- PU I Year Trigonometry

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Remember:

1. Angle between Minute hand and Hour hand in X Hr. and Y min. is $\left|30X - \frac{11}{2}Y\right|$

2. The maximum value of

$a\cos\theta + b\sin\theta + c$, is $c + \sqrt{a^2 + b^2}$ and

the minimum value is $c - \sqrt{a^2 + b^2}$

3. If $\text{Cos}^2\text{A} + \text{Cos}^2\text{B} = 1 = \text{Sin}^2\text{A} + \text{Sin}^2\text{B}$ then $\text{A}+\text{B} = \frac{\pi}{2}$.

4. If $a\text{Sin}x + b\text{Cos}x = c$, then

$$b\text{Sin}x - a\text{Cos}x = \pm\sqrt{a^2+b^2-c^2}$$

1. The angle between Hr.hand and Min. hand of a clock when the time is 3 : 20

1) 10° 2) 20° 3) 30° 4) $22\frac{1}{2}^\circ$

Solution: $\text{Req.} = \left|30(3) - \frac{11}{2}(20)\right|$

$= \left|90 - 110\right| = 20^\circ$

Ans: (2)

2. The vertical angle of an isosceles triangle is 45° then the base angle in circular measure is

(1) $67^\circ\ 30'$ (2) $65^\circ\ 30'$ (3) $\frac{3\pi}{8}$ (4) $\frac{3\pi}{16}$

Solution: $A+B+C=180°$

$A+B=180-C=180-45=135$

$B=A \quad \therefore\ 2A=135°=\frac{3\pi}{4}$

$\therefore\ A=\frac{3\pi}{8}$

Ans: (3)

3. If the length of a chord of a circle is equal to that of the radius of the circle, then the angle subtended in radians at the centre of the circle by chord is

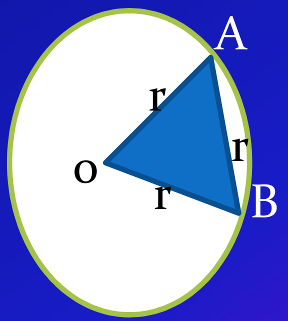
1) 1 2) $\frac{\pi}{2}$ 3) $\frac{\pi}{3}$ 4) $\frac{\pi}{4}$

Solution:

Δ**OAB is an equilateral triangle**

$$\therefore \angle AOB = \frac{\pi}{3}$$

$\therefore$ **Ans:(3)**



4. If $\text{Sin}A + \frac{1}{\text{Sin}A} = \frac{5}{2}$ and A is acute then A is

1) $\frac{\pi}{6}$ 2) $\frac{\pi}{4}$

3) $\frac{\pi}{3}$ 4) None of these

$$\textit{Solution:}\ \mathbf{SinA} + \frac{1}{\mathbf{SinA}} = 2 + \frac{1}{2}$$

$$\therefore \mathbf{SinA} = \frac{1}{2} \Rightarrow \mathbf{A} = \frac{\pi}{6}$$

$\therefore$ Ans: (1)

5.If $\text{Sec}\,\theta + \tan\theta = 2$, then the values of $\text{Sec}\,\theta$ & $\tan\theta$ are respectively

1) $\frac{1}{4}, \frac{2}{3}$ 2) $\frac{5}{4}, \frac{3}{4}$ 3) $\frac{2}{3}, \frac{1}{4}$ 4)None

$$\textit{Solution}: \mathbf{Sec}\,\theta - \mathbf{tan}\,\theta = \frac{1}{2}$$

$$\because (\mathbf{Sec}\,\theta + \mathbf{tan}\,\theta)(\mathbf{Sec}\,\theta - \mathbf{tan}\,\theta) = 1$$

adding and Simplifying

$$\mathbf{Sec}\,\theta = \frac{5}{4} \quad \text{and } \mathbf{tan}\,\theta = \frac{3}{4}$$

Ans : (2)

