TED (10)–1002

(REVISION—2010)

Reg. No. .....

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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 ΔABC, 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)

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 $(AB)^T = B^TA^T$. 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 tanx = 7/24 and x is in the third quadrant, find the value of 3 sinx – 4cos 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) cosec 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 = cosec 2A. 5

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