Trigonometry

1 Mark

Note: In the following questions $0° \le \theta \le 90°$

1. If $x = a\sin\theta$ and $y = a\cos\theta$ then the value of $x^2 + y^2$ is ________
2. The value of $\cos ec70° - \sec 20°$ is ___
3. If $3\sec\theta - 5 = 0$, then $\cot\theta =$_______
4. If $\theta = 45°$, then find $\sec\theta\cot\theta - \cos ec\theta\tan\theta$
5. If $\sin(90° - \theta)\cos\theta = 1$ and θ is an acute angle then find θ.
6. The value of $(1+\cos\theta)(1-\cos\theta)\cos ec^2\theta =$ ______
7. ΔTRY is right- angled isosceles triangle then $\cos T + \cos R + \cos Y\, is$ ______
8. If $K + 7\sec^2 62° - 7\cot^2 28° = 7\sec 0°$, then the value of K is _______
9. The value of $\cot\theta - \sin\left(\frac{\pi}{2} - \theta\right)\cos\left(\frac{\pi}{2} - \theta\right) is$ _____
10. If $\sin\theta - \cos\theta = 0$, $0° \le \theta \le 90°$, then the value of θ is______
11. Write in simplest form $\frac{\sin\theta}{\sqrt{1-\sin^2\theta}}$
12. If $\sin\theta = \frac{1}{2}$, then value of $\sin\theta + \cos ec\theta\, is$
13. In an isosceles right angle triangle ABC, $\angle B = 90°$. The value of $2\sin A\cos A\, is$ _______
14. If $\frac{\sin^2 20° + \sin^2 70°}{2(\cos^2 69° + \cos^2 21°)} = \frac{\sec 60°}{K}$ then K is ____
15. $\Delta ABC \sim \Delta PRT$ and $\angle C = \angle R = 90°$. If $\frac{AC}{AB} = \frac{3}{5}$, then $\sin T$ is ______
16. Write in simplest form $\sqrt{1+\tan^2\theta}$.
17. If $A + B = 90°$, $\cot B = \frac{3}{4}$, then $\tan A$=?
18. Find the maximum Value of $\frac{1}{\cos ec\theta}$, $0° < \theta < 90°$.
19. If $\cos\theta = \frac{1}{2}$ and $\sin\phi = \frac{1}{2}$ then find value of $\theta + \phi$
20. If $\sin(A+B) = 1 = \cos(A-B)$, then find $A\ and\ B$.

2/3/4 Marks

1. In ΔPQR, right- angle at Q, $PQ = 4cm$ and $RQ = 3cm$. Find the value of $\sin P$, $\sin R$, $\sec P$, $\sec R$
2. In a right-angled ΔABC, if $AB = 12$ units, $\angle B = 90°$ and $BC = 5$ units, find all the six T-ratios of $\angle A$.

3. Given $\tan\theta = \frac{12}{5}$, calculate $\sin\theta$, $\cos\theta$ and verify that $\sin^2\theta + \cos^2\theta = 1$.