6. The value of

$\text{Cos}^2 85 + \text{Cos}^2 5$, is

1) 0 2) -1 3) 1 4) $\frac{1}{2}$

$Solution: \mathbf{Cos}^2 A + \mathbf{Cos}^2 B = 1$

when $\mathbf{A} + \mathbf{B} = \mathbf{90}$

$\therefore$ **Ans.(3)1**

7. The maximum value of $4\text{Sin}\theta + 3\text{Cos}\theta + 2$, is

1)7 2)4 3)6 4)5

$$Solution: \textbf{Max.value} = \mathbf{c} + \sqrt{\mathbf{a^2 + b^2}}$$

$$= \mathbf{2} + \sqrt{\mathbf{16 + 9}} = \mathbf{7}$$

$\therefore$ **Ans.(1)7**

8. Sinθ + Cosθ = 1,

then Sin2θ =

1)1 2) -1 3)0 4)2

$Solution:$ **Sq. both sides,**

$$\text{Sin}^2\theta + \text{Cos}^2\theta + 2\text{Sin}\theta\ \text{Cos}\theta = 1$$

$$\Rightarrow \text{Sin}2\theta = 0$$

Ans.(3)0

9. If $\text{Cos}\,\theta + \text{Sec}\,\theta = 2$, then the value of $\text{Cos}^{100}\theta - \text{Sec}^{100}\theta =$

1)0   2)1   3)2   4) -1

Solution: $\cos\theta + \dfrac{1}{\cos\theta} = 1 + 1$

$\Rightarrow \cos\theta = 1 = \sec\theta$

$\therefore$ G.E. $= 1 - 1 = 0$

10. If $\text{Sec}\theta + \tan\theta = 4$ then

$\text{Cos}\theta =$

1) $\frac{8}{15}$ 2) $\frac{15}{17}$ 3) $\frac{8}{17}$ 4) $\frac{7}{17}$

$$\textbf{Solution: Sec}\,\theta - \textbf{tan}\,\theta = \frac{1}{4}$$

$$\textbf{adding, we get } 2\textbf{Sec}\,\theta = 4 + \frac{1}{4}$$

$$\Rightarrow \textbf{Sec}\,\theta = \frac{17}{8}$$

$$\therefore \textbf{Cos}\,\theta = \frac{8}{17}$$

11. The value of $\tan 20^\circ + \tan 40^\circ$

$+ \tan 60^\circ + \ldots + \tan 180^\circ$, is

1)0 2)1 3)2 4)4

Solution : **If $A+B=180^\circ$ then**

$\tan A = -\tan B$ or $\tan A + \tan B = 0$

$\therefore \tan 20 + \tan 160 + \tan 40 +$

$\tan 140 + \ldots + \tan 180$

$= 0 + 0 + \ldots = 0$

$\therefore$ *Ans* : (1)**0**

12.The value of

$$\frac{\text{Sin}^2\alpha}{1+\text{Cot}^2\alpha}+\frac{\tan^2\alpha}{(1+\tan\alpha)^2}+\text{Cos}^2\alpha$$

1) -1   2)0   3)1   4)2

$$Solution: \textbf{Put } \alpha = 45°$$

$$G.E. = \frac{1/2}{1+1} + \frac{1}{(1+1)^2} + \frac{1}{2}$$

$$= 1$$

Ans: (3) 1

13. A,B,C are the angles of a ΔABC, then

$$\text{Cos}\left(\frac{3A+2B+C}{2}\right)+\text{Cos}\left(\frac{A-C}{2}\right)=$$

1)1 2)0 3)CosA 4)CosC

Solution : **Put A = B = C**

G.E. = Cos180 + Cos0 = -1 + 1 = 0

Ans : (2) 0

14. If $x = \cos 1^\circ$ and $y = \cos 1$ then

1) $x = y$ 2) $x < y$

3) $x > y$ 4) $2x = y$

$Solution:$ **Cosθ is decreasing**

for $0 < \theta < \frac{\pi}{2}$

$\therefore \text{Cos}1^\circ > \text{Cos}1$

Ans: (3) $x > y$

15. In a ΔABC, C = 90°, then the equation whose roots are tanA & tanB is

1) $abx^2 + c^2x + ab = 0$ 2) $abx^2 + c^2x - ab = 0$

3) $abx^2 - c^2x - ab = 0$ 3) $abx^2 - c^2x + ab = 0$

$$Solution: \mathbf{C = 90 \Rightarrow A + B = 90}$$

$$\mathbf{(a^2 + b^2 = c^2)}$$

$$\therefore \mathbf{\tan A \tan B = 1} \Rightarrow \alpha\beta = \mathbf{1}$$

$$\alpha + \beta = \mathbf{\tan A + \tan B} = \frac{\mathbf{a}}{\mathbf{b}} + \frac{\mathbf{b}}{\mathbf{a}}$$

$$\frac{\mathbf{a}^2 + \mathbf{b}^2}{\mathbf{ab}} = -\left(\frac{-\mathbf{c}^2}{\mathbf{ab}}\right) \quad \therefore \mathbf{Ans: (4)}$$

