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C16–C–102/C16–CM–102

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BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—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 sentences.

1. Resolve $\frac{1}{(x \quad 4)(x \quad 9)}$ into partial fractions.

2. If $A \quad \begin{matrix} 2 & 3 \\ 5 & 1 \end{matrix}$, then find $A \quad A^T$.

3. If

$$A \quad \begin{matrix} 0 & 1 & 2 \\ 1 & 3 & 4 \end{matrix} \quad \text{and } B \quad \begin{matrix} 0 & 2 & 1 \\ 4 & 3 & 2 \end{matrix}$$

find $2A \quad 3B$.

4. If $\tan A \quad \frac{5}{6}$ and $\tan B \quad \frac{1}{11}$, show that $A \quad B \quad \frac{}{4}$.

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

6. Find the modulus of the complex number $(3 \quad 4i)(4 \quad 3i)$.

7. Find the equation of the straight line passing through the point $(0, 1)$ and perpendicular to $2x \quad 3y \quad 5 \quad 0$.

8. Find the distance between two parallel lines $3x \quad 4y \quad 5 \quad 0$ and $3x \quad 4y \quad 2 \quad 0$.

9. Evalulate $\lim_{\quad 0} \frac{\cos ec \qquad \cot}{\qquad}$.

10. Find $\frac{dy}{dx}$ if $y \quad \sec x \quad \log x \quad 5e^{x}$.

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)* If

$$A \quad \begin{matrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ 2 & 1 & 1 \end{matrix} \quad \text{and } B \quad \begin{matrix} 4 & 0 & 5 \\ 1 & 2 & 0 \\ 0 & 3 & 1 \end{matrix}$$

then verify that $(AB)^T \quad B^T A^T$.

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

12. *(a)* Show that $\sin A \quad \sin(120 \quad A) \quad \sin(120 \quad A) \quad 0$.

(b) Show that $\sec^{\ 1}\frac{5}{4} \quad \tan^{\ 1}\frac{5}{12} \quad \cot^{\ 1}\frac{33}{56}$.

13. *(a)* Solve $\sin 7 \quad \sin 4 \quad \sin \quad 0$.

(b) In any ABC show that $a \cos\frac{B \quad C}{2} \quad (b \quad c)\sin\frac{A}{2}$.

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

(b) Find the equation of the parabola with focus (2, 3) and the directrix is the line $2x \quad 3y \quad 4 \quad 0$.

15. *(a)* Find the derivative of $e^{\tan \ 1 x}$ with respect to $\tan \ ^1 x$.

(b) If $y \quad x^{x^{x^{\ldots\ldots \quad times}}}$ find $\frac{dy}{dx}$.

16. *(a)* If $x \quad a(\quad \sin \quad)$ and $y \quad a(1 \quad \cos \quad)$, find $\frac{dy}{dx}$.

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

$$x\frac{u}{x} \quad y\frac{u}{y} \quad z\frac{u}{z} \quad \frac{3}{x \quad y \quad z}.$$

17. *(a)* Find the equation of the tangent and normal to the curve $y \quad x^2 \quad 2x \quad 1$ at (1, 2).

(b) A sphere of radius 10 cm shrinks to 9·8 cm. Find the approximate decrease in volume of the sphere.

18. *(a)* Show that the area of a rectangle of given fixed perimeter is maximum when the rectangle is a square.

(b) If the radius of a spherical balloon is increased by 0·2%, find the approximate percentage in its volume.

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