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C14–M–102/C14–CHOT–102/C14–RAC–**102**

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2016

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

2. If $A \quad \begin{matrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{matrix}$, then show that $A^2 \quad 4A \quad 5I \quad 0$, I is the unit matrix of order 3.

3. If $A \quad \begin{matrix} 2 & 3 & 1 \\ 0 & 5 & 6 \\ 2 & 4 & 21 \end{matrix}$ and $B \quad \begin{matrix} 1 & 2 & 3 \\ 1 & 0 & 2 \\ 1 & 1 & 1 \end{matrix}$, find AB and BA.

4. Show that $\tan 15 \quad \cot 15 \quad 4$.

5. Prove that $\frac{1 \quad \cos 2A}{1 \quad \cos 2A} \quad \tan^2 A$.

6. Find the real and imaginary parts of $\frac{3 \quad 2i}{7 \quad 4i}$.

7. Find the perpendicular distance from the origin to the line $3x \quad 4y \quad 26 \quad 0$.

8. Find the point circle with centre (5, 2).

9. Evaluate $\underset{x \quad 0}{\text{Lt}} \frac{\sin 8x}{\tan 5x}$.

10. Differentiate e^{16x^2} w.r.t. x.

PART—B 10×5=50

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

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

11. *(a)* Solve the following system of equations by matrix inversion method :

$x \quad 2y \quad 3z \quad 6; 3x \quad 2y \quad 4z \quad 5; x \quad y \quad z \quad 1$

(b) Solve :

$$\begin{vmatrix} x & 1 & 2 & 3 \\ 1 & x & 2 & 3 \\ 1 & 2 & x & 3 \end{vmatrix} \quad 0$$

12. *(a)* If $\sin x \quad \sin y \quad \frac{3}{4}$ and $\sin x \quad \sin y \quad \frac{2}{5}$, prove that

$$8 \tan \frac{x \quad y}{2} \quad 15 \tan \frac{x \quad y}{2}$$

(b) Prove that

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

13. *(a)* Solve $8 \sin^3 \quad \sin 3$.

(b) In ABC, if $\frac{a}{b \quad c} \quad \frac{b}{c \quad a} \quad 1$, prove that $C \quad 60$.

14. *(a)* Find the vertex, focus, directrix and latus rectum of the parabola $x^2 \quad 32y$.

(b) Find the eccentricity of the ellipse whose latus rectum is equal to halt of the length of major axis.

15. *(a)* If $y \quad \log(x \quad \sqrt{x^2 \quad 1})$, find $\frac{dy}{dx}$.

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

16. *(a)* If $y \quad \tan^{\ 1} x$, show that $(1 \quad x^2)y_2 \quad 2xy_1 \quad 0$

(b) Verify Euler's theorem $f(x, y, z) \quad x^2 \quad y^2 \quad z^2$.

17. *(a)* Show that the curves $y^2 \quad 4(x \quad 1)$ and $y^2 \quad 36(9 \quad x)$ cut each other orthogonally.

(b) A spherical balloon is being inflated so that the radius is increasing at the rate of 3 cm/sec. Find the rate at which the volume is increasing when $r \quad 10$ cm.

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

(b) If the length of simple pendulum l is decreased by 2%, find the percentage error in its period T, where $T \quad 2\sqrt{\frac{l}{g}}$ and g is a constant.

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