Practice Exercise

Level - I

1. $\cos 1° \cdot \cos 2° \cdot \cos 3° \ldots\ldots \cos 179°$ is equal to

(a) -1 (b) 0

(c) 1 (d) $1/\sqrt{2}$

2. The value of $(\sin^2 7\frac{1}{2}° + \cos^2 7\frac{1}{2}°) - (\sin^2 30° + \cos^2 30°) + (\sin^2 7° + \sin^2 83°)$ is equal to

(a) 3 (b) $3\frac{1}{2}$

(c) 2 (d) 1

3. If $\tan 15° = 2 - \sqrt{3}$, then the value of $\cot^2 75°$ is

(a) $7 + \sqrt{3}$ (b) $7 - 2\sqrt{3}$

(c) $7 - 4\sqrt{3}$ (d) $7 + 4\sqrt{3}$

4. If $b \tan\theta = a$, the value of $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta}$

(a) $\frac{a-b}{a^2+b^2}$ (b) $\frac{a+b}{a^2+b^2}$

(c) $\frac{a^2+b^2}{a^2-b^2}$ (d) $\frac{a^2-b^2}{a^2+b^2}$

5. $\tan 9° \times \tan 27° \times \tan 63° \times \tan 81° =$

(a) 4 (b) 3

(c) 2 (d) 1

6. If $\sin\theta = \frac{11}{15}$, then $\cos\theta =$

(a) $\frac{2\sqrt{26}}{15}$ (b) $\frac{15\sqrt{26}}{2}$

(c) $\frac{15}{11}$ (d) $\frac{11}{15}$

7. If $\tan\theta = \sqrt{3}$, then $\sec\theta =$

(a) $\frac{2}{\sqrt{3}}$ (b) 2

(c) $\sqrt{\frac{3}{2}}$ (d) $\frac{1}{3}$

8. $(1 + \tan^2\theta)/\cos^2\theta =$

(a) $\frac{1}{\sin^2\theta - \cos^2\theta}$ (b) $\sec^2\theta$

(c) 1 (d) $\frac{1}{2}$

9. If $4\tan\theta = 3$, then $\left(\frac{4\sin\theta - \cos\theta}{4\sin\theta + \cos\theta}\right)$ is equal to

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$

(c) $\frac{1}{2}$ (d) $\frac{3}{4}$

10. $\frac{2\tan 30°}{1+\tan^2 30°} =$

(a) $\sin 60°$ (b) $\cos 60°$

(c) $\tan 60°$ (d) $\sin 30°$

11. $\frac{1-\tan^2 45°}{1+\tan^2 45°} =$

(a) $\tan 90°$ (b) 1

(c) $\sin 45°$ (d) 0

12. $\sin 2A = 2\sin A$ is true when $A =$

(a) $0°$ (b) $30°$

(c) $45°$ (d) $60°$

13. $\frac{2\tan 30°}{1-\tan^2 30°} =$

(a) $\cos 60°$ (b) $\sin 60°$

(c) $\tan 60°$ (d) None of these

14. Given that $\sin\alpha = \frac{1}{2}$ and $\cos\beta = \frac{1}{2}$, then the value of $(\alpha + \beta)$ is

(a) $0°$ (b) $30°$

(c) $60°$ (d) $90°$

15. If $\cos 9\alpha = \sin\alpha$ and $9\alpha < 90°$, then the value of $\tan 5\alpha$ is

(a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$

(c) 1 (d) 0

16. $9\sec^2 A - 9\tan^2 A =$

(a) 1 (b) 9

(c) 8 (d) 0

17. $(\sec A + \tan A)(1 - \sin A) =$

(a) $\sec A$ (b) $\sin A$

(c) $\operatorname{cosec} A$ (d) $\cos A$

18. $\dfrac{1+\tan^2 A}{1+\cot^2 A} =$

(a) $\sec^2 A$ (b) -1

(c) $\cot^2 A$ (d) None of these

19. Which of the following relationship is true ?