16. If $5\sin x + 4\cos x = 3$, then $4\sin x - 5\cos x =$

1) 4   2) $4\sqrt{2}$ 3) $3\sqrt{2}$ 4) $\sqrt{2}$

$$Solution: \textbf{G.E.} = \sqrt{a^2 + b^2 - c^2}$$

$$= \sqrt{16 + 25 - 9} = \sqrt{32} = 4\sqrt{2}$$

$\therefore$ **Ans : (2)**

17. If $a = \sin 1^\circ$ and $b = \sin 1$ then

1) $a = b$ 2) $a < b$ 3) $a > b$ 4) $a = 2b$

$Solution:$ **Sin** θ **is increasing in** $0 < \theta < 90°$

$\therefore$ **Ans : (2) a < b**

18. IF $\cos A = a\cos B$ and $\sin A = b\sin B$, then $(b^2 - a^2)\sin^2 B =$

1) $1+a^2$ 2) $2+a^2$ 3) $1-a^2$ 4) $2-a^2$

Solution : squaring we get

$$\cos^2 A = a^2\cos^2 B = a^2(1 - \sin^2 B)$$

$$= a^2 - a^2\sin^2 B \ldots\ldots(1)$$

$$\& \quad \sin^2 A = b^2\sin^2 B \ldots\ldots(2)$$

adding (1) & (2)

$$1 = a^2 - a^2 Sin^2 B + b^2 Sin^2 B$$

$$\Rightarrow (b^2 - a^2) Sin^2 B = 1 - a^2$$

$$\therefore \text{Ans} : (3)$$

19. The maximum value of $4\sin^2 x + 3\cos^2 x$ is

1)3 2)4 3)5 4)None

Solution :

$$G.E. = Sin^2x + 3(Sin^2x + Cos^2x)$$

$$= Sin^2x + 3$$

$$\leq 1 + 3 = 4$$

$$\therefore Ans : (2) 4$$

20. The value of

$$\tan 100 + \tan 125 + \tan 100 \tan 125 =$$

1) 2   2) 3   3) $\frac{1}{3}$ 4) 1

$$\text{Sol}: \tan 225 = \tan(100 + 125) = 1$$

$$\Rightarrow \frac{\tan 100 + \tan 125}{1 - \tan 100 \tan 125} = 1$$

$$\therefore \text{G.E.} = 1$$

$$Ans: (4)\ 1$$

21. If ABCD is a cyclic quadrilateral then

1) $\sin(A+C)=1$

2) $\cos(A+C)=-1$

3) $\sin(B+D)=1$

4) $\cos(A+C)=1$

Solution :

Sum of opp.angles = 180°

$\therefore$ **A + C = 180° $\Rightarrow$ Cos(A + C) = -1**

Ans : (2)

22. For a ΔABC, $\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0$

then the value of

$Cos^2 A + Cos^2 B + Cos^2 C =$

1) $\frac{9}{4}$ 2) $\frac{3}{4}$ 3) $\frac{4}{9}$ 4) $\frac{4}{3}$

$Solution : \Delta = 0$ **if any two rows / columns**

are identical $\Rightarrow$ **a = b = c (by inspection)**

$\Rightarrow$ **A = B = C = 60°**

$G.E. = 3Cos^2 60 = \frac{3}{4}$ **Ans : (2)**

23.