4. Given $\sin\theta = \frac{3}{5}$, find the other five trigonometric ratios of θ.

5. If $3\cot A = 4$, check whether $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$ or not.

6. In ΔABC right angled at *B*. If $\tan A = \frac{1}{\sqrt{3}}$, find the values of

   (i) $\sin A.\cos C + \cos A.\sin C$

   (ii) $\cos A.\cos C - \sin A.\sin C$

7. In ΔOPQ right angle at *P*, $OP = 7cm$, $OQ - PQ = 1cm$, Determine the value of $\sin Q$ and $\cos Q$.

8. If $\cos\theta = \frac{3}{5}$, evaluate $\frac{\sin\theta - \cot\theta}{2\tan\theta}$

9. Given $\cos\theta = \frac{21}{29}$, determine the values of $\frac{\sec\theta}{\tan\theta - \sin\theta}$.

10. Evaluate $\frac{\cos ec\theta - \cot\theta}{2\cot\theta}$, when $\sin\theta = \frac{3}{5}$.

11. Given that $\cos\theta = \frac{p}{q}$, find the value of $\tan\theta$.

12. If $\cot\theta = \frac{1}{\sqrt{3}}$, show that $\frac{1-\cos^2\theta}{2-\sin^2\theta} = \frac{3}{5}$.

13. If $\tan\theta = 2$, evaluate $\sin\theta.\sec\theta + \tan^2\theta - \cos ec\theta$.

14. If $\sec\theta = \frac{13}{5}$, show that $\frac{2\sin\theta - 3\cos\theta}{4\sin\theta - 9\cos\theta} = 3$

15. In ΔABC right-angled at *B*, $AB = 5cm$ and $\angle ABC = 30°$. Determine the length of sides BC and AC.

16. Evaluate: $\sin 30°.\cos 45° + \cos 30°.\sin 45°$

17. Evaluate: $4\cot^2 45° - \sec^2 60° + \sin^2 60° + \cos^2 90°$

18. Evaluate: $\frac{\tan 60°}{\sec 60° + \cos ec 60°}$

19. Show that: $\sin^2 45° + \sin^2 30° + \sin^2 60° = \frac{3}{2}$

20. Show that: $\frac{\tan^2 60° + 4\sin^2 45° + 3\sec^2 30° + 5\cos^2 90°}{\cos ec 30° + \sec 60° - \cot^2 30°} = 9$

21. Given $A = 30°$, verify:

   (i) $\sin A = \sqrt{\frac{1-\cos 2A}{2}}$

   (ii) $\cos 3A = 4\cos^3 A - 3\cos A$

22. If $\sin(A-B) = \frac{1}{2}$, $\cos(A+B) = \frac{1}{2}$, $0 < A+B \le 90°$. Find *A* and *B*

23. Evaluate:

(i) $2\sin^2 30°.\tan 60° - 3\cos^2 60°.\sec^2 30°$

(ii) $\cos 30°.\cos 45° - \sin 30°.\sin 45°$

(iii) $\tan^2 60° + 4\cos^2 45° + 3\sec^2 30° + 5\cos^2 90°$

(iv) $\cos ec^2 30°.\sin 45° - \sec^2 60°$

(v) $\dfrac{\sin 60°}{\cos^2 45°} + 5\cos 90° - \cot 30°$

(vi) $\dfrac{\tan 45°}{\sin 30° + \cos 30°}$

(vii) $\dfrac{5\sin^2 30° + \cos^2 45° + 4\tan^2 60°}{2\sin 30° + \cos 60° + \tan 45°}$

(viii) $\sin^2 30°.\cos^2 45° + 4\tan^2 30° + \frac{1}{2}\sin^2 90° + \frac{1}{8}\cot^2 60°$