(a) $\sin A/\operatorname{cosec} A = \cot A$

(b) $\sin A/\cos A = \tan A$

(c) $\cos A/\sin A = \sec A$

(d) $\operatorname{cosec} A/\sin A = \cos A$

20. $(\sin A/\tan A) + \cos A =$

(a) $2 \sec A$ (b) $\sec A$

(c) $2 \operatorname{cosec} A$ (d) $2 \cos A$

21. If $\cos(40° + x) = \sin 30°$, then x is equal to

(a) $20°$ (b) $30°$

(c) $60°$ (d) $0°$

22. If $\sin(A-B) = \dfrac{1}{2}$ and $\cos(A+B) = \dfrac{1}{2}$, then

(a) $A = 60°, B = 45°$ (b) $A = 30°, B = 15°$

(c) $A = 45°, B = 15°$ (d) $A = 60°, B = 30°$

23. $\tan 1° \tan 2° \tan 3° \ldots\ldots \tan 89°$ is equal to

(a) 1 (b) 0

(c) cannot be determined (d) None of these

24. If $\tan\theta = \dfrac{x\sin\phi}{1-x\cos\phi}$, then $\cot\theta + \cot\phi =$

(a) $\dfrac{\sin\phi}{\sin\theta}$ (b) $\dfrac{1}{x\sin\phi}$

(c) $\dfrac{\sin\theta}{1-\cos\theta}$ (d) $\dfrac{\sin\theta}{1-\cos\phi}$

25. $\tan^2\theta \sin^2\theta$ is equal to

(a) $\tan^2\theta - \sin^2\theta$ (b) $\tan^2\theta + \sin^2\theta$

(c) $\dfrac{\tan^2\theta}{\sin^2\theta}$ (d) $\sin^2\theta \cot^2\theta$

26. If $x = r\sin\alpha\cos\beta$, $y = r\sin\alpha\sin\beta$ and $z = r\cos\alpha$, then

(a) $x^2 + y^2 + z^2 = r^2$ (b) $x^2 + y^2 - z^2 = r^2$

(c) $x^2 - y^2 + z^2 = r^2$ (d) $x^2 + y^2 - z^2 = r^2$

27. If $\dfrac{x}{a}\cos\theta + \dfrac{y}{b}\sin\theta = 1, \dfrac{x}{a}\sin\theta - \dfrac{y}{b}\cos\theta = 1$, then

(a) $x^2 + y^2 = a^2 + b^2$ (b) $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 2$

(c) $a^2x^2 + b^2y^2 = 1$ (d) None of these

28. $\dfrac{\cos 70°}{\sin 20°} + \dfrac{\cos 59°}{\sin 31°} - 8\sin^2 30°$ is equal to

(a) 1 (b) -1

(c) 0 (d) 2

29. If $\sin\theta = \dfrac{1}{2}$ and θ is acute, then $(3\cos\theta - 4\cos^3\theta)$ is equal to

(a) 0 (b) $\dfrac{1}{2}$

(c) $\dfrac{1}{6}$ (d) -1

30. If $\tan\theta + \cot\theta = 2$, then $\tan^2\theta + \cot^2\theta =$

(a) 4 (b) 3

(c) 2 (d) None of these

31. If $\cos(81° + \theta) = \sin\left(\dfrac{k}{3} - \theta\right)$, then $k =$

(a) $9°$ (b) $30°$

(c) $27°$ (d) $45°$

32. If $\tan x = \sin 45° \cos 45° + \sin 30°$, then x is equal to

(a) $30°$ (b) $45°$

(c) $60°$ (d) $15°$

33. $\cos^2 5° + \cos^2 10° + \cos^2 15° \ldots\ldots + \cos^2 85° + \cos^2 90°$ is equal to

(a) 10 (b) $\dfrac{19}{2}$

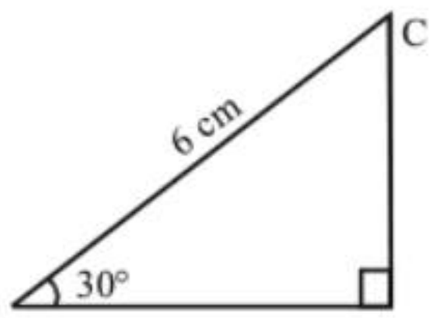
(c) $\dfrac{9}{2}$ (d) $\dfrac{17}{2}$

34. $\dfrac{\sin(90° - \theta)\sin\theta}{\tan\theta} + \sin^2\theta$ is equal to

