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(Affiliated to CBSE up to +2 Level)

CLASS: X

SUB.: MATHS (NCERT BASED)

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Exercise 8.4

4. Choose the correct option. Justify your choice.

(i) $9 \sec^2 A - 9 \tan^2 A = \dots\dots\dots$

- (a) 1 (b) 9 (c) 8 (d) 0

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

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

(iii) $(\sec A + \tan A) (1 - \sin A) = \dots\dots\dots$

- (a) $\sec A$ (b) $\sin A$ (c) $\operatorname{cosec} A$ (d) $\cos A$

(iv) $\frac{1 + \tan^2 A}{1 + \cot^2 A} = \dots\dots\dots$

- (a) $\sec^2 A$ (b) -1 (c) $\cot^2 A$ (d) $\tan^2 A$

Sol. (i) Since, $9 \sec^2 A - 9 \tan^2 A$

$$= 9 (\sec^2 A - \tan^2 A)$$

$$= 9 (1)$$

$$[\because \tan^2 A + 1 = \sec^2 A \Rightarrow \sec^2 A - \tan^2 A = 1]$$

$$= 9$$

\therefore The option (b) is correct.

(ii) Here, $(1 + \tan \theta + \sec \theta) (1 + \cot \theta - \operatorname{cosec} \theta)$

$$= (1 + \tan \theta + \sec \theta) \left[1 + \frac{1}{\tan \theta} - \operatorname{cosec} \theta \right]$$

$$= (1 + \tan \theta + \sec \theta) \left[\frac{\tan \theta + 1 - \tan \theta \cdot \operatorname{cosec} \theta}{\tan \theta} \right]$$

$$= \frac{(1 + \tan \theta + \sec \theta) [\tan \theta + 1 - \sec \theta]}{\tan \theta}$$

$$\left[\because \tan \theta \cdot \operatorname{cosec} \theta = \frac{\sin \theta}{\cos \theta} \times \frac{1}{\sin \theta} = \frac{1}{\cos \theta} = \sec \theta \right]$$

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

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

\therefore The option (c) is correct.

(iii) We have:

$$(\sec A + \tan A)(1 - \sin A)$$

$$= \left(\frac{1}{\cos A} + \frac{\sin A}{\cos A} \right) (1 - \sin A)$$

$$= \left(\frac{1 + \sin A}{\cos A} \right) (1 - \sin A) = \frac{(1 + \sin A)(1 - \sin A)}{\cos A}$$

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

$$[\because 1 - \sin^2 A = \cos^2 A]$$

$$= \cos A$$

\therefore The option (d) is correct.

(iv) Here,
$$\frac{1 + \tan^2 A}{1 + \cot^2 A} = \frac{1 + \tan^2 A}{1 + \frac{1}{\tan^2 A}}$$

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

$$= \tan^2 A$$

\therefore The option (d) is correct.