PRACTICE SHEET

1. Consider the following statements:
I. If $\theta = 1200°$, then $(\sec\theta + \tan\theta)^{-1}$ is positive
II.If $\theta = 1200°$, then $(\operatorname{cosec}\theta - \cot\theta)$ is negative.
Which of the statements given above is/are correct?
(a) Only I (b) Only II
(c) Both I nor II (d) Neither I nor II

2. Match List I with List II and select the correct answer using the code given below the lists.

	List I		List II
A.	tan15°	(i)	$-2-\sqrt{3}$
B.	tab75°	(ii)	$2+\sqrt{3}$
C.	tan105°	(ii)	$-2+\sqrt{3}$
		(iv)	$2-\sqrt{3}$

(a) A-(iv), B-(i), C-(ii) (b) A-(iv), B-(ii), C-(i)
(c) A-(iii), B-(ii), C-(i) (d) A-(ii), B-(i), C-(iv)

3. If $A+B+C=\frac{\pi}{2}$, then what is the value of tan A tan B + tan B. tan C + tan C tan A?
(a) 0
(b) 1
(c) –1
(d) tan A tan B tan C

4. What is the value of
$\cos\left(\frac{\pi}{9}\right)+\cos\left(\frac{\pi}{3}\right)+\cos\left(\frac{5\pi}{9}\right)+\cos\left(\frac{7\pi}{9}\right)$?
(a) 1 (b) –1
(c) –1/2 (d)1/2

5. If $\cot\theta = 5/12$ and θ lies in the third quadrant, then what is $(2\sin\theta + 3\cos\theta)$ equal to?
(a) –4
(b) $-p^2$ for some odd prime p
(c) $\left(-\frac{q}{p}\right)$ where p is an odd prime and q is a positive integer with $\left(\frac{q}{p}\right)$ not an integer
(d) –p for some odd prime p.

6. If $\cot\theta = 2\cos\theta$, where $\left(\frac{\pi}{2}\right) < \theta < \pi$, then what is the value of θ?
(a) $\frac{5\pi}{6}$ (b) $\frac{2\pi}{3}$
(c) $\frac{3\pi}{4}$ (d) $\frac{11\pi}{12}$

7. If p = sin (989°) cos (991°), then which one of the following is correct?
(a) p is finite and positive
(b) p is finite and negative
(c) p = 0
(d) p is undefined

8. If sin x + cosec x = 2, then what is the value of $\sin^4 x + \operatorname{cosec}^4 x$?
(a) 2 (b) 4
(c) 8 (d) 16

9. What is the value of $\tan(-1575°)$?
(a) 1 (b) ½
(c) 0 (d) –1

10. For which acute angle θ, $\operatorname{cosec}^2\theta = 3\sqrt{3}\cot\theta - 5$?
(a) $\frac{5\pi}{12}$ (b) $\frac{\pi}{3}$
(c) $\frac{\pi}{6}$ (d) $\frac{\pi}{4}$

11. If $\tan^2\theta = 2\tan^2\phi + 1$, then which one of the following is correct?
(a) $\cos(2\theta) = \cos(2\phi) - 1$
(b) $\cos(2\theta) = \cos(2\phi) + 1$
(c) $\cos(2\theta) = [\cos(2\phi) - 1]/2$
(d) $\cos(2\theta) = [\cos(2\phi) + 1]/2$

12. If $\cos\theta < \sin\theta$ and θ lies in the first quadrant, then which one of the following is correct?
(a) $0 < \theta < \frac{\pi}{4}$ (b) $\frac{\pi}{4} < 0 < \frac{\pi}{2}$
(c) $0 < \theta < \frac{\pi}{3}$ (d) $\frac{\pi}{3} < \theta < \frac{\pi}{2}$

13. If $\sin^2 x + \sin^2 y = 1$, then what is the value of cot (x+y)?
(a) 1 (b) $\sqrt{3}$
(c) 0 (d) $\frac{1}{\sqrt{3}}$

14. If sin x + sin y = a, cos x + cos y = b, then what is the value of cos (x–y)?
(a) $a^2 - 1$ (b) $b^2 - 1$
(c) $\frac{1}{2}(a^2 + b^2 - 2)$ (d) $\frac{1}{2}(a^2 + b^2)$

15. Which one of the following is correct?
$\left(1+\cos 67\frac{1}{2}^\circ\right)\left(1+\cos 112\frac{1}{2}^\circ\right)$ is?
(a)An irrational number and is greater than1
(b)A rational number but not an integer
(c)An integer
(d)An irrational number and is less than 1

16. What is the measure of the angle 114°35’ 30’ in radian?
(a) 1 rad (b) 2 rad
(c) 3 rad (d) 4 rad

17. If $\sin A = \frac{1}{\sqrt{5}}, \cos B = \frac{3}{\sqrt{10}}$; where A, B being positive acute angles, then what is (A+B) equal to:

