



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

**PART—A**

3×10=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  $(2, 1)$ .

\* 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

8×5=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  $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \tan^{-1}\left(\frac{1}{2}\right)$ .

13. <sup>\*</sup> (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

10×1=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).

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