* 4002 *

C14–A/AA/BM/CH/CHST/AEI/MNG/
MET/IT/TT/PCT–102

4002

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2015

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

2. If

$$A \quad \begin{matrix} 1 & 4 & 1 \\ 2 & 5 & 2 \\ 3 & 6 & 3 \end{matrix}$$

find $(A \quad A^T)$.

3. Find the values of x, y and z from

$$\begin{matrix} x & 3 & 3x & 2y \\ 3x & z & x & y \end{matrix} \quad \begin{matrix} 2 & 7 & 2y \\ z & y & 4 & 2x \end{matrix}$$

4. If $A + B = 45°$, then prove that $(1 \quad \tan A)(1 \quad \tan B) \quad 2$.

5. Prove that

$$\frac{\cos 7A}{\sec A} \quad \frac{\sin 7A}{\operatorname{cosec} A} \quad \cos 8A$$

6. Find the real and imaginary parts of the complex number $\frac{4 \quad 5i}{1 \quad 2i}$.

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

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

9. Evaluate :

$$\lim_{x \to 0} \frac{\log(1 \quad x)}{x}$$

10. Differentiate $\frac{x^8}{8} \quad e^x \quad \sqrt{x} \quad 2$ with respect to x.

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each question carries **ten** marks.

11. *(a)* Solve

$$\begin{vmatrix} x & 1 & 2 & 3 \\ 1 & x & 2 & 3 \\ 1 & 2 & x & 3 \end{vmatrix} \quad 0$$

(b) Solve the following equations by matrix inversion method :

$3x \quad y \quad 2z \quad 3, 2x \quad 3y \quad z \quad 3$ and $x \quad 2y \quad z \quad 4$

12. *(a)* If $\cos C \quad \cos D \quad \frac{3}{7}$ and $\cos C \quad \cos D \quad \frac{5}{9}$, then show that

$$27 \tan \frac{C \quad D}{2} \quad 35 \cot \frac{C \quad D}{2} \quad 0$$

(b) Prove that

$$\sin^{1} \frac{3}{5} \quad \sin^{1} \frac{5}{13} \quad \tan^{1} \frac{56}{33}$$

13. *(a)* In a ABC, prove that

$$\cot\frac{A}{2} \quad \cot\frac{B}{2} \quad \cot\frac{C}{2} \quad \frac{s^2}{}$$

(b) Solve $\sin 3 \quad \sin \quad \sin 7 \quad \sin 5$.

14. *(a)* Find the equation of the parabola with focus (3, 0) and vertex (1, 0).

(b) Find the equation of the ellipse whose major axis is 6 and whose eccentricity is $\frac{\sqrt{3}}{2}$, referred to its axes as the axes of coordinates.

15. *(a)* If $y \quad \sqrt{\sin\sqrt{x}}$, then find $\frac{dy}{dx}$.

(b) Differentiate $\sin(\log x)$ with respect to $\tan(e^x)$.

16. *(a)* If $y \quad \sqrt{\sec x \quad \sqrt{\sec x \quad \sqrt{\sec x \quad \cdots}}}$ terms, then find $\frac{dy}{dx}$.

(b) If $u \quad \sin(x \quad y) \quad \log(x \quad y)$, then prove that

$$\frac{^2u}{x^2} \quad \frac{^2u}{y^2}$$

17. *(a)* Show that the curves $y \quad x^2 \quad 1$ and $y \quad 8x \quad x^2 \quad 9$ touch each other at the point (2, 3). Also find the equations of common tangent and common normal at that point to the curves.

(b) Gas is leaking out from a spherical balloon at the rate of 2 cu. cm/sec. How fast is the surface area shrinking when the radius is 16 cm?

18. *(a)* Find the maximum and minimum values of $2x^3 \quad 9x^2 \quad 12x \quad 10$.

(b) The pressure P and the volume V of a gas are connected by the relation $PV^{1\,4} \quad K$, where K is a constant. Find the percentage increase in P if V is decreased by 1%.

★ ★ ★