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C16–EC/CHPC/PET–**102**

6028

BOARD DIPLOMA EXAMINATION, (C–16)
SEPTEMBER/OCTOBER - 2020
DECE—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. Resolve $\frac{1}{(x \quad 8)(x \quad 11)}$ into partial fractions.

2. If $A \quad \begin{matrix} 2 & 1 \\ 4 & 3 \end{matrix}$, then find $A^2 \quad 2A \quad 3I$, where I is a unit matrix of order 2.

3. If $A \quad \begin{matrix} 1 & 3 & 2 \\ 2 & 1 & 3 \\ 4 & 3 & 3 \end{matrix}$ and $B \quad \begin{matrix} 2 & 2 & 4 \\ 1 & 3 & 4 \\ 1 & 2 & 3 \end{matrix}$, then find $2A \quad 3B$.

4. If $\tan A \quad \frac{1}{2}$ and $\tan B \quad \frac{1}{3}$, then show that $A \quad B \quad 45$.

5. Prove that $\frac{\sin 2}{1 \quad \cos 2} \quad \cot$.

6. Find the real and imaginary parts of the complex number

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

7. Find the equation of the straight line passing through the points (1, 2) and (3, 4).

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

9. Evaluate $\underset{x \quad 5}{\text{Lt}} \dfrac{x^3 \quad 125}{x \quad 5}$.

10. Find $\dfrac{dy}{dx}$, 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.

11. *(a)* Prove that

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

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

$$x \quad y \quad z \quad 6, \; x \quad 2y \quad z \quad 2 \text{ and } 2x \quad y \quad z \quad 1$$

12. *(a)* Prove that $\cos 20 \quad \cos 30 \quad \cos 40 \quad \cos 80 \quad \dfrac{\sqrt{3}}{16}$.

(b) Show that

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

13. *(a)* Solve $2\sin^2 \quad 3\cos \quad 3 \quad 0$.

(b) In any ABC, if $C \quad 60$, then prove that

$$\frac{a}{b \quad c} \quad \frac{b}{c \quad a} \quad 1$$

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

(b) Find $\frac{dy}{dx}$, if $x \quad e^t \cos t$ and $y \quad e^t \sin t$.

16. *(a)* If $y \quad \sin(\log x)$, then prove that $x^2 y_2 \quad xy_1 \quad y \quad 0$.

(b) If $u \quad \log \frac{x^4 \quad y^4}{x \quad y}$, then prove that $x \frac{u}{x} \quad y \frac{u}{y} \quad 3$.

17. *(a)* Find the equation of tangent and normal to the curve $y \quad x^2 \quad 2x \quad 1$ 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 $2x^3 \quad 9x^2 \quad 12x \quad 15$.

(b) The time T of a complete oscillation of a simple pendulum of length l is given by $T \quad 2 \sqrt{\frac{l}{g}}$, 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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