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C09–A–102/C09–AA–102/C09–AEI–102/C09–BM–102/
C09–C–102/C09–CM–102/C09–CH–102/C09–CHPC–102/
C09–CHPP–102/C09–CHOT–102/C09–CHST–102/
C09–EC–102/C09–EE–102/C09–IT–102/C09–M–102/
C09–MET–102/C09–MNG–102/ C09–PET–102/
C09–TT–102/C09–RAC–102

3002

BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2017

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.

1. If $x \quad \frac{1}{x} \quad 2$, find the values of $x^2 \quad \frac{1}{x^2}$.

2. Express $x^2 \quad 4x \quad 21$ in the form $X^2 \quad A^2$.

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

4. Show that tan(45).tan(45) 1.

5. Find the modulus and amplitude of $\sqrt{3}$ i.

6. Show that $\frac{\cos 3 \quad \sin 3}{\cos \quad \sin}$ 1 2 sin 2 .

7. Find the equation of the straight line passing through the point (1, 2) and parallel to the line $3x$ $4y$ 5 0.

8. Find the centre and radius of the circle x^2 y^2 $6x$ $8y$ 1 0.

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

10. If x $a\cos$, y $b\sin$, find $\frac{dy}{dx}$.

PART—B

10×5=50

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

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

11. *(a)* Find the inverse of the matrix $\begin{matrix} 1 & 2 & 2 \\ 1 & 3 & 0 \\ 0 & 2 & 1 \end{matrix}$.

(b) Show that

$$\begin{vmatrix} 1 & a & b & c \\ a & 1 & b & c \\ a & b & 1 & c \end{vmatrix} \quad 1 \quad a \quad b \quad c$$

12. *(a)* Show that

$$\frac{\cos 7A \quad \cos 5A \quad \cos 3A \quad \cos A}{\sin A \quad \sin 3A \quad \sin 5A \quad \sin 7A} \quad \cot 4A$$

(b) Show that

$$\sin \ ^1\frac{3}{5} \quad \sin \ ^1\frac{5}{13} \quad \cos \ ^1\frac{33}{65}$$

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

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

14. *(a)* Find the vertex, focus, equation of the directrix and the length of latus rectum of the parabola $y^2 \quad 4x \quad 4y \quad 16 \quad 0$.

(b) Find the equation of the ellipse whose focus is (0, 0), eccentricity is $\frac{1}{2}$ and directrix is $x \quad y \quad 1 \quad 0$.

15. *(a)* Find the equation of the hyperbola whose foci are (6, 4) and (–4, 4) and eccentricity is 2.

(b) Show that the points (–2, 4, 1), (–1, 5, 5), (2, 2, 5) and (1, 1, 1) form a square.

16. *(a)* Find the equation of the tangent and normal to the curve $y \quad x^3 \quad 2x^2 \quad 4$ at (2, 4).

(b) A circular plate of metal when heated such that its radius increases at the rate of 0·02 cm/sec. At what rate its area increases when the radius is 20 cm?

17. *(a)* If $x^2 \quad y^2 \quad 6x \quad 3y \quad 1 \quad 0$, find $\frac{dy}{dx}$.

(b) Find the derivative of $\tan^{1} \frac{2x}{1 \quad x^2}$ with respect to x.

18. *(a)* Find the maximum and minimum values of $4x^3 \quad 9x^2 \quad 12x \quad 1$.

(b) If there is an error of 1% in measuring the side of a square plate, find the percentage error in its area.

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