$\text{Cos}^3 10^\circ + \text{Cos}^3 110^\circ + \text{Cos}^3 130^\circ =$

1) $\frac{3}{4}$ 2) $\frac{3}{8}$ 3) $\frac{3\sqrt{3}}{8}$ 4) $\frac{3\sqrt{3}}{4}$

$Solution:$ **If** $\alpha = 60° \text{ or } 120° \text{ or } 240° \text{ or } 300°$

then, $Cos^3\theta + Cos^3(\alpha+\theta) + Cos^3(\alpha-\theta) = \frac{3}{4}Cos3\theta$

$$G.E. = \frac{3}{4}Cos^3(3x10°) = \frac{3\sqrt{3}}{4x2} = \frac{3\sqrt{3}}{8}$$

$Ans: (3)$

24. $Cos^2 10^\circ + Cos^2 50^\circ + Cos^2 70^\circ =$

1) $\frac{1}{2}$ 2) 1 3) $\frac{3}{2}$ 4) 2

Solution:

when $\alpha = 60^\circ$ or 120° or 240° or 300°

then $\cos^2\theta + \cos^2(\alpha - \theta) + \cos^2(\alpha + \theta) = \frac{3}{2}$

Ans: (3)

25. If $x = \sqrt{\dfrac{1 - \text{Cos}\theta}{1 + \text{Cos}\theta}}$, then, $\dfrac{2x}{1 - x^2} =$

1) $\text{Sin}\theta$ 2) $\text{Cos}\theta$ 3) $\tan\theta$ 4) $\text{Cot}\theta$

$$\text{Solution: } x = \tan\frac{\theta}{2}$$

$$\therefore \text{G.E.} = \frac{2\tan\frac{\theta}{2}}{1-\tan^2\frac{\theta}{2}} = \tan\theta$$

Ans: (3)

26. $$\frac{\cos^2\left(\frac{\pi}{4}-A\right)-\sin^2\left(\frac{\pi}{4}-A\right)}{\cos^2\left(\frac{\pi}{4}+A\right)+\sin^2\left(\frac{\pi}{4}+A\right)}=$$

1) Cos2A 2) tan2A

3) Sin2A 4) Cot2A

$$\text{Solution : G.E.} = \frac{\cos 2\theta}{1}$$

$$= \cos\left(\frac{\pi}{2} - 2A\right) = \sin 2A$$

$\therefore$ **Ans : (3)**

27. If

$\tan\beta = 2\sin\alpha\sin\gamma\,\mathrm{cosec}(\alpha+\gamma)$,

then $\cot\alpha$, $\cot\beta$, $\cot\gamma$ are in

1)A.P. 2)G.P. 3)H.P. 4)A.G.P.

Solution : Taking reciprocals,

$$\text{Cot}\beta = \frac{\text{Sin}(\alpha+\gamma)}{2\text{Sin}\alpha\text{Sin}\gamma} = \frac{\text{Cot}\gamma + \text{Cot}\alpha}{2}$$

$\therefore$ They are in A.P. Ans : (1)

28. If $\cos(x-y)+\cos(y-z)+\cos(z-x)=\frac{-3}{2}$

then, $\sum \cos x =$

1) 0   2) 1   3) 2   4) 3

$$\text{Solution}: \sum Cos(x - y) = \frac{-3}{2}$$

$$\Rightarrow \sum 2(CosxCosy + SinxSiny) = -3$$

$$3 + \sum 2(CosxCosy + SinxSiny) = 0$$

$$\text{i.e.,} (Cosx + Cosy + Cosz)^2 +$$

$$(Sinx + Siny + Sinz)^2 = 0$$

$$\therefore \sum Cosx = 0 = \sum Sinx$$

29. $$\frac{\text{Minimum of } (\sin^2 x + \cos^2 x)}{\text{Maximum of } \left(\cos^2 \frac{x}{2} + \sin^2 \frac{x}{2}\right)} =$$

1) -1 2) 1 3) 2 4) -2

$$\textbf{Solution: G.E.} = \frac{\text{Min. of 1}}{\text{Max. of 1}}$$

$$= \frac{1}{1} = 1$$

$\therefore$ **Ans: (2)**

30. $3\sin^2 x + 4\cos^2 x \in$

1) $[0,3]$ 2) $[0,4]$

3) $[3,4]$ 4) $[-4,-3]$

$$G.E. = 3(\sin^2 x + \cos^2 x) + \cos^2 x$$

$$= 3 + \cos^2 x \in [3,4]$$

$$\because \cos^2 x \in [0,1]$$

$$Ans : (3)$$

31.The maximum value of

$$\frac{3}{5\sin x - 12\cos x + 19} \text{ is}$$

1) 1 2) $\frac{1}{2}$ 3) $\frac{1}{3}$ 4) $\frac{1}{4}$

Sol^n : G.E. is maximum when Denominator is Minimum and Min.value of Dr.

