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C16–M/CHOT/RAC–102

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BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—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 $\frac{x}{(x \quad 2)(x \quad 3)}$ into partial fractions.

2. If $A \begin{matrix} 4 & 2 & 6 \\ 1 & 4 & 5 \\ 2 & 3 & 3 \end{matrix}$ and $B \begin{matrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 2 & 3 & 4 \end{matrix}$, find X such that $A \quad B \quad X \quad 0$

3. Find the value of $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$.

4. If $A \quad B \quad 45$, then show that $(1 \quad \tan A)(1 \quad \tan B) \quad 2$.

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

6. Express $\frac{2 \quad i}{3 \quad 4i}$ in the form of $A \quad iB$.

7. Find the equation of the line passing through the points (1, 2) and (–2, 3).

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

9. Evaluate $\underset{x \quad 2}{\text{Lt}} \dfrac{x^3 \quad 8}{x^5 \quad 32}$.

10. Differentiate $3\cos x \quad 2\log x \quad 21x \quad 5$.

PART—B 10×5=50

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

11. *(a)* Solve the equations $2x \quad y \quad 3z \quad 9$, $x \quad y \quad z \quad 6$, $x \quad y \quad z \quad 2$ by Cramer's method.

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

12. *(a)* Prove that $\cos 20 \quad \cos 40 \quad \cos 80 \quad 0$

(b) If $\tan^{\ 1} x \quad \tan^{\ 1} y \quad \tan^{\ 1} z \quad \frac{}{2}$, then prove that $xy \quad yz \quad zx \quad 1$.

13. *(a)* Solve $2\cos^2 \quad 3\cos \quad 1 \quad 0$.

(b) Solve the triangle ABC given $a \quad 9$ unit, $B \quad 65$, $C \quad 15$.

14. *(a)* Find the equation of the circle with (2, 3) and (6, 9) as the end points of a diameter. Also find the radius, centre of the circle.

(b) Find vertices, foci, directices and the length of latusrectum of the ellipse $4x^2 \quad 9y^2 \quad 36$.

15. *(a)* Find $\dfrac{dy}{dx}$, if $y \quad \log(\sin(\cos 3x))$.

(b) If $U(x, y) \quad \tan^{\ 1}(x / y)$, then find $\dfrac{u}{x}, \dfrac{u}{y}$.

16. *(a)* Differentiate $e^{\tan^{\ 1} x}$ w.r.t. $\tan^{\ 1} x$.

(b) If $y \quad \sin(\log x)$, then show that $x^2 y_2 \quad xy_1 \quad y \quad 0$.

17. *(a)* Find the length of tangent, normal, sub-tangent and sub-normal to the curve $y \quad x^3 \quad 2x \quad 5$ at the point (1, 4).

(b) Each side of square is increasing at the rate of 1·5 cm/sec.Find the rate at which the area of the square increases, when the side is 12 cm.

18. *(a)* Find the dimensions of a rectangle of maximum area having a perimeter of 24 ft.

(b) If the radius of a spherical balloon is increased by 0·1%, find the approximate percentage increases in its volume.

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