TED (10) 1002
(Revision -2010)

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Reg. No……
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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2021

TECHNICAL MATHEMATICS – I

[Maximum Marks: **100**] [Time: **3** Hours]

PART-A

[Maximum Marks: 10]

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

1. Evaluate $\begin{vmatrix} sin\theta & cos\theta \\ -cos\theta & sin\theta \end{vmatrix}$
2. If ${}^{n}C11 = {}^{n}C_7$, find 'n'
3. Prove That $sinA.SecA.CotA = 1$
4. Find the slope of the line joining the points (4, 5) and (6, 9)
5. State Sine Rule. (5 x 2 = 10)

PART-B

[Maximum Marks: 30]

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

1. Solve using determinants $x + y - z = 4, 3x - y + z = 4, 2x - 7y + 3z = -6$
2. Prove that every square matrix can be written as the sum of two matrices of which one is symmetric and the other is skew-symmetric.
3. Find the constant term in the expansion of $\left(x^2 + \frac{1}{x}\right)^{12}$
4. Prove that $\tan 75^0 + \cot 75^0 = 4$ without using tables.
5. Prove that $2(bcCosA + caCosB + abCosC) = a^2 + b^2 + c^2$
6. The x-intercept of a line is three times its y-intercept. The line passes through (-6, 3).Find its equation.
7. Find the value of 'k' for which the lines 3x+y-2=0, kx+2y-3=0 and 2x-y-3=0 are concurrent. (5 x 6 = 30)

PART-C

[Maximum Marks: 60]

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

UNIT - I

III (a) Find the inverse of $\begin{bmatrix} 3 & 1 & -1 \\ -1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ 5

(b) If B = $\begin{bmatrix} 1 & 3 \\ 0 & 2 \\ -1 & 4 \end{bmatrix}$ and C=$\begin{bmatrix} 1 & 2 & 3 & -4 \\ 2 & 0 & -2 & -1 \end{bmatrix}$, find B x C 5

(c) Solve $for\ 'x' \begin{vmatrix} 3 & 1 & 9 \\ 2x & 2 & 6 \\ x^2 & 3 & 3 \end{vmatrix} = 0$ 5

OR

IV (a) Find the value of 'k' if the following system of equations is consistent

$kx + 3y - 5 = 0, 5x - y + 3 = 0, 7x + ky - 2 = 0$ 5

(b) If A = $\begin{bmatrix} 3 & 1 & -1 \\ 0 & 1 & 2 \end{bmatrix}$, show that $A.A^T$ is symmetric. 5

(c) If A = $\begin{bmatrix} 3 & 1 & 0 \\ -1 & 1 & 1 \\ 2 & 3 & 4 \end{bmatrix}$, Find A^2-3A+2I 5

UNIT - II

V (a) Expand $\left(x^2 - \frac{1}{x}\right)^5$ binomially. 5

(b) If ${}^nC_2$=210, find the value of 'n' 5

(c) Prove that $\frac{sin\theta}{1+cos\theta} + \frac{1+cos}{sin\theta} = 2cosec\theta$ 5

OR

VI (a) Find the middle terms in the expansion of $\left(2a - \frac{b}{3}\right)^{12}$ 5

(b) If Cot A= $\frac{-15}{8}$, A lies in the fourth quadrant, Find all other T-functions. 5

(c) Prove that $\frac{\tan 45 - tan30}{1+tan45.tan30}$ = 2 -$\sqrt{3}$ 5

UNIT- III

VII (a) If A+B=$\frac{\pi}{4}$, $show\ that\ (1+tanA)(1+tanB)=2$ 5

(b) Evaluate tan $22\frac{1}{2}°$ without using tables. 5

(c) State and prove Tangent Rule. 5

OR

VIII (a) If tan A=$\frac{3}{4}$,$Sin\ B=\frac{5}{13}$ $(A\ lies\ in\ third\ quadrant\ and\ B\ lies\ in\ second\ quadrant)$, $Find\ Sin\ (A-B) and\ Cos\ (A+B)$ 5

(b) Prove that Cos 20°.Cos40°.Cos80° = $\frac{1}{8}$ 5

(c) Prove that a (b^2+ c^2) CosA+b(c^2+ a^2)CosB+c (a^2+ b^2)CosC=3abc. 5

UNIT - IV

IX (a) Solve triangle ABC, given a=4cm, b=5cm, c=7cm 5

(b) A straight line is inclined at 135^0 with the X-axis and it passes through (3,-4) find its equation. 5

(c) Find the equation to the line passing through the point of intersection of the lines x-y+1=0 and 2x+3y+2=0 and parallel to x+y-6=0 5

OR

X (a) Solve triangle ABC, given a=87cm, b=53cm, C=70^0 5

(b) Find the slope and intercepts of the line 2x-3y+5=0 5

(c) Find the foot of the perpendicular from the origin to the line 3x-2y-13=0 5

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