

TED (10)–1002

Reg. No. ....

(REVISION—2010)

Signature.....

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/  
TECHNOLOGY—MARCH, 2012

TECHNICAL MATHEMATICS-I

[Time : 3 hours

(Maximum marks : 100)

Marks

PART—A

I Answer all questions. Each question carries 2 marks.

1. If  $A = \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$   $B = \begin{bmatrix} 2 & 1 \\ 5 & 2 \end{bmatrix}$  find  $2A + B$ .

2. If  ${}^n C_{n-2} = 28$ , find  $n$ .

3. If  $\sin \theta = \frac{3}{5}$ , find  $\cos \theta$  and  $\tan \theta$ .

4. If  $\sin A = 0.8$ ,  $A$  is acute, find  $\cos 2A$ .

5. Find the slope of the line joining the points (7, 4) and (5, -2). (5×2=10)

PART—B

II Answer any five questions. Each question carries 6 marks.

1. Find 'K' if the system is constant

$$x + y + 1 = 0; x + 2y + 1 = 0;$$

$$2x + 3y + k = 0.$$

2. If  $A = \begin{bmatrix} 1 & 4 & 3 \\ -4 & 0 & 1 \end{bmatrix}$   $B = \begin{bmatrix} 1 & 2 \\ 0 & 5 \\ -1 & 1 \end{bmatrix}$  Show that  $AB \neq BA$ .

3. Find the 4th term in the expansion of  $(x^2 - \frac{1}{x})^9$ .

4. Prove that  $\frac{\operatorname{cosec} A}{(\operatorname{cosec} A - 1)} + \frac{\operatorname{cosec} A}{(\operatorname{cosec} A + 1)} = 2 \sec^2 A$ .

5. Prove that  $\frac{\tan 60^\circ - \tan 45^\circ}{1 + \tan 60^\circ \cdot \tan 45^\circ} = 2 - \sqrt{3}$

6. Show that  $\sin 10^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ = \frac{1}{8}$

7. Find the angle between two lines with slope  $\sqrt{3}$  and  $\frac{1}{\sqrt{3}}$ . (5×6=30)

## PART—C

Marks

(Answer one full question from each unit. Each question carries 15 marks.)

## UNIT—I

- III 1. Solve for 'Z', if  $\begin{vmatrix} 2 & 3 & 5 \\ 2 & Z & 5 \\ 3 & -1 & 2 \end{vmatrix} = 0$ . 5
2. If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -2 & 6 \\ 1 & 3 & 2 \end{bmatrix}$  Compute  $A + A^T$  and show that  $A + A^T$  is symmetric. 4
3. Find the Inverse of  $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 2 & 4 & 1 \end{bmatrix}$  6

OR

- IV 1. Solve using determinants :  $2a - 3b + c = -1$   
 $a + 4b - 2c = 3$   
 $4a - b + 3c = 11$  5
2. If  $A = \begin{bmatrix} 4 & 1 & 0 \\ 2 & 1 & 5 \\ -1 & 1 & 0 \end{bmatrix}$   $B = \begin{bmatrix} 2 & -1 & 3 \\ 1 & 2 & 1 \\ 2 & -2 & 5 \end{bmatrix}$   $C = \begin{bmatrix} 2 & 1 & 3 \\ -1 & 1 & -1 \\ 2 & 1 & 0 \end{bmatrix}$   
 Show that  $A(B + C) = AB + AC$ . 5
3. Solve the following system of equations by finding the inverse of their coefficient matrix :  $3x + y - z = 3$   
 $x + y + z = 1$   
 $x + y + z = 3$  5

## UNIT—II

- V 1. Prove that  $nc_r = n-1c_{r-1} + n-1c_r$ . 6
2. Find the middle term of  $(2a + \frac{b}{3})^{10}$  5
3. Prove that  $\frac{1 + \sin A}{\cos A} = \frac{\cos A}{1 - \sin A}$  4

OR

- VI 1. Expand  $(x^2 + \frac{1}{x^2})^7$  binomially. 5
2. Find the constant term in the expansion of  $(\sqrt{x} + \frac{2}{x^2})^{10}$ . 5
3. If  $\sin B = \frac{3}{5}$ , B lies in second quadrant, find all other t-functions. 5

## UNIT—III

- VII 1. If  $A + B = 45^\circ$ , show that  $(1 + \tan A)(1 + \tan B) = 2$ . 4
2. Show that  $\sin 18^\circ = \frac{\sqrt{5}-1}{4}$  6
3. In any triangle ABC, prove that  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$ . 5

OR



Marks

- VIII 1. Prove that  $\frac{\cos A - \sin A}{\cos A + \sin A} = \tan (45^\circ - A)$  5
2. Prove that  $\frac{\sin x + \sin 2x}{\cos x + \cos 2x} = \tan \frac{3x}{2}$  4
3. In a  $\Delta ABC$   $R (a^2 + b^2 + c^2) = abc (\cot A + \cot B + \cot C)$  6

## UNIT—IV

- IX 1. Solve  $\Delta ABC$ , given  $a = 24.5$   $b = 18.6$   $c = 26.4$  5
2. The vertices of a triangle are A (3, 4) B (5, 6) and C (-1, -2). Find the equation to the median through 'A'. 5
3. Prove that the lines  $2x - 3y - 7 = 0$  ;  
 $3x - 4y - 10 = 0$  ;  
 $8x + 11y - 5 = 0$  ; are concurrent. 5

OR

- X 1. Solve  $\Delta ABC$ , given  $a = 87$  cm  $b = 53$  cm and  $C = 110^\circ$  5
2. Find the value of 'q' for which the straight line  $8qx + (2 - 3q)y + 1 = 0$  and  $qx + 8y + 7 = 0$  are perpendicular. 5
3. Prove that the points (3, -5), (-5, -4), (7, 10) and (15, 9) taken in order are the vertices of a parallelogram. 5