C14–C–102/C14–CM–102

4015

BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2016

DCE—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 $\dfrac{7x \quad 6}{(x \quad 1)(x \quad 2)}$ into partial fractions.

2. Solve for x, if $\begin{vmatrix} 1 & 0 & 1 \\ 2 & x & 3 \\ 1 & 3 & 2 \end{vmatrix} \quad 3.$

3. If $A \quad \begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix}$ and $B \quad \begin{matrix} 3 & 8 \\ 7 & 2 \end{matrix}$, then find the matrix X such that $2X \quad A \quad B$.

4. Prove that $\dfrac{\cos(A \quad B)}{\cos A \sin B} \quad \tan A \quad \cot B$.

5. If tan 2, then find cos 2 .

6. Express in modulus-amplitude form of the complex number $\sqrt{3} \quad i1$.

7. Find the point of intersection of the lines $2x \quad 4y \quad 6$ and $x \quad 4y \quad\quad 3$.

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

9. Evaluate :

$$\underset{x \quad 0}{\mathrm{Lt}} \frac{1 \quad \cos 2x}{\sin 2x}$$

10. Find $\frac{dy}{dx}$ if $y \quad c\,t$ and $x \quad \frac{c}{t}$.

PART—B

10×5=50

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

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

11. *(a)* Find the inverse of $A \quad \begin{matrix} 2 & 7 & 3 \\ 3 & 9 & 4 \\ 1 & 5 & 3 \end{matrix}$, if exists.

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

$$x \quad y \quad z \quad 0,\ 2x \quad y \quad z \quad 1 \text{ and } 3x \quad 2y \quad 2z \quad 5$$

12. *(a)* If $\tan^{1} x \quad \tan^{1} y \quad \tan^{1} z \quad \frac{}{2}$, then show that $xy \quad yz \quad zx \quad 1$.

(b) Prove that $\cos 10° \cos 50° \cos 70° \quad \frac{\sqrt{3}}{8}$.

13. *(a)* If $b\cos^2\frac{C}{2} \quad c\cos^2\frac{B}{2} \quad \frac{3a}{2}$, show that the sides of the triangle are in AP.

(b) Solve $\cos \quad \cos 5 \quad \cos 3$.

14. *(a)* Find the equation of the rectangular hyperbola whose focus is $(\ 1, \ \ 3)$ and the directrix is $x \quad 2y \quad 7 \quad 0$.

(b) Find the coordinates of the centre, vertices, eccentricity, foci, length of the latus rectum of the ellipse $25x^2 \quad 16y^2 \quad 1600$.

15. *(a)* Find the derivative of $\log[\sin(\cos(e^x))]$ with respect to x.

(b) Differentiate $\tan^{\ 1}\frac{2x}{1 \quad x^2}$ with respect to x.

16. *(a)* Find $\frac{dy}{dx}$, if $y \quad \frac{(x \quad 1)^2(2x \quad 3)^2}{(x^2 \quad 2)^2(x^3 \quad 3)^3}$.

(b) If $u \quad x^2 \quad y^2 \quad z^2$, then show that $x\frac{u}{x} \quad y\frac{u}{y} \quad z\frac{u}{z} \quad 2u$.

17. *(a)* Find the lengths of tangent, normal, sub-tangent and sub-normal to the curve $y \quad x^3 \quad 2x \quad 5$ at the point $(1, 4)$.

(b) A ladder is 13 m long leans against a vertical wall. If the lower end is pulled away from the wall at the rate of 1 m/sec along the horizontal floor, how fast is the top descending when the lower end is 12 m away from the wall?

18. *(a)* The sum of the lengths of the sides of a rectangle is constant. If the area is to be maximum, then show that the rectangle is a square.

(b) The radius of a sphere was determined as 10·01 cm instead of 10 cm. Find approximately the errors in its volume and surface area.

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