TED (10) – 1002

(REVISION — 2010)

Reg. No. .....

Signature .....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

TECHNICAL MATHEMATICS - I

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions. Each question carries 2 marks.

1. Find x if $\begin{vmatrix} 2-x & 2 \\ 2 & 2-2x \end{vmatrix} = 0$.
2. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -2 \\ -3 & -3 \end{bmatrix}$. Find $(A + B)^T$.
3. If $\sin\theta = -4/5$, θ is in the 3rd quadrant, find $\cos\theta$ and $\tan\theta$.
4. If $\tan A = 2$, $\tan B = 1$ find $\tan(A-B)$
5. Find the slope and y- intercept of the equation $3x+2y-12 = 0$. $(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

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

1. Solve the following system of equation by using Cramer's Rule.

   $x + 2y - z = -3$

   $3x + y + z = 4$

   $x - y + 2z = 6$

2. Find the inverse of the matrix.

   $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$

3. Show that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = 1/16$.
4. Find the middle term in the expansion of $(x^2 - 2/3x)^8$.

Marks

5. Prove that $R(a^2+b^2+c^2) = abc(\cot A + \cot B + \cot C)$

6. Solve the triangle ABC, given a = 4cm, b = 5cm and c = 7cm

7. Find the angle between the line $2x - y + 1 = 0$ and $2x - 6y + 5 = 0$. $(5 \times 6 = 30)$

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Solve by Cramer's Rule :

$$\frac{5}{x} + \frac{2}{y} = 4$$

$$\frac{2}{x} - \frac{1}{y} = 7$$

5

(b) If $A = [1 \ 2 \ 3]$ and $B = \begin{bmatrix} 0 \\ 5 \\ 4 \end{bmatrix}$

Find AB and BA and show that $AB \neq BA$ 5

(c) If A is any square matrics show that $A+A^T$ is symmetric and $A-A^T$ is skew - symmetric. 5

OR

IV (a) If $A = \begin{bmatrix} 2 & -1 \\ 3 & 0 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 1 \\ 1 & 3 & 1 \end{bmatrix}$

verify that $(AB)^T = B^TA^T$. 5

(b) Compute the adjoint of a matrix

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & -3 \\ -1 & 2 & 3 \end{bmatrix}$$ 5

(c) Solve the system of equations $x + 2y + z = 7$, $x + 3z = 11$, $2x - 3y - 1 = 0$ by finding the inverse of the coefficient matrix. 5

UNIT — II

V (a) Find the coefficient of x^{10} in the expansion of $(2x^2 - 3/x)^{11}$ 5

(b) Show that $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2\operatorname{Cosec}\theta$ 5

(c) If $\tan x = \frac{7}{24}$ and x is in the third quadrant, find the value of $3\sin x - 4\tan x$. 5

OR

Marks

VI (a) Find term independent of x in the expansion of $(2\sqrt{x} - 1/x^2)^{10}$ 5

(b) Show that $\frac{1+\text{Cos}\theta}{\text{Sin}\theta} = \frac{\text{Sin}\theta}{1-\text{Cos}\theta}$ 5

(c) An aeroplane start from a place and flies 1000m along a straight line at 45° to the horizontal. Find this horizontal distance described. 5

UNIT — III

VII (a) Show that $a(b\,\text{Cos}\,C - c\,\text{Cos}B) = b^2 - c^2$ 5

(b) Show that $\frac{\text{Sin}A + \text{Sin}\,3A + \text{Sin}\,5A}{\text{Cos}\,A + \text{Cos}\,3A + \text{Cos}\,5A} = \text{Tan}\,3A$ 5

(c) Show that Cos 20° Cos 40° Cos 80° = 1/8 5

OR

VIII (a) Show that for any triangle ABC,
$a(b^2 + c^2)\text{Cos}\,A + b(c^2 + a^2)\,\text{Cos}\,B + c(a^2 + b^2)\,\text{Cos}\,C = 3abc.$ 5

(b) Show that Cos A + Cos 2A + Cos 3A = Cos 2A (1 + 2Cos A). 5

(c) Show that $\text{Sin}\,\theta + \text{Sin}3\theta + \text{Sin}\,5\theta + \text{Sin}7\theta = 4\,\text{Cos}\,\theta\,\text{Cos}2\theta\,\text{Sin}4\theta.$ 5

UNIT — IV

IX (a) If $b = \sqrt{3}$, c = 1 and $\angle A = 30°$, Solve the triangle using Cosine and Sine Rules. 5

(b) Find the equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through the point (-2, 3) 5

(c) If the lines $2x + y - 3 = 0$, $5x + ky - 3 = 0$ and $3x - y - 2 = 0$ are concurrent, find the value of K. 5

OR

X (a) Solve the triangle given b = 64 cm, $\angle C = 38°20'$ and $\angle B = 45°$ 5

(b) Find the angle between the lines
$\sqrt{3}.x + y = 1$ and $x + \sqrt{3}\,y = 1$. 5

(c) Find the co-ordinates of the foot of the perpendicular from the point (-1, 3) to the line $3x - 4y - 16 = 0$. 5