(a) 2 (b) 1

(c) 0 (d) None of these

35. In the adjoining figure, the length of BC is



(a) $2\sqrt{3}$ cm (b) $3\sqrt{3}$ cm

(c) $4\sqrt{3}$ cm (d) 3 cm

36. If the angle of depression of an object from a 75 m high tower is $30°$, then the distance of the object from the tower is

(a) $25\sqrt{3}$ m (b) $50\sqrt{3}$ m

(c) $75\sqrt{3}$ m (d) 150 m

37. The angle of elevation of the top of a tower at point on the ground is 30°. If on walking 20 metres toward the tower, the angle of elevation become 60°, then the height of the tower is

(a) 10 metre (b) $\frac{10}{\sqrt{3}}$ metre

(c) $10\sqrt{3}$ metre (d) None of these

38. An aeroplane flying horizontally 1 km. above the ground is observed at an elevation of 60° and after 10 seconds the elevation is observed to be 30°. The uniform speed of the aeroplane in km/h is

(a) 240 (b) $240\sqrt{3}$

(c) $60\sqrt{3}$ (d) None of these

39. A 25 m ladder is placed against a vertical wall of a building. The foot of the ladder is 7 m from the base of the building. If the top of the ladder slips 4m, then the foot of the ladder will slide

(a) 5 m (b) 8 m

(c) 9 m (d) 15 m

40. If the length of the shadow of a tower is $\sqrt{3}$ times that of its height, then the angle of elevation of the sun is

(a) 15° (b) 30°

(c) 45° (d) 60°

41. The angles of elevation of the top of a tower from two points at distances m and n metres are complementary. If the two points and the base of the tower are on the same straight line, then the height of the tower is

(a) $\sqrt{mn}$ (b) mn

(c) $\frac{m}{n}$ (d) None of these

42. The distance between the tops of two trees 20 m and 28 m high is 17 m. The horizontal distance between the two trees is

(a) 9 m (b) 11 m

(c) 15 m (d) 31 m

43. A pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the sun's elevation is

(a) 60° (b) 45°

(c) 30° (d) 90°

44. The length of a string between a kite and a point on the ground is 85 m. If the string makes an angle θ with level ground such that $\tan\theta = \frac{15}{8}$, how high is the kite ?

(a) 75 m (b) 78.05 m

(c) 226 m (d) None of these

45. A person walking 20 m towards a chimney in a horizontal line through its base observes that its angle of elevation changes from 30° to 45°. The height of chimney is

(a) $\frac{20}{\sqrt{3}+1}$m (b) $\frac{20}{\sqrt{3}-1}$m

(c) $20(\sqrt{3}-1)$m (d) None of these

46. The top of two poles of height 20 m and 14 m are connected by a wire. If the wire makes an angle of 30° with the horizontal, then the length of the wire is

(a) 12 m (b) 10 m

(c) 8 m (d) 6 m

47. Two men standing on opposite sides of a flagstaff measure the angles of the top of the flagstaff is 30° and 60°. If the height of the flagstaff is 20 m, distance between the men is

(a) 46.19 m (b) 40 m

(c) 50 m (d) 30 m

48. If in ΔABC, $\angle A = 90°$, BC = a, AC = b and AB = c, then the value of tan B + tan C is *[SSC-Sub. Ins.-2012]*

(a) $\frac{b^2}{ac}$ (b) $\frac{a^2}{bc}$

(c) $\frac{c^2}{ab}$ (d) $\frac{a^2+c^2}{b}$

49. A ladder is resting against a wall at height of 10m. If the ladder is inclined with the ground at an angle of 30°, then the distance of the foot of the ladder from the wall is *[SSC-Sub. Ins.-2012]*

