* 4041 *

C14–EE/CHPP–102

# 4041

## BOARD DIPLOMA EXAMINATION, (C–14)

## OCT/NOV—2016

## 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.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

**1.** Resolve

$$\frac{2x \quad 1}{(x \quad 1)(2x \quad 3)}$$

into partial fractions.

**2.** If

$$A \begin{matrix} 1 & 4 & 7 \\ 2 & 5 & 8 \end{matrix} \text{ and } B \begin{matrix} 3 & 4 & 0 \\ 4 & 2 & 1 \end{matrix}$$

then verify that $(A \quad B)^T \quad A^T \quad B^T$.

**3.** If

$$A \begin{matrix} 1 & 2 \\ 3 & 1 \end{matrix}$$

then find $A^2 \quad 3A \quad 2I$.

**4.** Prove that

$$\tan\left(\frac{}{4} \quad A\right) \tan\left(\frac{}{4} \quad A\right) \quad 1$$

**5.** Prove that

$$\frac{\sin 2}{1 \quad \cos 2} \quad \tan$$

**6.** Express the complex number $1 \quad \sqrt{3}i$ in modulus-amplitude form.

**7.** Find the distance between the parallel lines $2x \quad y \quad 3 \quad 0$ and $2x \quad y \quad 2 \quad 0$.

**8.** Find the equation of the circle having $(a, 0)$ and $(0, b)$ as the extremities of the diameter.

**9.** Evaluate :

$$\lim_{n} \frac{1 \quad 2 \quad 3 \quad \cdots \quad n}{n^2}$$

**10.** Find

$$\frac{dy}{dx}$$

if $y \quad \sqrt{1 \quad \sin 2x}$.

**PART—B** 10×5=50

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

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

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

**11.** *(a)* Show that

$$\begin{vmatrix} a & b & 2c \\ & c & \\ & c & \end{vmatrix} \quad \begin{vmatrix} a & & b \\ b & c & 2a \\ & a & \end{vmatrix} \quad \begin{vmatrix} & & b \\ & b & \\ c & a & 2b \end{vmatrix} \quad 2(a \quad b \quad c)^3$$

(b) Solve the equations

$$\begin{aligned} 2x \quad 3y \quad z \quad & 1 \\ x \quad 4y \quad 2z \quad & 3 \\ 4x \quad y \quad 3z \quad & 11 \end{aligned}$$

by Cramer's rule.

**12.** (a) If $A \quad B \quad C \quad 90$, then show that

$$\tan A \tan B \quad \tan B \tan C \quad \tan C \tan A \quad 1$$

(b) If $\tan^{1} x \quad \tan^{1} y \quad \tan^{1} z \quad$, then prove that $x \quad y \quad z \quad xyz$.

**13.** (a) Solve the equation :

$$\cos \quad \sqrt{3} \sin \quad 1$$

(b) Solve the triangle $ABC$ with $a \quad 1$, $b \quad \sqrt{3}$, $c \quad 2$.

**14.** (a) Find the equation of the parabola whose axis is parallel to the $X$-axis and which passes through the points (1, 2), (–1, 3) and (–2, 1).

(b) Find the centre, length of axes, length of latus rectum (LLR), eccentricity foci of the ellipse $16x^2 \quad 9y^2 \quad 144$.

**15.** (a) If

$$y \quad \sqrt{\cot x \quad \sqrt{\cot x \quad \sqrt{\cot x \quad \cdots}}}$$

show that

$$\frac{dy}{dx} \quad \frac{\operatorname{cosec}^2 x}{1 \quad 2y}$$

(b) Find

$$\frac{dy}{dx}$$

if $x^3 \quad y^3 \quad 3axy \quad 10$.

**16.** *(a)* Find the derivative of $e^{\tan^{-1} x}$ with respect to $\tan^{-1} x$.

*(b)* If

$$u = \sin^{-1} \frac{x^2 - y^2}{x - y}$$

then prove that

$$x\frac{u}{x} + y\frac{u}{y} = \tan u$$

**17.** *(a)* Find the equations of tangent and normal to the curve $y = x^2 - 2x + 1$ at the point (1, 2).

*(b)* A particle is moving along a straight line according to the law $s = 2t^3 - 3t^2 - 15t + 18$. Find its velocity when its acceleration is zero.

**18.** *(a)* The sum to two numbers is 10. Find the numbers so that the sum of square is minimum.

*(b)* If there is an error of 2% in measuring the side of a square plate, then find the percentage error in its area.

★ ★ ★