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C16–C–102/C16–CM–102

6017

BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—2017

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.

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

2. Compute $A^2 \quad 3A$, if $A \quad \begin{matrix} 1 & 3 \\ 2 & 1 \end{matrix}$.

3. Evaluate $\begin{vmatrix} g & f & c \\ a & h & g \\ h & b & f \end{vmatrix}$ using Laplace's expansion.

4. Prove that $\tan 75 \quad \cot 75 \quad 4$.

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

6. Find the real and imaginary parts of $\frac{4 \quad 2i}{1 \quad 2i}$.

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

8. Find the equation of straight line passing through (3, 1) and parallel to $5x \quad 7y \quad 3 \quad 0$.

9. Find the limit of $\dfrac{\sin 7x}{\tan 5x}$ as $x \quad 0$.

10. Find the derivative of $x \cot^{1} x$ w.r.t. x.

PART—B 10×5=50

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

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

11. *(a)* Find the inverse of the matrix $\begin{matrix} 2 & 2 & 4 \\ 3 & 3 & 1 \\ 1 & 4 & 1 \end{matrix}$.

(b) Solve the equations $x \quad y \quad z \quad 2$, $2x \quad 3y \quad 4z \quad 4$ and $3x \quad y \quad z \quad 8$ by Cramer's rule.

12. *(a)* Prove that $\dfrac{\sin 70 \quad \sin 50}{\cos 50 \quad \cos 70} \quad \dfrac{1}{\sqrt{3}}$.

(b) Prove that $\cos^{1} \dfrac{33}{65} \quad \sin^{1} \dfrac{5}{13} \quad \sin^{1} \dfrac{3}{5}$.

13. *(a)* Solve $\sin \quad \cos \quad \sqrt{2}$.

(b) If $a \cos A \quad b \cos B$, then prove that the triangle ABC is either isosceles or right-angled triangle.

14. *(a)* Find the equation of the parabola whose focus is (1, 2) and whose directrix is the line $3x \quad 4y \quad 5 \quad 0$.

(b) Find the equation of the circle passing through the points (0, 0), (1, 0) and (0, 1).

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15. *(a)* Find the derivative of $\log(\cos(\log x))$ w.r.t. x.

(b) If $x \quad a(\quad \sin\ ),\ y \quad a(1 \quad \cos\ )$, then find $\dfrac{d^2y}{dx^2}$.

16. *(a)* Find the derivative of $\cos^{1}(4x^3 \quad 3x)$ w.r.t. x.

(b) If $u \quad \log(x^2 \quad y^2 \quad z^2)$, then prove that

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

17. *(a)* Find the lengths of tangent, normal, subtangent and subnormal of the curve $y \quad x^3 \quad 2x^2 \quad 4$ at the point (3, 13).

(b) A circular patch of oil spreads out on water and the area is growing at the rate of 3 sq.cm/sec. How fast does the radius increase, when the radius is 4 cm?

18. *(a)* Find the dimensions of a rectangle of maximum area having a perimeter of 26 ft.

(b) The radius of spherical balloon is increased by 2%. Find the approximate the percentage increase in its surface area.

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