TED (10)–1002

(REVISION—2010)

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—OCTOBER, 2013

TECHNICAL MATHEMATICS—I

(Common to all branches except DCP and CABM)

[*Time* : 3 hours

(Maximum marks : 100)

Marks

PART—A

(Maximum marks : 10)

I 1. Which of the following matrices is symmetric :

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} , \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} , \begin{bmatrix} 2 & -2 \\ 3 & 4 \end{bmatrix}$$

2. Find the value of r, if $20C_r = 20C_{r+2}$.

3. State the identity for tan (A-B).

4. State projection formula.

5. Define slope of a straight line.   (5×2=10)

PART—B

(Maximum marks : 30)

(Answer *any five* questions. Each question carries 6 marks.)

II 1. Solve the equations: $3x + y - z = 3$, $-x + y + z = 1$, $x + y + z = 3$ by finding the inverse of the coefficient matrix.

2. If A = $\begin{bmatrix} 5 & 3 \\ 2 & 2 \end{bmatrix}$, and B = $\begin{bmatrix} 7 & 5 \\ 4 & 3 \end{bmatrix}$, show that $(AB)^{-1} = B^{-1} A^{-1}$.

3. Prove that $nC_r + nC_{r-1} = (n+1)C_r$.

4. Prove that $\dfrac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

5. State and prove sine rule.

6. Using Napier's formula, find angles A and B in $\triangle ABC$, if a = 5cm, b = 8cm, C = 30°.

7. Find the equation to the line passing through (4, 5) which is

(i) parallel   (ii) perpendicular to the line $2x + 3y = 4$.   (5×6=30)

[29]

Marks

PART—C
(Maximum marks : 30)

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

UNIT – I

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

2. If $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ 4 & 6 \end{bmatrix}$, show that $(AB)^T = B^T A^T$. 5

3. Show that the eliminant of $1x + my + n = 0$, $mx + ny + 1 = 0$ and $nx + 1y + m = 0$ is $1^3 + m^3 + n^3 = 31mn$. 5

OR

IV 1. If $A = \begin{bmatrix} 1 & 2 & 6 \\ 7 & 4 & 10 \\ 1 & 3 & 5 \end{bmatrix}$, evaluate $A^2 - 8A - 20I$. 5

2. Express the matrix $A = \begin{bmatrix} 1 & 4 & 5 \\ 2 & 2 & 3 \\ 3 & 1 & 0 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix. 5

3. Solve using determinant : $x + 2y - z = -1$, $3x - y - 2z = 5$, $x - y - 3z = 0$. 5

UNIT – II

V 1. Expand $(x + 1/x)^7$ using binomial theorem. 5

2. If $\tan x = 7/24$ and x is in the third quadrant, find the value of $3 \sin x - 4\cos x$. 5

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

OR

VI 1. Find the term independent of x in the expansion of $(x + 3/x)^{10}$. 5

2. Write the signs of (i) $\cot (7\pi/4)$ (ii) $\tan 500$ (iii) $\csc 280$. (2+2+1)

3. Prove that $\dfrac{\tan 45 - \tan 30}{1 + \tan 45.\tan 30} = 2 - \sqrt{3}$. 5

UNIT – III

VII 1. Prove the formula for $\cos 3A$. 5

2. If $\sin 18 = \dfrac{\sqrt{5} - 1}{4}$, find $\cos 36$ and $\sin 54$. 5

3. Prove that $\cos \dfrac{\pi}{8} + \cos \dfrac{3\pi}{8} + \cos \dfrac{5\pi}{8} + \cos \dfrac{7\pi}{8} = 0$. 5

OR

VIII 1. If $\cos A = -12/13$, $\cot B = 24/7$ and A is in quadrant II and B is in Quadrant I, find $\cos (A-B)$. 5

2. Prove that $\cot A - \cot 2A = \csc 2A$. 5

3. Show that $\left(\dfrac{a+b}{c}\right) \sin^2 \dfrac{c}{2} = \cos \dfrac{A+B}{2}$. 5

Marks

UNIT – IV

IX 1. Derive the equation of a straight line of the form x/a + y/b = 1.   5

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

3. Find the angles of the triangle having vertices (3, 2), (5, −4) and (1, −2).   5

OR

X 1. Find the values of p if the lines (2p + 1) x−(5−p)y = 8 and (5p −1) x −(p+1)y = 3 are parallel.   5

2. Find the foot of the perpendicular from (−2,1) on the line x − 2y = 6.   5

3. A straight line cuts off on the axes of coordinates positive intercepts whose sum is 5. Given that the line passes through (−4, 9), find its equation.   5

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