24. Verify each of the following :

(i) $\cos 60°.\cos 30° - \sin 60°.\sin 30° = 90°$

(ii) $\cos 90° = 1 - 2\sin^2 45° = 2\cos^2 45° - 1$

(iii) $\sin 30°.\cos 60° + \cos 30°.\sin 60° = \sin 90°$

(iv) $\dfrac{\tan 60° - \tan 30°}{1 + \tan 60°.\tan 30°} = \tan 30°$

(v) $1 + \cot^2 30° = \cos ec^2 30°$

(vi) $\dfrac{\cos 30° + \sin 60°}{1 + \sin 30° + \cos 60°} = \cos 30°$

(vii) $\dfrac{\sin 60°}{1 + \cos 60°} = \tan 30°$

(viii) $2\sin 45°.\cos 45° = \sin 90°$

25. Show that:

(i) $\sin^2 45° + \cos^2 45° = 1$

(ii) $2\sin^2 60°.\cos 60° = \dfrac{3}{4}$

(iii) $\cos^2 30° + \sin 30° + \tan 45° = 2\dfrac{1}{4}$

26. Given $A = 30°$, Verify:

(i) $\sin 2A = 2\sin A.\cos A$

(ii) $\cos A = \sqrt{\dfrac{1 + \cos 2A}{2}}$

(iii) $\sin 3A = 3\sin A - 4\sin^3 A$

(iv) $\cos A = \dfrac{1}{\sqrt{1 + \tan^2 A}}$

(v) $\sin^2 A + \cos^2 A = 1$

(vi) $1 + \tan^2 A = \sec^2 A$

(vii) $\tan A = \dfrac{\sin A}{\sqrt{1 - \sin^2 A}}$

(viii) $\sin A = \frac{\tan A}{\sqrt{1+\tan^2 A}}$

(ix) $\tan A = \frac{\sqrt{1-\cos^2 A}}{\cos A}$

27. If $\sin(A+B)=1$ and $\cos(A-B)=1$, $0° < A+B \le 90°; A \ge B$, find *A* and *B*.

28. If $\tan(A+B)=\sqrt{3}$ and $\tan(A-B)=\frac{1}{\sqrt{3}}$, $0° < A+B \le 90°$, find *A* and *B*.

29. Evaluate the following:
 (i) $\frac{\cot 54°}{\tan 36°}+\frac{\tan 20°}{\cot 70°}-2$
 (ii) $\sin^2 20° + \sin^2 70° - \tan^2 45°$
 (iii) $\left(\frac{\sin 47°}{\cos 43°}\right)^2 + \left(\frac{\cos 43°}{\sin 47°}\right)^2 - 4\cos^2 45°$

30. Express each of the following in terms of trigonometric ratios of angles between $0°$ and $45°$
 (i) $\sin 85° + \operatorname{cosec} 85°$
 (ii) $\tan 68° + \sec 68°$

31. Prove that:
 (i) $\cos\theta.\sin(90°-\theta)+\sin\theta.\cos(90°-\theta)=1$
 (ii) $\frac{\cos\theta}{\sin(90°-\theta)}+\frac{\sin\theta}{\cos(90°-\theta)}=2$
 (iii) $\frac{\sin\theta.\cos(90°-\theta).\cos\theta}{\sin(90°-\theta)}+\frac{\cos\theta.\sin(90°-\theta).\sin\theta}{\cos(90°-\theta)}=1$
 (iv)

32. Show that:
 (i) $\tan 10°.\tan 15°.\tan 75°.\tan 80° = 1$
 (ii) $\cos 1°.\cos 2°.\cos 3°.....\cos 180° = 0$

33. If $\tan 2\theta = \cot(\theta+6°)$, where 2θ and $(\theta+6°)$ are acute angles, find the value of θ

34. Evaluate the following:
 (i) $\left(\frac{\sin 49°}{\cos 41°}\right)^2 + \left(\frac{\cot 41°}{\tan 49°}\right)^2$
 (ii) $\left(\frac{\tan 20°}{\operatorname{cosec} 70°}\right)^2 + \left(\frac{\cot 20°}{\sec 70°}\right)^2$
 (iii) $\tan 35°.\tan 45°.\tan 40°.\tan 50°.\tan 55°$
 (iv) $\frac{\cos^2 20° + \cos^2 70°}{\sin^2 59° + \sin^2 31°} + \sin 35°.\sec 55°$
 (v) $(\sin^2 63° + \sin^2 27°) + (\cos^2 73° + \cos^2 17°)$

(vi) $\frac{2\cos 67^\circ}{\sin 23^\circ} - \frac{\tan 40^\circ}{\cot 50^\circ} - \cos 0^\circ$

(vii) $\left(\frac{\sin 27^\circ}{\cos 63^\circ}\right)^2 + \left(\frac{\cos 63^\circ}{\sin 27^\circ}\right)^2$

