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C16–C/CM–102

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BOARD DIPLOMA EXAMINATION, (C–16)

SEPTEMBER/OCTOBER - 2020

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 $\frac{1}{(x \quad 5)(x \quad 7)}$ into partial fractions.

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

3. Using Laplace's expansion, find the value of $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$.

4. Prove that

$$\frac{\cos 11^\circ \quad \sin 11^\circ}{\cos 11^\circ \quad \sin 11^\circ} \quad \tan 56^\circ$$

5. Prove that

$$\frac{1 \quad \cos 2A}{\sin 2A} \quad \cot A$$

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

7. Find the perpendicular distance of the point (3, 2) to the line $3x \quad 4y \quad 10 \quad 0$.

8. Find the point of intersection of the lines $2x \quad 4y \quad 6$ and $x \quad 4y \quad 3$.

9. Evaluate $\underset{x \quad 2}{\text{Lt}} \frac{x^2 \quad 4}{x \quad 2}$.

10. Find the derivative of $3\tan x \quad 4\log x \quad 7x^2$ with respect to x.

PART—B

10×5=50

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

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

11. *(a)* Prove that

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

(b) Using matrix inversion method, solve the equations

$$2x \quad y \quad z \quad 4, \quad x \quad y \quad z \quad 1, \quad x \quad 3y \quad 2z \quad 2$$

12. *(a)* Prove that

$$\frac{\cos 3A \quad \cos A}{\sin 3A \quad \sin A} \quad \cot 2A$$

(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 $\sin \quad \cos \quad \sqrt{2}$.

(b) Solve the triangle ABC with $a \quad 1$, $b \quad 2$, $c \quad \sqrt{3}$.

14. *(a)* Find the equation of the circle with (5, 1) and (3, 7) as the end points of a diameter.

(b) Find the centre, foci, vertices, eccentricity, length of latus rectum and equations of the directrices of the ellipse $9x^2 \quad 25y^2 \quad 225$.

15. *(a)* Find $\frac{dy}{dx}$, if $y \quad \sin^{1}(3x \quad 4x^3)$.

(b) Find $\frac{dy}{dx}$, if $x^y \quad y^x$.

16. *(a)* If $y \quad x^{x^{x^{\cdots \text{ to}}}}$, then prove that

$$\frac{dy}{dx} \quad \frac{y^2}{x(1 \quad y\log x)}$$

(b) If $y \quad \log(e^x \quad e^y)$, then show that

$$\frac{z}{x} \quad \frac{z}{y} \quad 1$$

17. *(a)* Find the angles between the curves $y^2 \quad 4x$ and $x^2 \quad 4y$.

(b) A particle is moving along a straight line according to the law $s \quad 2t^3 \quad 3t^2 \quad 15t \quad 18$ (t in sec). Find its velocity, when its acceleration is zero.

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

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

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