TED (15/19) 1002
(Revision -2015/19)

A25 - 8995

Reg. No……………………
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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2025

ENGINEERING MATHEMATICS – I

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

PART-A

[Maximum Marks: **10**]

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

1. Prove that $(\sin A+\cos A)^2=1+2\sin A\cos A$.
2. Prove that $\sin 60\cos 30+\cos 60\sin 30=1$
3. Find the area of a triangle if a=4cm, b=5cm, c=7cm
4. If $y = x\sin x$. find $\frac{dy}{dx}$?
5. Find the rate of change of volume of a sphere w.r.t the radius ? (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

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

1. Prove that $\cos\pi/8+\cos 3\pi/8+\cos 5\pi/8+\cos 7\pi/8=0$.
2. If $A+B=45^0$ Prove that $(l+\tan A)(l+\tan B)=2$
3. $2(bc\cos A+ca\cos B+ab\cos C)=a^2+b^2+c^2$
4. If $x=a(\cos t+t\sin t)$, $y=a(\sin t-t\cos t)$. Show that $\frac{dy}{dx}=\tan t$.
5. Differentiate 'cosx' using first principle.
6. The displacement of a body is given by $x=4\cos 3t+5\sin 3t$. Show that the acceleration of the body is always proportional to the displacement.
7. A cylindrical can open at one end is to have a volume of $64\pi cm^3$. Find the radius and height such that the metal used is a minimum. (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) Prove that $\frac{sinx}{1+cosx} + \frac{1+cosx}{sinx} = 2\ cosec\ x.$ (5)

(b) Prove that sin120 cos330+cos240 sin 330=1 (5)

(c) If tanA=3, tanB=1, A and B are acute angles. Find cos(A-B). (5)

OR

IV. (a) Express $\sqrt{3}$ cosx+sinx in the form R Sin(x+α), where α is acute. Find R and α? (5)

(b) If sin A $= \frac{-3}{5}$, sin B $= \frac{12}{13}$ A lies in third quadrant, B lies in second quadrant.

Find cos (A+B) and sin (A-B). (5)

(c) $(\cot A-1)^2 + (\cot A+1)^2 = 2\ \mathrm{Cosec}^2 A$. (5)

UNIT - II

V. (a) Prove that $\frac{sin3A}{sinA} + \frac{cos3A}{cosA} = 4\ cos2A.$ (5)

(b) Prove that $sin50 - sin70 + sin10 = 0$ (5)

(c) Show that $a(b^2+c^2) \cos A + b(c^2+a^2) \cos B + c(a^2+b^2) \cos C = 3abc$ (5)

OR

VI. (a) Prove that $\frac{sin2A+sin5A-sinA}{cos2A+cos5A+cosA} = tan2A$ (5)

(b) Prove that $\frac{(cotA-tanA)}{cotA+tanA} = cos2A$ (5)

(c) Solve ΔABC, $given\ a = 4cm, b = 5cm, c = 7cm.$ (5)

UNIT- III

VII. (a) $\lim_{x\to\infty} \frac{x^3-2x+3}{2x^3-4x+6}$. (5)

(b) Differentiate 'sinx' by method of first principle. (5)

(c) Find log (x+$\sqrt{1+x^2}$) (5)

OR

VIII. (a) Evaluate $\lim_{x\to 4} \frac{x^3-64}{x^2-16}$. (5)

(b) Find $\frac{dy}{dx}$. If $x^2y^2 = x^3+y^3+3xy$. (5)

(c) If y = x cosx, prove that y''+y+2 sinx=0 (5)

UNIT - IV

IX. (a) Find the equation of the tangents and normals of the curve $y^2=4ax$ at $(a,2a)$. (5)

(b) The distance travelled by a particle moving along a straight line is given by

$S=2t^3-9t^2+12t+6$. Find the value of 't' when the acceleration is zero. (5)

(c) The perimeter of a rectangle is 100m. Find the sides when the area is maximum? (5)

OR

X. (a) Find the equation of the tangents and normals of the curve $x^2+y^2=25$ at $(3,-4)$. (5)

(b) A ballon is spherical in shape. Gas is escaping from it at the rate of 10 cc/sec.

How fast is the surface area shrinking when the radius is 15cm? (5)

(c) Find the minimum value of $2x^3-3x^2-36x+10$. (5)

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