

RRB NTPC SUNDAY QUANT(Solutions)

S1. Ans.(d)

Sol.

$$\text{Difference of 2 year} = P \left[\frac{r}{100} \right]^2$$

$$8 = P \times \frac{4}{100} \times \frac{4}{100}$$

$$P = 5000$$

S2. Ans.(b)

Sol.

	Sum	Time
2 times	$P \times 2$	15 year
8 time	$P \times (2)^3 \rightarrow$	15×3
= 45 year		

S3. Ans.(b)

Sol.

Let the sum be Rs 100, then,

$$\text{S.I. for first 6 months} = \left(\frac{100 \times 20 \times 1}{100 \times 2} \right) = \text{Rs.10.}$$

$$\text{S.I. for last 6 months} = \left(\frac{110 \times 20 \times 1}{100 \times 2} \right) = \text{Rs.11}$$

$$\text{Effective rate} = 10 + 11 = 21\%$$

S4. Ans.(c)

Sol.

$$28 = P \times \frac{10}{100} \times \frac{10}{100}$$

$$P = 2800$$

$$\text{S.I.} = 2800 \times \frac{10}{100} \times 2 = 560$$

$$\text{C.I.} = 2800 \left[\left(1 + \frac{5}{100} \right)^4 - 1 \right] = 603.41$$

$$\text{Difference} = 603.41 - 560 = 43.41$$

S5. Ans.(d)

Sol.

$$1261 = P \left\{ \left(1 + \frac{R}{100} \right)^n - 1 \right\}$$

$$1261 = P[1.05 \times 1.05 \times 1.05 - 1]$$

$$= P\{1.157625 - 1\}$$

$$1261 = P\{0.157625\}$$

$$P = 8000$$

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S6. Ans.(c)

Sol.

For the first year S.I. & C.I. are same.

$$\begin{aligned} \text{Interest for second year} &= 540.8 - 260 \\ &= 280.8 \end{aligned}$$

Interest on Rs. 260 for one year = 20.8

$$20.8 = \frac{260 \times R \times 1}{100}$$

$$R = 8\%$$

S7. Ans.(d)

Sol.

Interest on 2420 for one year = 2662 - 2420 = 242

$$242 = \frac{2420 \times R}{100}$$

$$R = 10\%$$

S8. Ans.(b)

Sol.

Let the S.I. for one year = I

$$\text{C.I. for half year} = \frac{I}{2}$$

$$\text{C.I. for next half} = \frac{I}{2} \times 1.05$$

∴ because for half year rate of interest is considered as 5% and to calculate the interest we multiply it by 1.05.

A.T.Q.

$$\frac{I}{2} + \frac{I}{2} \times 1.05 - I = 180$$

$$I \left[\frac{1}{2} + \frac{1.05}{2} - 1 \right] = 180$$

$$I \times \frac{0.05}{2} = 180$$

$$I = \frac{P \times R \times 1}{100}$$

$$7200 = \frac{P \times 10}{100}$$

$$P = 72,000$$

S9. Ans.(c)

Sol.

$$\text{Amount} = 30,000 + 4347 = 34347$$

$$34347 = P \left[1 + \frac{7}{100} \right]^n$$

$$\frac{34347}{30000} = \left[\frac{107}{100} \right]^n$$

$$\left[\frac{107}{100} \right]^2 = \left[\frac{107}{100} \right]^n$$

$$n = 2$$

S10. Ans.(a)**Sol.** S.I. for one year = 1000Interest on this amount for one year = 2050 – 2000
= 50

$$50 = \frac{1000 \times R}{100}$$

$$R = 5\%$$

$$1000 = \frac{P \times 5}{100}$$

$$P = 20000$$

S11. Ans.(b)**Sol.** Let $\theta = 45^\circ$

$$\text{Option A} = \sin 45^\circ = \sin^2 45^\circ \Rightarrow \frac{1}{\sqrt{2}} \neq \frac{1}{2} \times$$

$$\text{Option B} = \sin 45^\circ > \sin^2 45^\circ \Rightarrow \frac{1}{\sqrt{2}} > \frac{1}{2} \checkmark$$

$$\text{Option D} = \sin 45^\circ = \operatorname{cosec} 45^\circ \Rightarrow \frac{1}{\sqrt{2}} \neq \sqrt{2} \times$$

Clearly option (b) is correct.

