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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—2018

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 $p \quad a \quad 2b \quad c, q \quad 3a \quad b \quad 2c, r \quad 2a \quad 3b \quad c$, find $2p \quad 3q \quad 2r$.

2. Solve the equation $2x^2 \quad 3x \quad 8 \quad 0$.

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

4. If $\sin A \quad \frac{4}{5}$, find $\cos 2A$ and $\sin 2A$.

5. Express $\frac{3 \quad i}{3 \quad i}$ in the form of $a \quad ib$.

6. Show that

$$\frac{\cos 11 \quad \sin 11}{\cos 11 \quad \sin 11} \quad \cot 34$$

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

8. Find the centre and radius of the circle $3x^2 \quad 3y^2 \quad 5x \quad 6y \quad 4 \quad 0$.

9. Differentiate $\sqrt{1 \quad \sin 2x}$ w.r.t. x.

10. Evaluate :

$$\lim_{n} \frac{1 \quad 2 \quad 3 \quad \ldots \quad n}{n^2 \quad 1}$$

PART—B

10×5=50

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

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

11. *(a)* If $A \begin{matrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 1 & 1 & 2 \end{matrix}$, $B \begin{matrix} 1 & 3 & 0 \\ 1 & 2 & 1 \\ 0 & 0 & 2 \end{matrix}$, find AB.

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

$$\begin{matrix} 2x & y & z & 1 \\ 3x & 2y & 2z & 5 \\ x & y & z & 0 \end{matrix}$$

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

(b) In any ABC, prove that

$$C\cos^2\frac{A}{2} \quad a\cos^2\frac{C}{2} \quad S$$

13. *(a)* In any triangle ABC, show that

$$\frac{\sin 7A \quad \sin 17A}{\cos 7A \quad \cos 17A} \quad \tan 12A$$

(b) Show that

$$\tan \ ^{1}\frac{1}{3} \quad \tan \ ^{1}\frac{1}{7} \quad \tan \ ^{1}\frac{1}{2}$$

14. *(a)* Find the equation of parabola with focus (+2, – 4) and directrix $x \quad y \quad 1 \quad 0$.

(b) Find the equation of the ellipse whose foci are (5, 0) and (– 5, 0) with eccentricity $e \quad 1 / 5$.

15. *(a)* Find the centre, length of the transverse axis, equations of the axes of the hyperbola represented by the equation $9x^2 \quad 16y^2 \quad 144$.

(b) Find the angle between the planes $x \quad y \quad z \quad 1 \quad 0$, $x \quad y \quad z \quad 2 \quad 0$.

16. *(a)* Differentiate x^x w.r.t. x.

(b) If $y \quad \sin (\log x)$, show that $x^2 y_2 \quad xy_1 \quad y \quad 0$.

17. *(a)* Find the maximum and minimum values of the function $y \quad \sin 2x \quad x$ in the interval $\frac{}{2}, \frac{}{2}$.

(b) Circumference of a circle is measured to be 20 cm with an error of 0·01 cm. Find approximately the percentage error in its area.

18. *(a)* Find the lengths of tangent, normal, subtangent and subnormal to the curve $y^3 \quad x$ at the point (1, 1).

(b) Radius of a spherical balloon is increasing at a rate of 5 cm/sec. Find the rate of increase of its volume when its radius is 10 cm.

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