35. Express $\cos 75^\circ + \cot 75^\circ$ in terms of angles between 0° and 45°.

36. Without using trigonometric table prove that :

(i) $\sin 35^\circ.\sin 55^\circ - \cos 35^\circ.\cos 55^\circ = 0$

(ii) $\cos ec^2 67^\circ - \tan^2 23^\circ = 1$

(iii) $\frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 59^\circ}{\sin 31^\circ} - 8\sin^2 30^\circ = 0$

(iv) $\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ.\cos ec 31^\circ = 2$

(v) $\tan 7^\circ.\tan 23^\circ.\tan 60^\circ.\tan 67^\circ.\tan 83^\circ = \sqrt{3}$

37. Prove that:

(i) $\frac{\sin\theta}{\sin(90^\circ-\theta)} + \frac{\cos\theta}{\cos(90^\circ-\theta)} = \sec\theta.\cos ec\theta$

(ii) $\sin\theta.\cos(90^\circ-\theta) + \cos\theta.\sin(90^\circ-\theta) = 1$

(iii) $\frac{\cos(90^\circ-\theta)}{1+\sin(90^\circ-\theta)} + \frac{1+\sin(90^\circ-\theta)}{\cos(90^\circ-\theta)} = 2\cos ec\theta$

(iv) $\frac{\cos(90^\circ-\theta).\sec(90^\circ-\theta).\tan\theta}{\cos ec(90^\circ-\theta).\sin(90^\circ-\theta).\cot(90^\circ-\theta)} + \frac{\tan(90^\circ-\theta)}{\cot\theta} = 2$

38. Evaluate:

(i) $\frac{\tan 20^\circ}{\cot 70^\circ} + \frac{\cot 50^\circ}{\tan 40^\circ} + \frac{\sin^2 20^\circ + \sin^2 70^\circ}{\sin\theta.\cos(90^\circ-\theta) + \cos\theta.\sin(90^\circ-\theta)}$

(ii) $\sin(20^\circ + A).\cos(70^\circ - A) + \cos(20^\circ + A).\sin(70^\circ - A)$

(iii) $\frac{\tan 50^\circ + \sec 50^\circ}{\cot 40^\circ + \cos ec 40^\circ} + \cos 40^\circ.\cos ec 50^\circ$

(iv) $\frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 55^\circ.\cos ec 35^\circ}{\tan 5^\circ.\tan 25^\circ.\tan 45^\circ.\tan 65^\circ.\tan 85^\circ}$

(v) $\frac{\cos^2 20^\circ + \cos^2 70^\circ}{\sin^2 59^\circ + \sin^2 31^\circ} + \sin 35^\circ.\sec 55^\circ$

(vi) $\tan 15^\circ.\tan 20^\circ.\tan 70^\circ.\tan 75^\circ$

(vii) $\frac{\cos 35^\circ}{\sin 55^\circ} + \frac{\tan 27^\circ.\tan 63^\circ}{\sin 30^\circ} - 3\tan^2 60^\circ$

(viii) $\frac{\sin 39^\circ}{\cos 51^\circ} + 2\tan 11^\circ.\tan 31^\circ.\tan 45^\circ.\tan 59^\circ.\tan 79^\circ - 3(\sin^2 21^\circ + \sin^2 69^\circ)$

39. If A and B are the angles of a right-angled triangle ABC, right angle at C. Prove that:

(i) $\sin^2 A + \sin^2 B = 1$

(ii) $1+\tan^2 A=\cos ec^2 B$

(iii) $1+\cot^2 B=s\,ec^2 A$

40. If A, B, C are the angles of a triangle, prove that $\tan\left(\frac{B+C}{2}\right)=\cot\frac{A}{2}$
41. Prove that: $\tan 1°.\tan 2°.\tan 3°.....\tan 89°=1$
42. If $\tan A=\cot B$, prove that $A+B=90°$
43. Find θ, if $\sin(\theta+36°)=\cos\theta$, where $\theta+36°$ is an acute angle.
44. If $\sin 3\theta=\cos(\theta-6°)$, where 3θ and $(\theta-6°)$ are acute angle.
45. If A and B are acute angles and $\sin A=\cos B$, prove that $A+B=90°$
46. In a ΔABC, show that $\sin\left(\frac{B+C}{2}\right)=\cos\frac{A}{2}$

