Chapter Test 2	**PARISHRAM PUBLICATIONS PUNE** **NAME of Student : _____** **Subject : MATHEMATICS** **Class : XI** **Max. Marks :- 80** **Topic : Trigonometric functions and equations**	

Instructions :

(i) For each question in Section I, you will be awarded 3 Marks if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (– 1) mark will be awarded.

(ii) For each question in Section II, you will be awarded 3 Marks if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (– 1) mark will be awarded.

(iii) For each question in Section III, you will be awarded 3 Marks if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (– 1) mark will be awarded.

(iv) For each question in Section IV, you will be awarded 2 marks for each row in which you have darkened the bubble(s) corresponding to the correct answer. Thus, each question in this section carries a maximum of 8 marks. There is no negative marking for incorrect answer(s) for this section.

(v) For each question in Section V, you will be awarded 3 marks if you darken the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (–1) mark will be awarded.

(vi) For each question in Section VI, you will be awarded 3 Marks if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (– 1) mark will be awarded.

SECTION - I

This section contains 8 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

Q.1 If triangle ABC, $\angle C = 45°$, then all the values of $\sin^2 A + \sin^2 B$ lie in the interval –

(A) [0, 1] (B) (0, 1) (C) $\left(\frac{1}{2}, \frac{1+\sqrt{2}}{\sqrt{2}}\right)$ (D) None of these

Q.2 If $\sin\theta + \sin 3\theta + \sin 5\theta = 0$, then the general value of θ is –

(A) $\frac{n\pi}{6}, \frac{m\pi}{12}$; m, n ∈ I (B) $\frac{n\pi}{3}, m\pi \pm \frac{\pi}{3}$; m, n ∈ I

(C) $\frac{n\pi}{3}, m\pi \pm \frac{\pi}{6}$; m, n ∈ I (D) None of these

Q.3 If $2\cos^2\theta + 3\sin\theta = 0$, then general value of θ is –

(A) $n\pi + (-1)^n \frac{\pi}{6}$; n ∈ I (B) $2n\pi \pm \frac{\pi}{6}$; n ∈ I

(C) $n\pi + (-1)^{n+1} \frac{\pi}{6}$; n ∈ I (D) None of these

Q.4 The general solution of $\cos^2\theta = \frac{1}{2}$ is –

(A) $n\pi \pm \frac{\pi}{3}$; n ∈ I (B) $2n\pi \pm \frac{\pi}{4}$; n ∈ I (C) $n\pi \pm \frac{\pi}{4}$; n ∈ I (D) None of these

Q.5 General solution of equation $\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$ is –

(A) $n\pi \pm \frac{\pi}{4} + \frac{\pi}{6}$; n ∈ I (B) $2n\pi \pm \frac{\pi}{4} + \frac{\pi}{6}$; n ∈ I

(C) $2n\pi \pm \frac{\pi}{4} - \frac{\pi}{6}$; n ∈ I (D) None of these

Q.6 Solve $\sin x + \cos x = \sqrt{2}$, if $0 \le x < 2\pi$

(A) $\pi/4$ (B) $7\pi/4$ (C) $3\pi/4$ (D) π

Q.7 Find the solution of the equation $\sin^4 x + \cos^4 x = \sin x \cos x$

(A) $\frac{(4n+1)\pi}{4} (n \in I)$ (B) $\frac{(4n+1)\pi}{2} (n \in I)$ (C) $\frac{(2n+1)\pi}{4} (n \in I)$ (D) None of these

Q.8 Solve : $\tan\theta + \tan(\theta + (\pi/3)) + \tan(\theta + (2\pi/3)) = 3$

(A) $(3n + 1)(\pi/12)$, where $n \in I$ (B) $(4n + 1)(\pi/6)$, where $n \in I$

(C) $(4n + 1)(\pi/12)$, where $n \in I$ (D) None of these

SECTION - II

This section contains 3 multiple choice questions . Each question has 4 choices (A), (B), (C) and (D), out of which one or more answers are correct.

Q.9 In which of the following sets the inequality $\sin^6 x + \cos^6 x > \frac{5}{8}$ holds good ?

(A) $\left(-\frac{\pi}{8}, \frac{\pi}{8}\right)$ (B) $\left(\frac{3\pi}{8}, \frac{5\pi}{8}\right)$ (C) $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$ (D) $\left(\frac{7\pi}{8}, \frac{9\pi}{8}\right)$

Q.10 Which of the following is/are correct –

(A) $(\tan x)^{\ln(\sin x)} > (\cot x)^{\ln(\sin x)} \forall x \in \left(0, \frac{\pi}{4}\right)$ (B) $4^{\ln \operatorname{cosec} x} < 5^{\ln \operatorname{cosec} x} \forall x \in \left(0, \frac{\pi}{2}\right)$

(C) $\left(\frac{1}{2}\right)^{\ln(\cos x)} < \left(\frac{1}{3}\right)^{\ln(\cos x)} \forall x \in \left(0, \frac{\pi}{2}\right)$ (D) $2^{\ln(\tan x)} > 2^{\ln(\sin x)} \forall x \in \left(0, \frac{\pi}{2}\right)$

Q.11 For the smallest positive values of x and y the equation, $2(\sin x + \sin y) - 2\cos(x - y) = 3$, has a solution then which of the following is/are true –

(A) $\sin\frac{x+y}{2} = 1$ (B) $\cos\left(\frac{x-y}{2}\right) = \frac{1}{2}$

(C) Number of ordered pairs (x, y) is 2 (D) Number of ordered pairs (x, y) is 3

SECTION - III

This section contains paragraph. Based upon each paragraph, 3 multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D), out of which only one is correct.

