



C09-CHOT-102/C09-M-102/C09-RAC-102

3040

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2014

DME—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS—I

Time : 3 hours ]

[ Total Marks : 80

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**PART—A**

**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  $4 \left[ 3 \left\{ 6(5 - 4 - 3) \right\} \right]$ .

2. Solve  $x^2 - 5x + 6 = 0$ .

3. Resolve into partial fractions

$$\frac{6 - 5x}{(x - 2)(x - 1)}$$

4. In any  $\triangle ABC$ , prove that  $\tan A + \tan B + \tan C = \tan A \tan B \tan C$ .

5. Show that  $\cos(60^\circ) \cos(60^\circ) = \frac{1}{4}(4 \cos^2 - 3)$ .

6. Find the real and imaginary of  $\frac{1 - i}{1 + i}$ .

- \* 7. Find the equation of the line passing through the points (1, 2), (-3, 5).
8. Find the equation of the circle having the points (4, 2), (1, 5) as the end points of a diameter.
9. Evaluate

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin x}$$

10. Differentiate  $\sqrt{\cos \sqrt{x}}$  with respect to  $x$ .

**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  $x + 2y + z = 4, x + 3y + 2z = 2, 3x + y + 2z = 6$  using Gauss-Jordan method.

(b) Show that

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

12. (a) Prove that  $\frac{\sin A}{\cos A} + \frac{\sin 2A}{\cos 2A} + \frac{\sin 3A}{\cos 3A} + \frac{\sin 4A}{\cos 4A} = \cot A$ .

(b) Solve  $\tan^{-1}(1-x) + \tan^{-1}(1+x) = \tan^{-1} \frac{1}{2}$ .

13. (a) Solve  $\sin 5\theta = \sin 3\theta$ .

(b) Solve  $\triangle ABC$ , with  $a = 1, b = \sqrt{3}, c = 2$ .

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- 14.** (a) Find the equation of the parabola whose focus is (2, 3) and the directrix is  $x - y - 2 = 0$ .
- (b) Find the centre, vertex, foci, directrix, eccentricity, LLR of  $9x^2 - 25y^2 = 225$ .
- 15.** (a) Find the equation of the hyperbola with foci (3, 0) and  $e = 6$ .
- (b) If two vertices (3, -9), (11, -2), (5, 7) and the centroid (-3, 3, -3), find the third vertex of the triangle.
- 16.** (a) Find  $\frac{dy}{dx}$ , if  $y = \sqrt{\cos x} \sqrt{\cos x} \sqrt{\cos x} \dots$
- (b) If  $U = \log(x - y - z)$ , prove that  $x \frac{u}{x} + y \frac{u}{y} + z \frac{u}{z} = 1$ .
- 17.** (a) Find the angle between the curves  $x^2 - y^2 = 8$  and  $x^2 = 2y$ .
- (b) A particle is moving along a line according to the law  $S = 2t^3 - 3t^2 - 15t + 18$  ( $t$  in second). Find its velocity when acceleration is zero.
- 18.** (a) Find the maxima and minima of  $2x^3 - 9x^2 - 12x + 15$ .
- (b) Radius of a spherical balloon is increased by 0.1%. Find the approximate percentage increase in its volume.

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