

TED (15) - 1002

(REVISION — 2015)

Reg.	No.	
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# DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

## **ENGINEERING MATHEMATICS - I**

[Time: 3 hours

(Maximum marks: 100)

PART - A

(Maximum marks: 10)

Marks

- I Answer all questions. Each question carries 2 marks.
  - 1. Prove that  $(1 + \cos A) (1 \cos A) = \sin^2 A$
  - 2. Find the value of  $3\sin 15^{\circ} 4\sin^3 15^{\circ}$
  - 3. Find  $\frac{dy}{dx}$  if  $y = x^3 \tan x$ .
  - 4. Find the rate of change of volume V with respect to the side of a cube.
  - 5. Find the area of triangle ABC given B = 3cm, C = 2cm and  $A = 30^{\circ}$

 $(5 \times 2 = 10)$ 

PART — B

(Maximum marks: 30)

- II Answer any five of the following questions. Each question carries 6 marks.
  - 1. Prove that  $\left(\frac{\tan\theta + \sec\theta 1}{\tan\theta \sec\theta + 1}\right) = \frac{1 + \sin\theta}{\cos\theta}$
  - 2. If  $\tan A = \frac{m}{m+1}$ ,  $\tan B = \frac{1}{2m+1}$  A and B are acute angles. Prove that  $A + B = 45^{\circ}$
  - 3. Prove that  $\sin 20^{\circ} \cdot \sin 40^{\circ} \cdot \sin 80^{\circ} = \frac{\sqrt{3}}{8}$
  - 4. Prove that  $R(a^2 + b^2 + c^2) = abc (cotA + cotB + cotC)$  where R is radius of circumcircle.
  - Differentiate x<sup>n</sup> by method of first principles.
  - 6. A particle moves such that the displacement from a fixed point 'o' is always given by  $S = 5\cos(nt) + 4\sin(nt)$  where n is a constant. Prove that the acceleration varies as its displacement S at the instant.
  - 7. Find the equation to the tangent and normal to the curve  $y = 3x^2 + x-2$  at (1,2).

 $(5 \times 6 = 30)$ 



Marks

### PART — C

#### (Maximum marks: 60)

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

## UNIT — I

III (a) Prove that 
$$\left(\frac{1+\sin A}{\cos A}\right) = \left(\frac{\cos A}{1-\sin A}\right)$$
 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) If  $\sin A = \frac{-4}{5}$  and A lies in third quadrant, find all other trigonometric functions.

OR

IV (a) If  $\cos A = 3/5$ ,  $\tan B = 5/12$ , A and B are acute angles, find the values of  $\sin(A + B)$  and  $\cos(A - B)$ .

(b) Prove that  $\frac{\tan 45 - \tan 30}{1 + \tan 45 \tan 30} = 2 - \sqrt{3}$  4

(c) Express  $5 \sin x - 12 \cos x$  in the form  $R\sin(x - \infty)$  5

UNIT — II

V (a) Prove that  $\sin 33 + \cos 63 = \cos 3$  5

(b) Show that  $(a-b) \cos \frac{C}{2} = c \sin \frac{A - B}{2}$  5

(c) Solve triangle ABC, given  $a = 2 \cos b = 3 \cos c = 4 \cos c = 4$ 

## UNIT - III

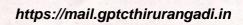
required to fence the plot ?

between them is measured to be 150m. How many metres of fencing is

VII (a) Evaluate Lt 
$$\frac{\sqrt{(1+x)^{-1}}}{x \to 0}$$
 4

(b) Find  $\frac{dy}{dx}$ , if (i)  $y = \frac{\cot 11x}{(x^3 - 1)^2}$  (ii)  $(x^2 + 1)^{10} \sec^5 x$  (3+3)

(c) If 
$$x = a(\theta + \sin\theta) y = a(1 - \cos\theta)$$
 find  $\frac{dy}{dx}$ 





			Marks
VIII	(a)	Find the derivative of cotx using quotient rule.	5
	(b)	If $y = \sin^{-1} x$ prove that $(1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} = 0$	5
	(c)	If x and y are connected by the relation $ax^2 + 2hxy + by^2 = 0$ find $\frac{dy}{dx}$ .	5
		Unit — IV	
IX	(a)	Show that all the points on the curve $x^3 + y^3 = 3axy$ at which the tangents are parallel to the x-axis lie on the curve, $ay = x^2$ .	5
	(b)	A spherical balloon is inflated by pumping 25cc of gas per second. Find the rate at which the radius of the balloon is increasing when the radius is 15 cm.	5
	(c)	The deflection of a beam is given by $y = 4x^3 + 9x^2 - 12x + 2$ . Find the maximum deflection.	n 5
		OR	
X	(a)	Prove that a rectangle of fixed perimeter has its maximum area when it becomes a square.	5
	(b)	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 2cms.?	5
	(c)	The distance travelled by a moving body is given by $S = 2t^3 - 9t^2 + 12t + 6$ . Find the time when the acceleration is zero.	5



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