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C16–EC/CHPC/PET–**102**

6028

BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2017

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

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

into partial fractions.

2. If

$$A \begin{matrix} \sec & \tan \\ \tan & \sec \end{matrix}$$

find det A.

3. If

$$A \begin{matrix} 2 & 4 \\ 5 & 3 \end{matrix}$$

find $A \quad A^T$.

4. Find the value of tan 75 .

5. Show that

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

6. If $z \quad 2 \quad 3i$, then find $z \quad \bar{z}$ and $z \quad \bar{z}$.

7. Find the distance between the parallel lines

$$2x \quad 3y \quad 5 \quad 0 \text{ and } 2x \quad 3y \quad 9 \quad 0$$

8. Find the equation of the line passing through the points (1, 2) and (3, 5).

9. Evaluate :

$$\lim_{x \quad 0} \frac{\sin 37x}{\sin 11x}$$

10. Find $\frac{dy}{dx}$, if $y \quad 3\tan x \quad 4\log x \quad 7x^2$.

PART—B 10×5=50

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

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

11. *(a)* If

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

then find adjoint of A.

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

$2x \quad 3y \quad z \quad 1, \; x \quad 4y \quad 2z \quad 3$ and $4x \quad y \quad 3z \quad 11$

12. *(a)* If $\cos x \quad \cos y \quad \frac{3}{5}$ and $\cos x \quad \cos y \quad \frac{2}{7}$, then show that $21\tan \frac{x \quad y}{2} \quad 10\cot \frac{x \quad y}{2} \quad 0$.

(b) Show that

$$\tan^{1} \frac{1}{5} \quad \tan^{1} \frac{1}{7} \quad \tan^{1} \frac{6}{17}$$

13. *(a)* Solve $4\sin^2 \quad 8\cos \quad 1 \quad 0$.

(b) In a ABC, show that $a\sin(B \quad C) \quad 0$.

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

(b) Find the equation of the rectangular hyperbola whose focus is the point (3, 4) and directrix is the line $x \quad y \quad 5 \quad 0$.

15. *(a)* Find the derivative of $\cot(e^x \quad 2x)$ with respect to x.

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

16. *(a)* Find $\frac{d^2y}{dx^2}$ if $x \quad a\cos^3$ and $y \quad b\sin^3$.

(b) Verify Euler's theorem for the function $z \quad ax^2 \quad 2hxy \quad by^2$.

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

(b) The volume of a sphere is increasing at the rate of 400 cm^3/sec. Find the rate of increase of its radius and its surface area at the instant when the radius of the sphere is 40 cm.

18. *(a)* The sum of two numbers is 24. Find the numbers when the sum of their squares is minimum.

(b) The pressure p and volume v of a gas are connected by the relation pv^{14} constant. Find the percentage increase in p if v is decreased by 1%.

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