

C16-EE/CHPP-102

6035

BOARD DIPLOMA EXAMINATION, (C-16)

DEEE—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS—I

Time: 3 hours]

[Total Marks : 80

 $3 \times 10 = 30$

Instructions: (1) Answer all questions.

- 1. Resolve $\frac{3x-1}{(x-2)(x-3)}$ into partial fractions. 2. If $A = \begin{bmatrix} 2 & 4 \\ -1 & k \end{bmatrix}$ and $A^2 = 0$, then find the value of k
 - **4**. Prove that $tan(45^{\circ} + A) \cdot tan(45^{\circ} A) = 1$
 - **5.** If $\cos \theta = \frac{4}{5}$, then find $\cos 2\theta$ and $\sin 2\theta$
 - **6.** Find the conjugate of the complex number $\frac{1+8i}{5-2i}$

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[Contd....

- **7**. Find the value of x if the slope of the line joining the points (5, 6) and (x, -7) is 7.
- Find the point of intersection of the lines x + 3y 6 = 0 and y - 3x = 7.
- **9.** Evaluate $\lim_{x \to 3} \left(\frac{x^3 27}{x^2 9} \right)$
- **10**. Find the derivative of $x e^x \cos x$ with respect to x.



10×5=50

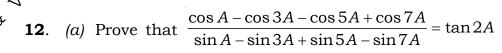
Instructions: (1) Answer if five questions.

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

 Solve the countings

$$3x + y + z = 3$$
, $2x + 2y + 5z = -1$ and $x - 3y - 4z = 2$

using matrix inversion method.



(b) Show that
$$\sin^{-1}\left(\frac{2x}{1+x^2}\right) + \cos^{-1}\left(\frac{1-y^2}{1+y^2}\right) = 2\tan^{-1}\left(\frac{x+y}{1-xy}\right)$$

- (a) Solve the equation $2\sin^2\theta \sin\theta 1 = 0$
 - (b) In a $\triangle ABC$, prove that $c\cos^2\left(\frac{A}{2}\right) + a\cos^2\left(\frac{C}{2}\right) = s$

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- (a) Find the equation of the circle with (0, 1) and (3, 0) as end points of a diameter.
 - (b) Find the center, vertices, eccentricity, foci and length of latus rectum of the ellipse

$$\frac{x^2}{16} + \frac{y^2}{36} = 1$$

- **15**. (a) Differentiate $\sin^{-1}(2x\sqrt{1-x^2})$ with respect to $\sin^{-1}x$ (b) Find $\frac{dy}{dx}$, if $y = x^{x^{x - \infty}}$
- **16.** (a) If $x = a\cos\theta$, $y = b\sin\theta$, then find $\frac{d^2y}{dx^2}$ (b) Verify Euler's theorem for the function $u(x,y,z) = x^3y + y^3z + z^3x$

$$u(x,y,z) = x^3y + y^3z + z^3x$$

- (a) First the lengths of tangent, normal, sub-tangent and sub-normal to the curve $y = x^2 + 2x 1$ at the point (1, 2).
 - (b) A circular metal expands by heat so that is radius increases at the rate of 0.5 cm/sec. Find the rate of increase of its area when the radius is 10 cm.
- 18. (a) A wire of length 50 cm is cut into two parts which are bent in the form of a square and circle. Find the least value of the sum of the areas so formed.
 - (b) A circular plate expands when heated from a radius 5 cm to 5.03 cm. Find the approximate percentage error in its area. Also find the percentage error in its circumference.

