C16-EE/CHPP-102

6035

BOARD DIPLOMA EXAMINATION, (C-16)

SEPTEMBER/OCTOBER - 2020

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 $\frac{1}{(x+3)(x+1)}$ into partial fractions.

2. If $A = \begin{bmatrix} 3 & 2 & -1 \\ 1 & 5 & 4 \\ 2 & 3 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$, find $4A - 2B$.

3. Using Laplace expansion, evaluate the determinant

$$\begin{vmatrix} 0 & q & -r \\ -q & 0 & p \\ r & -p & 0 \end{vmatrix}$$

4. Show that $\frac{\cos 37^\circ + \sin 37^\circ}{\cos 37^\circ - \sin 37^\circ} = \cot 8^\circ$.

5. Show that $\cos^4 A - \sin^4 A = \cos 2A$.

6. Find the conjugate of the complex number $(3 + 4i)(2 - 3i)$.

7. Find the perpendicular distance from the point (3, 2) to the line $4x + 5y + 6 = 0$.

8. Find the equation of the line passing through the points (2, 4)(−2, 3).

9. Evaluate :

$$\lim_{x \to 0} \frac{\sin 3x}{\sin 5x}$$

10. Differentiate $\sin(\cos x)$ w.r.t. x.

10×5=50

PART—B

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

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

11. *(a)* Find the inverse of

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

(b) Solve the equation by Cramer's method $x + y + z = 9$; $2x + 5y + 7z = 52$; $2x + y - z = 0$.

12. *(a)* Prove that $\cos 70° + \cos 50° - \cos 10° = 0$.

(b) Show that

$$\tan^{-1}\left(\frac{2}{3}\right) + \tan^{-1}\left(\frac{3}{4}\right) = \tan^{-1}\left(\frac{17}{6}\right)$$

13. *(a)* Solve : $\cos 5\theta + \cos\theta = \cos 3\theta$

(b) In any triangle ABC, show that

$$\sum (b + c)\cos A = a + b + c$$

14. *(a)* Find the equation of the circle passing through the points (0, 0), (6, 0) and (8, 4).

(b) Find the equation of the ellipse whose focus (–1, 1) and directrix is $x - y + 3 = 0$ and eccentricity is 1 / 2.

15. *(a)* Differentiate $x^{\tan x}$ w.r.t. X.

(b) Find $\frac{dy}{dx}$, if $x^2 + y^2 - 2axy = 1$.

16. *(a)* Find $\frac{dy}{dx}$, if $x = 4t^2$ and $y = 8t$.

(b) Differentiate $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ w.r.t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$.

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

(b) A circular metal plate expands by heat, so that its radius increases at the rate of 0·02 cm/sec. At what rate its area is increasing, when the radius is 20 cm.

18. *(a)* The sum of two numbers is 20. Find the numbers, so that the sum of their squares is a minimum.

(b) The circumference of a circle is measured as 28 cm with an error of 0·04 cm. Find the approximate percentage error in the area of the circle.

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