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C16–A/AA/BM/CH/CHST/AEI/MNG/
MET/TT/IT/PCT—102

6002

BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—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. Resolve

$$\frac{x}{(x-1)(2x-1)}$$

into partial fractions.

2. If

$$A = \begin{matrix} 1 & 1 \\ 2 & 1 \end{matrix} \text{ and } B = \begin{matrix} 2 & 3 \\ 4 & 5 \end{matrix}$$

show that $(A-B)^T = A^T - B^T$.

3. Using Laplace expansion, evaluate

$$\begin{matrix} a & b & c \\ c & a & b \\ b & c & a \end{matrix}$$

4. Show that

$$\frac{\cos 16 \quad \sin 16}{\cos 16 \quad \sin 16} \quad \tan 61$$

5. Prove that

$$\tan \frac{}{4} \quad A \quad \tan \frac{}{4} \quad A \quad 2\sec 2A$$

6. Find the additive and multiplicative inverse of

$$\frac{7}{2 \quad i\sqrt{3}}$$

7. Find the equation of the straight line passing through the points (1, 2) and (3, 4).

8. Find the perpendicular distance of the point (2, 3) from the line $2x \quad y \quad 3 \quad 0$.

9. Evaluate :

$$\lim_{x \quad 0} \frac{x}{\sqrt{2} \quad \sqrt{2 \quad x}}$$

10. Differentiate e^{2x} $(x^2 \quad 1)$ w.r.t. x.

PART—B

10×5=50

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

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

11. *(a)* Show that

$$\begin{vmatrix} 1 & 2 & \\ & 1 & 2 \\ 2 & & \end{vmatrix} \quad 0$$

where is cube root of unity.

(b) Using Cramer's rule. Solve the equations

$x \quad 2y \quad 3z \quad 6,\ 3x \quad 2y \quad 4z \quad 5,\ x \quad y \quad z \quad 1$

12. (a) If $\cos x \quad \cos y \quad \frac{5}{7}$ and $\cos x \quad \cos y \quad \frac{5}{6}$, then show that

$$6 \tan \frac{x \quad y}{2} \quad 7 \cot \frac{x \quad y}{2} \quad 0$$

(b) Show that

$$\tan^{\ 1} \frac{3}{4} \quad \tan^{\ 1} \frac{5}{12} \quad \cot^{\ 1} \frac{63}{16}$$

13. (a) Solve $\sin 9 \quad \sin 6 \quad \sin \quad 0$

(b) In ^{le} ABC, prove that $(c \quad a)\cos B \quad 2s$

14. (a) Find the equation of the circle having $\frac{1}{2}, \frac{5}{2}$ and $\frac{3}{2}, \frac{1}{2}$ as the extremeties of the diameter.

(b) Find the length of major axis and minor axis, length of latus rectum, centre, eccentricity, foci and equations of directrices of the ellipse $25x^2 \quad 16y^2 \quad 400$.

15. (a) Differentiate $\cot^{\ 1} \frac{1 \quad \cos x}{\sin x}$ w.r.t. x.

(b) If $y \quad \sqrt{\operatorname{cosec} x \quad \sqrt{\operatorname{cosec} x \quad \sqrt{\operatorname{cosec} x \quad \cdots}}}$, find $\frac{dy}{dx}$.

16. (a) If $y \quad \cot^{\ 1} x$, show that $(1 \quad x^2)y_2 \quad 2xy_1 \quad 0$

(b) If $u \quad \log (x \quad y \quad z)$, find $\frac{u}{x} \quad \frac{u}{y} \quad \frac{u}{z}$.

17. *(a)* Find the angle between the curves x^2 $4y$ and y^2 $4x$ at the point (4, 4).

(b) A wire of length 40 cm is cut into two parts which are bent in the form of a square and circle. Find the least value of the sum of the areas so formed.

18. *(a)* A light is hund 4 m directly above a straight horizontal floor. A man of 1·5 m tall is walking away from the lamp at the rate of 5 m/minute. Find the rate at which is shadow is lengthening.

(b) A circular plate expands when heated from a radius 5 cm to 5·03 cm. Find the approximate increase in its area. Also find the relative increase and percentage increase in it.

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