(a) $10\sqrt{3}$ m (b) $20\sqrt{3}$ m

(c) $\frac{10}{\sqrt{3}}$m (d) $\frac{20}{\sqrt{3}}$m

50. tan 7° tan 23° tan 60° tan 67° tan 83° is equal to *[SSC-Sub. Ins.-2012]*

(a) $\frac{1}{\sqrt{3}}$ (b) 1

(c) 0 (d) $\sqrt{3}$

51. The value of
(sec θ – cos θ) (cosec θ – sin θ) (tan θ + cot θ)
is *[SSC-Sub. Ins.-2012]*

(a) 2 (b) 0

(c) 1 (d) $\frac{3}{2}$

52. If $\tan(\theta_1+\theta_2) = \sqrt{3}$ and $\sec(\theta_1-\theta_2) = \frac{2}{\sqrt{3}}$, then the value of $\sin 2\theta_1 + \tan 3\theta_2$ is equal to *[SSC-Sub. Ins.-2012]*
(Assume that $0 < \theta_1 - \theta_2 < \theta_1 + \theta_2 < 90°$)

(a) 1 (b) 2

(c) 0 (d) 3

53. The value of $\tan 1° \tan 2° \tan 3° \ldots \tan 89°$ is:
[*SSC-Sub. Ins.-2013*]
(a) 1 (b) 2
(c) undefined (d) 0

54. Minimum value of $4\tan^2\theta + 9\cot^2\theta$ is : [*SSC-Sub. Ins.-2013*]
(a) 12 (b) 1
(c) 6 (d) 13

55. If $\sin\theta - \cos\theta = \frac{1}{2}$ the value of $\sin\theta + \cos\theta$ is :
[*SSC-Sub. Ins.-2013*]
(a) -2 (b) ± 2
(c) $\frac{\sqrt{7}}{2}$ (d) 2

56. If $\text{cosec}\,\theta - \cot\theta = \frac{7}{2}$, the value of $\text{cosec}\,\theta$ is :
[*SSC-Sub. Ins.-2013*]
(a) $\frac{47}{28}$ (b) $\frac{51}{28}$
(b) $\frac{53}{28}$ (d) $\frac{49}{28}$

57. From the top of a hill 200 m high, the angle of depression of the top and the bottom of a tower are observed to be 30° and 60°. The height of the tower is (in m) :
[*SSC-Sub. Ins.-2013*]
(a) $\frac{400\sqrt{3}}{3}$ (b) $166\frac{2}{3}$
(c) $133\frac{1}{3}$ (d) $200\sqrt{3}$

58. If $0 \le \theta \le \frac{\pi}{2}$ and $\sec^2\theta + \tan^2\theta = 7$, then θ is
[*SSC-Sub. Ins.-2014*]
(a) $\frac{5\pi}{12}$ radian (b) $\frac{\pi}{3}$ radian
(c) $\frac{\pi}{5}$ radian (d) $\frac{\pi}{6}$ radian

59. The simplest value of
$\sin^2 x + 2\tan^2 x - 2\sec^2 x + \cos^2 x$ is
[*SSC-Sub. Ins.-2014*]
(a) 1 (b) 0
(c) -1 (d) 2

60. If $x = a\sin\theta$ and $y = b\tan\theta$ then $\frac{a^2}{x^2} - \frac{b^2}{y^2}$ is
[*SSC-Sub. Ins.-2014*]
(a) 1 (b) 2
(c) 3 (d) 4

61. A kite is flying at a height of 50 metre. If the length of string is 100 metre then the inclination of string to the horizontal ground in degree measure is [*SSC-Sub. Ins.-2014*]
(a) 90 (b) 60
(c) 45 (d) 30

62. From the top of a light-house at a height 20 metres above sea-level, the angle of depression of a ship is 30°. The distance of the ship from the foot of the light-house is
[*SSC-Sub. Ins.-2014*]
(a) 20 m (b) $20\sqrt{3}$ m
(c) 30 m (d) $30\sqrt{3}$ m

63. If $\frac{2\sin\theta - \cos\theta}{\cos\theta + \sin\theta} = 1$, then value of $\cot\theta$ is:
[*SSC 10+2-2012*]
(a) $\frac{1}{2}$ (b) $\frac{1}{3}$
(c) 3 (d) 2

