TED (10)–1002

(REVISION—2010)

Reg. No. .....

Signature .....

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

TECHNICAL MATHEMATICS – I

(Common to all branches except DCP and CABM)

[*Time* : 3 hours

(Maximum marks : 100)

Marks

PART—A

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Which of the following matrices is singular :

$$\begin{bmatrix} 2 & -2 \\ 3 & 3 \end{bmatrix}, \begin{bmatrix} 5 & -1 \\ 0 & 5 \end{bmatrix}, \begin{bmatrix} 2 & 3 \\ 2 & 3 \end{bmatrix}$$

2. Find the value of $20C_{18}$.
3. State the identity for $\sin (A - B)$.
4. State Napier's formula.
5. Find the third side of a triangle, given b = 2 cm, c = 3 cm and A = 60°. (5x2=10)

PART—B

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

1. Solve the equations : $2x + y + z = 1$, $x - 2y - z = 3/2$, $3y - 5z = 9$ by finding the inverse of the coefficient matrix.
2. If $A = \begin{bmatrix} 4 & 1 \\ 6 & 5 \end{bmatrix}$, find A^{-1} and show that $AA^{-1} = A^{-1} A = 1$.
3. Find the middle terms in the expansion of $(2x + 3/x)^9$.
4. Prove that $\dfrac{\sin 11A. \sin A + \sin 7A. \sin 3A}{\cos 11A. \sin A + \cos 7A. \sin 3 A} = \tan 8A.$
5. State and prove projection formula.
6. Solve the ΔABC, given b = 50 cm, c = 80 cm, A = 132°.
7. Derive the equation of a straight line of the form $\dfrac{y - y1}{y1 - y2} = \dfrac{x - x1}{x1 - x2}$

(5x6=30)

Marks

PART—C

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

UNIT – I

III 1. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 0 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & -1 & -1 \\ -2 & 2 & 3 \end{bmatrix}$, verify that $A(B+C) = AB + AC$. 5

2. If $A = \begin{bmatrix} 1 & 0 & 5 \\ -2 & 1 & 6 \\ 3 & 2 & 7 \end{bmatrix}$, show that AA^T and A^TA are symmetric. 5

3. Solve the following system using cramer's rule : $x + y + z = 3$, $2x + 3y + z = 6$, $x - y - z = -3$. 5

OR

IV 1. If I is the unit matrix of order 3 and $A = \begin{bmatrix} 1 & 2 & 6 \\ 7 & 4 & 10 \\ 1 & 3 & 5 \end{bmatrix}$, find A^2-3A+I. 5

2. Show that every square matrix can be expressed as the sum of two matrices of which one is symmetric and the other is skew symmetric. 5

3. Find k if the system is consistent : $x + y + 1 = 0$, $x + 2y + 1 = 0$, $2x + 3y + k = 0$. 5

UNIT – II

V 1. Expand $(x^2 - 3/x)^5$ using binomial theorem. 5

2. If $\cos x = -4/5$ and x is in the second quadrant, find the remaining Trigonometric functions of x. 5

3. Draw the graph of $y = \sin 3x$. 5

OR

VI 1. Find the coefficient of x^{11} in the expansion of $(x^4 - 1/x^3)^{15}$. 5

2. Write the signs of the following:

(i) cot (1080 + x), $0 < x < 90$

(ii) cot (–97)

(iii) Sec (360 –x), $0 < x < 90$. (2+2+1=5)

3. Prove that $\tan^2 30 + \tan^2 45 + \tan^2 60 = 13/3$. 5

UNIT – III

VII 1. Express $\sqrt{3}\cos x + \sin x$ in the form $R \sin (x + \alpha)$, where α is acute. 5

2. Prove the identity for sin3A. 5

3. Show that $2 (bc.\cos A + ca.\cos B + ab.\cos C) = a^2 + b^2 + c^2$. 5

OR

Marks

VIII 1. Show that tan 15 + cot 15 = 4. 5

2. If tan A = .38, find tan 2A. 5

3. Prove that cos 55 + cos 65 + cos 175 = 0. 5

UNIT – IV

IX 1. Find the equation of a line which passes through the point (–4, 5) and whose intercepts are equal in magnitude but opposite in sign. 5

2. Find the slope and intercepts of the line $3x + 4y - 15 = 0$. 5

3. Find the angle between the lines $ax + by + c = 0$ and $dx + ey + f = 0$. 5

OR

X 1. Find the condition for two lines are (i) parallel (ii) perpendicular. 5

2. The straight line through (4, 3) makes intercepts 4a and 3a on the X and Y axis respectively, find a. 5

3. Show that the point of intersection of the lines $5x - 12y = 2$ and $3x - 8y + 2 = 0$ lies on $2x - 3y = 8$. 5