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C09–CM–102

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

DCME—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) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Find the value of $4C_2 \quad 4P_2$.

2. Solve $x^2 \quad 22x \quad 57 \quad 0$.

3. Resolve $\dfrac{7x \quad 1}{(2x \quad 1)(3x \quad 1)}$ into partial fractions.

4. If tan $\frac{1}{2}$ and tan $\frac{1}{3}$, then prove that tan( ) 1.

5. Prove that

$$\frac{\cos \quad \sin 2}{\sin \quad (1 \quad \cos 2)} \quad \cot$$

6. Find the multiplicative inverse of $\dfrac{50}{3 \quad 4i}$.

7. Find the angle between lines $x \quad 2y \quad 9 \quad 0$ and $3x \quad y \quad 7 \quad 0$.

8. Find the equation of the polar of the point (4, 5) with respect to the circle $x^2 \quad y^2 \quad 4x \quad 6y \quad 12 \quad 0$.

9. Evaluate :

$$\lim_{x \ 0} \frac{\sqrt{5 \quad x} \quad \sqrt{5 \quad x}}{x}$$

10. If $\sqrt[3]{x^2} \sin x$, then find $\frac{dy}{dx}$.

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 following equation by Cramer's rule :

$$\begin{array}{rrrr} x & 2y & 3z & 6 \\ 2x & 4y & z & 7 \\ 3x & 2y & 9z & 14 \end{array}$$

(b) If

$$A \quad \begin{array}{rrr} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & 1 & 0 \end{array}$$

then find A^2.

12. *(a)* In any triangle ABC, prove that

$$\sin 2A \quad \sin 2B \quad \sin 2C \quad 4 \sin A \sin B \sin C.$$

(b) Prove that

$$2 \tan^{1} \frac{1}{3} \quad \tan^{1} \frac{1}{7} \quad \frac{}{4}.$$

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

(b) In any triangle ABC, prove that $\sin A \quad \sin B \quad \sin C \quad \frac{s}{R}$.

14. *(a)* Find the equation of parabola whose focus is (5, 2) and vertex is (3, 2).

(b) Find foci, length of latus rectum and equation of directrices of the ellipse $4(x \quad 1)^2 \quad (y \quad 1)^2 \quad 4$.

15. *(a)* Find the equation of the hyperbola whose foci is (1, 1) and directix is $2x \quad y \quad 1$, eccentricity is $\sqrt{3}$.

(b) Find the angle between the lines whose direction ratios are respectively (1, 1, 2) and $(\sqrt{3} \quad 1, \quad \sqrt{3} \quad 1, 4)$.

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

(b) Find the derivative of $\frac{1 \quad \log x}{\sin x \quad e^x}$.

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

(b) A boy 1·6 m tall is walking away from a lamp post 10 m tall. If the boy is walking at a speed of 1·2 m/sec. How fast his shadow is increasing?

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

(b) A circular plate expands upon heating so that its radius increased by 2%. Find the approximate increase in the area of the plate if the radius of the plate before heating is 10 cm.

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