64. If $\tan\left(\frac{\pi}{2} - \frac{\theta}{2}\right) = \sqrt{3}$, value of $\cos\theta$ is: [*SSC 10+2-2012*]
(a) 0 (b) $\frac{1}{\sqrt{2}}$
(c) $\frac{1}{2}$ (d) 1

65. $2\,\text{cosec}^2\ 23°\ \cot^2\ 67° - \sin^2\ 23° - \sin^2\ 67° - \cot^2\ 67°$ is equal to [*SSC 10+2-2013*]
(a) 0 (b) 1
(c) $\sec^2\ 23°$ (d) $\tan^2\ 23°$

66. If $5\tan\theta = 4$, then $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 2\cos\theta}$ is [*SSC 10+2-2013*]
(a) $\frac{1}{3}$ (b) $\frac{2}{3}$
(c) $\frac{1}{4}$ (d) $\frac{1}{6}$

67. If $x\sin\theta + y\cos\theta = \sqrt{x^2 + y^2}$ and
$\frac{\cos^2\theta}{a^2} + \frac{\sin^2\theta}{b^2} = \frac{1}{x^2 + y^2}$, then the correct relation is
[*SSC 10+2-2013*]
(a) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (b) $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$
(c) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (d) $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

68. If $2(\cos^2\theta - \sin^2\theta) = 1$ (θ is a positive acute angle), then $\cot\theta$ is equal to [*SSC 10+2-2013*]

(a) $\sqrt{3}$ (b) $-\sqrt{3}$

(c) $\frac{1}{\sqrt{3}}$ (d) 1

69. The equation $\cos^2\theta = \frac{(x+y)^2}{4xy}$ is only possible when [*SSC 10+2-2013*]

(a) $x < y$ (b) $x = -y$

(c) $x > y$ (d) $x = y$

70. If $\tan^2\theta - \sin^2\theta = x$, then the value of $\tan^2\theta \sin^2\theta$ is [*SSC 10+2-2013*]

(a) x (b) 2

(c) $\frac{1}{x}$ (d) 1

71. The value of

$$\frac{\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ}{\tan^2 70^\circ - \operatorname{cosec}^2 20^\circ}$$ is [*SSC 10+2-2014*]

(a) -1 (b) 0

(c) 1 (d) 2

72. If θ is a positive acute angle and $4\cos^2\theta - 4\cos\theta + 1 = 0$, then the value of $\tan(\theta - 15^\circ)$ is equal to [*SSC 10+2-2014*]

(a) 0 (b) 1

(c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

73. If $(r\cos\theta - \sqrt{3})^2 + (r\sin\theta - 1)^2 = 0$, then the value of $\frac{r\tan\theta + \sec\theta}{r\sec\theta + \tan\theta}$ is equal to [*SSC 10+2-2014*]

(a) $\frac{4}{5}$ (b) $\frac{5}{4}$

(c) $\sqrt{\frac{3}{4}}$ (d) $\sqrt{\frac{5}{4}}$

74. A vertical pole and a vertical tower are standing on the same level ground. Height of the pole is 10 metres. Form the top of the pole is the angle of elevation of the top of the tower and angle of depression of the foot of the tower are 60° and 30° respectively. The height of the tower is [*SSC 10+2-2014*]

(a) 20 m (b) 30 m

(c) 40 m (d) 50 m

75. The length of the shadow of a vertical tower on level ground increases by 10 metres when the altitude of the sun changes from 45° to 30°. Then the height of the tower is [*SSC 10+2-2014*]

(a) $5(\sqrt{3}+1)$ metres (b) $5(\sqrt{3}-1)$ metres

(c) $5\sqrt{3}$ metres (d) $\frac{5}{\sqrt{3}}$ metres

76. The value of $\frac{\tan^2\theta}{1+\tan^2\theta} + \frac{\cot^2\theta}{1+\cot^2\theta}$ is equal to [*SSC 10+2-2014*]

