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C14–M/CHOT/RAC–**102**

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2015

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.

(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Resolve

$$\frac{7x \quad 1}{(3x \quad 1)(2x \quad 1)}$$

into partial fractions.

2. If

$$A = \begin{matrix} 1 & 3 & 1 \\ 2 & 5 & 4 \\ 1 & 6 & 1 \end{matrix} \text{ and } B = \begin{matrix} 2 & 0 & 2 \\ 2 & 1 & 5 \\ 0 & 2 & 4 \end{matrix}$$

find X such that $2A \quad 3B \quad 2X \quad 0$.

3. Find :

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ b & c & c & a & a & b \end{vmatrix}$$

4. Prove that

$$\frac{\cos 11 \quad \sin 11}{\cos 11 \quad \sin 11} \quad \tan 56$$

5. If

$$x \quad \frac{1}{x} \quad 2\cos$$

then show that

$$x^2 \quad \frac{1}{x^2} \quad 2\cos 2$$

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

7. Find the equation of the point circle with centre (9, –2).

8. Find :

$$\lim_{x} \; x(\sqrt{x^2 \quad 4} \quad x)$$

9. Find the value of x, if the slope of the line joining the points (2, 5) and (x, 3) is 2.

10. Find the derivative of $\sqrt[3]{x^2} \sin x$.

PART—B

10×5=50

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

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

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Solve the equations $x \quad 2y \quad z \quad 1, 3x \quad y \quad 2z \quad 5$ and $x \quad y \quad 3z \quad 0$ by using Cramer's method.

(b) Show that

$$\begin{vmatrix} 1 & a & 1 & 1 \\ 1 & 1 & b & 1 \\ 1 & 1 & 1 & c \end{vmatrix} \quad abc\left[\frac{1}{a} \quad \frac{1}{b} \quad \frac{1}{c} \quad 1\right]$$

12. *(a)* If

$$\sin x \quad \sin y \quad \frac{3}{4} \text{ and } \sin x \quad \sin y \quad \frac{2}{5}$$

Then prove that

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

(b) If

$$\cos^{\ 1} x \quad \cos^{\ 1} y \quad \cos^{\ 1} z$$

then prove that

$$x^2 \quad y^2 \quad z^2 \quad 2xyz \quad 1$$

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

(b) In triangle *ABC*, if

$$\frac{1}{a \quad c} \quad \frac{1}{b \quad c} \quad \frac{3}{a \quad b \quad c}$$

Then show that $c \quad 60°$.

14. *(a)* Find the equation of the parabola whose axis is parallel to x-axis and which passes through the points (2, 0); (0, 4) and (1, 2).

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

15. *(a)* If

$$y \quad x^{x^{x\cdots}}$$

Then prove that

$$\frac{dy}{dx} \quad \frac{y^2}{x(1 \quad y\log x)}$$

(b) Differentiate $\sin^{1}(3x \quad 4x^3)$ with respect to x.

16. *(a)* If

$y \quad \tan^{1}\left(\frac{2x}{1 \quad x^2}\right)$, then find $\frac{d^2y}{dx^2}$

(b) If

$$u \quad \sin^{1}\frac{x^2 \quad y^2}{x \quad y}$$

then prove that

$$x\frac{u}{x} \quad y\frac{u}{y} \quad \tan u$$

17. *(a)* Compute lengths of tangent, normal, subtangent and subnormal of the curve $y \quad 6x^3 \quad 7x^2 \quad 9$ at (1, 8).

(b) The volume of a sphere is increasing at the rate of 400 cubic.cm/sec. Find the rate of increase of its radius and surface area when the radius of the sphere is 40 cm.

18. *(a)* The sum of two numbers is 24. Find the numbers when the sum of their squares is minimum.

(b) If an error of 2% is made in measuring the side of a square plate then find % error in its area.

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