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C14–EC/CHPC/PET–**102**

4034

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2015

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

$$\frac{1}{(x \quad 8)(x \quad 11)}$$

into partial fractions.

2. If

$$A \begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix} \text{ and } B \begin{matrix} 3 & 8 \\ 7 & 2 \end{matrix}$$

show that $(A \quad B)^T \quad A^T \quad B^T$.

3. If

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

find the matrix A^2.

4. Prove that $\cos 70 \cos 10 \quad \sin 70 \sin 10 \quad \frac{1}{2}$.

5. Prove that

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

6. Find the additive and multiplicative inverses of $2 \quad 3i$.

7. Find the equation of the straight line passing through the points (–5, 2) and (3, –2).

8. Find the equation to the circle whose centre is (–1, 2) and radius is 3.

9. Evaluate :

$$\lim_{x \to 3} \frac{x^5 \quad 243}{x \quad 3}$$

10. Find the derivative of $3\tan x \quad 4\log x \quad 7x^3 \quad 9$ w.r.t. x.

PART—B

10×5=50

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

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

11. *(a)* Prove that

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

(b) If

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

find the adjoint of the matrix A.

12. *(a)* If $A \quad B \quad C \quad 90$, then prove that

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

(b) Prove that $\tan^{1}\frac{1}{5} \quad \tan^{1}\frac{1}{7} \quad \tan^{1}\frac{6}{17}$.

13. *(a)* Solve cos $\sqrt{3}\sin$ 1

(b) Solve the triangle ABC with a 2, b $\sqrt{2}$ and c $\sqrt{3}$ 1.

14. *(a)* Find the vertex, focus, equation of the axis, directrix and latus-rectum of the parabola x^2 $36y$.

(b) Find the equation of the ellipse whose focus is (3, 1), eccentricity is $\frac{1}{2}$ and directrix is x y 6 0.

15. *(a)* Find $\frac{dy}{dx}$, if y $\sin^{1}(3x$ $4x^3)$.

(b) Find $\frac{dy}{dx}$, if y $\sqrt{\cos x \quad \sqrt{\cos x \quad \sqrt{\cos x \quad \cdots}}}$.

16. *(a)* If

$$u \quad \sin^{1}\frac{x^2 \quad y^2}{x \quad y}$$

prove that

$$x\frac{u}{x} \quad y\frac{u}{y} \quad \tan u$$

(b) If y $\sin(\log x)$, then prove that x^2y_2 xy_1 y 0.

17. *(a)* A circular metal plate expands by heat so that its radius is increasing at the rate of 0·02 cm per second. At what rate its area is increasing when the radius is 20 cm?

(b) Find the lengths of the tangent, normal, subtangent and subnormal for the curve y^2 $4x$ at (1, 2).

18. *(a)* Find the dimensions of a rectangle of maximum area having a perimeter of 36 feet.

(b) If there is an error of 1% in measuring the side of a square plate, find the approximate percentage error in its area.

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