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C14–EC/CHPC/PET–**102**

4034

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

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

$$\frac{1}{(x-4)(x-9)}$$

into partial fractions.

2. If

$$A \begin{matrix} 0 & 1 & 2 \\ 1 & 3 & 4 \end{matrix} \text{ and } B \begin{matrix} 0 & 2 & 1 \\ 4 & 3 & 2 \end{matrix}$$

then find $2A - 3B$.

3. If

$$A \begin{matrix} 1 & 2 & 3 \\ x & 2 & 4 \\ 2 & 3 & 1 \end{matrix}$$

is a singular matrix, then find x.

4. Prove that

$$\frac{\cos 19 \quad \sin 19}{\cos 19 \quad \sin 19} \quad \tan 26$$

5. Show that

$$\frac{\sin 2}{1 \quad \cos 2} \quad \cot$$

6. Find the multiplicative inverse of $z \quad 2 \quad 3i$.

7. Find the equation of the straight line passing through (–2, –4) and parallel to the line $3x \quad 7y \quad 1 \quad 0$.

8. Find the equation of the circle whose centre is (2, 5,) and radius 6.

9. Evaluate :

$$\lim_{x \quad 0} \frac{\sqrt{5 \quad x} \quad \sqrt{5 \quad x}}{x}$$

10. Find the derivative of $x^6 \quad 3x^5 \quad 4x^3 \quad 9x^2 \quad 6x \quad 7$.

PART—B

10×5=50

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

11. *(a)* Show that

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} \quad (a \quad b)(b \quad c)(c \quad a)$$

(b) Solve the equations

$$\begin{aligned} x \quad 2y \quad 3z \quad 6 \\ 2x \quad 4y \quad z \quad 7 \\ 3x \quad 2y \quad 9z \quad 14 \end{aligned}$$

by Cramer's rule.

12. *(a)* If $A \quad B \quad C \quad 180$, then prove that

$$\sin 2A \quad \sin 2B \quad \sin 2C \quad 4 \sin A \sin B \sin C$$

(b) Prove that

$$\tan^{1} \frac{1}{3} \quad \tan^{1} \frac{1}{5} \quad \tan^{1} \frac{4}{7}$$

13. *(a)* Solve the following equation :

$$\cos \quad \sqrt{3} \sin \quad 1$$

(b) In any triangle ABC, prove that $2bc \cos A \quad a^2 \quad b^2 \quad c^2$.

14. *(a)* Find the equation of the parabola whose focus is the point (3, –4) and directrix is the line $x \quad y \quad 5 \quad 0$.

(b) Find the centre, length of axes, length of latus-rectum, eccentricity and foci of the ellipse $9x^2 \quad 16y^2 \quad 144$.

15. *(a)* Find

$$\frac{dy}{dx}$$

if $x^2 \quad y^2 \quad 3xy \quad 7$.

(b) If

$$y \quad \sqrt{x \quad \sqrt{x \quad \sqrt{x \quad \cdots}}}$$

then show that

$$\frac{dy}{dx} \quad \frac{1}{2y \quad 1}$$

16. *(a)* If $y \quad a \sin(\log x) \quad b \cos(\log x)$, then show that $x^2 y_2 \quad xy_1 \quad y \quad 0$.

(b) If

$$u \quad \tan^{1} \frac{x^3 \quad y^3}{x \quad y}$$

then show that

$$x \frac{u}{x} \quad y \frac{u}{y} \quad \sin 2u$$

17. *(a)* Find the equations of the tangent and normal to the curve $y \quad 2x^2 \quad 4x \quad 5$ at (3, 11).

(b) A circular metal plate expands by heat so that its radius is increasing at the rate of 0·02 cm per second. Find 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 square is minimum.

(b) If there is an error of 2% in measuring the side of a square plate, then find the percentage error in its area.

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