(a) 0 (b) 1

(c) 2 (d) 3

Level - II

1. $\sin^2\theta + \operatorname{cosec}^2\theta$ is always

(a) greater than 1

(b) less than 1

(c) greater than or equal to 2

(d) equal to 2

2. If $\sin\theta + \cos\theta = a$ and $\frac{\sin\theta + \cos\theta}{\sin\theta\cos\theta} = b$, then

(a) $b = \frac{2a}{a^2 - 1}$ (b) $a = \frac{2b}{b^2 - 1}$

(c) $ab = b^2 - 1$ (d) $a + b = 1$

3. If $x = p\sec\theta$ and $y = q\tan\theta$ then

(a) $x^2 - y^2 = p^2q^2$ (b) $x^2q^2 - y^2p^2 = pq$

(c) $x^2q^2 - y^2p^2 = \frac{1}{p^2q^2}$ (d) $x^2q^2 - y^2p^2 = p^2q^2$

4. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then the value of $m^2 - n^2$ is equal to

(a) $4mn$ (b) $2\sqrt{mn}$

(c) $4\sqrt{mn}$ (d) $2\sqrt{m/n}$

5. The value of expression

$$\frac{\sin^2 22^\circ + \sin^2 68^\circ}{\sin^2 22^\circ + \cos^2 68^\circ} + \sin^2 63^\circ + \cos 63^\circ \sin 27^\circ$$

(a) 3 (b) 2

(c) 1 (d) 0

6. The value of the expression

$[\operatorname{cosec}(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)]$

(a) -1 (b) 0

(c) 1 (d) $\frac{3}{2}$

7. $\sin(45° + \theta) - \cos(45° - \theta)$ is equal to

(a) $2\cos\theta$ (b) 0

(c) $2\sin\theta$ (d) 1

8. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta) =$

(a) 0 (b) 1

(c) 2 (d) None of these

9. If $\sin A + \sin^2 A = 1$, then the value of expression $(\cos^2 A + \cos^4 A)$ is

(a) 1 (b) $\frac{1}{2}$

(c) 2 (d) 3

10. If $7\sin^2\theta + 3\cos^2\theta = 4$, then $\sec\theta + \operatorname{cosec}\theta$ is equal to

(a) $\frac{2}{\sqrt{3}} - 2$ (b) $\frac{2}{\sqrt{3}} + 2$

(c) $\frac{2}{\sqrt{3}}$ (d) None of these

11. If $a\cos\theta + b\sin\theta = 4$ and $\sin\theta - b\cos\theta = 3$, then $a^2 + b^2 =$

(a) 7 (b) 12

(c) 25 (d) None of these

12. If $p\sin\theta + q\sin\theta = a$ and $p\cos\theta - q\sin\theta = b$, then

$\frac{p+a}{q+b} + \frac{q-b}{p-a}$ is equal to

(a) 1 (b) 2

(c) 0 (d) None of these

13. If $\operatorname{cosec}\theta - \cot\theta = \frac{1}{2}, 0° < \theta < 90°$, then $\cos\theta$ is equal

(a) $\frac{5}{3}$ (b) $\frac{3}{5}$

(c) $-\frac{3}{5}$ (d) $-\frac{5}{3}$

14. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta$ is equal to

(a) $\sqrt{2}\tan\theta$ (b) $\sqrt{2}\sin\theta$

(c) $\frac{\sqrt{2}}{\cos\theta + \sin\theta}$ (d) None of these

15. If $\sec\theta + \tan\theta = x$, then $\sin\theta$ is equal to

(a) $\frac{x^2+1}{2x}$ (b) $\frac{x^2+1}{x^2-1}$

(c) $\frac{x^2-1}{x^2+1}$ (d) $\frac{2x}{x^2-1}$

16. The value of $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \tan\theta + \sec\theta)$ is

(a) 1 (b) 2

(c) 4 (d) 0

17. $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$ is equal to

(a) 0 (b) 3

(c) 1 (d) –1

18. The top of a broken tree has its top touching the ground (shown in the adjoining figure) at a distance of 10m from the bottom. If the angle made by the broken part with ground is 30°, then the length of the broken part is

(a) $10\sqrt{3}$ cm

(b) $\frac{20}{\sqrt{3}}$ m

(c) 20 cm

(d) $20\sqrt{3}$ m

19. An aeroplane at a height of 600 m passes vertically above another aeroplane at an instant when their angles of elevation at the same observing point are 60° and 45° respectively. How many metres higher is the one from the other ?

