TED (10) 1002
(Revision -2010)

N19 - 05002

Reg. No……………………
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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, OCTOBER/NOVEMBER – 2019

TECHNICAL MATHEMATICS - I

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

PART-A

[Maximum Marks: 10]

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

I. 1. Solve for ‘x’ if $\begin{vmatrix} x & 12 \\ 3 & x \end{vmatrix} = 0$

2. Find the equation of a straight line passing through (-2,3) and having slope -2.

3. If $nC_{10} = nC_{15}$, find n.

4. If sin A = $\frac{3}{5}$ (A is acute) find sin 2A.

5. If A = $\begin{bmatrix} 1 & 0 & 5 \\ -2 & 1 & 6 \\ 3 & 2 & 7 \end{bmatrix}$ compute $A+A^T$ (5 x 2 = 10)

PART-B

[Maximum Marks: 30]

(Answer any ***two*** full questions. Each question carries ***6*** marks)

II 1. Find the coefficient of x^4 in the expansion of $\left[x^4 - \frac{1}{x^3}\right]^{15}$

2. Prove that the points (3,-5), (-5,-4), (7,10), (15,9) taken in order are the vertices of parallelogram..

3. Solve x + y – z = 4, 3x – y + z = 4, 2x – 7y + 3z = -6 using Cramer’s rule.

4. If A and B are acute angles where tan A = $\frac{1}{2}$, tan B = $\frac{1}{3}$ show that A + B = 45^o

5. Show that a(b cos C – c cose B) = $b^2 - c^2$.

6. Prove that $\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2 \operatorname{cosec} \theta$

7. solve ΔABC , given a = 87 cm, b = 53 cm, C = 70^o (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) Solve the following system of equations by finding the inverse of the coefficient matrix. Given x + y + z = 1, 2x + 2y + 3z = 6, x + 4y + 9z = 3.

(b) If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ Find $A^2 - 5A + 61$

(c) Solve $\frac{6}{x} + \frac{7}{y} = 5$ and $\frac{2}{x} + \frac{5}{y} = 3$ using determinants. (3 x 5 = 15)

OR

IV (a) Solve A – B = .$\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, A + B = $\begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$

(b) Find the value of 'k' if the system kx + 3y – 5 = 0, 5x – y + 3 = 0 and 7x + ky – 2 = 0 is consistent.

(c) Express the matrix $A = \begin{bmatrix} 1 & 4 & 5 \\ 2 & 2 & 3 \\ 3 & 1 & 0 \end{bmatrix}$ as the sum of symmetric and skew symmetric matrix.

(3 x 5 = 15)

UNIT - II

V (a) Find the 10^{th} term in the expansion of $\left[x^2 - \frac{1}{x^2}\right]^{20}$

(b) A light house is 30m high. An observer on the top of the light house observes a boat at an angle of depression 60^o. How far is the boat from the observer?

(c) Expand $\left(x + \frac{1}{x}\right)^4$ binomially. (3 x 5 = 15)

OR

VI (a) Find the middle term of $\left(2a - \frac{b}{3}\right)^{12}$.

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

(c) If $\sin \theta = \frac{3}{5}$, θ lies in the second quadrant, find all other t- functions (3 x 5 = 15)

UNIT- III

VII (a) Express $\sqrt{3}$ cos x + sin x in the form R sin(x + α) where α is acute.

(b) Show that $a(b^2 + c^2) \cos A + b (c^2 + a^2) \cos B + c (a^2 + b^2) \cos C = 3abc$

(c) Prove that $\frac{\cos(90-A)\sin(180+A)\tan(270+A)}{\sec(540-A)\cos(360+A)} = -\sin A \cos A$ (3 x 5 = 15)

OR

VIII (a) In a ΔABC, a = 2cm, c = 4cm, C = 30° Find A.

(b) Prove that $\frac{\sin 3x}{\sin x} - \frac{\cos 3x}{\cos x} = 2$

(c) Prove that cos 21 – sin 83 = -2 sin 14.sin 7 (3 x 5 = 15)

UNIT - IV

IX (a) Solve ΔABC, if B = 120°, C = 30° and b = $\sqrt{3}$

(b) Find the angle between the lines with slopes $\sqrt{3}$ and $\frac{1}{\sqrt{3}}$

(c) Find the greatest angle of ΔXYZ if x = 51, y = 81, z = 108. (3 x 5 = 15)

OR

X (a) If A(1,-1), B(-2,1) and C(3,5) are the vertices of a triangle, find the equation of the median through B.

(b) Solve ΔABC, if a = 2, b = 3, c = 4.

(c) Find the value of 'k' for which the lines 3x + y - 2 = 0, kx + 2y – 3 = 0 and 2x – y – 3 = 0 are concurrent.

(3 x 5 = 15)