Prove the following Identities: (47 to 100)

47. $(\cos\theta-\sin\theta)^2+(\cos\theta+\sin\theta)^2=2$
48. $\cot\theta-\tan\theta=\frac{2\cos^2\theta-1}{\sin\theta.\cos\theta}$
49. $\sin^4\theta-\cos^4\theta=(\sin^2\theta-\cos^2\theta)=(2\sin^2\theta-1)=(1-2\cos^2\theta)$
50. $\sqrt{\frac{1+\sin A}{1-\sin A}}=\sec A+\tan A$
51. $(\sin A+\cos ecA)^2+(\cos A+\sec A)^2=7+\tan^2 A+\cot^2 A$

52. $(\cos ecA-\sin A)(\sec A-\cos A)=\frac{1}{\tan A+\cot A}$
53. $\sin^4\theta+\cos^4\theta=1-2\sin^2\theta.\cos^2\theta$
54. $\sin^6\theta+\cos^6\theta=1-3\sin^2\theta.\cos^2\theta$
55. $2(\sin^6\theta+\cos^6\theta)-3(\sin^4\theta+\cos^4\theta)+1=0$
56. $\frac{1}{\cos ecA-\cot A}-\frac{1}{\sin A}=\frac{1}{\sin A}-\frac{1}{\cos ecA+\cot A}$
57. $\frac{\tan A+\sec A-1}{\tan A-\sec A+1}=\frac{1+\sin A}{\cos A}$
58. $(1+\cot A+\tan A)(\sin A-\cos A)=\frac{\sec A}{\cos ec^2 A}-\frac{\cos ecA}{\sec^2 A}$
59. $\frac{\cos^2\theta+\tan^2\theta-1}{\sin^2\theta}=\tan^2\theta$
60. $(1+\tan^2\theta)(1-\sin\theta)(1+\sin\theta)=1$

61. $\frac{\sin\theta}{1-\cos\theta}=\operatorname{cosec}\theta+\cot\theta$

62. $\frac{\cos\theta}{1+\sin\theta}=\frac{1-\sin\theta}{\cos\theta}$

63. $\tan^2\phi-\sin^2\phi=\tan^2\phi.\sin^2\phi$

64. $\left(\sec^2 A-1\right)\left(\operatorname{cosec}^2 A-1\right)=1$

65. $\tan^2\theta+\cot^2\theta+2=\sec^2\theta.\operatorname{cosec}^2\theta$

66. $\frac{\sec\phi-1}{\sec\phi+1}=\frac{1-\cos\phi}{1+\cos\phi}$

67. $\sin A(1+\tan A)+\cos A(1+\cot A)=(\sec A+\operatorname{cosec} A)$

68. $\frac{\operatorname{cosec} A}{\operatorname{cosec} A-1}+\frac{\operatorname{cosec} A}{\operatorname{cosec} A+1}=2\sec^2 A$

69. $\tan A+\cot A=\sec A.\operatorname{cosec} A$

70. $\frac{1+\sec A}{\sec A}=\frac{\sin^2 A}{1-\cos A}$

71. $\frac{1+\sin\theta}{\cos\theta}+\frac{\cos\theta}{1+\sin\theta}=2\sec\theta$

72. $\frac{\tan^2\theta}{\tan^2\theta-1}+\frac{\operatorname{cosec}^2\theta}{\sec^2\theta-\operatorname{cosec}^2\theta}=\frac{1}{\sin^2\theta-\cos^2\theta}$

73. $\frac{1-\tan^2\theta}{\cot^2\theta-1}=\tan^2\theta$

74. $\frac{\cot A-\cos A}{\cot A+\cos A}=\frac{\operatorname{cosec} A-1}{\operatorname{cosec} A+1}$

