TED (10) 1002

(Revision-2010)

**N20-R01427**

Reg.No.....

Signature.....

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER-2020**

**TECHNICAL MATHEMATICS-I**

[Maximum marks: 100] (Time: 3 Hours)

PART – A

[Maximum marks: 10]

(Answer all questions. Each question carries 2 marks)

I. (1). If A $= \begin{pmatrix} 2 & 3 \\ -1 & 2 \end{pmatrix}$ and B $= \begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$ find 2 A + B

(2). Evaluate $\begin{vmatrix} 4 & -2 \\ 2 & 3 \end{vmatrix}$

(3). In how many ways 4 athletes can be chosen out of 10.

(4). State the identity for sin (A+B) and cos (A-B)

(5). Find the slope of the line determined by the pairs of points (5, -2) and (6, 5).

(5 x 2 = 10)

PART – B

[Maximum marks: 30]

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

II. (1). If A $= \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$, show that $A^2 - 4A - 5I = 0$

(2). Solve using determinants.

$3x + y - z = 3, -x + y + z = 1, x + y + z = 3$

(3). Find the middle terms of $\left( x2 + \frac{2}{x} \right)^7$

(4). If $\sin\theta = \frac{3}{5}$, $\theta$ lies in second quadrant. Find all other trigonometric functions.

(5). Show that cos 5 – sin 25 = sin 35.

(6). Derive the expression for sin 3 A

(7). Find the equation of 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 x 6= 30)

PART – C

[Maximum marks: 60]

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

**UNIT –I**

III. (a). If $\begin{vmatrix} x^2 & 2 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 8 & 3 \\ 6 & 3 \end{vmatrix}$, find x (5)

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

(c). Solve the system of equations by finding the inverse of the coefficient matrix

x-y+z = 4, 2x+y-3z = 0, x+y+z = 2 (5)

**OR**

IV. (a). Find the values of a, b, c that satisfy the matrix relationship.

$$\begin{pmatrix} a+3 & 3a-2b \\ 3a-c & a+b+c \end{pmatrix} = \begin{pmatrix} 2 & -7+2b \\ b+4 & 8a \end{pmatrix}$$ (5)

(b). If $\begin{vmatrix} 2 & 4 & x \\ 3 & -1 & 2 \\ 1 & 1 & 2 \end{vmatrix} = \begin{vmatrix} 4 & x \\ 3 & 1 \end{vmatrix}$ find x (5)

(c). If A = $\begin{pmatrix} 1 & 2 \\ 4 & 8 \end{pmatrix}$ and B = $\begin{pmatrix} 3 & 1 \\ 6 & -5 \end{pmatrix}$ show that $(A + B)^T = A^T + B^T$ (5)

**UNIT-II**

V. (a). Expand $\left(x + \frac{1}{x}\right)^6$ binomially. (5)

(b). Prove that $\frac{cosec\ \theta}{cosec\ \theta - 1} + \frac{cosec\ \theta}{cosec\theta + 1} = 2\sec^2\theta$ (5)

(c). Evaluate $4 \sin^3 \frac{\pi}{3} - 3\cos \frac{\pi}{6}$ (5)

**OR**

VI. (a). Find the term independent of x in the expansion of $\left(x^2 - \frac{1}{x}\right)^9$ (5)

(b). Prove that $\sec^2 x + \operatorname{cosec}^2 x = \sec^2 x \cdot \operatorname{cosec}^2 x$ (5)

(c). Prove that $\frac{\tan 45 - \tan 30}{1 + \tan 45 . \tan 30} = 2-\sqrt{3}$ (5)

## UNIT-III

VII. (a). If tan A = $\frac{3}{4}$ , tan B = $\frac{5}{12}$ , A and B are acute angles , find tan (A-B) (5)

(b). Prove that cos 20.cos 40. cos 80 = $\frac{1}{8}$ (5)

(c). If sin A = 0.6, A is acute, find sin2 A (5)

**OR**

VIII. (a). Prove that $\frac{\sin 4A+\sin 2A}{\cos 4A+\cos 2A}$ = tan 3 A (5)

(b). Prove that cos 4 θ = 1 – 8 $\sin^2 \theta \cos^2 \theta$ (5)

(c). Show that α(b cos C – c cosB) = $b^2 - c^2$ (5)

## UNIT-IV

IX. (a). Solve ΔABC, given α = 4cm, b = 5 cm and c = 2 cm (5)

(b). Write down the equation of a line having x intercept 4 and passing through (3, 1) (5)

(c). A straight line is inclined at an angle $45^o$ with the *X* axis and it passes through the point (4, -5), find its equation. (5)

**OR**

X. (a). Solve ΔABC, given α = 5cm, c = 8 cm and B = $30^o$ (5)

(b). Show that the straight lines 4x + 2y – 10 = 0 and 2x – 4y + 15 = 0 are perpendicular to each other. (5)

(c). Find the angle between the lines 2x – y + 3 = 0 and x – 3y + 4 = 0 (5)

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