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

18. What is $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4A}}}$ equal to?

(a) cos A (b) cos(2A)

(c) $2\cos\left(\frac{A}{2}\right)$ (d) $\sqrt{2\cos A}$

19. What is the value of sin (1110°)?

(a) 1 (b) $\frac{1}{2}$

(c) $\frac{1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}}{2}$

20. If sin2A= $\frac{4}{5}$, then what is the value of tan A $\left(\text{where } 0 \le A \le \frac{\pi}{4}\right)$?

(a) 1 (b) –1

(c) $\frac{1}{2}$ (d) 2

21. What is the value of $\frac{\cos 10° - \sin 10°}{\cos 10° + \sin 10°}$?

(a) tan35° (b) tan10°

(c) $\frac{1}{\sqrt{2}}$ (d) 1

22. Which one of the following pairs is not correctly matched?

(a) sin 2π sin(–2π)

(b) tan 45° tan (–315°)

(c) cot ($\tan^{-1}$ 0.5) tan ($\cot^{-1}$ 0.5)

(d) tan 420° tan (–60°)

23. What is the value of $\sin\left(\frac{5\pi}{12}\right)$?

(a) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (b) $\frac{\sqrt{6}+\sqrt{2}}{4}$

(c) $\frac{\sqrt{3}+\sqrt{2}}{4}$ (d) $\frac{\sqrt{6}+1}{2}$

24. What is the value of $\left(\sin 22\frac{1}{2}° + \cos 22\frac{1}{2}°\right)^4$?

(a) $\frac{3+2\sqrt{2}}{2}$ (b) $\frac{1+2\sqrt{2}}{2}$

(c) $\frac{3\sqrt{3}+2}{2}$ (d) 1

25. What is the value of $\sin 292\frac{1}{2}°$?

(a) $\frac{1}{3}\sqrt{2+\sqrt{3}}$ (b) $-\frac{1}{3}\sqrt{2-\sqrt{3}}$

(c) $\frac{1}{2}\sqrt{2+\sqrt{2}}$ (d) $-\frac{1}{2}\sqrt{2+\sqrt{2}}$

26. What is the value of $\frac{\sin\theta+\cos\theta-\tan\theta}{\sec\theta+\text{cosec}\theta-\cot\theta}$, when $\theta=\frac{3\pi}{4}$?

(a) 0 (b) 1

(c) –1 (d) None of these

27. What is the value of sin 15°. sin 75°?

(a) $\frac{1}{4}$ (b) $\frac{1}{8}$

(c) $\frac{1}{16}$ (d) 1

28. What is $\frac{\sin\theta+1}{\cos\theta}$ equal to?

(a) $\frac{\sin\theta+\cos\theta-1}{\sin\theta+\cos\theta+1}$ (b) $\frac{\sin\theta+\cos\theta+1}{\sin\theta+\cos\theta-1}$

(c) $\frac{\sin\theta-\cos\theta-1}{\sin\theta+\cos\theta+1}$ (d) $\frac{\sin\theta-\cos\theta+1}{\sin\theta+\cos\theta-1}$

