

## TML012/EE/20070813

### Applied Mathematics - I

**Time : 180 minutes**

**Marks : 100**

**Instructions for the students :**

1. All questions are compulsory.
2. "Long Answer type Question (LAQ)" is a supply type question of 20 marks, which require typical answer of about 60-80 lines in about 32-40 minutes.
3. "Short Answer type Question (SAQ)" is a supply type question of 5 marks, which require typical answer of about 15-20 lines in about 08-10 minutes.
4. Use of non-programmable type of scientific calculator is allowed.
5. Draw neat diagrams wherever necessary.
6. Assume suitable data if necessary.

Q. No.	Question (Q)	Question Marks
<b>Long Answer type Questions (LAQ's)</b>		
<b>1.</b>	(a) For what values of 'k' are the roots of equation $(k-1)x^2 + (k-1)x + k^2 = 0$ equal  Suppose $T_4 = 3$ and $T_9 = \frac{32}{81}$ . Find the first three terms of G.P.	<b>10</b>  <b>10</b>
<b>2.</b>	(a) Prove that $\sin^6 A + \cos^6 A = 1 - 3\sin^2 A \cos^2 A$ (b) Write $(\sqrt{3} + i)^6$ in the form of $a + bi$	<b>10</b>  <b>10</b>
<b>3.</b>	(a) Solve graphically the following equations $x + 2y = 4$ and $2x - 3y = 1$ (b) Find the equation of the locus of a point such that the sum of the squares of its distances from the points (3, 0) and (0, -4) is 12.	<b>10</b>  <b>10</b>
<b>4.</b>	(a) Two fair dice are rolled. Find the probability that the score is 8. (b) Verify distributive law $x \cdot (y + z) = (x \cdot y) + (x \cdot z)$ using truth table.	<b>10</b>  <b>10</b>
<b>Short Answer type Questions (SAQ's)</b>		
<b>5.</b>	Simplify $\log_5 27 - \log_5 81 + \log_5 243 - \log_5 6 + \log_5 18$	<b>5</b>
<b>6.</b>	Show that $\frac{\sin 2\theta}{1 - \cos 2\theta} = \cot \theta$	<b>5</b>
<b>7.</b>	Find the equation of the circle having centre (3, 4) and radius 4.	<b>5</b>
<b>8.</b>	Find x if vector $2xi + 5j - 3k$ and $3i - 6j - 2k$ are perpendicular.	<b>5</b>