

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—OCTOBER, 2014

TECHNICAL MATHEMATICS – I
(Common to all except DCP and CABM)

[Time : 3 hours

(Maximum marks : 100)

Marks

PART—A

(Maximum marks : 10)

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

1. Given $\begin{vmatrix} x & 12 \\ 3 & x \end{vmatrix} = 0$. Find x .
2. If $nC_3 = nC_4$. What is n ?
3. If $\sin \theta = \frac{1}{2}$, find $\cos \theta$ and $\tan \theta$.
4. Find equation of the line with slope 3 and y -intercept 4.
5. State the identity for $\cos 3A$.

(5x2=10)

PART—B

(Maximum marks : 30)

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

1. Solve using determinants $x + 2y - z = -3$, $3x + y + z = 4$, $x - y + 2z = 6$.
2. If $A = \begin{bmatrix} 1 & 0 & 5 \\ 2 & 1 & 6 \\ 3 & 2 & 7 \end{bmatrix}$ show that $A + A^T$ is symmetric and $A - A^T$ is skew-symmetric.
3. Find middle terms of $(x^2 - 2/3x)^9$.
4. Prove : $\frac{\sin 2\theta + \sin 5\theta - \sin \theta}{\cos 2\theta + \cos 5\theta + \cos \theta} = \tan 2\theta$
5. Prove : $(a + b) \sin C/2 = c \cos (A-B)/2$.
6. A line passes through $(-5, 6)$ and makes on the axis positive intercepts whose sum is 8. Find the equation of the line.
7. Show that $A(5,2)$, $B(6, -15)$, $C(0, 0)$ are the vertices of a right angled triangle.

(5x6=30)

PART—C

(Maximum marks : 60)

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

UNIT - I

III 1. Find the inverse of $\begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$ 5

2. $A = \begin{bmatrix} 1 & 2 & 3 \\ -4 & 5 & -1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 1 & 1 \end{bmatrix}$

Compute AB and BA and hence show that $AB \neq BA$. 5

3. Find K if the following system is consistent $x+y+1=0$, $x+2y+1=0$, $2x+3y+k=0$. 5

OR

IV 1. Show that $[xy] \begin{bmatrix} a & h \\ h & b \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = [ax^2+2hxy+by^2]$ 5

2. If $A = \begin{bmatrix} 2 & 3 \\ 0 & 1 \end{bmatrix}$ Find A^3+3A^2+2A+1 . 5

3. Find a, b, c if $\begin{bmatrix} 2a & a+3b \\ 5-c & b+1 \end{bmatrix} = \begin{bmatrix} 4 & -3+4b \\ b+4 & 3a \end{bmatrix}$ 5

UNIT - II

V 1. Prove : $\cos 60 \cos 30 - \sin 60 \sin 30 = \cos 90$. 5

2. Find the ninth term in the expansion of $(x^2+1/x)^{18}$. 5

3. Find the co-efficient of x^{11} in $(x^4-1/x^3)^{15}$. 5

OR

VI 1. P.T. $\frac{\sin \theta}{1-\cos \theta} + \frac{1-\cos \theta}{\sin \theta} = 2 \operatorname{cosec} \theta$. 5

2. Expand binomially $(2a-b/3)^5$. 5

3. If $nC_{n-2}=36$, find the value of n. 5

UNIT - III

VII 1. Prove that $\sin 20 \sin 40 \sin 80 = \sqrt{3}/8$. 5

2. Prove that $\cos \pi/8 + \cos 3\pi/8 + \cos 5\pi/8 + \cos 7\pi/8 = 0$. 5

3. Prove $(b+c) \cos A + (c+a) \cos B + (a+b) \cos C = a+b+c$. 5

OR

	Marks
VIII 1. Prove : $\cos 4\theta = 1 - 8 \sin^2\theta \cos^2\theta$.	5
2. Express : $5 \sin\theta - 12 \cos \theta$ in the form $R \sin(\theta - \alpha)$.	5
3. Evaluate : $\frac{\cos(90+A) \sec(360+A) \tan(180-A)}{\sec(A-720) \sin(540+A) \cot(A-90)}$	5

UNIT - IV

- IX 1. Find equation of the line joining (6, -1) & (4, 3) what is the slope of the line? 5
2. Find K so that $5x+2y-4=0$, $2x+Ky+11=0$ and $3x-4y-18=0$ are concurrent lines. 5
3. In ΔABC , $a = 87$, $b=53$, $C=110^\circ$. Find A. 5

OR

- X 1. Obtain co-ordinates of the foot of the perpendicular to the line $x-2y-6=0$ from the point P(-2, 1). 5
2. Find 'K' so that the lines $4x - Ky = 6$ and $6x + 3y + 2 = 0$ are :
 (a) parallel
 (b) perpendicular to each other. 5
3. Solve ΔABC if $a = 4$, $b = 5$, $c = 7$. 5