C16-EC/CHPC/PET-102

6028

BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL—2017

DECE—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

$$\frac{1}{(x-8)(x+1)}$$

into partial fractions.

2. If

$$A = \begin{bmatrix} \sec\theta & \tan\theta \\ \tan\theta & \sec\theta \end{bmatrix}$$

find det A.

3. If

$$A = \begin{bmatrix} 2 & -4 \\ -5 & 3 \end{bmatrix}$$

find $A + A^T$.

4. Find the value of tan 75°.

5. Show that

$$\frac{\sin 2A}{1+\cos 2A} = \tan A$$

6. If $z = 2 + 3i$, then find $z + \bar{z}$ and $z \cdot \bar{z}$.

7. Find the distance between the parallel lines

$$2x + 3y + 5 = 0 \text{ and } 2x + 3y + 9 = 0$$

8. Find the equation of the line passing through the points (1, 2) and (−3, 5).

9. Evaluate :

$$\lim_{x \to 0} \frac{\sin 37x}{\sin 11x}$$

10. Find $\frac{dy}{dx}$, if $y = 3\tan x - 4\log x - 7x^2$.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

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

11. *(a)* If

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$$

then find adjoint of A.

(b) Solve the following equations by Cramer's rule :

$2x - 3y + z = -1$, $x + 4y - 2z = 3$ and $4x - y + 3z = 11$

12. *(a)* If $\cos x + \cos y = \frac{3}{5}$ and $\cos x - \cos y = \frac{2}{7}$, then show that $21\tan\left(\frac{x-y}{2}\right) + 10\cot\left(\frac{x+y}{2}\right) = 0$.

(b) Show that

$$\tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \tan^{-1}\left(\frac{6}{17}\right)$$

13. *(a)* Solve $4\sin^2\theta - 8\cos\theta + 1 = 0$.

(b) In a ΔABC, show that $\Sigma a \sin(B - C) = 0$.

14. *(a)* Find the equation of the circle with (1, 2) and (4, 5) as end points of a diameter.

(b) Find the equation of the rectangular hyperbola whose focus is the point (3, – 4) and directrix is the line $x - y + 5 = 0$.

15. *(a)* Find the derivative of $\cot(e^x + 2x)$ with respect to x.

(b) Differentiate $\tan^{-1}(\log x)$ with respect to $\log(\tan^{-1} x)$.

16. *(a)* Find $\frac{d^2y}{dx^2}$ if $x = a\cos^3\theta$ and $y = b\sin^3\theta$.

(b) Verify Euler's theorem for the function $z = ax^2 + 2hxy + by^2$.

17. *(a)* Find the equations of tangent and normal to the curve $y = 3x^2 + 2x + 5$ at the point (2, –1).

(b) The volume of a sphere is increasing at the rate of 400 cm^3/sec. Find the rate of increase of its radius and its surface area at the instant when the radius of the sphere is 40 cm.

18. *(a)* The sum of two numbers is 24. Find the numbers when the sum of their squares is minimum.

(b) The pressure p and volume v of a gas are connected by the relation $pv^{1.4}$ = constant. Find the percentage increase in p if v is decreased by 1%.

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