$$= 19 - \sqrt{25 + 144} = 6$$

$$\therefore \text{G.E.} = \frac{3}{6} = \frac{1}{2} \qquad \therefore \text{Ans.(2)}$$

32. If $\tan\theta = \frac{-4}{3}$ then, $\sin\theta =$

1) $\frac{-4}{5}$ but not $\frac{4}{5}$ 2) $\frac{-4}{5}$ or $\frac{4}{5}$

3) $\frac{4}{5}$ but not $\frac{-4}{5}$ 4) None of these

$$\text{Sol}^n : \tan\theta = \frac{-4}{3}$$

$$\Rightarrow \theta \in \text{II or IV quadrant}$$

$$\therefore \sin\theta = \pm\frac{4}{5}$$

Ans : (2)

33. The value of

$\sqrt{3}\text{Cosec}20° - \text{Sec}20°$ is

1) 2

2) 4

3) $\dfrac{2\text{Sin}20°}{\text{Sin}40°}$

4) $\dfrac{4\text{Sin}20°}{\text{Sin}40°}$

$$\text{Sol}^n : \text{G.E.} = \frac{\sqrt{3}}{\text{Sin}20} - \frac{1}{\text{Cos}20}$$

$$= \frac{\sqrt{3}\text{Cos}20 - \text{Sin}20}{\text{Sin}20\ \text{Cos}20}$$

$$= \frac{2\left(\frac{\sqrt{3}}{2}\mathrm{Cos}20 - \frac{1}{2}\mathrm{Sin}20\right)}{\frac{1}{2}\times 2\mathrm{Sin}20\ \mathrm{Cos}20}$$

$$= 4\frac{\mathrm{Sin}(60-20)}{\mathrm{Sin}40}$$

$$= 4\times 1 = 4 \qquad \mathrm{Ans:(2)}$$

34. If $A = \cos^2\theta + \sin^4\theta$, then for all the values of θ

1) $1 \le A \le 2$

2) $\frac{13}{16} \le A \le 1$

3) $\frac{3}{4} \le A \le \frac{13}{16}$

4) $\frac{3}{4} \le A \le 1$

$$\text{Sol}^n : A = 1 - \text{Sin}^2\theta + \text{Sin}^4\theta$$

$$= 1 - \text{Sin}^2\theta(1 - \text{Sin}^2\theta) = 1 - \text{Sin}^2\theta\text{Cos}^2\theta$$

$$= 1 - \left(\frac{\text{Sin}2\theta}{2}\right)^2 = 1 - 0 \quad \text{if Sin}2\theta \text{ is least}$$

$$\text{or } = 1 - \frac{1}{4} = \frac{3}{4}, \quad \text{if Sin}2\theta \text{ is greatest}$$

$$\therefore \frac{3}{4} \leq A \leq 1$$

Ans : (4)

35.

$$\tan 20^\circ + \tan 40^\circ + \sqrt{3}\tan 20^\circ \tan 40^\circ =$$

1) $\frac{1}{\sqrt{3}}$ 2) $\sqrt{3}$ 3) $\frac{-1}{\sqrt{3}}$ 4) $\sqrt{3}$

$$\text{Sol}^n : \text{We have, } \tan(40+20) = \sqrt{3}$$

$$\Rightarrow \frac{\tan 40 + \tan 20}{1 - \tan 40 \tan 20} = \sqrt{3}$$

$$\therefore \text{G.E.} = \sqrt{3}$$

Ans : (2)

36. If $\cos(\alpha+\beta)=\frac{4}{5}$, $\sin(\alpha-\beta)=\frac{5}{13}$ and α and β lies between 0 and $\frac{\pi}{4}$, then $\tan 2\alpha =$

