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C16–EE/CHPP–102

6035

BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2018

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

2. If $A \begin{matrix} 0 & 1 & 2 \\ 1 & 3 & 4 \end{matrix}$ and $B \begin{matrix} 0 & 2 & 1 \\ 4 & 3 & 2 \end{matrix}$, then find $2A \quad 3B$.

3. If $A \begin{matrix} 2 & 3 & 1 \\ 5 & 7 & 0 \end{matrix}$ and $B \begin{matrix} 2 & 3 \\ 1 & 0 \\ 5 & 4 \end{matrix}$, then find AB.

4. Prove that $\tan(45 \quad A) \quad \tan(45 \quad A) \quad 1$.

5. Prove that $\frac{1 \quad \cos 2}{\sin 2} \quad \tan$.

6. Find the modulus of complex number $(2 \quad i)(1 \quad i)$.

7. Find the equation of the line passing through the point (–2, 5) and have slope $\frac{3}{4}$.

8. Find the equation of the straight line passing through the point (–3, –4) and parallel to the line $3x \quad y \quad 31 \quad 0$.

9. Evaluate $\lim_{x \quad 2} \frac{x \quad 2}{x^2 \quad 5x \quad 6}$.

10. Differentiate the function $ax^5 \quad bx^4 \quad cx^3 \quad dx^2 \quad ex \quad f$ w.r.t. x, where a, b, c, d, e and f are constants.

PART—B

10×5=50

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

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

11. *(a)* Show that

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

(b) Solve the equations $2x \quad y \quad z \quad 1$, $x \quad y \quad z$, $3x \quad 2y \quad 2z \quad 5$ using Cramer's method.

12. *(a)* Prove that $\frac{\cos 3A \quad \cos A}{\sin A \quad \sin 3A} \quad \tan 2A$.

(b) If $\tan^{\quad 1} x \quad \tan^{\quad 1} y \quad \tan^{\quad 1} z \quad$, then show that

$$xyz \quad x \quad y \quad z$$

13. *(a)* Solve the equation $2\sin^2 \quad \sin \quad 1 \quad 0$.

(b) In any triangle ABC, if $\frac{b}{\cos B} \quad \frac{c}{\cos C}$, prove that the ABC is an isosceles triangle.

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

$$5x^2 \quad 5y^2 \quad 20x \quad 30y \quad 1 \quad 0$$

(b) Find the vertex, focus, equation of directrix and length of latus rectum of the parabola

$$y^2 \quad 4x \quad 4y \quad 16 \quad 0$$

15. *(a)* Find $\frac{dy}{dx}$, if $y = \tan^{-1}\sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}}$.

(b) Find $\frac{dy}{dx}$, if $y = \sqrt{\cos x + \sqrt{\cos x + \sqrt{\cos x + \ldots}}}$

16. *(a)* If $y = a\cos(\log x) + b\sin(\log x)$, then show that

$$x^2 y_2 + x y_1 + y = 0$$

(b) If $u = \log(x + y)$, then show that $x\frac{y}{x} + y\frac{x}{y} = 1$.

17. *(a)* Find the lengths of tangent, normal, subtangent and subnormal (in units) to the curve

$$y = x^3 + 2x^2 + 4 \text{ at } (2, 4)$$

(b) The radius of a spherical baloon is increasing at the rate of 3 cm/sec. Find the rate at which the volume is increasing when radius is 10 cm.

18. *(a)* Find the minimum and maximum values of

$$f(x) = 2x^3 + 9x^2 + 12x + 10$$

(b) The time T of a complete oscillation of a simple pendulum of length l is given by $T = 2\sqrt{\frac{l}{g}}$, where g is a constant. Show that the approximate error in the calculated value of T corresponding to an error of 2% in the value of l is 1%.

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