



C20-EE-CHPP-102

**7035**

**BOARD DIPLOMA EXAMINATION, (C-20)**

**JUNE/JULY—2022**

**DEEE – FIRST YEAR EXAMINATION**

**ENGINEERING MATHEMATICS-I**

*Time : 3 hours ]*

[ *Total Marks : 80*

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**PART—A**

$3 \times 10 = 30$

**Instructions :** (1) Answer **all** questions.

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

1. A function  $f$  is defined by  $f(x) = x^2 + 1$  then find (a)  $f(-1)$ , (b)  $f(0)$  and (c)  $f(5)$ .
2. Resolve  $\frac{1}{(x-2)(x+7)}$  into partial fractions.
3. If  $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & -3 & 1 \end{bmatrix}$ , compute  $3A - 4B$ .
4. If  $\tan A = \frac{5}{6}$  and  $\tan B = \frac{1}{11}$  then show that  $A + B = \frac{\pi}{4}$ .
5. Show that  $\frac{1 + \cos 2A}{\sin 2A} = \cot A$ .
6. Find the modulus and additive inverse of  $z = 1 + i\sqrt{3}$ .
7. Find the slope of line joining two points  $(1, -1)$  and  $(2, 1)$ .

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- \* 8. Evaluate  $\lim_{\theta \rightarrow 0} \frac{\sin 3\theta}{\theta}$ .
9. If  $y = \sin(2x - 3)$  then find  $\frac{dy}{dx}$ .
10. If  $u = x^2 + 2xy + y^2$  then find  $\frac{\partial u}{\partial x}$  and  $\frac{\partial u}{\partial y}$ .

## PART—B

$8 \times 5 = 40$

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

11. (a) If " $w$ " is the cube root of unity then show that  $\begin{vmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{vmatrix} = 0$ .

(OR)

- (b) Solve the following system of linear equations by using Cramer's Rule :

$$x + 2y + 3z = 6, 2x + 4y + z = 7, 3x + 2y + 3z = 8$$

12. (a) Show that  $\frac{\sin 8A + \sin 6A}{\cos 8A + \cos 6A} = \tan 7A$ .

(OR)

- (b) Show that  $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \tan^{-1}\left(\frac{1}{2}\right)$ .

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**13.**\* (a) Solve  $2\sin^2 \theta + 3\cos \theta - 3 = 0$ .

(OR)

(b) In a  $\Delta ABC$ , show that  $\cot A + \cot B + \cot C = \frac{a^2 + b^2 + c^2}{4\Delta}$ .

**14.** (a) Find the equation of the circle having (4, 2) and (1, 5) as the extremities of the diameter.

(OR)

(b) Find the equation of the parabola whose focus is at (1, -1) and directrix  $3x + 4y + 5 = 0$ .

**15.** (a) Find  $\frac{dy}{dx}$ , if  $y = e^x \tan x + \frac{1 + \sin x}{1 - \sin x}$ .

(OR)

(b) If  $y = a(1 - \cos \theta)$  and  $x = a(\theta + \sin \theta)$  then find  $\frac{dy}{dx}$  at  $\theta = \frac{\pi}{4}$ .

## PART—C

$10 \times 1 = 10$

**Instructions :** (1) Answer the following questions.

(2) The question carries **10** marks.

**16.** Find the lengths of the tangent, normal, sub-tangent and subnormal to the curve  $x^2 + y^2 - 6x - 2y + 5 = 0$  at the point (2, -1).