1) $\frac{16}{63}$ 2) $\frac{56}{33}$ 3) $\frac{28}{33}$ 4) None

$$\text{Sol}^n : \tan 2\alpha = \tan(\alpha + \beta + \alpha - \beta)$$

$$= \frac{\tan(\alpha+\beta) + \tan(\alpha-\beta)}{1 - \tan(\alpha+\beta)\tan(\alpha-\beta)}$$

$$= \frac{\frac{3}{4} + \frac{5}{12}}{1 - \frac{3}{4} \times \frac{5}{12}} = \frac{56}{33}$$

Ans : (2)

37. The value of

$$\sin^2\frac{\pi}{8}+\sin^2\frac{3\pi}{8}+\sin^2\frac{5\pi}{8}+\sin^2\frac{7\pi}{8}$$

1) 1 2) 2 3) $1\frac{1}{8}$ 4) $2\frac{1}{8}$

$$\text{Sol}^n : \text{Sin}\frac{7\pi}{8} = \text{Sin}\frac{\pi}{8} \text{ and}$$

$$\text{Sin}\frac{5\pi}{8} = \text{Sin}\frac{3\pi}{8}$$

$$\text{G.E.} = 2\left(\text{Sin}^2\frac{\pi}{8} + \text{Sin}^2\frac{3\pi}{8}\right)$$

$$= 2\left(\text{Sin}^2\frac{\pi}{8} + \text{Cos}^2\frac{\pi}{8}\right) = 2 \times 1 = 2$$

38. $$\frac{\tan 70 - \tan 20}{\tan 50} =$$

1) 3 2) 0 3) 1 4) 2

$$\text{Sol}^n : \frac{\tan A - \tan B}{\tan(A-B)} = 1 + \tan A \tan B$$

$$\therefore \text{G.E.} = \frac{\tan 70 - \tan 20}{\tan(70-20)}$$

$$= 1 + \tan 70 . \tan 20$$

$$= 1 + \tan 70 . \text{Cot} 70 = 1 + 1 = 2$$

39. If

$\text{CosACosB} + \text{SinASinBSinC} = 1$

then $a : b : c =$

1) $1:1:1$ 2) $\sqrt{2}:1:1$

3) $1:\sqrt{2}:1$ 4) $1:1:\sqrt{2}$

Sol^n :

$$1 = \text{CosACosB} + \text{SinASinBSinC}$$

$$\le \text{CosA CosB} + \text{SinA SinB}$$

$$(\because \text{SinC} \le 1)$$

$$= \text{Cos}(A - B)$$

$$1 \le \text{Cos}(A - B) \Rightarrow \text{Cos}(A - B) = 1$$

$\Rightarrow A - B = 0 \Rightarrow A = B$

By given expression we get

$C = 90 \quad \therefore A = B = 45.$ Hence

$a : b : c = \text{Sin}A : \text{Sin}B : \text{Sin}C$

$= \frac{1}{\sqrt{2}} : \frac{1}{\sqrt{2}} : 1 = 1 : 1 : \sqrt{2}$ Ans:(4)

40. In a ΔABC, A > B and if the measures of A and B satisfy

$3\text{Sin}x - 4\text{Sin}^3x - k = 0$,

$0 < k < 1$ then C =

1)30 2)45 3)120 4)None

$Sol^n : 3Sinx - 4Sin^3x = k$

$\Rightarrow Sin3x = k$. Given that

$Sin3A = k$ and $Sin3B = k$

$\therefore Sin3A = Sin3B \Rightarrow$

$3A = 3B$ or $3A = 180 - 3B$

But $A > B$ means $A \neq B$

$\therefore 3A = 180 - 3B \Rightarrow A + B = 60$

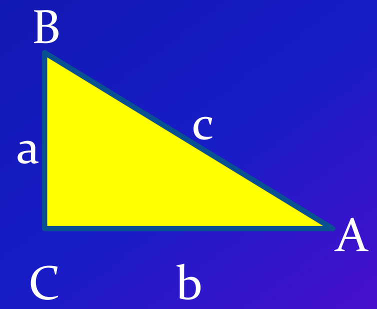
$\therefore C = 120$ Ans : (3)

41. ΔABC is right angled at C, then $\tan A + \tan B =$

1) $\frac{b^2}{ac}$ 2) $a+b$ 3) $\frac{a^2}{bc}$ 4) $\frac{c^2}{ab}$

$$\text{Sol}^n : \tan A = \frac{a}{b}, \tan B = \frac{b}{a}$$

$$\text{G.E.} = \frac{a}{b} + \frac{b}{a} = \frac{a^2 + b^2}{ab}$$



$$= \frac{c^2}{ab} \quad \because C = 90$$

Ans : (4)

