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C16–M/CHOT/RAC–**102**

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BOARD DIPLOMA EXAMINATION, (C–16)

SEPTEMBER/OCTOBER - 2020

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 $\frac{1}{(x \quad 2)(x \quad 4)}$ into partial fractions.

2. If $A \quad \begin{matrix} 9 & 1 \\ 4 & 3 \end{matrix}$, and $B \quad \begin{matrix} 1 & 5 \\ 6 & 11 \end{matrix}$, then find X such that $3A \quad 5B \quad 2X \quad 0$.

3. Evaluate $A \quad A^T$, if $A \quad \begin{matrix} 2 & 4 \\ 5 & 3 \end{matrix}$.

4. If $A \quad B \quad 45^{\circ}$, then prove that $(1 \quad \tan A)(1 \quad \tan B) \quad 2$.

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

6. Find the modulus of the complex number $\frac{(3 \quad 4i)(2 \quad 3i)}{(5 \quad 7i)}$.

7. Find the equation of the line passing through the points (1, 2) and (3, 5).

8. Find the perpendicular distance from (1, 3) to the line $2x \quad 3y \quad 3 \quad 0$.

9. Evaluate $\lim\limits_{x \quad 0} \dfrac{1 \quad \cos x}{x^2}$.

10. Find $\dfrac{dy}{dx}$, if $y \quad e^{2x} \quad \log x$.

PART—B 10×5=50

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

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

11. *(a)* Solve the equations $x \quad 2y \quad z \quad 4$, $3x \quad y \quad 2z \quad 3$ and $2x \quad 3y \quad z \quad 3$ by Cramer's rule.

(b) If $A \quad \begin{matrix} 1 & 2 \\ 3 & 1 \end{matrix}$, then show that $A^2 \quad 2A \quad 5I \quad 0$. Hence find $A^{\ 1}$.

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

(b) If $\tan^{\ 1} x \quad \tan^{\ 1} y \quad \tan^{\ 1} z \quad \overline{2}$, then show that

$$xy \quad yz \quad zx \quad 1$$

13. *(a)* Solve $\cos 2 \quad \cos 8 \quad \cos 5$.

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

14. *(a)* Find the equation of the circle passing through the points (0, 0), (2, 0) and (0, 4).

(b) Find the equation of the parabola whose focus is (1, 1) and equation of directrix is $2x \quad 3y \quad 7 \quad 0$.

15. *(a)* Differentiate $\cos(\log(\sin 2x))$ with respect to x.

(b) If $y \quad \sqrt{x \quad \sqrt{x \quad \sqrt{x \quad \cdots}}}$, then find $\frac{dy}{dx}$.

16. *(a)* If $x \quad a\cos^3 \quad , y \quad b\sin^3 \quad$, find $\frac{dy}{dx}$, d^2y / dx^2.

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

17. *(a)* Find the equations of the tangent and normal to the curve $y \quad x^2 \quad 3x \quad 2$ at (3, 2).

(b) All edges of a cube are expending at a rate of 1 cm/sec upon heating. Calculate the rate of increase of its volume and surface area when edge is 10 cm long.

18. *(a)* Show that the semi-vertical angle of the cone of maximum volume and of given slant height is $\tan^{\ 1}\sqrt{2}$.

(b) Find the approximate value of $\sqrt{17}$ using differentiation.

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