SECTION A

Q1. $(\text{cosec}\,\theta - \cot\theta)^2 = ?$

A $\frac{1+\cos\theta}{1-\cos\theta}$ **B** $\frac{1-\cos\theta}{1+\cos\theta}$

C $\frac{1+\sin\theta}{1-\sin\theta}$ **D** None of these.

Q2. If $\cos(\alpha+\beta) = 0$, then value of $\cos\left(\frac{\alpha+\beta}{2}\right)$ is equal to:

A $\frac{1}{\sqrt{2}}$ **B** $\frac{1}{2}$ **C** 0 **D** $\sqrt{2}$

Q3. Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

Assertion: In a right $\triangle$ABC, right angled at B, if $\tan A = \frac{12}{5}$, then $\sec A = \frac{13}{5}$.

Reason: cot A is the product ofcot and A.

A Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

B Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

C Assertion (A) is true but reason (R) is false.

D Assertion (A) is false but reason (R) is true.

Q4. $\frac{\tan\theta}{\sec\theta-1} + \frac{\tan\theta}{\sec\theta+1}$ is equal to:

A $2\tan\theta$ **B** $2\sec\theta$

C $2\text{cosec}\,\theta$ **D** $2\tan\theta\sec\theta$

Q5. If $\cot\theta = \frac{7}{8}$ then the value of $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ is:

A $\frac{8}{7}$ **B** $\frac{49}{64}$ **C** $\frac{7}{8}$ **D** $\frac{64}{49}$

Q6. Choose the correct answer from the given four options.

If $\cos A = \frac{4}{5}$, then the value of tan A is:

A $\frac{3}{5}$ **B** $\frac{3}{4}$ **C** $\frac{4}{3}$ **D** $\frac{5}{3}$

Q7. $\sqrt{\frac{1-\sin A}{1+\sin A}} = ?$

A $\sec A + \tan A$ **B** $\sec A - \tan A$

C $\sec A \tan A$ **D** None of these.

Q8. Choose the correct option and justify your choice:

$\frac{2\tan 30^\circ}{1-\tan^2 30^\circ} =$

A $\cos 60^\circ$ **B** $\sin 60^\circ$ **C** $\tan 60^\circ$ **D** $\sin 30^\circ$

Q9. If $8\tan x = 15$, then $\sin x - \cos x$ is equal to:

A $\frac{8}{17}$ **B** $\frac{17}{7}$ **C** $\frac{1}{17}$ **D** $\frac{7}{17}$

Q10. If $x\tan 45^\circ \cos 60^\circ = \sin 60^\circ \cot 60^\circ$, then x is equal to:

A 1 **B** $\sqrt{3}$ **C** $\frac{1}{2}$ **D** $\frac{1}{\sqrt{2}}$

SECTION B

Q11. Prove the following trigonometric identities.

$\frac{\cos\theta}{\text{cosec}\,\theta+1} + \frac{\cos\theta}{\text{cosec}\,\theta-1} = 2\tan\theta$

OR

Q11. Prove the following trigonometric identities.

$(\text{cosec}A - \sin A)(\sec A - \cos A)(\tan A + \cot A) = 1$

Q12. Very-short and Short-Answer Questions.

Write the value of $\sec^2\theta(1+\sin\theta)(1-\sin\theta)$.

SECTION C

Q13. Prove the following trigonometric identities.

$\sec^4 A(1 - \sin^4 A) - 2\tan^2 A = 1$

Q14. In a $\triangle ABC$, right angled at A, if $\tan C = \sqrt{3}$, find the value of sin B cos C + cos B sin C.

Q15. If $\sqrt{3}\tan\theta = 3\sin\theta$, find the value of $\sin^2\theta - \cos^2\theta$.

Q16. Prove the following: (cosec A − sin A)(sec A − cos A) $= \frac{1}{\tan A + \cot A}$

OR

Q16. Prove the following trigonometric identities.

$\frac{\sec\theta - 1}{\sec\theta + 1} = \left(\frac{\sin\theta}{1+\cos\theta}\right)^2$

SECTION D

Q17. Prove that $\frac{1}{(sec\theta - \tan\theta)} - \frac{1}{\cos\theta} = \frac{1}{\cos\theta} - \frac{1}{(\sec\theta + \tan\theta)}$.

OR

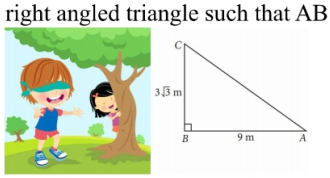
Q17. Prove that $\frac{\sin A - 2\sin^3 A}{(2\cos^3 A - \cos A)} = \tan A$.

Q18. Prove the following identities:

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

SECTION E

Q19. Three friends - Anshu, Vijay and Vishal are playing hide and seek in a park. Anshu and Vijay hide in the shrubs and Vishal have to find both of them. If the positions of three friends are at A, B and C respectively as shown in the figure and forms a right angled triangle such that AB = 9 m, BC = $\sqrt{3}$ m and $\angle B = 90^\circ$, then answer the following questions.



1. The measure of $\angle A$ is:
   1. 30°
   2. 45°
   3. 60°
   4. None of these.
2. The measure of $\angle C$ is:
   1. 30°
   2. 45°
   3. 60°
   4. None of these.
3. The length of AC is:
   1. $2\sqrt{3}$ m
   2. $\sqrt{3}$ m
   3. $4\sqrt{3}$ m
   4. $6\sqrt{3}$ m
4. cos 2A =
   1. 0
   2. $\frac{1}{2}$
   3. $\frac{1}{\sqrt{2}}$
   4. $\frac{\sqrt{3}}{2}$
5. $\text{Sin}\left(\frac{C}{2}\right)$ =
   1. 0
   2. $\frac{1}{2}$
   3. $\frac{1}{\sqrt{2}}$
   4. $\frac{\sqrt{3}}{2}$