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C09–CHPP–102/C09–EE–**102**

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2014

DEEE—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS—I

Time : 3 hours] [*Total Marks* : 80

PART—A

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. If $x \quad \frac{1}{x} \quad 8$, find the value of $x^3 \quad \frac{1}{x^3}$.

2. Rationalize the denominator of $\frac{\sqrt{7} \quad \sqrt{2}}{\sqrt{7} \quad \sqrt{2}}$.

3. Resolve $\frac{1}{(x \quad 5)(x \quad 2)}$ into partial fractions.

4. If $A \quad B \quad C \quad 180$, prove that

$$\cot A \cot B \quad \cot B \cot C \quad \cot C \cot A \quad 1$$

5. Show that

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

6. Find the modulus of $\frac{7 \quad 24i}{3 \quad 4i}$.

7. Find the equation of the straight line passing through the point (2, 5) and parallel to the line $7x \quad 2y \quad 11 \quad 0$.

8. Find the equation of the point circle with centre (3, –4).

9. Evaluate :

$$\lim_{x \quad 0} \frac{\tan px}{\sin qx}$$

10. Differentiate $x^2 \sin^{1} x$.

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)* Using Laplace's expansion, evaluate

$$\begin{vmatrix} x & y & z \\ z & x & y \\ y & z & x \end{vmatrix}$$

(b) Find the adjoint of

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

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

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

(b) Prove that

$$\cot^{1}\frac{3}{2} \quad \cot^{1}\frac{4}{3} \quad \tan^{1}\frac{17}{6}$$

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

(b) In any ABC, show that

$$\frac{\sin A}{a} \quad \frac{3}{2R}$$

14. *(a)* Find the vertex, focus and directrix of the parabola $(y \quad 2)^2 \quad 8(x \quad 1)$.

(b) Find the equation of the ellipse which passes through the points (–1, 3) and (2, 1) with axes as coordinate axes.

15. *(a)* Find the equation of the rectangular hyperbola whose focus is (3, 1) and directrix is $4x \quad 3y \quad 2 \quad 0$.

(b) Find the perimeter and centroid of the triangle formed by the points (2, 3, 7), (–4, 1, 0), (–5, –11, 3).

16. *(a)* Find $\frac{dy}{dx}$ if $x \quad 8(\quad \sin \ ), y \quad 8(1 \quad \cos \ )$.

(b) If $y \quad \sqrt{x^2 \quad \sqrt{x^2 \quad \sqrt{x^2 \quad \cdots \text{ to}}}}$, show that $\frac{dy}{dx} \quad \frac{2x}{2y \quad 1}$.

17. *(a)* For any curve, show that

$$\frac{\text{subnormal}}{\text{subtangent}} \quad \frac{\text{length of normal}}{\text{length of tangent}}^2$$

(b) When a cube is heated, all its edges increase at the rate of 0·5 cm/min. When one of its edges is 8 cm long, find the rate at which its surface and volume increase.

18. *(a)* Show that the square has the smallest perimeter of all the rectangles of given area K.

(b) An electric current C is measured by a tangent galvanometer, the current being proportional to the tangent of the angle of deflection . Find the approximate relative error in C corresponding to an error 3 in .

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