Shiksha Classes Bhandara

Mathematics **Topic : Trigonometry** **M.M. : 100**

Marking Scheme:

(i) Each question is allotted 4 (four) marks for each correct response.

(ii) ¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

Q.1 The number of points of intersection of the two curves $y = 2\sin x$ and $y = 5x^2 + 2x + 3$ is

(A) 0 (B) 1

(C) 2 (D) Infinite

Q.2 A tree is broken by wind, its upper part touches the ground at a point 10 m from the foot of the tree and makes an angle of 45° with the ground. The entire length of the tree is

(A) 15 m (B) 20 m

(C) $10(1+\sqrt{2})$ m (D) $10\left(1+\frac{\sqrt{3}}{2}\right)$ m

Q.3 Find the angle between the hour-hand and the minute-hand in degrees at half past 3.

(A) 75° (B) 35°

(C) 60° (D) 30°

Q.4 Find the value of $\frac{\sin A+\sin 3A+\sin 5A+\sin 7A}{\cos A+\cos 3A+\cos 5A+\cos 7A}$

(A) tan 2A (B) tan 4A

(C) tan 5A (D) tan 3A

Q.5 A pole stands vertically inside a triangular park ΔABC. If the angle of elevation of the top of the pole from each corner is same, then in ΔABC the foot of the pole is at the

(A) Centroid (B) Circum-centre

(C) Incentre (D) Orthocentre

Q.6 Solve the equation, $\sin\theta+\cos\theta=\frac{1}{\sqrt{2}}$.

(A) $\theta = 2n\pi+\frac{\pi}{4}\pm\frac{\pi}{3}$ (B) $\theta = 2n\pi+\frac{\pi}{2}\pm\frac{\pi}{3}$

(C) $\theta = n\pi+\frac{\pi}{4}\pm\frac{\pi}{6}$ (D) None of these

Q.7 The period of the function, f (x) = 3sin(2x + 1) in radians is

(A) 2π (B) π

(C) π/2 (D) –π

Q.8 Find the values of cos (–1710°)

(A) 0 (B) 4

(C) 10 (D) 12

Q.9 If $A = \cos^2\theta + \sin^4\theta$, then for all values of θ is

(A) $1 \le A \le 2$ (B) $\frac{13}{16} \le A \le 1$

(C) $\frac{3}{4} \le A \le \frac{13}{16}$ (D) $\frac{3}{4} \le A \le 1$

Q.10 Solve :

(A) $x = \frac{m\pi}{2}+(-1)^m\cdot\frac{\alpha_n}{2}$; n, m ∈ I

(B) $x = \frac{\pi}{2}+(-1)^m\cdot\frac{\alpha_n}{2}$; n, m ∈ I

(C) $x = \frac{m\pi}{4}+(-1)^m\cdot\frac{\alpha_n}{3}$; n, m ∈ I

(D) None of these

Q.11 The upper $(3/4)^{th}$ portion of a vertical pole subtends an angle $\tan^{-1}(3/5)$ at a point in the horizontal plane through its foot and at a distance 40 m from the foot. A possible height of the vertical pole is

(A) 20 m (B) 40 m

(C) 60 m (D) 80 m

Q.12 The value of $\cos\frac{\pi}{7}\cos\frac{2\pi}{7}\cos\frac{4\pi}{7}$ is

(A) 0 (B) 1/2

(C) 1/3 (D) –1/8

Q.13 An aeroplane flying at a height of 300 m above the ground passes vertically above another plane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Then the height of the lower plane from the ground is

(A) $100\sqrt{3}$ m (B) $\frac{100}{\sqrt{3}}$ m

(C) 50 m (D) $150(\sqrt{3}+1)$ m

Q.14 Find the most general values of q which satisfies the equations $\sin\theta = -\frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$.

(A) $\theta = 2n\pi+\frac{7\pi}{6}$ (B) $\theta = 2n\pi+\frac{5\pi}{6}$

(C) $\theta = n\pi+\frac{\pi}{6}$ (D) $\theta = 2n\pi+\frac{7\pi}{3}$

Q.15 The angles of elevation of the top of a TV tower from three points A, B and C in a straight line (in the horizontal plane) through the foot of tower are α, 2α and 3α respectively. If AB = a, the height of tower is

(A) a tanα (B) a sinα

(C) a sin2α (D) a sin3α

Q.16 What are the most general values of θ satisfying : $\sin\theta = 1/2$

(A) $\theta = n\pi+(-1)^n\cdot\frac{\pi}{6}$: n ∈ I

(B) $\theta = 2n\pi\pm\frac{3\pi}{4}$: n ∈ I

(C) $\theta = 2n\pi\pm\frac{\pi}{4}$: n ∈ I

(D) $\theta = n\pi\pm\frac{\pi}{3}$: n ∈ I

Q.17 A man from the top of a 100 m high tower sees a car moving towards the tower at an angle of depression 30°. After sometime, the angle of depression becomes 60°. The distance travelled by the car during this time is

(A) $100\sqrt{3}$m (B) $\frac{200}{\sqrt{3}}$m

(C) $200\sqrt{3}$ m (D) $\frac{100}{\sqrt{3}}$m

Q.18 Solve the equation :

(A) $x = 2m\pi \pm \frac{\pi}{2}$: $m \in I$ or $x = 2n\pi$: $n \in I$

(B) $x = 2m\pi \pm \frac{\pi}{3}$: $m \in I$ or $x = 2n\pi$: $n \in I$

(C) $x = 2m\pi \pm \frac{\pi}{6}$: $m \in I$ or $x = n\pi$: $n \in I$

(D) None of these

Q.19 The angle of elevation of the top of an incomplete vertical pillar at a horizontal distance of 100 m from its base is 45°. If the angle of elevation of the top of the complete pillar at the same point is to be 60°, then the height of the incomplete pillar is to be increased by

(A) $50\sqrt{2}$ m (B) 100 m

(C) $100\left(\sqrt{3}-1\right)$ m (D) $100\left(\sqrt{3}+1\right)$ m

Q.20 What are the most general values of θ satisfying?

$\cos\theta = -1/\sqrt{2}$

(A) $\theta = n\pi + (-1)^n \cdot \frac{\pi}{6}$: $n \in I$

(B) $\theta = 2n\pi \pm \frac{3\pi}{4}$: $n \in I$

(C) $\theta = 2n\pi \pm \frac{\pi}{4}$: $n \in I$

(D) $\theta = n\pi \pm \frac{\pi}{3}$: $n \in I$

For Q.21-Q.25 :

The answer to each question is a NUMERICAL VALUE.

Q.21 $5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3$ lies between –4 and A.

Find the value of A.

Q.22 Find the value of $\frac{1}{\sin 10°} - \frac{\sqrt{3}}{\cos 10°}$

For Q.23-Q.25

Consider the system of equations

$\sin x \cos 2y = (a^2 - 1)^2 + 1$, $\cos x \sin 2y = a + 1$

Q.23 No.of values of a for which the system has a solution is –

Q.24 Number of values of $x \in [0, 2\pi]$ when the system has solution for permissible values of a –

Q.25 Number of values of $y \in [0, 2\pi]$ when the system has solution for permissible values of a –