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C–14–CHPP/EE–**102**

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BOARD DIPLOMA EXAMINATION, (C–14)

APRIL/MAY—2015

DEEE—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 $\dfrac{7x \quad 1}{(3x \quad 1)(2x \quad 1)}$ into partial fractions.

2. Define skew-symmetric matrix. Give an example.

3. Find the value of $\begin{vmatrix} 1 & & {}^2 \\ & {}^2 & 1 \\ {}^2 & 1 & \end{vmatrix}$, where is the cube root of unity.

4. Prove that $\sin^2 52\dfrac{1}{2}^{o} \quad \sin^2 22\dfrac{1}{2}^{o} \quad \dfrac{\sqrt{3} \quad 1}{4\sqrt{2}}$.

5. Prove that $\dfrac{\sin 3}{1 \quad 2\cos 2} \quad \sin$.

6. Express $\dfrac{(1 \quad i)(2 \quad i)}{3 \quad i}$ in $a \quad ib$ form.

7. Find the perpendicular distance from the point (3, 2) to the line $4x \quad 5y \quad 6 \quad 0$.

8. Find the equation of circle with (2, 3) and (6, 9) as ends of diameter.

9. Evaluate $\lim_{x \quad 0} \dfrac{x}{1 \quad \sqrt{1 \quad x}}$.

10. Find the derivative of $\dfrac{\sin x}{1 \quad \cos x}$ with respect to 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)* Express the matrix $\begin{matrix} 1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{matrix}$ as sum of symmetric and skew-symmetric matrices.

(b) Solve the equations $3x \quad y \quad 2z \quad 3$, $2x \quad 3y \quad z \quad 3$, $x \quad 2y \quad z \quad 4$ by determinant method.

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

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

(b) Prove that $\tan^{\ 1}(n) \quad \tan^{\ 1}(n^2 \quad n \quad 1) \quad \cot^{\ 1}(n \quad 1) \quad 0$.

13. *(a)* Solve the equation $4 \quad \cos \quad 6\sin^2 \quad 0$.

(b) In any ABC, if $A \quad 60^\circ$, then show that $\frac{b}{c \quad a} \quad \frac{c}{a \quad b} \quad 1$.

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

(b) Find the eccentricity, vertices and foci of ellipse $9x^2 \quad 16y^2 \quad 144$.

15. *(a)* Differentiate $\log \frac{1 \quad x^2}{1 \quad x^2}$ with respect to x.

(b) Find the derivative of $\tan^{1} \frac{\sin x}{1 \quad \cos x}$ with respect to x.

16. *(a)* If $x^y \quad e^{x \quad y}$, then show that $\frac{dy}{dx} \quad \frac{\log x}{(1 \quad \log x)^2}$.

(b) Verify that $\frac{{}^2u}{x \quad y} \quad \frac{{}^2u}{y \quad x}$ if $u \quad \log(x^2 \quad y^2)$.

17. *(a)* Find the lengths of the tangent, normal, subtangent and subnormal to the curve $x \quad a(\quad \sin \ )$, $y \quad a(1 \quad \cos \ )$ at $/ 3$.

(b) The volume of sphere is increasing at the rate of 1 m^3/min. Find the rate at which the radius and surface area are increasing when the volume is $\frac{32}{3}$ m^3.

18. *(a)* Show that maximum rectangle that can be inscribed in a circle is a square.

(b) The time of oscillation of a simple pendulum of length l is given by $T \quad 2 \sqrt{\frac{l}{g}}$ if the length is increased by 2%. Find the approximate % increase in its time of oscillation, where g is constant.

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