### SECTION A

*Followings multiple choice questions are of **1 Mark** each (Q01-10).*
*Select the correct option in each one of them.*

Q01. If $\sin\theta = \frac{3}{5}$, then $\cos\theta$ is

(A) $\frac{4}{5}$ (B) $\frac{5}{4}$ (C) $\frac{3}{4}$ (D) $\frac{2}{5}$

Q02. If $\cos A = \frac{12}{13}$, then $\tan A =$

(A) $\frac{13}{12}$ (B) $\frac{12}{5}$ (C) $\frac{5}{13}$ (D) $\frac{5}{12}$

Q03. The value of $\sec^2\theta - \tan^2\theta$ is always

(A) 0 (B) 1 (C) $\pm 1$ (D) None of these

Q04. The value of $\tan 45^\circ + \cos 60^\circ - \sin 30^\circ$ is

(A) $-1$ (B) 0 (C) 1 (D) 2

Q05. The value of $\cos 30^\circ \times \sec 30^\circ$ is

(A) $-1$ (B) 0 (C) 2 (D) 1

Q06. Which of the following is **not** correct?

(A) $\sin 90^\circ = 1$ (B) $\cos 0^\circ = 1$ (C) $\tan 0^\circ = 1$ (D) $\cot 30^\circ = \sqrt{3}$

Q07. The value of $\frac{1+\tan^2\theta}{1+\cot^2\theta}$ is

(A) 1 (B) $\sec^2\theta$ (C) $\sin^2\theta$ (D) None of these

Q08. If $\tan A + \cot A = 2$, then the value of $\tan^2 A + \cot^2 A$ is

(A) $-1$ (B) 0 (C) 2 (D) 1

*Followings are **Assertion-Reason based questions** (Q09 & 10).*
In the following questions, a statement of Assertion (**A**) is followed by a statement of Reason (**R**). Choose the correct answer out of the following choices.

(A) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(B) Both **A** and **R** are true and **R** is not the correct explanation of **A**.
(C) **A** is true but **R** is false.
(D) **A** is false but **R** is true.

Q09. **Assertion (A) :** If $\sec\theta + \tan\theta = p$, then the value of $\sec\theta - \tan\theta$ is $\frac{1}{p}$.

**Reason (R) :** If $\sin\phi = \frac{1}{2}$, then $\phi = 30^\circ$.

Q10. **Assertion (A) :** If $\sin\theta + \cos\theta = \frac{3}{2}$, then the value of $\sin^3\theta + \cos^3\theta = \frac{9}{16}$.

**Reason (R) :** In a right angled triangle with an acute angle $\theta$, we have $\sin^2\theta + \cos^2\theta = \pm\frac{1}{2}$.

$[1\times 10 = 10$

## SECTION B

*Followings are of **2 Marks** each (Q11-12).*

Q11. Prove that : $\sqrt{\frac{\sec A-1}{\sec A+1}}+\sqrt{\frac{\sec A+1}{\sec A-1}}=2\operatorname{cosec} A$.

Q12. (a) If $\sin\alpha=\frac{1}{\sqrt{2}}$ and $\cot\beta=\sqrt{3}$, then find the value of $\operatorname{cosec}\alpha+\operatorname{cosec}\beta$.

**OR**

(b) Evaluate : $\frac{5\cos^2 60^\circ+4\sec^2 30^\circ-\tan^2 45^\circ}{\sin^2 30^\circ+\sin^2 60^\circ}$.

[$2\times2=4$

## SECTION C

*Followings are of **3 Marks** each (Q13-16).*

Q13. Given that $(1+\sin A)(1+\sin B)(1+\sin C)=(1-\sin A)(1-\sin B)(1-\sin C)$.
Then prove that both are equal to $\pm\cos A\cos B\cos C$.

Q14. (a) A rhombus of side 14 cm has two angles of 60° each. Find the length of the diagonals of the rhombus.

**OR**

(b) If $\cos\theta+\cos^2\theta=1$, prove that $\sin^{12}\theta+3\sin^{10}\theta+3\sin^8\theta+\sin^6\theta+2\sin^4\theta+2\sin^2\theta-2=1$.

Q15. If $\tan^2\alpha=1+2\tan^2\beta$, then prove that $2\sin^2\alpha=1+\sin^2\beta$.

Q16. In an acute angled triangle ABC, if $\tan(A+B-C)=1$ and $\sec(B+C-A)=2$, then find the values of angles A, B and C.

[$3\times4=12$

## SECTION D

*Followings are of **5 Marks** each (Q17-18).*

Q17. If $4\sin\theta=3$, then find the value of x, if it is given that $\sqrt{\frac{\operatorname{cosec}^2\theta-\cot^2\theta}{\sec^2\theta-1}}+\cot\theta=\frac{\sqrt{7}}{x}+\cos\theta$.

Q18. (a) If $\sec\theta=x+\frac{1}{4x}$, prove that $\sec\theta+\tan\theta=2x$ or $\frac{1}{2x}$.

**OR**

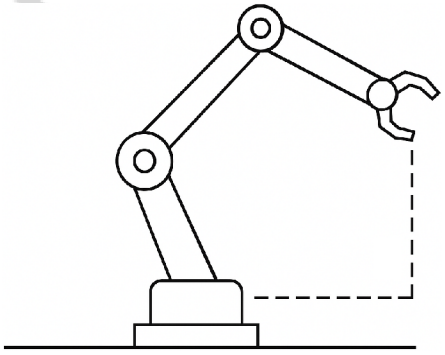
(b) If $\frac{\cos\alpha}{\cos\beta}=m$ and $\frac{\cos\alpha}{\sin\beta}=n$, then prove that $(m^2+n^2)\cos^2\beta=n^2$.

[$5\times2=10$

## SECTION E

*Following is a case-study based question of **4 Marks** (Q19); having three sub-parts (i), (ii) and (iii).*

Q19. A software company is testing an AI-controlled robotic arm that rotates from a fixed base. The control system continuously measures the horizontal and vertical components of the arm's extension using trigonometric ratios.



If $\sin\theta+\cos\theta=\frac{5}{4}$, where $\theta$ is the angle made by arm with horizontal, then answer the following questions.

(i) Find the value of $\sin\theta - \cos\theta$.

(ii) Find the value of $\cos\theta$.

(iii) (a) Find the value of $\sin\theta$. Using values of $\sin\theta$ and $\cos\theta$ (as obtained in sub-part **ii**), show that $\sin^2\theta + \cos^2\theta = 1$.

**OR**

(b) If the arm makes an angle $\phi$ such that $\tan\phi = \frac{7}{24}$, find the value of $\frac{1-\tan^2\phi}{1+\tan^2\phi}$. Hence show that $\sec^2\phi - \tan^2\phi = 1$.

$[1+1+2=4$

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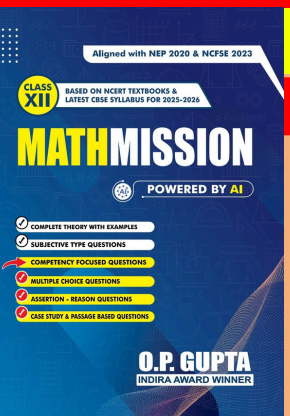


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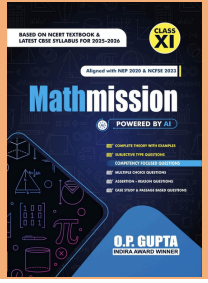


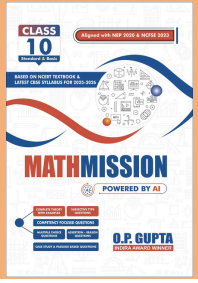


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