42. If P_1, P_2, P_3 are altitudes of a triangleABC, from the vertices A,B,C and Δ, the area of a triangle, then $P_1^{-1} + P_2^{-1} + P_3^{-1}$ is

1) $\frac{s-a}{\Delta}$ 2) $\frac{s-b}{\Delta}$ 3) $\frac{s-c}{\Delta}$ 4) $\frac{s}{\Delta}$

$$\text{Sol}^n : \Delta = \frac{1}{2} a P_1 \Rightarrow P_1 = \frac{2\Delta}{a}$$

$$\therefore P_1^{-1} = \frac{a}{2\Delta}$$

$$\Rightarrow P_2^{-1} = \frac{b}{2\Delta} \text{ and } P_3^{-1} = \frac{c}{2\Delta}$$

$$\text{Hence G.E.} = \frac{a+b+c}{2\Delta} = \frac{2s}{2\Delta} = \frac{s}{\Delta}$$

Ans : (4)

43. If in a ΔABC,

CosACosB + SinASinBSinC = 1,

then the triangle is

1) isosceles 2) right angled

3)isosceles right angled

4)equilateral

Sol^n : By Que.No.39

$A = B = 45°$ and $C = 90°$

$\therefore$ Ans : (3)

44. If two sides a,b and angle A be such that 2 triangles are formed then the sum of two values of third side is

1) 2b SinA 2) 2b CosA

3) $\frac{b}{a}$CosA 4)(c+b)CosA

$a^2=b^2+c^2-2bc\cos A$

$\therefore c^2-(2b\cos A)c+(b^2-a^2)=0$

which is Quad. in c,

if c_1&c_2 be two roots then

$c_1+c_2=2b\cos A$

45. $\log_x y = \log_y z = \log_z x$, then

1) $x=y=z$

2) $x>y>z$

3) $x=y>z$

4) $x<y<z$

Sol^n: $y = x^k$, $z = y^k$ and $x = z^k$

$\therefore xyz = (xyz)^k \Rightarrow k = 1$

$\Rightarrow x = y = z$

$\therefore$ Ans:(1)

46. If log 2, log(2x-1) and log(2x+3) are in A.P. then x =

1) $\frac{-1}{2}$ 2) $\frac{1}{2}$ 3) 1 4) None

Sol^n:

$$2\log(2x-1) = \log 2+\log(2x+3)$$

$$\therefore (2x-1)^2=2(2x+3)$$

$$\Rightarrow x=\frac{5}{2} \text{ or } \frac{-1}{2} \text{ but, when } x=\frac{-1}{2}$$

log(2x-1) is not difined.

Ans(4)

47. If x, y, z are in G.P. and

$a^x = b^y = c^z$, then

1) $\log_c b = \log_a c$ 2) $\log_a b = \log_c b$

3) $\log_a c = \log_b a$ 4) $\log_b a = \log_c b$

Sol^n: $a^x = b^y = c^z = k$ (say)

$\therefore x = \log_a k,\ y = \log_b k,\ z = \log_c k$

x,y,z are in G.P. $\Rightarrow \dfrac{y}{x} = \dfrac{z}{y}$

$$\frac{\log_b k}{\log_a k} = \frac{\log_c k}{\log_b k} \Rightarrow \log_b a = \log_c b$$

Ans:(4)

48. If $\log a + \log b = \log(a+b)$

then $a =$

1) b 2) $\frac{b}{b-1}$ 3) $\frac{b-1}{b}$ 4) $\frac{b}{b+1}$

Sol^n: log(ab) = log(a+b)

$$\Rightarrow ab = a + b \Rightarrow a = \frac{b}{b-1}$$

Ans:(2)

49. $5^{2n} - 1$ is divisible by

1) 10 2) 9 3) 20 4) 24

Sol^{n}: By inspection, put n=1

we get $5^{2(1)}-1 = 24$

which is divisible by 24

Ans: (4)