75. $\frac{1+\tan^2 A}{1+\cot^2 A}=\left(\frac{1-\tan A}{1-\cot A}\right)^2$

76. $\frac{1-\cos\theta}{1+\cos\theta}=(\operatorname{cosec}\theta-\cot\theta)^2$

77. $(\sec\theta-\tan\theta)^2=\frac{1-\sin\theta}{1+\sin\theta}$

78. $\sqrt{\frac{1+\sin A}{1-\sin A}}=\frac{1+\sin A}{\cos A}$

79. $\frac{\sin A+\cos A}{\sin A-\cos A}+\frac{\sin A-\cos A}{\sin A+\cos A}=\frac{2}{\sin^2 A-\cos^2 A}=\frac{2}{1-2\cos^2 A}=\frac{2}{2\sin^2 A-1}$

80. $\frac{\tan\theta}{\frac{\sin^3\theta}{\cos\theta}+\sin\theta.\cos\theta}=1$

81. $\sec x(\operatorname{cosec} x-\sin x)+\operatorname{cosec} x(\sec x-\cos x)=\sec x.\operatorname{cosec} x$

82. $\sin^8\theta-\cos^8\theta=\left(1-2\sin^2\theta.\cos^2\theta\right)\left(\sin^2\theta-\cos^2\theta\right)$

83. $\tan^4\theta+\tan^2\theta=\sec^4\theta-\sec^2\theta$

84. $\dfrac{1+\tan^2\theta}{1+\cot^2\theta}=\left(\dfrac{1-\tan\theta}{1-\cot\theta}\right)^2$

85. $\dfrac{\cos^3\theta+\sin^3\theta}{\cos\theta+\sin\theta}+\dfrac{\cos^3\theta-\sin^3\theta}{\cos\theta-\sin\theta}=2$

86. $\dfrac{1}{\sec A+\tan A}-\dfrac{1}{\cos A}=\dfrac{1}{\cos A}-\dfrac{1}{\sec A-\tan A}$

87. $\left(\dfrac{1}{\sec^2\theta-\cos^2\theta}+\dfrac{1}{\cos ec^2\theta-\sin^2\theta}\right)\sin^2\theta.\cos^2\theta=\dfrac{1-\sin^2\theta.\cos^2\theta}{2+\sin^2\theta.\cos^2\theta}$

88. $2\sec^2\theta-\sec^4\theta-2\cos ec^2\theta+\cos ec^4\theta=\cot^4\theta-\tan^4\theta$

89. $\dfrac{\cos\theta}{1-\tan\theta}+\dfrac{\sin\theta}{1-\cot\theta}=\sin\theta+\cos\theta$

90. $\dfrac{\cot\theta}{\cos ec\theta+1}+\dfrac{\cos ec\theta+1}{\cot\theta}=2\sec\theta$

91. $\dfrac{\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta}=\tan\theta$

92. $\dfrac{\sin\theta}{(\sec\theta+\tan\theta-1)}+\dfrac{\cos\theta}{(\cos ec\theta+\cot\theta-1)}=1$

93. $\dfrac{(1+\tan\theta+\cot\theta)(\sin\theta-\cos\theta)}{\sec^3\theta-\cos ec^3\theta}=\sin^2\theta.\cos^2\theta$

94. $\sqrt{\sec^2\theta+\cos ec^2\theta}=\tan\theta+\cot\theta$

95. $\dfrac{\sin A-\sin B}{\cos A+\cos B}+\dfrac{\cos A-\cos B}{\sin A+\sin B}=0$

96. $\tan^2 A-\tan^2 B=\dfrac{\sin^2 A-\sin^2 B}{\cos^2 A.\cos^2 B}=\dfrac{\cos^2 B-\cos^2 A}{\cos^2 B.\cos^2 A}$

