \begin{bmatrix} 1 & 3 & -1 \\ 2 & 8 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 & 2 \\ 1 & -4 & -1 \end{bmatrix}$ , then find  $2A - B$ .
4. Find the determinant of the matrix  $\begin{bmatrix} 2 & 1 \\ 1 & -5 \end{bmatrix}$ .
5. Show that  $\cos 100^\circ \cos 40^\circ + \sin 100^\circ \sin 40^\circ = \frac{1}{2}$ .
6. If  $\tan A = \frac{3}{4}$ , then find the value of  $\sin 2A$ .
7. Find the multiplicative inverse of the complex number  $(2 - 3i)$ .
8. Find the equation of the straight line passing through the points (2,3) and (5,6).

9. Evaluate  $\lim_{x \rightarrow 0} \frac{\sin 3x}{x}$ .

10. Find the derivative of  $x^3 + e^x$  w.r.t.  $x$ .

**PART—B**

10×5=50

**Instructions :** (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

11. Solve the system of linear equations  $x - y + 3z = 5$ ,  $4x + 2y - z = 0$  and  $-x + 3y + z = 5$  using matrix inversion method.

12. (a) Prove that  $\cos \theta + \cos(120^\circ + \theta) + \cos(120^\circ - \theta) = 0$ .

(b) Prove that  $\tan^{-1}\left(\frac{1}{2}\right) - \tan^{-1}\left(\frac{1}{5}\right) = \tan^{-1}\left(\frac{3}{11}\right)$ .

13. (a) Solve  $\sqrt{3} \cos \theta - \sin \theta = 1$ .

(b) Solve  $\triangle ABC$  with  $a = 1$ ,  $b = \sqrt{2}$ ,  $c = 1$ .

14. (a) Find the equation of the circle passing through the points  $(0,0)$ ,  $(2,0)$  and  $(0,-3)$ .

(b) Find the equation of the conic whose focus is  $(1,-2)$ , eccentricity  $\frac{1}{\sqrt{2}}$  and directrix is  $3x - 2y + 1 = 0$ .

15. (a) Find the derivative of  $x^2 \sin x$  with respect to  $x$ .

(b) Find the derivative of  $\sqrt{\tan 3x}$  with respect to  $x$ .

- 16.** (a) If  $x = ct$  and  $y = \frac{c}{t}$ , then find  $\frac{dy}{dx}$ .
- (b) If  $u(x, y) = \log(x + y)$ , then prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$ .
- 17.** (a) Find the equations of the tangent and normal to the curve  $y = x^2 + 2$ , at  $(0, 2)$ .
- (b) The side of square plate is expanding at the rate 0.3 cm/sec. Find the rate at which its perimeter is increasing when its side is 10 cm.
- 18.** (a) Find the maximum or minimum value of the function  $f(x) = 2x^2 - 3x + 5$ .
- (b) Compute  $\Delta y$  if  $y = x^3 - 2x$ ,  $x = 3$  and  $\Delta x = 0.001$ .

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