29. If y = $\sec^2\theta + \cos^2\theta$, where $0 < \theta < \frac{\pi}{2}$, then when one of the following is correct?

(a) y = 0 (b) $0 \le y \le 2$

(c) $y \ge 2$ (d) None of these

30. What is the value of (sin50° – sin 70° + sin 10°)?

(a) 1 (b) $\frac{1}{\sqrt{2}}$

(c) $\frac{\sqrt{3}}{2}$ (d) 0

31. What is $\left(\frac{\sec 18°}{\sec 144°}+\frac{\text{cosec}18°}{\text{cosec}144°}\right)$ equal to?

(a) sec18° (b) cosec18°

(c) –sec18° (d) –cosec18°

32. One of the angle of a triangle is ½ rad and the other is 99°. What is the third angle in radian measure?

(a) $\frac{9\pi-10}{\pi}$ (b) $\frac{90\pi-100}{7\pi}$

(c) $\frac{90\pi-10}{\pi}$ (d) None of these

33. Which one of the following is correct?

(a) sin 1° > sin1 (b) sin1° < sin 1

(c) sin 1° = sin 1 (d) sin 1° = $\frac{\pi}{180}$ sin1

34. If cos x ≠ –1, then what is $\frac{\sin x}{1+\cos x}$ equal to?

(a) $-\cot\frac{x}{2}$ (b) $\cot\frac{x}{2}$

(c) $\tan\frac{x}{2}$ (d) $-\tan\frac{x}{2}$

35. What is the value of $\frac{1+\tan 15^\circ}{1-\tan 15^\circ}$?

(a) 1 (b) $\frac{1}{\sqrt{2}}$

c) $\frac{1}{\sqrt{3}}$ (d) $\sqrt{3}$

36. If angles A, B and C are in AP, then what is sin A + 2sin B + sin C equal to?

(a) $4\sin B\cos^2\left(\frac{A-C}{2}\right)$

(b) $4\sin B\cos^2\left(\frac{A-C}{4}\right)$

(c) $4\sin(2B)\cos^2\left(\frac{A-C}{2}\right)$

(d) $4\sin(2B)\cos^2\left(\frac{A-C}{4}\right)$

37. What is $\tan\left(7\frac{1}{2}\right)^\circ$ equal to?

(a) $\sqrt{6}+\sqrt{3}-\sqrt{2}+2$ (b) $\sqrt{6}+\sqrt{3}+\sqrt{2}+2$

(c) $\sqrt{6}-\sqrt{3}+\sqrt{2}-2$ (d) $\sqrt{6}+\sqrt{3}+\sqrt{2}-2$

38. The angle A lies in the third quadrant and it satisfies the equation $4(\sin^2 x + \cos x) = 1$. What is the measure of the angle A?

(a) 225° (b) 240°

(c) 210° (d) None of these

39. What is the value of $\frac{\cos 15^\circ+\cos 45^\circ}{\cos^3 15^\circ+\cos^3 45^\circ}$?

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

(c) $\frac{1}{3}$ (d) None of these

ANSWER KEY																			
1.	d	**2.**	b	**3.**	b	**4.**	d	**5.**	c	**6.**	a	**7.**	b	**8.**	a	**9.**	a	**10.**	c
11.	c	**12.**	b	**13.**	c	**14.**	c	**15.**	d	**16.**	b	**17.**	b	**18.**	c	**19.**	b	**20.**	d
21.	a	**22.**	d	**23.**	a	**24.**	a	**25.**	c	**26.**	b	**27.**	a	**28.**	d	**29.**	c	**30.**	d
31.	a	**32.**	d	**33.**	b	**34.**	c	**35.**	d	**36.**	b	**37.**	c	**38.**	c	**39.**	d		

Solutions

Sol.1. (d)
$\theta = 1200^0 = 1080 + 120^0$

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

$= (sec\theta - tan\theta) = (-2+\sqrt{3}) = negative$

II.

$(cosec\theta - \cot\theta) = \frac{2}{\sqrt{3}} + \frac{1}{\sqrt{3}} = positive$

Sol.2. (b)

Sol.3. (b)

$A+B+C = \frac{\pi}{2}$

$A+B = \frac{\pi}{2} - C$

$\tan(A+B) = \tan\left(\frac{\pi}{2}-C\right)$

$\frac{\tan A+\tan B}{1-\tan A\tan B} = \cot C = \frac{1}{\tan C}$

$= \tan A\tan C + \tan B\tan C + \tan A\tan B$

Sol.4. (d)
$\cos 20^0 + \cos 60^0 + \cos 100^0 + \cos 140^0$
$\cos 20^0 + \cos 140^0 + \cos 60^0 + \cos 100^0$
$2\cos 80^0\cos 60^0 + \cos 60^0 + \cos 100^0$
$\cos 80^0 + \cos 60^0 + \cos 100^0 = \cos 60^0 = ½$

Sol.5. (c)
$\cot\theta$ = 5/12 than $\sin\theta$ = 5/13 and $\cos\theta$ = 12/13
$2\sin\theta + 3\cos\theta = -10/13 \ \ -36/13 = -46/13$

Sol.6. (a)
$\cot\theta = 2\cos\theta$
$\sin\theta = 1/2$ in second quadrant $\theta = 150^0$

Sol.7. (b)
$p = \sin(989^0)\cos(991^0)$
$p = -\cos 1^0\sin 1^0$ = negative number

Sol.8. (a)

Sol.9. (a)
$\tan(-1575^0) = -\tan(1440^0+135^0) = -\tan 135^0 = 1$

Sol.10. (c)

$\cos ec^2\theta = 3\sqrt{3}\cot\theta - 5$

$1+\cot^2\theta = 3\sqrt{3}\cot\theta - 5$

$\cot^2\theta - 3\sqrt{3}\cot\theta + 6 = 0$

$\cot\theta = \frac{3\sqrt{3}\pm\sqrt{27-24}}{2} = \frac{3\sqrt{3}\pm\sqrt{3}}{2}$

$\cot\theta = 2\sqrt{3} \ or \ \sqrt{3}$

$\cot\theta = \sqrt{3} \Rightarrow \theta = \frac{\pi}{6}$

Sol.11. (c)