Passage (Q.12-Q.14)

If $\alpha, \beta, \gamma, \delta$ are the solutions of the equation $\tan\left(\theta + \frac{\pi}{4}\right) = 3\tan 3\theta$, no two of which have equal tangents. Then,

Q.12 The value of $\tan\alpha + \tan\beta + \tan\gamma + \tan\delta$ is –

(A) 1/3 (B) 8/3 (C) – 8/3 (D) 0

Q.13 The value of $\tan\alpha \tan\beta \tan\gamma \tan\delta$ is –

(A) – 1/3 (B) –2 (C) 1 (D) None of these

Q.14 The value of $\frac{1}{\tan\alpha} + \frac{1}{\tan\beta} + \frac{1}{\tan\gamma} + \frac{1}{\tan\delta}$ is –

(A) – 8 (B) 8 (C) 2/3 (D) 1/3

Passage (Q.15-Q.17)

Consider the system of equations : $\sin x \cos 2y = (a^2 - 1)^2 + 1$, $\cos x \sin 2y = a + 1$

Q.15 Number of values of a for which the system has a solution is –

(A) 1 (B) 2 (C) 3 (D) Infinite

Q.16 Number of values of $x \in [0, 2\pi]$ when the system has solution for permissible values of a –

(A) 1 (B) 2 (C) 3 (D) 4

Q.17 Number of values of $y \in [0, 2\pi]$ when the system has solution for permissible values of a –

(A) 2 (B) 3 (C) 4 (D) 5

SECTION - IV

This section contains match the column question . Four statements (A, B, C and D) are given in column I and four/five statements (p, q, r, s and t) in Column II. Any given statement in column I can have correct matching with one or more statement(s) given in column II.

Q.18 Match the column –

Column I (Equation)	**Column II (Solution)**
(A) $\max_{\theta \in R} \{5 \sin\theta + 3 \sin(\theta - \alpha)\} = 7$ then the set of possible values of α is	(p) $x = 2n\pi + 3\pi/4$, $n \in Z$
(B) $x \neq \frac{n\pi}{2}$ and $(\cos x)^{\sin^2 x - 3\sin x + 2} = 1$	(q) $x = 2n\pi \pm \pi/3$, $n \in Z$
(C) $\sqrt{(\sin x)} + 2^{1/4} \cos x = 0$	(r) $x = 2n\pi + \cos^{-1}(1/3)$, $n \in Z$
(D) $\log_5 \tan x = (\log_5 4)(\log_4 (3 \sin x))$	(s) no solution

SECTION - V

This section contains 5 questions numbered . The answer to each of the questions is a single digit integer, ranging from 0 to 9.

Q.19 Find the number of solutions of the equation $\sin x + \cos x = 0$ in $(0, 3\pi/4)$.

Q.20 If n be the number of solutions of the equation $|\cot x| = \cot x + \frac{1}{\sin x}$ $(0 < x < 2\pi)$, then find the value of n

Q.21 Find the value of cot 5° cot 10° ..... cot 85°.

Q.22 Find the value of sin 10° + sin 20° + sin 30° +.....+sin 360°.

Q.23 If sin t + cos t = 4/3 and tan (t/2) is the root of quadratic equation $ax^2 + bx + 1 = 0$, where $b, c \in Q$, then find the value of a + b

SECTION - VI

This section contains 2 questions. Each questions contain STATEMENT-1 (Assertion) and STATEMENT-2 (Reason). Each question has 4 choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

(A) Statement- 1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement -1.
(B) Statement -1 is True, Statement -2 is True ; Statement-2 is NOT a correct explanation for Statement - 1.
(C) Statement - 1 is True, Statement- 2 is False.
(D) Statement -1 is False, Statement -2 is True.

Q.24 **Statement 1 :** The equation, $\sin(\cos x) = \cos(\sin x)$, has no real solution.
Statement 2 : $\sin x \pm \cos x$ is bounded in $[-\sqrt{2}, \sqrt{2}]$.

Q.25 **Statement 1 :** $\sin x = a$, where $-1 < a < 0$, then for $x \in [0, n\pi]$ has $2(n-1)$ solutions $x \in N$.
Statement 2 : sin x takes value a exactly two time when we take one complete rotation covering all the quadrant starting from $x = 0$.