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C16–M/CHOT/RAC–**102**

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BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2018

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

2. If $A \begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix}$, $B \begin{matrix} 3 & 8 \\ 7 & 2 \end{matrix}$ and $2x \quad A \quad B$, then find X.

3. Find $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 \quad a & 1 \\ 1 & 1 & 1 \quad b \end{vmatrix}$.

4. Prove that $\frac{\cos 37 \quad \sin 37}{\cos 37 \quad \sin 37} \quad \cot 8$.

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

6. Find the modulus and amplitude of $1 \quad i\sqrt{3}$.

7. Find the intercepts made by the straight line $3x \quad 2y \quad 2 \quad 0$ on the coordianate axes.

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

9. Find $\lim_{x \quad 0} \frac{\sqrt{1 \quad 3x} \quad 1}{x}$.

10. Find $\frac{dy}{dx}$ if $x \quad a(\quad \sin \ )$ and $y \quad a(1 \quad \cos \ )$.

PART—B

10×5=50

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

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

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

(b) Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} \quad (a \quad b)(b \quad c)(c \quad a)(a \quad b \quad c)$.

12. *(a)* Show that $\sin^2 A \quad \sin^2(60 \quad A) \quad \sin^2(60 \quad A) \quad \frac{3}{2}$.

(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 the equation $\tan^3 x \quad 3\tan x$.

(b) Solve the triangle ABC with $a \quad 2, b \quad 2\sqrt{3}$ and $c \quad 4$.

14. *(a)* Find the equation of the circle passing through the points (0, 0), (1, 0) and (0, 1).

(b) Find the lengths of the semi-axes, centre, vertices, foci, LLR and equations of directrices of ellipse $\frac{x^2}{25} \quad \frac{y^2}{16} \quad 1$.

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

(b) Find $\frac{dy}{dx}$, if $y \quad x^x$.

16. *(a)* If $y \quad a\cos(\log x) \quad b\sin(\log x)$, then show that

$$x^2y_2 \quad xy_1 \quad y \quad 0$$

(b) If $u \quad \log \frac{x^4 \quad y^4}{x \quad y}$, then prove that $x\frac{u}{x} \quad y\frac{u}{y} \quad 3$.

17. *(a)* Find the angle between the curves $y^2 \quad x$ and $x^2 \quad y$ at point of intersection (1, 1).

(b) Each side of a square increases 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. Also find the rate at which perimeter increases.

18. *(a)* Show that the maximum rectangle that can be inscribed in a circle is a square.

(b) If an error of 0·02 cm is made in measuring the radius 10 cm of a sphere, find the approximate percentage error in the surface area of the sphere.

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