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C16–M–102/C16–CHOT–102/C16–RAC–102

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BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—2017

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

2. If $A \begin{vmatrix} 3 & 2 \\ 1 & 6 \end{vmatrix}$ and $B \begin{vmatrix} 4 & 1 \\ 2 & 5 \end{vmatrix}$, find AB.

3. Evaluate $\begin{vmatrix} 3 & 1 & 1 \\ 1 & 3 & 1 \\ 1 & 1 & 3 \end{vmatrix}$.

4. Prove that $\cos^2 45 \quad \sin^2 15 \quad \frac{\sqrt{3}}{4}$.

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

6. Express $\sqrt{3} \quad i$ in modulus-amplitude form.

7. Find the distance between the parallel lines $3x \quad 4y \quad 3 \quad 0$ and $6x \quad 8y \quad 1 \quad 0$.

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

9. Evaluate $\lim_{x \to 2} \frac{x^2 \quad x \quad 6}{x^2 \quad 5x \quad 6}$.

10. Differentiate $\sqrt{\tan 2x}$ w.r.t. x.

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each question carries **ten** marks.

11. *(a)* Show that $\begin{vmatrix} a & a^2 & 1 \\ b & b^2 & 1 \\ c & c^2 & 1 \end{vmatrix}$ $(a \quad b)(b \quad c)(c \quad a)$.

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

12. *(a)* Prove that $8\cos 20 \cos 40 \cos 80 \quad 1$.

(b) Prove that $\tan^{1} \frac{2}{7} \quad \cot^{1} 5 \quad \tan^{1} \frac{17}{33}$.

13. *(a)* Solve $2\sin^2 \quad \cos \quad 1 \quad 0$.

(b) In ABC, prove that $b\cos^2 \frac{C}{2} \quad c\cos^2 \frac{B}{2} \quad S$.

14. *(a)* Find the centre and radius of the circle $2x^2 \quad 2y^2 \quad 3x \quad 7y \quad 2 \quad 0$.

(b) Find the equation of the rectangular hyperbola whose focus is the point (1, 3) and directrix $2x \quad y \quad 1 \quad 0$.

15. *(a)* Find the derivative of $e^{\cot^{1} x}$ w.r.t. $\tan^{1} x$.

(b) Differentiate $x^{\cos x}$ w.r.t. x.

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

(b) If $U \quad \sin^{1} \frac{x^2 \quad y^2}{x \quad y}$, prove that $x\frac{u}{x} \quad y\frac{u}{y} \quad \tan u$.

17. *(a)* Find the equations of tangent and normal to the curve $x \quad a(\quad \sin \ ), y \quad a(1 \quad \cos \ )$ at $\frac{}{6}$.

(b) The radius of a sphere is decreasing at the rate of 0·1 cm/sec. Find the rate at which its volume is decreasing when the radius is 20 cm.

18. *(a)* Find the dimensions of the rectangle of maximum area having a perimeter of 32 ft.

(b) The time period T of a complete oscillation of a simple pendulum of length L is given by the equation $T \quad 2\sqrt{\frac{L}{g}}$, where g is a constant. Find the approximate percentage error in the calculated value of T corresponding to an error 3% in the value of L.

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