(a) 286.53 m (b) 274.53 m

(c) 253.58 m (d) 263.83 m

20. If a kite is flying at a height of $40\sqrt{3}$ metres from the level ground, attached to a string inclined at 60° to the horizontal, then the length of the string is

(a) 80 m (b) $60\sqrt{3}$ m

(c) $80\sqrt{3}$ m (d) 120 m

21. Two persons are 'a' metres apart and the height of one is double that of the other. It from the middle point of the line joining their feet, an observer finds the angular elevations of their tops to be complementary, then the height of the shortest persons in metre is

(a) $\frac{a}{4}$ (b) $\frac{a}{\sqrt{2}}$

(c) $a\sqrt{2}$ (d) $\frac{a}{2\sqrt{2}}$

22. The angle of elevation of the top of a rock from the top and foot of 100 m high tower are respectively 30° and 45°. The height of the rock is

(a) $50(3 - \sqrt{3})$ m (b) $50(3 + \sqrt{3})$ m

(c) $50\sqrt{3}$ m (d) 150 m

23. If $2y\cos\theta = x\sin\theta$ and $2x\sec\theta - y\operatorname{cosec}\theta = 3$, then the relation between x and y is *[SSC CGL-2012]*

(a) $2x^2 + y^2 = 2$ (b) $x^2 + 4y^2 = 4$

(c) $x^2 + 4y^2 = 1$ (d) $4x^2 + y^2 = 4$

24. If $\sec\theta + \tan\theta = \sqrt{3}$, then the positive value of $\sin\theta$ is [*SSC CGL-2012*]

(a) 0 (b) $\frac{1}{2}$

(c) $\frac{\sqrt{3}}{2}$ (d) 1

25. The radian measure of $63°14'51''$ is [*SSC CGL-2012*]

(a) $\left(\frac{2811\pi}{8000}\right)^c$ (b) $\left(\frac{3811\pi}{8000}\right)^c$

(c) $\left(\frac{4811\pi}{8000}\right)^c$ (d) $\left(\frac{5811\pi}{8000}\right)^c$

26. In a triangle ABC, $AB = AC$, BA is produced to D in such a manner that $AC = AD$. The circular measure of $\angle BCD$ is [*SSC CGL-2012*]

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$

(c) $\frac{2\pi}{3}$ (d) $\frac{\pi}{2}$

27. If $\frac{\cos^4\alpha}{\cos^2\beta} + \frac{\sin^4\alpha}{\sin^2\beta} = 1$, then the value of $\frac{\cos^4\beta}{\cos^2\alpha} + \frac{\sin^4\beta}{\sin^2\alpha}$ is [*SSC CGL-2012*]

(a) 4 (b) 0

(c) $\frac{1}{8}$ (d) 1

28. $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1}\left(\text{where } \theta \neq \frac{\pi}{2}\right)$ is equal to [*SSC CGL-2012*]

(a) $\frac{1+\sin\theta}{\cos\theta}$ (b) $\frac{1-\sin\theta}{\cos\theta}$

(c) $\frac{1-\cos\theta}{\sin\theta}$ (d) $\frac{1+\cos\theta}{\sin\theta}$

29. If $\sin^2\alpha = \cos^3\alpha$, then the value of $(\cot^6\alpha - \cot^2\alpha)$ is [SSC CGL-2012]

(a) 1 (b) 0

(c) – 1 (d) 2

30. The simplified value of [SSC CGL-2012]
$(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \text{cosec}\,\theta)$ is

(a) – 2 (b) 2

(c) 1 (d) – 1

31. The angles of elevation of the top of a tower standing on a horizontal plane from two points on a line passing through the foot of the tower at a distance 9 ft and 16 ft respectively are complementary angles. Then the height of the tower is [*SSC CGL-2012*]