97. $\dfrac{\sin\theta}{\cot\theta+\cos ec\theta}=2+\dfrac{\sin\theta}{\cot\theta-\cos ec\theta}$

98. $(1-\tan A)^2+(1-\cot A)^2=(\sec A-\cos ecA)^2$

99. $\dfrac{\tan^3\theta-1}{\tan\theta-1}=\sec^2\theta+\tan\theta$

100. $\dfrac{\tan\theta}{1-\cot\theta}+\dfrac{\cot\theta}{1-\tan\theta}=1+\tan\theta+\cot\theta=1+\sec\theta.\cos ec\theta$

101. If $\cos\theta+\sin\theta=\sqrt{2}\cos\theta$, show that $\cos\theta-\sin\theta=\sqrt{2}\sin\theta$.

102. If $x=a\sin\theta$ and $y=b\tan\theta$, prove that $\dfrac{a^2}{x^2}-\dfrac{b^2}{y^2}=1$

103. If $\tan\theta+\sin\theta=m$ and $\tan\theta-\sin\theta=n$, show that

$m^2-n^2=4\sqrt{mn}\ or\ \left(m^2-n^2\right)^2=16mn$

104. If $x=r\sin A\cos C$, $y=r\sin A\sin C$ and $z=r\cos A$, prove that $r^2=x^2+y^2+z^2$

105. If $a\cos\theta+b\sin\theta=m$ and $a\sin\theta-b\cos\theta=n$, prove that $a^2+b^2=m^2+n^2$

106. If $x=a\sec\theta+b\tan\theta$ and $y=a\tan\theta+b\sec\theta$, prove that $x^2-y^2=a^2-b^2$.

107. If $\dfrac{x}{a}\cos\theta+\dfrac{y}{b}\sin\theta=1$ and $\dfrac{x}{a}\sin\theta-\dfrac{y}{b}\cos\theta=1$, prove that $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}=2$.

108. If $\sin A+\sin^2 A=1$, prove that $\cos^2 A+\cos^4 A=1$

109. If $\sin\theta+\cos\theta=p$ and $\sec\theta+\cos ec\theta=q$, show that $q\left(p^2-1\right)=2p$

110. If $7\sin^2\theta+3\cos^2\theta=4$, show that $\tan\theta=\dfrac{1}{\sqrt{3}}$.

111. If $\sec A=x+\dfrac{1}{4x}$, prove that $\sec A+\tan A=2x\ or\ \dfrac{1}{2x}$

112. If $\dfrac{\cos\alpha}{\cos\beta}=m$ and $\dfrac{\cos\alpha}{\sin\beta}=n$, show that $\left(m^2+n^2\right)\cos^2\beta=n^2$

113. If $7\cos ec\phi-3\cot\phi=7$, prove that $7\cot\phi-3\cos ec\phi=3$.

114. If $\tan\theta=\dfrac{5}{6}$ & $\theta+\phi=90°$ what is the value of $\cot\phi$.

115. If $\sec\theta+\tan\theta=4$ find $\sin\theta$, $\cos\theta$.

116. If $\sec\theta+\tan\theta=p$, prove that $\sin\theta=\dfrac{p^2-1}{p^2+1}$

117. Prove geometrically $\sin 60°=\dfrac{\sqrt{3}}{2}$

118. If $2x=\sec\theta$ and $\dfrac{2}{x}=\tan\theta$, then find the value $2\left(x^2-\dfrac{1}{x^2}\right)$.

119. If $\dfrac{1-\tan\theta}{1+\tan\theta}=\dfrac{\sqrt{3}-1}{\sqrt{3}+1}$, show that $\dfrac{\sin\theta}{\cos 2\theta}=1$.

