



C16-EE/CHPP-102

6035

BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL-2017

DEEE—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.

1. Resolve

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

into partial fractions.

2. If

$$A = \begin{pmatrix} 1 & 3 & 2 \\ 2 & 1 & 3 \\ 4 & 3 & 3 \end{pmatrix} \text{ and } B = \begin{pmatrix} 2 & 2 & 4 \\ 1 & 3 & 4 \\ 1 & 2 & 3 \end{pmatrix}$$

then find $2A - 3B$.

3. Using Laplace expansion, evaluate the determinant

$$\begin{vmatrix} 8 & 2 & 5 \\ 2 & 1 & 9 \\ 7 & 4 & 12 \end{vmatrix}$$

4. Show that $\cos^2 15^\circ - \cos^2 75^\circ = \sqrt{3}/2$.

5. If $\cos A = 3/5$, then find $\cos 2A$, $\sin 2A$, $\cos 3A$.

- * 6. Find the multiplicative inverse and additive inverse of $(3 - 2i)(1 - 2i)$.
7. Find the equation of the line passing through the points $(1, 2)$ and $(3, 5)$.
8. Find the angle between the lines $3y - 1 = 0$ and $2x - 3y - 5 = 0$.
9. Evaluate $\lim_{x \rightarrow 5} \frac{125}{x - 5}$.
10. Differentiate $\sin(\log x)$ w.r.t. x .

PART—B

10×5=50

Instructions: (1) Answer any **five** questions.
 (2) Each question carries **ten** marks.

11. (a) Prove that

$$\begin{vmatrix} a & b & 2c & a & b \\ & c & & b & c & 2a & b \\ & & c & & a & & c & a & 2b \end{vmatrix} = 2(a - b - c)^3$$

(b) Solve the equations $x + y + z = 6$, $x - y + z = 2$ and $2x - y + z = 1$ by Cramer's method.

* 12. (a) If $\sin x = \frac{3}{4}$ and $\sin y = \frac{2}{5}$, then prove that $8 \cot((x - y)/2) = 15 \cot((x + y)/2)$.

(b) Show that $\sin^{-1}(3/5) + \sin^{-1}(5/13) = \cos^{-1}(33/65)$.

* 13. (a) Solve $\sqrt{3} \cos x = \sin x = \sqrt{2}$.

(b) In any triangle ABC , if $A = 60^\circ$ then prove that

$$\frac{c}{a} = \frac{b}{a} = \frac{1}{c}$$

14. (a) Find the centre and radius of the circle

$$5x^2 + 5y^2 - 20x - 30y - 1 = 0$$

(b) Find the equation of rectangle hyperbola with focus $(3, 4)$ and directrix as $4x - 3y - 1 = 0$.

15. (a) Differentiate

$$\tan^{-1} \frac{\sin x}{1 - \cos x}$$

w.r.t. x .

(b) Differentiate $\sin^m x \cos^n x$ w.r.t. x .

16. (a) Find all second-order partial derivatives for

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

(b) Differentiate $\cos^{-1}(4x^3 - 3x)$ w.r.t. $\sin^{-1} x$.

17. (a) Find the length of the tangent, normal, sub-tangent and sub-normal to the curve $y = 2x^2 - 4x + 5$ at the point $(3, 1)$.

(b) A particle is moving along a line whose movement is governed by $S = t^2 - 6t + 8$ (t in sec). Find the velocity and acceleration at $t = 2$ sec. Also find the initial velocity.

* 18. (a) The sum of two numbers is 10. Find them so that the sum of their squares is minimum.

(b) Find approximately the value of $\sqrt{82}$ using derivatives.
