

## C16-EC/CHPC/PET-102

# 6028

# BOARD DIPLOMA EXAMINATION, (C-16) SEPTEMBER/OCTOBER - 2020 **DECE—FIRST YEAR EXAMINATION**

### ENGINEERING MATHEMATICS—I

Time: 3 hours]

#### PART—A

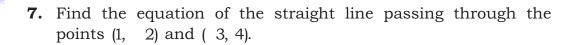
 $3 \times 10 = 30$ 

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

- (2) Each question carries three marks.
- **1.** Resolve  $\frac{1}{(x-8)(x-11)}$  into partial fractions.
- **2.** If  $A = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$ , then find  $A^2 = 2A = 3I$ , where I is a unit matrix of

- **5.** Prove that  $\frac{\sin 2}{1 \cos 2}$  cot.
- 6. Find the real and imaginary parts of the complex number

$$\frac{4}{1} \frac{2i}{2i}$$



- **8.** Find the distance between the two parallel lines 2x y 3 0 and 2x y 2 0.
- **9.** Evaluate Lt  $\frac{x^3}{x^5} = \frac{x^3}{x^5} = \frac{125}{5}$ .
- **10.** Find  $\frac{dy}{dx}$ , if  $y = \sqrt{1 \sin 2x}$ .

10×5=50

Instructions: (1) Answer any five questions.

- (2) Each question carries ten marks.
- **11.** (a) Prove that

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

(b) Solve the following equations by using matrix inversion method:

$$x$$
  $y$   $z$  6,  $x$  2 $y$   $z$  2 and 2 $x$   $y$   $z$  1

- **12.** (a) Prove that  $\cos 20 \cos 30 \cos 40 \cos 80 \frac{\sqrt{3}}{16}$ .
  - (b) Show that

$$\tan^{-1}\frac{2}{7}$$
  $\tan^{-1}\frac{1}{4}$   $\tan^{-1}\frac{15}{26}$ 

- **13.** (a) Solve  $2\sin^2 3\cos 3$  0.
  - (b) In any ABC, if C 60, then prove that  $\frac{a}{b} \frac{b}{c} \frac{b}{a} 1$
- **14.** (a) Find the equation of the circle passing through the points (0, 0), (1, 2) and (2, 0).
  - (b) Find the equation of the Ellipse whose center is the origin, whose axes are the axes of coordinates and which passes through the points (2, 1) and (1, 3).
- **15.** (a) Find  $\frac{dy}{dx}$ , if  $x^3 + y^3 + 3axy = 10$ .
  - (b) Find  $\frac{dy}{dx}$ , if  $x = e^t \cos t$  and  $y = e^t \sin t$ .
- **16.** (a) If  $y \sin(\log x)$ , then prove that  $x^2y_2 + xy_1 + y = 0$ .
  - (b) If  $u \log \frac{x^4 + y^4}{x + y}$ , then prove that  $x \frac{u}{x} + y \frac{u}{y} = 3$ .
- **17.** (a) Find the equation of tangent and normal to the curve  $y x^2 2x 1$  at (1, 2).
  - (b) A light is hung 8 m directly above a straight horizontal floor. A man of 2 m tall is walking away from the lamp at a rate of 5.4 m/min. Find the rate at which his shadow is lengthening.
- **18.** (a) Find the maximum and minimum values of  $2x^3 9x^2 12x 15$ .
  - (b) The time T of a complete oscillation of a simple pendulum of length l is given by T =  $2\sqrt{\frac{l}{g}}$ , where g is a constant. Show that the approximate percentage error in the calculated value of T corresponding to an error of 4% in the value of l is 2%.

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