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

A26-9721

Reg. No……………………
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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2026

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. If tan θ=1, Find sinθ and cosθ.
2. If sin A = 0.6 Find sin2A.
3. Find the area of a triangle having sides a=3cm, b=7cm, C=30^0
4. Evaluate $\lim_{x\to 0} \frac{tanx}{x}$.
5. Find the rate of change of area of a circle with respect to its radius? (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

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

1. Show that $\frac{sin\theta}{1+cos\theta} + \frac{1+cos\theta}{sin\theta} = 2cosec\theta$.
2. Show that $\sin 10^0 . \sin 50^0 . \sin 70^0 = 1/8$.
3. Show that bc cosA + ca cosB + ab cosC = $\frac{a^2+b^2+c^2}{2}$.
4. Find the derivative of tan x and cot x with respect to x using quotient rule.
5. Find $\frac{dy}{dx}$ if $x^2 + y^2 + 2gx + 2fy + c = 0$.
6. Find the equation to the tangent and normal to the curve $y = 3x^2 + x - 2$ at $(1,2)$.
7. Show that a rectangle with fixed perimeter has it's maximum area when it becomes a square. (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 $(\cot A-1)^2 + (\cot A+1)^2=2\text{cosec}^2 A$. (5)

(b) If $sin\theta = \frac{3}{5}$, θ lies in the second quadrant, find all other T − functions. (5)

(c) The rope supporting a flag post is fixed to the ground 20m away from the post making an angle of elevation 45^0 to the ground. Find the length of the rope. (5)

OR

IV. (a) Evaluate $cos570^0.sin510^0 - sin330^0.cos390^0$. (5)

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

(c) Express $\sqrt{3}$ cosx + sinx in the form R sin(x + a). (5)

UNIT - II

V. (a) Prove that $\cos 4\theta = 1 - 8\sin^2\theta.\cos^2\theta$. (5)

(b) Show that $a(bcosC - ccosB) = b^2 - c^2$. (5)

(c) Solve triangle ABC with sides a=4 cm, b=5 cm, c=7 cm. (5)

OR

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

(b) Prove that $sin50 - sin70 + cos80 = 0$. (5)

(c) Solve triangle ABC given a = 87 cm, b = 53 cm and c = 70^0. (5)

UNIT- III

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

(b) Differentiate with respect to x

1) x^2.sinx 2) $\frac{1-x^2}{1+x^2}$ (2+3)

3) log(secx − tanx) 4) $e^{sin\sqrt{x}}$ (3+2)

OR

VIII. (a) Find the derivative of cosx with respect to x by the method of first pricnciples. (5)

(b) If x = a secθ, y = b tanθ, find $\frac{dy}{dx}$. (5)

(c) If y = x. sinx prove that $\frac{d^2y}{dx^2} + y = 2\cos x$. (5)

UNIT - IV

IX. (a) Find the values of x for which the tangents to the curve $y = x^3 - 2x^2 + x + 1$ are parallel to the X-axis. (5)

(b) The distance in meters travelled by a particle is given by $S = ae^{nt} + be^{-nt}$ where n is a constant. Show that the acceleration varies as it's displacement. (5)

(c) The deflection of a beam is given by $y = 2x^3 - 9x^2 + 12x$. Find the maximum deflection. (5)

OR

X. (a) Find the velocity and acceleration at time t=4 sec of a body whose displacement S in meters related to time t seconds is given by $S = \frac{1}{2}t^2 + \sqrt{t}$. (5)

(b) A spherical balloon is inflated by pumping 5cc of gas per second. Find the rate at which it's curved surface area is increasing when the radius is 15 cm. (5)

(c) An open box is to be made out of a square sheet of size 18 cm by cutting off equal squares from each corner and turning up the sides. What size of the squares to be cut of so that the volume of the box may be maximum. (5)

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