

C-14- C/CM-102

4015

BOARD DIPLOMA EXAMINATION, (C-14) OCT/NOV-2015

DCE—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS—I

Time: 3 hours [Total Marks: 80

PART—A

 $3 \times 10 = 30$

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. Resolve $\frac{7x + 6}{(x + 1)(x + 2)}$ into partial fractions.
- **2.** If

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$$A = \begin{pmatrix} 2 & 3 & 1 \\ 0 & 1 & 5 \end{pmatrix}$$
 and $B = \begin{pmatrix} 1 & 2 & 6 \\ 0 & 1 & 3 \end{pmatrix}$, find 2A-3B.

3. If

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4. Prove that

$$\frac{\cos 11^{\circ} \sin 11^{\circ}}{\cos 11^{\circ} \sin 11^{\circ}} \tan 56^{\circ}$$

5. Prove that

$$\frac{\sin 2}{1 \cos 2}$$
 tan

- **6.** Express $\frac{2}{3} \frac{3i}{4i}$ in the form of a ib.
- **7.** Find the distance between parallel lines 2x + 3y + 5 = 0 and 2x + 3y + 9 = 0.
- **8.** Find the equation of the circle with (2, 3) and (6, 9) as the end points of a diameter.
- 9. Evaluate:

10. Find $\frac{dy}{dx}$, if $y = x \sin x$.

PART—B

 $10 \times 5 = 50$

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)* If

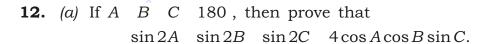
verify that $(AB)^T$ B^TA^T .

(b) Solve the system of equations x + 2y + 3z + 6, 2x + 4y + z + 7 and 3x + 2y + 9z + 14 by using Cramer's rule.

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- (b) If $\tan^{-1}(x) \tan^{-1}(y) \tan^{-1}(z) = \frac{1}{2},$ show that XY YZ ZX 1.
- **13.** (a) Solve: $2\cos^2 3\cos 1 0$
 - (b) In a triangle ABC, prove that $2bc\cos A$ a^2 b^2 c^2 .
- **14.** (a) Find the equation of the parabola whose focus is at (1, -1) and directrix is the line 3x + 4y + 5 = 0.
 - (b) Find the lengths of the major and minor axes, length of latus rectum, eccentricity and foci of the ellipse

$$\frac{x^2}{25} \quad \frac{y^2}{16} \quad 1$$

- **15.** (a) Find $\frac{dy}{dx}$, if $y = x^x$.
 - (b) Find $\frac{dy}{dx}$, if x^3 y^3 3 axy.
- **16.** (a) If

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$$u \log(x \ y \ z)$$
, prove that $x - \frac{u}{x} \ y - \frac{u}{y} \ z - \frac{u}{z}$ 1.

(b) If

$$u(x,y)$$
 x^2 xy y^2 , find $\frac{2u}{x^2}$ and $\frac{2u}{y^2}$

- **17.** (a) Find the equations of tangent and normal to the curve $y x^2 2x 1$ at (1, 2).
 - (b) The side of an equilateral triangle is increasing at a rate of 2cm/sec. Find the rate of increase of its area given its side is 25 cm.
- /**4015** 3 [Contd...

- **18.** (a) The sum of two numbers is 24. Find the numbers so that the sum of their squares is a minimum.
 - (b) If the radius of a spherical balloon is increased by 0.1%, find the approximate percentage increase in its volume.

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