



c09-CM-102

3022

BOARD DIPLOMA EXAMINATION, (C-09)

OCT/NOV—2013

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. Simplify $[2x \{3y (4z \overline{5x - 3y})\}]$.

2. If $16a = 25b$, find the ratio $a^2 : b^2$.

3. Resolve

$$\frac{2x - 1}{(x - 1)(2x - 3)}$$

into partial fraction

4. Prove that $\cot A = \cot 2A \operatorname{cosec} 2A$.

5. If $\tan \theta = 2$, find $\sin 2\theta$.

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6. Find the amplitude of $(1 - i)(1 - 3i)$.
7. Find the locus of a point which is at a distance of 5 units from $(2, -3)$.
8. Find the equation of the circle having the points $(2, 3)$, $(6, 9)$ as ends of a diameter.
9. Evaluate

$$\lim_{x \rightarrow 0} \frac{\sqrt{5-x} - \sqrt{5+x}}{x}$$

10. Find $\frac{dy}{dx}$ if $y = \frac{2x-3}{x-4}$.

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 by Cramer's rule

$$\begin{matrix} x & 2y & 3z & 6 \\ 2x & 4y & z & 7 \\ 3x & 2y & 3z & 8 \end{matrix}$$

- (b) Show that

$$\begin{vmatrix} 1 & a & b & c \\ 1 & b & c & a \\ 1 & c & a & b \end{vmatrix} = 0$$

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12. (a) If $A + B + C = 90^\circ$ then
prove that $\tan A \tan B + \tan B \tan C + \tan C \tan A = 1$

(b) If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{\pi}{2}$, show that

$$x^2 + y^2 + z^2 + 2xyz = 1$$

13. (a) Solve $\sin 7^\circ + \sin 4^\circ + \sin \theta = 0$.

(b) Solve the triangle ABC with $a = \sqrt{3}$, $b = \sqrt{3}$, $C = 60^\circ$.

14. (a) Find the equation to the parabola with focus $(3, 1)$ and vertex $(1, 1)$.

(b) Find the coordinates of the centre, vertices, eccentricity, foci, LLR of the ellipse

$$9(x - 2)^2 + 4(y - 1)^2 = 36$$

15. (a) Find the equation of the hyperbola whose centre at the origin, transverse axis along x -axis with $e = 5$ and LLR=32.

(b) Find the angle between the planes $2x + y + z - 5 = 0$ and $x + y + 2z - 7 = 0$.

16. (a) If

$$y = (\sqrt{x})^{\sqrt{x}^{\sqrt{x}^{\dots}}}$$

find $\frac{dy}{dx}$.

(b) If $z = \log(e^x + e^y)$, show that $\frac{z}{x} + \frac{z}{y} = 1$.

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- 17.** (a) Find the lengths of the tangent, normal, subtangent, subnormal for the curve $y = \frac{x-1}{x}$ at (1,2).
- (b) One end of the ladder of 17ft length is leaning against a vertical wall. If the foot of the ladder be pulled away from the wall at the rate of 3ft/min., how fast is the top descending when the foot of the ladder is 8ft from the wall?
- 18.** (a) Find the maximum and minimum values of $2x^3 - 9x^2 - 12x - 5$.
- (b) If there be an error of 1% in measuring the side of a square plate, find the percentage error into its area.