(a) 9 ft (b) 12 ft

(c) 16 ft (d) 144 ft

32. The value of $\frac{\sin 53°}{\cos 37°} \div \frac{\cot 65°}{\tan 25°}$ is [SSC CGL-2013]

(a) 2 (b) 1

(c) 3 (d) 0

33. The value of $\frac{\cos 60° + \sin 60°}{\cos 60° - \sin 60°}$ is [*SSC CGL-2013*]

(a) – 1 (b) $\sqrt{3} + 2$

(c) $-(2 + \sqrt{3})$ (d) $\sqrt{3} - 2$

34. The value of [*SSC CGL-2013*]

$$\frac{\cot 5°.\cot 10°.\cot 15°.\cot 60°.\cot 75°.\cot 80°.\cot 85°}{(\cos^2 20° + \cos^2 70°) + 2}$$ is

(a) $\frac{9}{\sqrt{3}}$ (b) $\frac{1}{9}$

(c) $\frac{1}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{9}$

35. In a triangle, the angles are in the ratio 2 : 5 : 3. What is the value of the least angle in the radian ? [*SSC CGL-2013*]

(a) $\frac{\pi}{20}$ (b) $\frac{\pi}{10}$

(c) $\frac{2\pi}{5}$ (d) $\frac{\pi}{5}$

36. If $x = a\cos\theta - b\sin\theta$, $y = b\cos\theta + a\sin\theta$, then find the value of $x^2 + y^2$. [*SSC CGL-2013*]

(a) a^2 (b) b^2

(c) $\frac{a^2}{b^2}$ (d) $a^2 + b^2$

37. If $\tan\alpha + \cot\alpha = 2$, then the value of $\tan^7\alpha + \cot^7\alpha$ is [*SSC CGL-2013*]

(a) 2 (b) 16

(c) 64 (d) 128

38. From 125 metre high towers, the angle of depression of a car is 45°. Then how far the car is from the tower ? [*SSC CGL-2013*]

(a) 125 metre (b) 60 metre

(c) 75 metre (d) 95 metre

39. The value of $\sin^2 1° + \sin^2 2° + \sin^2 3° + ... + \sin^2 89°$ is [*SSC CGL-2014*]

(a) 22 (b) 44

(c) $22\frac{1}{2}$ (d) $44\frac{1}{2}$

40. The value of $\frac{\cos^3\theta+\sin^3\theta}{\cos\theta+\sin\theta}+\frac{\cos^3\theta-\sin^3\theta}{\cos\theta-\sin\theta}$ is equal to [*SSC CGL-2014*]

(a) -1 (b) 1
(c) 2 (d) 0

41. If $\sin 17^\circ = \frac{x}{y}$ then $\sec 17^\circ - \sin 73^\circ$ is equal to [*SSC CGL-2014*]

(a) $\frac{y}{\sqrt{y^2-x^2}}$ (b) $\frac{y^2}{\left(x\sqrt{y^2-x^2}\right)}$

(c) $\frac{x}{\left(y\sqrt{y^2-x^2}\right)}$ (d) $\frac{x^2}{\left(y\sqrt{y^2-x^2}\right)}$

42. If θ is a positive acute angle and $\operatorname{cosec}\theta+\cot\theta=\sqrt{3}$, then the value of $\operatorname{cosec}\theta$ is [*SSC CGL-2014*]

(a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$

(c) $\frac{2}{\sqrt{3}}$ (d) 1

43. If $\cos\alpha+\sec\alpha=\sqrt{3}$, then the value of $\cos^3\alpha+\sec^3\alpha$ is [*SSC CGL-2014*]

(a) 2 (b) 1
(c) 0 (d) 4

44. If $\sin\theta+\cos\theta=\sqrt{2}\cos\theta$, then the value of $\cot\theta$ is [*SSC CGL-2014*]

(a) $\sqrt{2}+1$ (b) $\sqrt{2}-1$
(c) $\sqrt{3}-1$ (d) $\sqrt{3}+1$

45. The shadow of a tower standing on a level plane is found to be 30 m longer when the Sun's altitude changes from 60° to 45°. The height of the tower is [*SSC CGL-2014*]

(a) $15\left(3+\sqrt{3}\right)$ m

(b) $15\left(\sqrt{3}+1\right)$ m

(c) $15\left(\sqrt{3}-1\right)$ m

(d) $15\left(3-\sqrt{3}\right)$ m