* 6017 *

C16–C/CM–**102**

6017

BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2018

DCE—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 steps.

1. Resolve $\frac{2x \quad 3}{(x \quad 1)(x \quad 2)}$ into partial fractions.

2. If $A \begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix}$, $B \begin{matrix} 3 & 8 \\ 7 & 2 \end{matrix}$ and $2X \quad A \quad B$, then find X.

3. If $A \begin{matrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{matrix}$ and $B \begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 0 \end{matrix}$, then find $(A \quad B)^T$.

4. If $A \quad B \quad 45°$, then prove that $(1 \quad \tan A)(1 \quad \tan B) \quad 2$.

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

6. Find the modulus of $\frac{7 \quad 24i}{3 \quad 4i}$.

7. Find the perpendicular distance of a point (3, 5) from the line $3x \quad 4y \quad 26 \quad 0$.

8. Find the equation of a straight line parallel to $x \quad 2y \quad 1 \quad 0$ and passing through the point (1, 2).

9. Evaluate $\lim_{x \quad 0} \frac{\tan 3x}{\sin 5x}$.

10. If $y \quad \log \frac{1 \quad x^2}{1 \quad x^2}$, then find $\frac{dy}{dx}$.

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)* Solve the equation $2x \quad 3y \quad z \quad 1$, $x \quad 4y \quad 2z \quad 3$ and $4x \quad y \quad 3z \quad 11$ by using Cramer's method.

(b) Show that

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} \quad (a \quad b)(b \quad c)(c \quad a)$$

12. *(a)* If $\sin x \quad \sin y \quad \frac{3}{4}$ and $\sin x \quad \sin y \quad \frac{2}{5}$, then prove that

$$8 \cot \frac{x \quad y}{2} \quad 15 \cot \frac{x \quad y}{2}$$

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

$$x \quad y \quad z \quad xyz$$

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

(b) In triangle ABC, if $\frac{1}{a \quad c} \quad \frac{1}{b \quad c} \quad \frac{3}{a \quad b \quad c}$, show that $C \quad 60^\circ$.

14. *(a)* Find the equation of the circle passing through the points (0, 0), (1, 2) and (2, 0).

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

15. *(a)* If $y \quad x^{x^{x...}}$, then prove that $\frac{dy}{dx} \quad \frac{y^2}{x(1 \quad y\log x)}$.

(b) Differentiate $e^{\tan^{1} x}$ with respect to $\tan^{1} x$.

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

(b) If $z \quad \log(e^x \quad e^y)$, then prove that $\frac{z}{x} \quad \frac{z}{y} \quad 1$.

17. *(a)* Find the equations of tangent and normal to the curve $Y \quad x^2 \quad 6x \quad 11$ at (6, 11).

(b) The radius of a sphere is decreasing at the rate of 0·2 cm/sec. Find the rate at which its volume is decreasing when the radius of the sphere is 10 cm.

18. *(a)* The sum of two numbers is 24. Find the numbers when the sum of their squares is minimum.

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

★ ★ ★