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C16–A/AA/BM/CH/CHST/AEI/MNG/
MET/TT/IT/PCT—102

6002

BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—2017
FIRST YEAR (COMMON) 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

$$\frac{x \quad 4}{x^2 \quad 5x \quad 6}$$

into partial fractions.

2. If

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

then find $A^2 \quad 5A \quad 71$.

3. If

$$A \begin{matrix} 1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & X & 7 \end{matrix}$$

is a symmetric matrix, then find X.

4. If $A \quad B \quad 135$, then prove that $(1 \quad \cot A)(1 \quad \cot B) \quad 2$.

5. Prove that

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

6. Find the additive and multiplicative inverses of $3 \quad 4i$.

7. Find the angle between the lines $x \quad 2y \quad 9 \quad 0$ and $3x \quad y \quad 7 \quad 0$.

8. Find the distance between the parallel lines $3x \quad 4y \quad 8 \quad 0$ and $6x \quad 8y \quad 5 \quad 0$.

9. Evaluate :

$$\lim_{x \quad 0} \frac{e^{ax} \quad 1}{e^{bx} \quad 1}$$

10. Find $\frac{dy}{dx}$ if $y \quad e^x \log x$.

PART—B 10×5=50

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

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

11. *(a)* Solve the following equations by using Cramer's rule :

$$x \quad 2y \quad z \quad 3$$
$$3x \quad y \quad z \quad 4$$
$$x \quad y \quad 2z \quad 6$$

(b) Show that

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

12. *(a)* If $\cos x \quad \cos y \quad \frac{3}{7}$ and $\cos x \quad \cos y \quad \frac{5}{9}$, then show that

$$27 \tan \frac{x \quad y}{2} \quad 35 \cot \frac{x \quad y}{2} \quad 0$$

(b) Show that

$$\tan^{1} \frac{1}{7} \quad \tan^{1} \frac{3}{4} \quad \frac{}{4}$$

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

(b) Solve the triangle ABC with $b \quad 1$, $c \quad \sqrt{2}$, $A \quad 30$.

14. *(a)* Find the equation of the circle passing through the points (0, 0), (6, 0), (8, 4).

(b) Find the centre, length of the axes, length of latus rectum and focus of the ellipse

$$\frac{(x \quad 3)^2}{16} \quad \frac{y \quad 4^2}{25} \quad 1$$

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

(b) Find $\frac{dy}{dx}$, if $ax^2 \quad 2hxy \quad by^2 \quad 2gx \quad 2fy \quad c \quad 0$, where a, b, c, f, g, h are constants.

16. *(a)* If $u \quad x^2 \quad y^2 \quad z^2$, then show that

$$x\frac{u}{x} \quad y\frac{u}{y} \quad z\frac{u}{z} \quad 2u$$

(b) Find the derivative of $\tan^{1} \frac{2x}{1 \quad x^2}$ with respect to $\sin^{1} \frac{2x}{1 \quad x^2}$.

17. *(a)* Find the lengths of tangent, normal, subtangent and subnormal to the curve $y \quad x^3 \quad 2x^2 \quad 4$ at the point (2, 4).

(b) A circular metal plate expands by heat so that its radius increases at the rate of 0·02 cm per second. At what rate its area is increases when the radius is 20 cm?

18. *(a)* The sum of two numbers is 26. Find them, if their product is to be minimum.

(b) If the radius of a spherical balloon is increasing by 0·1 percent, find the approximate percentage of increase in the volume.

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