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C16–EC/CHPC/PET–102

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BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—2018

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

1. Resolve $\frac{x \quad 4}{(x \quad 2)(x \quad 7)}$ into partial fractions.

2. If $A \begin{matrix} 9 & 1 \\ 4 & 3 \end{matrix}$ and $B \begin{matrix} 1 & 5 \\ 6 & 11 \end{matrix}$, then find X such that $3A \quad 5B \quad 4X \quad 0$.

3. If $A \begin{matrix} \sec & \tan \\ \tan & \sec \end{matrix}$, find det A.

4. Prove that $\sin^2 45 \quad \sin^2 15 \quad \frac{\sqrt{3}}{4}$.

5. If $x \quad \frac{1}{x} \quad 2\cos$, then show that $x^2 \quad \frac{1}{x^2} \quad 2\cos 2$.

6. Express $\sqrt{3}$ i in modulus amplitude form.

7. Find the angle between the lines $2x$ y 3 0 and x y 2 0.

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

9. Evaluate $\lim_{0} \frac{1 \quad \cos 2}{\sin 2}$.

10. Find $\frac{dy}{dx}$ if y $\sqrt{x}$ $\sec x$ $\log x$.

PART—B 10×5=50

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

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

(3) All dimensions are in mm.

11. *(a)* If $A \begin{matrix} 1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & x & 7 \end{matrix}$ is a symmetric matrix, then find x.

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

x y z 3, x $2y$ $3z$ 4 and x $4y$ $9z$ 6

12. *(a)* Show that $\frac{\sin^2 A \quad \sin^2 B}{\sin A \cos A \quad \sin B \cos B}$ $\tan A \quad B$.

(b) If $\cos^{1} x \quad \cos^{1} y \quad \cos^{1} z$, then show that $x^2 \quad y^2 \quad z^2 \quad 2xyz \quad 1$.

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

(b) In a ABC if $\frac{a}{\cos A} \quad \frac{b}{\cos B}$ then show that ABC is isosceles.

14. *(a)* Find the center and radius of the circle $3x^2 \quad 3y^2 \quad 5x \quad 6y \quad 4 \quad 0$.

(b) Find the center, lengths of axes, vertices, eccentricity, foci, directrices, latera recta and length of latus rectum of the ellipse represented by $4x^2 \quad 9y^2 \quad 36$.

15. *(a)* Find $\frac{dy}{dx}$, if $y \quad x^{\tan x}$.

(b) If $y \quad ae^x \quad be^{\ x}$, then show that $\frac{d^2y}{dx^2} \quad y \quad 0$.

16. *(a)* If $x \quad a(\quad \sin \ )$, and $y \quad a\,1 \quad \cos$ find $\frac{dy}{dx}$

(b) If $u \quad \tan^{\ 1} \frac{x^3 \quad y^3}{x \quad y}$, prove that $x\frac{u}{x} \quad y\frac{u}{y} = \sin 2u$.

17. *(a)* Find the lengths of the tangent, normal, subtangent and subnormal to the curve $y \quad x^2 \quad 3x \quad 2$ at (2, 3).

(b) The volume of a cube increases at a rate of 0.3 cm^3 / min at the instant when the edge is 20 cm long. Find the rate at which the surface area changes.

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

(b) Find the approximate value of $\sqrt[3]{127}$.

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