50. If $x^2 + bx + c = 0$ and

$x^2 + cx + b = 0$,

have a common root

and $b \neq c$ then $b + c =$

1) 0 2) -1 3) 2 4) 1

Sol^n: If α be the common root then, $\alpha^2+b\alpha+c=0$ and $\alpha^2+c\alpha+b=0$ solving we get, $\alpha = 1$ & $\alpha = -b-1$

$\therefore -b-c = 1 \Rightarrow b + c = -1$

51. The value of

$$\sqrt{6+\sqrt{6+\sqrt{6+\ldots\ldots}}}\text{ is}$$

1) 3 2) 2 3) 4 4) 5

$$Sol^n: x=\sqrt{6+\sqrt{6+\sqrt{6+.....}}}$$

$$=\sqrt{6+x}$$

$$\Rightarrow x^2 = 6+x \Rightarrow x^2-x-6=0$$

$$\therefore \; x = 3 \text{ or } -2, \text{ but } x \neq -2$$

$$\therefore \; x = 3$$ **Ans : (1)**

52. If a,b,c are the roots of

$x^3 - 6x^2 + 2x - 7 = 0$ then,

$$\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca} =$$

1) $\frac{2}{7}$ 2) $\frac{-7}{2}$ 3) $\frac{6}{7}$ 4) $\frac{-6}{7}$

$$Sol^n: \text{G.E.} = \frac{a+b+c}{abc} = \frac{\sum a}{abc}$$

$$= \frac{6}{7}$$

Ans: (3)

53. Remainder when

$x^{55} + x^{24} + 1$ is divided by

$x + 1$ is

1) 0 2) 1 3) 2 4) -1

Sol^n: When f(x) is divided by (x-a) the remainder = f(a)

$= f(-1) = -1 + 1 + 1 = 1$

54. The domain of $\sqrt{4x-x^2}$ is

1) [0, 4] 2) (0, 4)

3) R-(0,4) 4) R-[0,4]

Sol^n: $4x-x^2 \geq 0$ i.e., $x^2-4x \leq 0$

$$(x-2)^2 \leq 4 \Rightarrow |x-2| \leq 2$$

$$\Rightarrow -2 \leq x-2 \leq 2, \quad \therefore 0 \leq x \leq 4$$

Ans: (1)

55. The range of the function

$$f(x)=\frac{x-2}{2-x},\quad x\neq 2 \quad \text{is}$$

1) 1   2) -1   3) {1}   4) { -1}

Sol^n: $f(x) = -\left(\frac{x-2}{x-2}\right) = -1$

$\therefore$ Range (f) = { -1}

Ans : (4)

56. The range of the function $\sin([x]\pi)$, (where $[x]$ is greatest integer function) is

1) 0 2) {0} 3) [-1, 1] 4) (0,1)

Sol^n: [x]=integer

$\therefore$ Sin(kπ) =0 $\forall k \in Z$

$\therefore$ Range ={0}

Ans: (2)

57. A set A has 6 elements. Then the number of possible relations on A is

1) 6 2) 2^6 3) 2^{36} 4) 6^2

Sol^n: No. of possible relations from A to B is 2^{mn} where m=O(A) and n=O(B)

Hence Req.=2^{36}

Ans : (3)

58. The number of functions from a set A containing 7 elements into a set B containing 3 elements is

1) 3 2) 7 3) 3^7 4) 7^3

Sol^n: No. of functions from a finite set A into a finite set B is $[n(B)]^{n(A)}$

$\therefore$ Req. No. of functions = 3^7

Ans : (3)

59. If $\dfrac{3x}{(x-6)(x+a)} = \dfrac{2}{(x-6)} + \dfrac{1}{x+a}$

then a =

1) 4 2) 3 3) 2 4) 1

Sol^n: Put x = 6 in Nr. of LHS and Dr. of II term

we get, $\frac{3(6)}{6+a} = 2 \quad \therefore a=3$

Ans: (2)

60. In the expansion of $(1+x)^{50}$, the sum of the coefficients odd powers of x is

1) 0 2) 2^{50} 3) 2^{49} 4) 2^{51}

Sol^n: Req. Sum

$= C_1 + C_3 + C_5 + \ldots + C_{49}$

$= 2^{50-1} = 2^{49}$

Ans : (3)