Pre Board MT -04

INFINITY THINK BEYOND..... AN EDUCATIONAL INSTITUTE

10 th

Syllabus: Mock Test 04 : Ch – Trigonometry and Application of Trigonometry

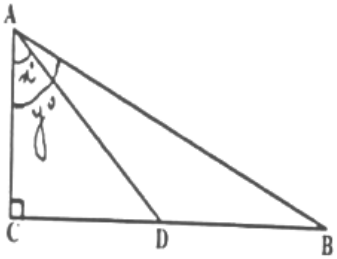
Time: 90 min **Maximum marks :40**

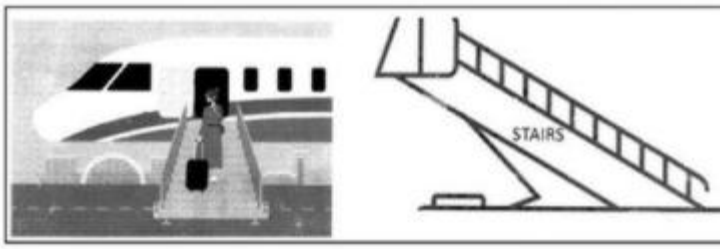
INSTRUCTIONS TO THE STUDENTS

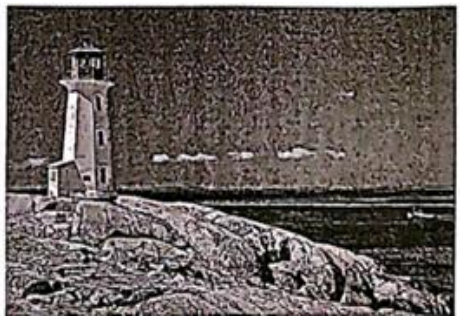
1 . Read each question carefully .
2. Mark of each question is mention in front of question .
3. Attempt one question in internal choice based question .
4. Use of calculators is not allowed.
5. No negative marking .

SECTION A

(Questions 1 – 10 carry 1 marks)

1	The value of $\frac{\sin^3\theta+\cos^3\theta}{\sin\theta+\cos\theta}+\sin\theta\cos\theta$ (a) $\sin\theta\cos\theta$ (b) $\cos\theta$ (c) $\sin\theta$ (d)1	**1**
2	If $\alpha+\beta=90^o$ and $\alpha=2\beta$, then $\cos^2\alpha+\sin^2\beta$ is equal to: (a)0 (b) $\frac{1}{2}$ (c)1 (d)2	**1**
3	If $\sin\theta+\sin^2\theta=1$, then $\cos^2\theta+\cos^4\theta=$ (a)-1 (b)1 (c)0 (d)2	**1**
4	If $4\tan\theta=3$, then $\frac{4\sin\theta-\cos\theta}{4\sin\theta+\cos\theta}$ is equal to: (a)$\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$	**1**
5	If $\cos\theta=\frac{3}{4}$, then find the value of $9\tan^2\theta+9$ is (a)16 (b)24 (c)20 (d)18	**1**
6	The ratio of the length of a rod and its shadow is $1:\sqrt{3}$. The angle of elevation of the sum is (a)30º (b)45º (c)60º (d)90º	**1**
7	If $\tan^2 45^o-\cos^2 30^o=p\sin^2 45^o\cos^2 45^o$, then p= (a)1 (b)-1 (c) $\frac{-1}{2}$ (d) $\frac{1}{2}$	**1**
8	If $\tan 3\theta=\sqrt{3}$, then $\frac{\theta}{2}$ is … (a)60º (b)20º (c)30º (d)10º	**1**
9	**In the fig , D is the midpoint of BC , then the value of** $\frac{\cot y}{\cot x}$  (a)2 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{3}{4}$	**1**
10	Two statements are given, one labelled Assertion (A) and the other labelled Reason(R) Select the correct answer from the options (A), (B), (C) and (D) as given below . (a)Both A and R are true and R is the correct explanation for A. (b) Both A and R are true and R is not the correct explanation for A.	**1**

	(c) A is true but R is false. (d) A is false but R is true **Assertion (A):**If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$, then the value of x+y=3 **Reason(R):** For any value of θ , $\sin^2\theta + \cos^2\theta = 1$	
	SECTION B **(Questions 11 – 13 carry 2 marks)**	
11	If $\text{cosec}\theta = 2x$ and $\cot\theta = \frac{2}{x}$, find the value of $2\left(x^2 - \frac{1}{x^2}\right)$	**2**
12	(a)If $\sin\theta + \cos\theta = \sqrt{2}$, then prove that $\tan\theta + \cot\theta = 1$ **OR** (b)If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$, $0^o < A + B \leq 90^o$; A > B . Find A and B.	**2**
13	If $1 + \sin^2\theta = 3\sin\theta\cos\theta$, prove that $\tan\theta = 1$ or $\frac{1}{2}$.	**2**
	SECTION C **(Questions 14 – 15 carry 3 marks)**	
14	Prove that $\frac{(\sec A - \tan A)^2 + 1}{\sec A - \tan A} = 2\sec A$	**3**
15	(a)Prove that: $(\text{cosec}A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$ **OR** (b)Prove that $\frac{\sin\theta}{\cot\theta + \text{cosec}\theta} = 2 + \frac{\sin\theta}{\cot\theta - \text{cosec}\theta}$	**3**
	SECTION D **(Questions 16 – 17 carry 5 marks)**	
16	The angles of elevation and depression of the top and the bottom of a tower from the top of a building, 60 m high are 30^o and 60^o respectively. Find the difference between the heights of the building and the tower and the distance between them .(use $\sqrt{3} = 1.732$)	**5**
17	(a)Prove that $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{2}{2\sin^2\theta - 1}$ **OR** (b)$\left(1 + \frac{1}{\tan^2 A}\right)\left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\cos^2 A - \cos^4 A}$	**5**
	SECTION E **(Questions 18 – 19 carry 4 marks)**	
18	An aircraft has a door sill at a height of 15 feet above the ground. A stair car is placed at a horizontal distance of 15 feet from the plane.  Based on given information, answer the questions given in part (i) and (ii). (i) Find the angle at which stairs are inclined to reach the door sill 15 feet high above the ground. (ii) Find the length of stairs used to reach the door sill. (iii) (a) If the 20 feet long stairs is inclined at an angle of 60◦ to reach the door sill, then find the height of the door sill above the ground. (use 3=1.732) **OR**	**4**

	(iii) (b) What should be the shortest possible length of stairs to reach the door sill of the plane 20 feet above the ground, if the angle of elevation cannot exceed 30° ? Also, find the horizontal distance of base of stair car from the plane.	
19	A light house is a structure, usually with a tower , built onshore or on the seabed to serve as an aid to mariners of hazards , establishing their position , and guiding them to their destinations . While they are declining in relevance, the truth is that there's still no substitute for the active aid that these shining beacons provide. There are still hundreds of lighthouse in the U.S that remain operational, with a few modern additions to improve their efficiency .  An observer on the top of a 40 m tall lighthouse (including the height of the observer) observer a ship at an angle of depression 30° coming towards the base of the light house along straight line joining the ship and the base of the light house . The angle of depression of the ship changes to 45° after 8 seconds (Use $\sqrt{3} = 1.73$) (i)Draw a labeled diagram to represent the situation (ii)(a)Find the distance between the two positions of the ship **Or** (b)Find the distance between the observer and the initial position of the ship (iii)Find the speed of the ship in km/h.	**4**