S12. Ans.(a)**Sol.**

$$\text{Required} = \frac{\tan^2 60^\circ + 6 \sin^2 45^\circ - 3 \operatorname{cosec}^2 45^\circ}{\sec^2 60^\circ - \cot 45^\circ}$$

$$= \frac{3 + 6 \times \frac{1}{2} - 3 \times 2}{4 - 1}$$

$$= \frac{6 - 6}{3} = 0$$

S13. Ans. (c)**Sol.** $\tan a = 2$

ATQ

$$\frac{\sin \alpha}{\cos^2 \alpha (\tan^2 \alpha + 1)} = \frac{\tan \alpha}{\cos^2 \alpha (\tan^2 \alpha + 1)}$$
$$= \frac{2}{\frac{1}{(\sqrt{3})^2} (8+1)} = \frac{2 \times 5}{9} = \frac{10}{9}$$

S14. Ans. (a)**Sol.**

$$\cos 37^\circ = a$$

$$(\cos (90^\circ - \theta) = \sin \theta)$$

$$\sin 53^\circ = a$$

Also,

$$\cos^2 \theta = 1 - \sin^2 \theta$$

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$$\cos^2 53^\circ = 1 - \sin^2 53^\circ$$

$$\cos 53^\circ = \sqrt{1 - a^2}$$

$$\tan 53^\circ = \frac{\sin 53^\circ}{\cos 53^\circ} = \frac{a}{\sqrt{1 - a^2}}$$

S15. Ans. (b)

Sol.

$$\tan \theta + \cot \theta = 2 [\tan \theta - \cot \theta]$$

$$\Rightarrow 3 \cot \theta = \tan \theta$$

$$\Rightarrow \tan^2 \theta = 3$$

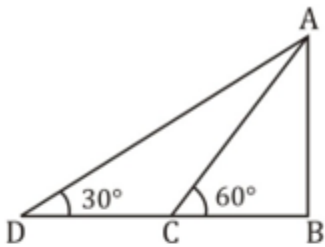
$$\Rightarrow \tan \theta = \sqrt{3}$$

$$\Rightarrow \theta = 60^\circ$$

$$\therefore \sin \theta = \frac{\sqrt{3}}{2}$$

S16. Ans. (a)

Sol.



Pole AB is 30 metre high

$$\tan 60^\circ = \frac{AB}{CB}$$

$$CB = \frac{AB}{\tan 60^\circ}$$

$$CB = \frac{30}{\sqrt{3}}$$

$$CB = 10\sqrt{3}$$

$$\text{Also, } \tan 30^\circ = \frac{AB}{DB}$$

$$DB = \frac{30}{\frac{1}{\sqrt{3}}} = 30\sqrt{3}$$

$$\text{Difference in shadows} = DB - CB$$

$$= 30\sqrt{3} - 10\sqrt{3}$$

$$= 20\sqrt{3}$$

S17. Ans. (d)

Sol.

$$\operatorname{cosec}\theta - \cot\theta = \frac{1}{2} \quad - (i)$$

As we know

$$\operatorname{cosec}^2\theta - \cot^2\theta = 1$$

$$\Rightarrow (\operatorname{cosec}\theta - \cot\theta)(\operatorname{cosec}\theta + \cot\theta) = 1$$

$$\Rightarrow \left(\frac{1}{2}\right)(\operatorname{cosec}\theta + \cot\theta) = 1$$

$$\Rightarrow \operatorname{cosec}\theta + \cot\theta = 2 \quad - (ii)$$

Using equation (i) and equation (ii)

$$\operatorname{cosec}\theta = \frac{2 + \frac{1}{2}}{2} = \frac{5}{4}$$

S18. Ans.(d)

Sol.

$$\text{Required radian measure} = 120 \times \frac{\pi}{180} = \frac{2\pi}{3}$$

S19. Ans. (a)

Sol.

$$\begin{aligned} x &= \frac{\cos 2\pi}{3} = \cos 120^\circ \\ &= \cos(180^\circ - 60^\circ) \\ &= -\cos 60^\circ \\ &= -\frac{1}{2} \end{aligned}$$

S20. Ans. (b)

Sol.

By value putting method,

Put $A = 60^\circ$

$$x = \cot 30^\circ = \sqrt{3}$$

Options

$$(a) \operatorname{cosec} 60^\circ - \cot 60^\circ = \frac{1}{\sqrt{3}}$$

$$(b) \operatorname{cosec} 60^\circ + \cot 60^\circ = \sqrt{3} \text{ (satisfied)}$$

$$(c) \sec 60^\circ + \cot 60^\circ = \frac{2\sqrt{3}+1}{\sqrt{3}}$$

$$(d) \sec 60^\circ - \cot 60^\circ = \frac{2\sqrt{3}-1}{\sqrt{3}}$$

S21. Ans.(b)

Sol.

$$\angle ABC = 75^\circ$$

[$\because 180^\circ = \pi$ radian or π^c]

$$75^\circ = \frac{\pi}{180} \times 75 = \frac{5\pi}{12} \text{ radian}$$

$$\therefore \angle BAC = \pi - \frac{\pi}{4} - \frac{5\pi}{12}$$

$$= \frac{12\pi - 3\pi - 5\pi}{12} = \frac{4\pi}{12}$$

$$= \frac{\pi}{3} \text{ radian}$$

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S22. Ans.(b)

Sol.

