



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)  
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. Express  $3 - 2x - x^2$  in the form of  $A^2 - B^2$

2. If  $p = 2a + 3b$ ,  $q = 3b + 4c$ ,  $r = 5a + 2b$ , Find  $3p - 2q + 5r$ .

3. Resolve  $\frac{4}{x^2 - x - 5}$  into partial fractions.

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

5. Find the Modulus of  $\frac{5 - 12i}{2 + 3i}$

6. If  $\sin A = \frac{4}{5}$ , Find  $\cos 2A$  and  $\sin 2A$

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7. Find the Equation of the Circle with  $(-5,1)$  and  $(3,-7)$  as end points of a diameter.
8. Find the angle between the straight lines  $x + 5y - 7 = 0$  and  $x - 3y - 18 = 0$ .
9. Evaluate  $\lim_{x \rightarrow 1} \frac{x^2 - 3x + 2}{x^2 - 4x + 3}$
10. Differentiate  $\frac{1 + \sin x}{1 - \sin x}$  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

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

- (b) Find the inverse of the matrix

$$\begin{vmatrix} 1 & 1 & 1 \\ 4 & 1 & 0 \\ 8 & 1 & 1 \end{vmatrix}$$

12. (a) Solve  $\tan^2 \theta - 1 = \sqrt{3} \tan \theta - \sqrt{3} = 0$

- (b) Solve the  $\triangle ABC$  if  $a = 2, c = \sqrt{3}, B = 60^\circ$ .

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13. (a) If  $A+B+C=180^\circ$  prove that  $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$ .

- (b) Show that  $\tan^{-1} \frac{3}{4} + \tan^{-1} \frac{5}{12} = \tan^{-1} \frac{56}{33}$

- \* 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 latusrectum of the ellipses represented by the equation  $16x^2 + 9y^2 = 144$
15. (a) Find the centre, length of the Transverse axis, equations of the axes, of the hyperbola represented by the equation  $4x^2 - 25y^2 = 100$ .
- (b) Find the mid point of the line joining the points  $(7,2,9)$  and  $(9,-6,-3)$ .
16. (a) Differentiate  $\tan^{-1} \frac{3x - x^3}{1 - 3x^2}$  with respect to  $\sin^{-1} \frac{2x}{1 - x^2}$
- (b) If  $u = \sin^{-1} \frac{x^2 - y^2}{1 - 3x^2}$ , Show that  $x \frac{u}{x} - y \frac{u}{y} = \tan u$
17. (a) Find the Equations of Tangent and normal to the curve  $y = x^2 - 2x - 3$  at the point  $(0,-3)$ .
- (b) A ladder of 5m long is placed against a vertical wall. Foot of the ladder is slipping away from the wall at rate of 5cm/sec. Find the rate of descending of its top if the foot of the ladder is 3m away from the wall.
18. (a) Find the maximum and minimum values of the function  $y = \sin x$  in the interval  $0.2$ .
- (b) Time of oscillation of a simple pendulum of variable length 'l' is given by  $T = 2\pi \sqrt{\frac{l}{g}}$ .

If the length is increased by 1%, find approximate percentage increase in its time of oscillation where 'g' is constant.

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