TED (10)–1002

(REVISION—2010)

Reg. No. .....

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FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY—OCTOBER, 2011

TECHNICAL MATHEMATICS–I

(Common—except DCP and CABM)

[*Time* : 3 hours

(Maximum marks : 100)

PART—A

(Answer *all* questions. Each question carries 2 marks.)

Marks

I (a) If $\begin{vmatrix} 3x & 7 \\ 2 & 3 \end{vmatrix} = \begin{vmatrix} 4 & 2 \\ 2 & 2 \end{vmatrix}$ find x.

(b) If $nc_{20} = nc_{23}$, find n.

(c) If $\text{Cos } \theta = \frac{\sqrt{3}}{2}$, find Sin θ and Tan θ.

(d) If Sin θ = a, find Sin 3θ.

(e) Find the slope of the line joining the vertices (2, 6), (4, 0) (5×2=10)

PART—B

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

II (a) Solve using determinents :

$x + y + z = 3$

$2x + 3y + z = -6$

$x - y - z = -3$.

(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 and BA.

(c) Find the middle term of $\left(x^2 + \frac{1}{x}\right)^{12}$

(d) Prove that $\text{Sin}\theta + \text{Sin } 3\theta + \text{Sin } 5\theta + \text{Sin } 7\theta = 4 \text{ Cos}\theta . \text{ Cos } 2\theta . \text{ Sin } 4\theta$.

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

(f) Prove that $\text{Cos } 3A = 4 \text{ Cos}^3 A - 3 \text{ Cos } A$.

(g) 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)

Marks

PART—C

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

UNIT—I

III (a) Solve for 'x' if $\begin{vmatrix} 2 & 3 & 5 \\ 2 & x & 5 \\ 3 & -1 & 2 \end{vmatrix} = 0$. 4

(b) Express the matrix $A = \begin{bmatrix} 1 & 4 & 5 \\ 2 & 2 & 3 \\ 3 & 1 & 0 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrices. 6

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

OR

IV (a) Find the value of 'p', if the system $2x + 3y + 9 = 0$; $4x + py + 13 = 0$ and $px - 2y - 25 = 0$ is consistent. 5

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

(c) If $A = \begin{bmatrix} 5 & 3 \\ 2 & 2 \end{bmatrix}$ $B = \begin{bmatrix} 7 & 5 \\ 4 & 3 \end{bmatrix}$ show that $(AB)^{-1} = B^{-1} A^{-1}$. 5

UNIT—II

V (a) Expand $\left(x + \frac{1}{\sqrt{x}}\right)^5$ binomially. 4

(b) Find the 10th term in the expansion of $\left(x^2 + \frac{1}{x^2}\right)^{20}$. 6

(c) Prove that $\frac{\text{Sin A}}{1 + \text{Cos A}} + \frac{1 + \text{Cos A}}{\text{Sin A}} = 2 \text{ Cosec A}$. 5

OR

VI (a) Find the middle term of the expansion $\left(2x + \frac{3}{x}\right)^9$ 5

(b) Find the coefficient of x^4 in the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$ 4

(c) If Sin A = ½, A lies in first quadrant find all t - functions. 6

Marks

UNIT—III

VII (a) If $\tan A = \frac{18}{17}$, $\tan B = \frac{1}{35}$, prove that $A - B = 45°$. 4

(b) Prove that $\frac{\text{Cos}\,(90 + A)\ \sec\,(360 + A)\ \tan\,(150 - A)}{\text{Sec}\,(A - 720)\ (\sin\,540 + A)\ \cot\,(A - 90)} = 1$. 6

(c) Prove that in ΔABC, $(a + b)\ \text{Sin}\ {}^{C}/_{2} = C.\ \text{Cos}\frac{A-B}{2}$. 5

OR

VIII (a) Express $\sqrt{3}\ \text{Cos}\ x + \text{Sin}\ x$ in the form $R\ \text{Sin}\ (x + \alpha)$. 5

(b) Show that $\text{Cos}\ 20\ \text{Cos}\ 40\ \text{Cos}\ 60\ \text{Cos}\ 80 = {}^{1}/_{16}$. 6

(c) In a ΔABC, $A = 30°$ $C = 45°$ $a = 2$ cm. Find C. 4

UNIT—IV

IX (a) Solve ΔABC, Given $a = 24.5$ $b = 18.6$ $c = 26.4$. 5

(b) The x – intercept of a line is 3 times its y – intercept. The line passes through (–2, 3). Find its equation. 5

(c) Find the value of 'k' for which the lines :

$5x + 2y - 4 = 0$

$2x + ky + 11 = 0$

$3x - 4y - 18 = 0$ are concurrent. 5

OR

X (a) Solve ΔABC, $a = 4$ $b = 5$ $C = 50°$. 5

(b) Find the equation to the straight line passes 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

(c) Find the foot of the perpendicular from the origin to the line $3x - 2y - 13 = 0$. 5