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C–14–CHPC/EC/PET–**102**

4034

BOARD DIPLOMA EXAMINATION, (C–14)

APRIL/MAY—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.

(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Resolve $\frac{1}{(x \quad 5)(x \quad 7)}$ into partial fractions.

2. If $A \begin{matrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & 1 & 0 \end{matrix}$, then find A^2.

3. If $A \begin{matrix} 1 & 3 \\ 2 & 1 \end{matrix}$, then find $A^2 \quad 3A \quad 2I$, where I is a unit matrix of order 2.

4. If $A \quad B \quad 45$, then show that

$$(1 \quad \tan A)(1 \quad \tan B) \quad 2$$

5. Prove that $\cot A \quad \cot 2A \quad \operatorname{cosec} 2A$.

6. Find the modulus of the complex number $\frac{3 \quad 4i}{1 \quad 7i}$.

7. Find the equation of the straight line passing through the point (3, –4) and perpendicular to the line $3x \quad 5y \quad 21 \quad 0$.

8. Find the equation of the circle having $(a, 0)$ and $(0, b)$ as the extremities of the diameter.

9. Evaluate $\lim_{x \quad 5} \frac{x^3 \quad 125}{x \quad 5}$.

10. Find the derivative of $\log[\log(\log x)]$.

PART—B

10×5=50

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

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

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

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 $x \quad 2y \quad z \quad 1$, $3x \quad y \quad 2z \quad 5$ and $x \quad y \quad 3z \quad 0$ by Cramer's rule.

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

$$\cos 2A \quad \cos 2B \quad \cos 2C \quad 1 \quad 4\cos A \cos B \cos C$$

(b) Show that

$$\tan^{1} \frac{2}{7} \quad \tan^{1} \frac{1}{4} \quad \cot^{1} \frac{26}{15}$$

13. *(a)* Solve the equation $\sqrt{3}\cos \quad \sin \quad \sqrt{2}$.

(b) If $a\cos A \quad b\cos B$, prove that ABC is either isosceles or right angled.

14. *(a)* Find the equation of the parabola with focus (5, 0) and directrix $x \quad y \quad 1 \quad 0$.

(b) Find the lengths of the major and minor axis, length of latus recum (LLR), eccentricity and foci of the ellipse

$$\frac{x^2}{25} \quad \frac{y^2}{16} \quad 1$$

15. *(a)* Find the derivative of $\dfrac{a \quad b\cos x}{a \quad b\cos x}$ with respect to x.

(b) Find $\dfrac{dy}{dx}$, if $y \quad \tan^{1} \sqrt{\dfrac{1 \quad \cos x}{1 \quad \cos x}}$.

16. *(a)* Find $\dfrac{dy}{dx}$, if $x \quad a\cos^3 \ , \ y \quad b\sin^3$.

(b) If $u \quad \log(x^2 \quad y^2)$, then prove that $\dfrac{^2u}{y \ x} \quad \dfrac{^2u}{x \ y}$.

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

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

18. *(a)* A wire of length 40 cm is bent so as to form a rectangle. If its area is to be maximum, find dimensions of the rectangle.

(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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