$$\begin{aligned}\pi \text{ radian} &= 180^\circ \\ \therefore 1 \text{ radian} &= \frac{180^\circ}{\pi} \\ &= \frac{180 \times 7^\circ}{\pi} \\ &= \frac{630}{11} = 57 \frac{3}{11}^\circ \\ &= 57^\circ \frac{3}{11} \times 60' = 57^\circ \frac{180'}{11} \\ &= 57^\circ 16' \frac{4}{11} \times 60'' = 57^\circ 16' 22''\end{aligned}$$

S23. Ans.(a)

Sol.

$$\begin{aligned}\tan 15^\circ \cdot \cot 75^\circ + \tan 75^\circ \cdot \cot 15^\circ \\ &= \tan 15^\circ \cdot \cot(90^\circ - 15^\circ) + \tan(90^\circ - 15^\circ) \cdot \cot 15^\circ \\ &= \tan^2 15^\circ + \cot^2 15^\circ \dots \dots (i) \\ [\because \tan(90^\circ - \theta) &= \cot \theta \quad \cot(90^\circ - \theta) = \tan \theta] \\ (2 - \sqrt{3})^2 + (2 + \sqrt{3})^2 \\ &= 14\end{aligned}$$

S24. Ans.(d)

Sol.

$$\begin{aligned}A + B &= 90^\circ \\ \Rightarrow B &= 90^\circ - A \\ \therefore \sec^2 A + \sec^2 B - \sec^2 A \cdot \sec^2 B \\ &= \sec^2 A + \operatorname{cosec}^2 A - \sec^2 A \cdot \operatorname{cosec}^2 A \\ &= \frac{1}{\cos^2 A} + \frac{1}{\sin^2 A} \\ &= \frac{1}{\sin^2 A \cdot \cos^2 A} \\ &= \frac{1}{\sin^2 A + \cos^2 A - 1} \\ &= \frac{\sin^2 A \cdot \cos^2 A}{1 - 1} \\ &= \frac{\sin^2 A \cdot \cos^2 A}{0} = 0.\end{aligned}$$

S25. Ans.(a)

Sol.

$$\begin{aligned}\sec^2 \theta - \tan^2 \theta &= 1 \\ \sec^2 \theta + \tan^2 \theta &= \frac{7}{12} \\ \therefore \sec^4 \theta - \tan^4 \theta \\ &= (\sec^2 \theta - \tan^2 \theta)(\sec^2 \theta + \tan^2 \theta) \\ &= 1 \times \frac{7}{12} = \frac{7}{12}\end{aligned}$$

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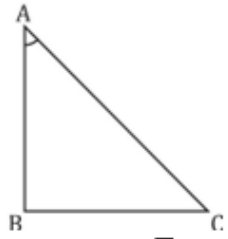
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S26. Ans.(b)

Sol.

$$m \angle C = 45^\circ$$



$$\begin{aligned} \therefore \tan C + \frac{\sqrt{3}}{2} &= \tan 45^\circ + \frac{\sqrt{3}}{2} \\ &= \frac{2 + \sqrt{3}}{2} \end{aligned}$$

S27. Ans.(c)

Sol.

$$4\angle A = 3\angle B = 12\angle C$$

$$A : B : C = \frac{1}{4} : \frac{1}{3} : \frac{1}{12}$$

$$A : B : C = 3 : 4 : 1$$

Now

$$3x + 4x + x = 180$$

$$8x = 180$$

$$x = \frac{180}{8}$$

$$\angle A = 3x = \frac{180}{8} \times 3 = 67.5$$

S28. Ans.(a)

Sol.

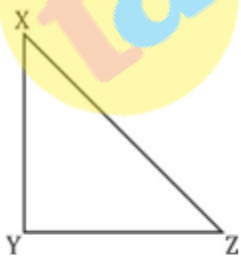
$$\cos 53^\circ - \sin 37^\circ$$

$$= \cos (90^\circ - 37^\circ) - \sin 37^\circ$$

$$= \sin 37^\circ - \sin 37^\circ = 0$$

S29. Ans.(d)

Sol.



$$\cot X = \frac{XY}{YZ} = \frac{5}{12}$$

$$\therefore XZ = 13$$

We have, 5 unit = 2.5 cm

$$\therefore 13 \text{ unit} = \frac{2.5}{5} \times 13$$

$$= 6.5 \text{ cm}$$

S30. Ans.(a)

Sol.

$$\alpha + \beta = 90$$

$$\text{and } \alpha : \beta = 2 : 1$$

$$2x + x = 90^\circ$$

$$x = 30^\circ$$

$$\alpha = 60^\circ$$

$$\beta = 30^\circ$$

$$\frac{\cos \alpha}{\cos \beta} = \frac{\cos 60^\circ}{\cos 30^\circ} = \frac{1/2}{\sqrt{3}/2}$$

$$= \frac{1}{2} \times \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}} = 1 : \sqrt{3}$$

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