



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)
OCT/NOV—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.

1. Solve the equation $x^2 - 3x - 5 = 0$.

2. Simplify $x^2 - [2x - \{3y - (4z - 2x)\}]$ by removing the brackets.

3. Resolve $\frac{3}{(x-1)(x-2)}$ into partial fraction.

4. Prove that $\frac{\cot A - \tan A}{\cot A + \tan A} = \cos 2A$.

5. Express $\sqrt{3} - i$ in the modulus amplitude form.

*

6. If $A + B + C = 90^\circ$, prove that

$$\tan A \tan B + \tan B \tan C + \tan C \tan A = 1$$

7. Find the equation of the straight line making intercepts $\frac{3}{7}$ and $\frac{4}{9}$ with the X and Y -axis respectively.

8. Find the equation of the circle with centre at $(3, -2)$ and radius 7.

9. Evaluate : $\lim_{x \rightarrow 2} \frac{x^2 - 4x + 3}{x^2 - 2x - 1}$

10. Differentiate e^{4x^2} with respect to x .

PART—B

10×5=50

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

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

11. Solve the equation :

$$x + y + z = 6$$

$$x + y + z = 2$$

$$2x + y + z = 1$$

using matrix inverse method.

12. (a) Solve : $\sin 6^\circ \sin 2^\circ \sin 4^\circ = 0$

(b) In any $\triangle ABC$, prove that $\sin A \sin B \sin C = \frac{s}{R}$

*

13. (a) Show that $\frac{\cos 15A \cos 5A}{\sin 15A \sin 5A} = \cot 10A$.

(b) Show that $\tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} = \tan^{-1} \frac{6}{17}$.

- * 14. (a) Find the equation of parabola whose focus is $(1, 1)$ and directrix $x - y - 1 = 0$.
- (b) Find the centre, vertices, eccentricity, foci, equations of directrices and lengths of latus rectum of the ellipses represented by the equation $4x^2 - 9y^2 = 36$.
15. (a) Find the equation of hyperbola with centre at origin, y -axis as the conjugate axis and it is of length 8 and passing through the point $(6, 4)$.
- (b) Find the distance between the points $(2, -1, 4)$ and $(-2, 1, 3)$.
16. (a) If $y = \sqrt{\tan x} \sqrt{\tan x} \sqrt{\tan x} \dots$ to ∞
show that $\frac{dy}{dx} = \frac{\sec^2 x}{2y - 1}$.
- (b) Find $\frac{d^2y}{dx^2}$, if $y = a \cos(\log x)$.
17. (a) A wire of length 20 cm is bent to form a rectangle. Find the maximum area the rectangle encloses.
- (b) If the percentage error in the side of an equilateral triangle is 3.5%, find the absolute error and percentage error in its area when the side is measured as $6/\sqrt{3}$ cm.
18. (a) Find the angle between the curves $y^2 = 4x$ and $x - y = 1$ at any point of intersection.
- * (b) A circular plate of metal expands by heat so that its radius increases at the rate of 0.01 cm/sec. At what rate is the surface increasing when the radius is 2 cm?
