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C09–A–102/C09–AA–102/C09–AEI–102/C09–BM–102/
C09–CH–102/C09–CHST–102/C09–FW–102/
C09–IT–102/C09–MET–102/C09–MNG–102/
C09–PKG–102/C09–TT–102

3002

BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

FIRST YEAR (COMMON) 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. Simplify $[2a \quad \{3b \quad (4c \quad \overline{5a \quad 36})\}]$.

2. Find the value of ${}^{8}C_{3} \quad {}^{8}P_{4}$.

3. Resolve $\frac{5x \quad 6}{(2 \quad x)(1 \quad x)}$ into partial fractions.

4. Show that $\frac{\cos 11 \quad \sin 11}{\cos 11 \quad \sin 11} \quad \cot 34$.

5. Prove that $\sin 8 \quad 8 \sin \quad \cos \quad \cos 2 \quad \cos 4$

6. Express $\frac{1 \quad i}{1 \quad i}$ in the form of $a \quad ib$.

7. Find the distance between the parallel lines $3x \quad 4y \quad 3 \quad 0$; $6x \quad 8y \quad 1 \quad 0$.

8. Find the equation of the circle whose extremities of the diameter are (1, 2) and (4, 5).

9. Evaluate $\underset{x \quad 0}{\text{Lt}} \dfrac{\sin mx}{\sin nx}$.

10. Find the derivative of $(\sqrt{1 \quad \sin 2x})$.

PART—B

10×5=50

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

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

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

11. *(a)* Solve the following equations by Cramer's rule :

$$\begin{array}{rrrr} x & y & z & 2 \\ 2x & 3y & 4z & 4 \\ 3x & y & z & 8 \end{array}$$

(b) Prove that

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} \quad (a \quad b)(b \quad c)(c \quad a)$$

12. *(a)* In any ABC, prove that

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

(b) If $\tan^{1} x \quad \tan^{1} y \quad \tan^{1} z$, show that

$$xyz \quad x \quad y \quad z$$

13. *(a)* Solve $2 \sin^2 \quad 3 \cos \quad 3 \quad 0$.

(b) In any ABC, prove that $a^3 \sin (B \quad C) \quad 0$.

14. *(a)* Find the equation to the parabola whose focus is (2, 3) and directrix is $3x \quad 4y \quad 1 \quad 0$.

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

15. *(a)* Find the equation of the hyperbola referred to its axes as axes of coordinates whose latus rectum is 8, and eccentricity is 3.

(b) Find the centroid of the tetrahedron formed by the points (1, 6, 7), (3, 18, 17), (5, 4, 5), (11, 4, 3).

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

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

17. *(a)* Find the equations of tangent, normal to the curve $y \quad x^2 \quad 4x \quad 10$ at (2, 2).

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

18. *(a)* The time T of a complete oscillation of a simple pendulum of length l is given by $T \quad 2 \sqrt{\frac{l}{g}}$, where g is a constant. Find the approximate error in the calculated value of T corresponding to an error of 2% in the value of l.

(b) The sum of two numbers is 10. Find them if the sum of their squares is minimum.

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