120. If $\cos^2\alpha-\sin^2\alpha=\tan^2\beta$, then prove that $\cos\beta=\dfrac{1}{\sqrt{2}\cos\alpha}$

121. If $\cos ec\theta-\sin\theta=m^3$ and $\sec\theta-\cos\theta=n^3$, then prove that $m^4n^2+m^2n^4=1$

122. If $\sin\alpha = a\sin\beta$ and $\tan\alpha = b\tan\beta$, then prove that $\cos^2\alpha = \frac{a^2-1}{b^2-1}$

123. If $\sin\theta + \sin^2\theta = 1$, then prove that

$$\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta + 2\cos^4\theta + \cos^2\theta = 2 + \sin^2\theta$$

124. If A, B, C are the interior angles of triangle ABC, show that

$$\sin\frac{B+C}{2}\cos\frac{A}{2} + \cos\frac{B+C}{2}\sin\frac{A}{2} = 1$$

125. Given that $\tan(\theta_1+\theta_2) = \frac{\tan\theta_1 + \tan\theta_2}{1-\tan\theta_1.\tan\theta_2}$, find $(\theta_1+\theta_2)$ when $\tan\theta_1 = \frac{1}{2}$ and $\tan\theta_2 = \frac{1}{3}$

126. If $a\cos\theta - b\sin\theta = c$ prove that $b\cos\theta + a\sin\theta = \pm\sqrt{a^2+b^2-c^2}$.

127. In an acute angled ΔABC, if $\sin(A+B-C) = \frac{1}{2}$ and $\cos(B+C-A) = \frac{1}{\sqrt{2}}$, then find angles A, B, C.

128. If θ is acute angle and $5\sin^2\theta + \cos^2\theta = 4$, then find value of θ.

Answers

1 Mark

1. a^2
2. 0
3. $\frac{3}{4}$
4. 0
5. $0°$
6. 1
7. $\sqrt{2}$
8. 0
9. $\cot\theta\cos^2\theta$
10. $45°$
11. $\tan\theta$
12. $\frac{5}{2}$
13. 1
14. 4
15. $\frac{3}{5}$
16. $\sec\theta$
17. $\frac{3}{4}$
18. 1
19. $90°$
20. $A = B = 45°$

2/3/4 Marks

1. $\frac{3}{5}, \frac{4}{5}, \frac{5}{4}, \frac{5}{3}$
2. $\frac{5}{13}, \frac{12}{13}, \frac{5}{12}, \frac{13}{5}, \frac{13}{12}, \frac{12}{5}$
4. $\frac{4}{5}, \frac{3}{4}, \frac{5}{3}, \frac{5}{3}, \frac{5}{4}, \frac{4}{3}$
6. (i) 1, (ii) 0
8. $\frac{3}{160}$
9. $\frac{841}{160}$
10. $\frac{1}{8}$
11. $\frac{\sqrt{q^2-p^2}}{p}$
13. $6 - \frac{\sqrt{5}}{2}$
15. $10,\ 5\sqrt{3}$
16. $\frac{\sqrt{2}+\sqrt{6}}{4}$
17. $\frac{3}{4}$
18. $\frac{3}{4}(\sqrt{3}-1)$
22. $45°, 15°$

23. (i) $\left(\frac{\sqrt{3}}{2}-1\right)$ (ii) $\left(\frac{\sqrt{6}-\sqrt{2}}{4}\right)$

(iii) 9 (iv) $2\sqrt{2}-4$

(v) 0 (vi) $\sqrt{3}-1$

(vii) $\frac{11}{2}$ (viii) 2

29. (i) 0 (ii) 0 (iii) 0

34. (i) 2 (ii) 1 (iii) 1 (iv) 2 (v) 2 (vi) 0 (vii) 2

37. (i) 3 (ii) 1 (iii) 2 (iv) 2 (v) 2 (vi) 1

(vii) $1+2\sqrt{3}$ (viii) 0

42. $27°$

43. $24°$

114. $\frac{5}{6}$

115. $\sin\theta=\frac{15}{17}$

116. $\cos\theta=\frac{8}{17}$

118. $\frac{1}{2}$

125. $45°$

127. $67.5°, 37.5°, 75°$

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