

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017**

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. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$ find $(A+B)^T$

2. If $nC_{20} = nC_{23}$, find 'n'

3. Evaluate $\begin{vmatrix} \sin\theta & \cos\theta \\ -\cos\theta & \sin\theta \end{vmatrix}$

4. Find the value of $\sin 30^\circ \cdot \cos 60^\circ + \cos 30^\circ \cdot \sin 60^\circ$.

5. Find the angle of inclination of the line joining the points (5,3) and (-8,3)

(5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Solve using determinants: $x+y-z = 4$, $3x-y+z = 4$, $2x-7y+3z = -6$

2. Find the inverse of the matrix $\begin{bmatrix} 3 & 1 & -1 \\ -1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

3. Find the term independent of x in the expansion of $(x^3 - 3/x^2)^5$

4. In ΔABC , P.T $R(a^2 + b^2 + c^2) = abc(\cot A + \cot B + \cot C)$

5. Find the equation of a line parallel and perpendicular to $2x-3y+10 = 0$ and passing through (1,1).

6. P.T $\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B$

7. The straight line through (4,3) makes intercepts of $4a$ and $3a$ on the X axis and Y axis respectively. Find 'a'.

(5×6 = 30)

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Solve using inverse of coefficient matrix :

$$x+y+z=3, \quad 2x+3y+z=-6, \quad x-y-z=-3$$

6

(b) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 0 & 0 \end{bmatrix}$ $B = \begin{bmatrix} 2 & -1 & 3 \\ 0 & 1 & 2 \\ 0 & 2 & 3 \end{bmatrix}$ Evaluate AB.

4

(c) Find k if the system is consistent : $x+y+1=0$, $x+2y+1=0$, $2x+3y+k=0$

5

OR

IV (a) Solve for 'x' if $\begin{vmatrix} 2 & 3 & 5 \\ 2 & x & 5 \\ 3 & -1 & 2 \end{vmatrix} = 0$

5

(b) If I is unit matrix of order 3 and $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ find $A^2 - 3A + 5I$

5

(c) Find the inverse of : $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 & 0 \\ 2 & 4 & 3 \end{bmatrix}$

5

UNIT — II

V (a) Find the 10th term in the expansion of $(x^2 + 1/x^2)^{20}$

5

(b) If $nC_{n-2} = 36$, find the value of n

5

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

5

OR

VI (a) P.T $\tan 75^\circ + \cot 75^\circ = 4$

5

(b) State and prove sine Rule.

5

(c) Find the coefficient of x^5 in the expansion of $(3x+4/x)^{11}$

5

UNIT — III

- VII (a) P.T $\cos A + \cos 2A + \cos 3A = \cos 2A(1+2\cos A)$ 5
- (b) P.T $\frac{1+\sin\theta - \cos\theta}{1+\sin\theta + \cos\theta} = \tan\theta/2$ 5
- (c) If ΔABC , P.T $2(b\cos A + c\cos B + a\cos C) = a^2 + b^2 + c^2$ 5

OR

- VIII (a) P.T $\sin 10^\circ \sin 50^\circ \sin 70^\circ = 1/8$. 5
- (b) Express $\sqrt{3}\cos\theta + \sin\theta$ in the form $R\sin(\theta + \alpha)$ 5
- (c) Prove that $2\tan 10^\circ + \tan 40^\circ = \tan 50^\circ$ 5

UNIT — IV

- IX (a) Solve ΔABC , given $a = 5\text{cm}$, $c = 8\text{cm}$, $B = 30^\circ$ by Napier's formula and sine rule. 6
- (b) Find the foot of the perpendicular from the origin to the line $3x-2y-13=0$. 5
- (c) Find 'K' so that the lines $4x-Ky = 6$ and $6x+3y+2=0$ are parallel. 4

OR

- X (a) Find the equation of the line joining $(6,1)$ & $(4,3)$ what is the slope of the line? 5
- (b) If $A(1,-1)$, $B(-2,1)$ and $C(3,5)$ are the vertices of a triangle, then find the equation of the median through A. 5
- (c) Show that the three lines are concurrent :
 $5x+2y-4 = 0$, $2x+5y+11 = 0$ and $3x-4y-18 = 0$ 5