(REVISION - 2015)

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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)



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 3sin15° 4sin315°
- 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°

 $(5 \times 2 = 10)$ 

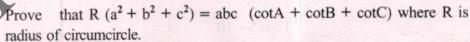
PART — B

(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 
$$A + B = 45^{\circ}$$

Prove that sin 20° sin 40° sin 80° =  $\frac{\sqrt{3}}{8}$ 



- 5. 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).

 $(5 \times 6 = 30)$ 

5

#### PART — C

#### (Maximum marks: 60)

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

## UNIT — I

Unit — III

required to fence the plot ?

VII (a) Evaluate Lt  $x \to 0$  Lt  $x \to 0$   $x \to 0$  (i)  $y = \frac{\cot 11x}{(x^3 - 1)^2}$  (ii)  $(x^2 + 1)^{10} \sec^5 x$ 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  $\frac{dy}{dx}$ 

VIII ()		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, $ay = x^2$ .	0
(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.	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