TED (15) -1002B
(Revision- 2015)

N20-06847

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE – NOVEMBER -2020.

ENGINEERING MATHEMATICS-I

(Maximum Marks: 75) [Time: 2.15 hours]

PART–A

Marks

I. Answer **any three** questions in one or two sentences. Each question carries 2 marks.

1. Find the exact value of $\cos 330^0$.
2. In triangle ABC, show that abc = 4RΔ, where Δ is the area of the triangle.
3. Evaluate $\lim_{x\to 4}\frac{x^3-64}{x^2-16}$.
4. Find the derivative of $2\cos x - 5\sec x$ with respect to x.
5. Find the range of values of x for which the function $y = 4x^2 - 12x + 7$ is decreasing.

(3x2=6)

PART - B

II Answer **any four** of the following questions. Each question carries 6 marks.

1. Show that $\sqrt{\frac{1-\sin x}{1+\sin x}} = \sec x - \tan x$.
2. A vertical tree is broken by the wind. The top of the tree touches the ground and makes an angle 30^0 with it. If the top of the tree touches the ground 30m away from the foot. Find the actual height of the tree.
3. Prove that $\cos\frac{\pi}{8} + \cos\frac{3\pi}{8} + \cos\frac{5\pi}{8} + \cos\frac{7\pi}{8} = 0$.
4. Prove in any triangle ABC, $(a - b)\cos\frac{C}{2} = c\sin(\frac{A-B}{2})$.
5. Using first principle, find the derivative of $\sqrt{x}$.
6. Find $\frac{dy}{dx}$, if $y = \frac{e^x \sin x}{1+\log x}$.
7. Find the equation of tangent and normal to the parabola $y^2 = 4ax$ at the point $(at^2, 2at)$ on it.

[4x6 =24]

PART - C

(Answer **any of the three units** from the following. Each full question carries 15 marks)

UNIT - I

III a) If $\cot A = \frac{-15}{8}$ and A is in the fourth quadrant, find the remaining trigonometric functions of A. 5

b) Express $3\sin x - 4\cos x$ in the form $R\sin(x-\alpha)$. 5

c) Prove that $\tan 15^0 = 2 - \sqrt{3}$. 5

OR

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

b) Prove that $\frac{\cos(90+A)\sec(360+A)\tan(180-A)}{\sec(A-720)\sin(540+A)\cot(A-90)} = 1$. 5

c) Prove that $\sin A + \sin(\frac{2\pi}{3} + A) + \sin(\frac{4\pi}{3} + A) = 0$. 5

UNIT II

V a) Prove that $\sin 33^0 + \cos 63^0 = \cos 3^0$. 5

b) Prove that $\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1} = \frac{1+\sin\theta}{\cos\theta}$. 5

c) Solve triangle ABC, given $A = 30^0$, $B = 60^0$ and $c = 13$cm. 5

OR

VI a) Prove that $\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} = 2$. 5

b) Show that $\sin 18^0 = \frac{\sqrt{5}-1}{4}$. 5

c) Prove that $\sin 50^0 - \sin 70^0 + \cos 80^0 = 0$. 5

UNIT III

VII a) Using quotient rule, find the derivative of cosecx. 5

b) If y = log(secx +tanx), prove that $\frac{dy}{dx}$ = secx. 5

c) Find $\frac{dy}{dx}$, if $y = \frac{cot11x}{(x^3-1)^2}$. 5

OR

VIII a) Find $\frac{dy}{dx}$ if,

i) $x = a(t + \frac{1}{t})$, $y = a(t - \frac{1}{t})$ ii) $y = (1+x^2)\cot^{-1}x$. 5

b) If x and y are connected by the relation $x^2y^2 = x^3+y^3+3xy$, find $\frac{dy}{dx}$. 5

c) If $y = ae^x + be^{2x}$, prove that y" – 3y' + 2y = 0. 5

UNIT IV

IX a) Find the values of x for which the tangent to the curve $y = \frac{x}{(1-x)^2}$ will be parallel to x axis. 5

b) Let S denotes the displacement of a particle at the time 't' seconds and $S = t^3 - 6t^2 + 8t - 4$. Find the time when the acceleration is 12cm/sec^2 and the velocity at that time. 5

c) Find the stationary points of the curve $y = x^3 - 3x^2 - 9x + 5$. 5

OR

X a) A circular patch of oil spreads out on water, the area growing at the rate of 6 sq.cm per minute. How fast is the radius increasing when the radius is 2cm. 5

b) Prove that the function $x^3 - 3x^2 + 6x + 7$ is increasing for all real values of x. 5

c) Prove that a rectangle of fixed perimeter has, its maximum area when it becomes a square. 5

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