$\tan^2\theta = 2\tan^2\phi + 1$

$\frac{1}{\tan^2\theta} = \frac{1}{2\tan^2\phi+1}$

apply componendo and dividendo

$\frac{1-\tan^2\theta}{1+\tan^2\theta} = \frac{-2\tan^2\phi}{2+2\tan^2\phi} = \frac{-\tan^2\phi}{1+\tan^2\phi}$

$\frac{1-\tan^2\theta}{1+\tan^2\theta} = -\sin^2\phi = \frac{\cos 2\phi - 1}{2}$

Sol.12. (b)

Sol.13. (c)
$\sin^2 x + \sin^2 y = 1$
put $x=0^0$ and $y = 90^0$
than $\cot(x+y) = \cot 90^0 = 0$

Sol.14. (c)
$\sin x + \sin y = a$ .....(i)
$\cos x + \cos y = b$ .....(ii)
$(i)^2 + (ii)^2$
$1 + 1 + 2\sin x\sin y + 2\cos x\cos y = a^2 + b^2$
$2 + 2\cos(x-y) = a^2 + b^2$
$2\cos(x-y) = a^2 + b^2 - 2$

$\cos(x-y) = \frac{1}{2}[a^2 + b^2 - 2]$

Sol.15. (d)

$\left(1+\cos 67\frac{1}{2}^0\right)\left(1+\cos 112\frac{1}{2}^0\right)$

$\left(1+\cos\left(90^0-22\frac{1}{2}^0\right)\right)\left(1+\cos\left(90^0+22\frac{1}{2}^0\right)\right)$

$\left(1+\sin 22\frac{1}{2}^0\right)\left(1-\sin 22\frac{1}{2}^0\right)$

$\left(1-\sin^2 22\frac{1}{2}^0\right)=1-\frac{1}{4}\left(2-\sqrt{2}\right)=\frac{1}{2}+\frac{\sqrt{2}}{4}$

Sol.16. (b)

Sol.17. (b)

$\text{SinA} = \frac{1}{\sqrt{5}}$, than $\text{CosA} = \frac{2}{\sqrt{5}}$

$\text{cosB} = \frac{3}{\sqrt{10}}$, than $\text{SinB} = \frac{1}{\sqrt{10}}$

Cos(A + B) = Cos A Cos B − SinA SinB

after substituting these values

$\text{Cos(A + B)} = \frac{1}{\sqrt{2}}$

$A + B = 45^0$

Sol.18. (c)

$\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4A}}}=\sqrt{2+\sqrt{2+\sqrt{2(1+\cos 4A)}}}$

$\sqrt{2+\sqrt{2+\sqrt{2.2\cos^2 2A}}}=\sqrt{2+\sqrt{2+2\cos 2A}}$

$\sqrt{2+\sqrt{2(1+\cos 2A)}}=\sqrt{2+\sqrt{2.2\cos^2 A}}$

$\sqrt{2+2\cos A}=\sqrt{2(1+\cos A)}$

$2\cos\frac{A}{2}$

Sol.19. (b)

Sin 1110^0 = Sin(1080^0 + 30^0) = Sin30^0 = ½

Sol.20. (d)

$Sin2A=\frac{4}{5}\Rightarrow\frac{2\tan A}{1+\tan^2 A}=\frac{4}{5}$

$10\tan A = 4 + 4\tan^2 A$

$4\tan^2 A - 10\tan A + 4 = 0$

$2\tan^2 A - 5\tan A + 2 = 0$

$(2\tan A-1)(\tan A-2)= 0$

$\tan A = 2$

Sol.21. (a)

$\frac{\cos 10^0-\sin 10^0}{\cos 10^0+\sin 10^0}=\frac{1-\tan 10^0}{1+\tan 10^0}$

$=\tan(45^0-10^0)=\tan 35^0$

Sol.22. (d)

Sol.23. (a)

Sol.24. (a)

$\left(\sin 22\frac{1^\circ}{2}+\cos 22\frac{1^\circ}{2}\right)^4=(1+\sin 45^0)^2$

$=\left(1+\frac{1}{\sqrt{2}}\right)^2=\frac{3+2\sqrt{2}}{2}$

Sol.25. (c)

$\sin\left(292\frac{1}{2}\right)^0=\sin\frac{585^0}{2}$

$=\sqrt{\frac{1-\cos 585^0}{2}}$

$\left(\because \cos 2\theta=1-2\sin^2\theta\Rightarrow\sin\theta=\sqrt{\frac{1-\cos 2\theta}{2}}\right)$

$=\sqrt{\frac{1-\cos\left(360^0+225^0\right)}{2}}=\sqrt{\frac{1-\cos 225^0}{2}}$

$=\sqrt{\frac{1-\cos\left(180^0+45^0\right)}{2}}$

$=\sqrt{\frac{1+\cos 45^0}{2}}=\sqrt{\frac{1+\frac{1}{\sqrt{2}}}{2}}=$

$=\sqrt{\frac{\sqrt{2}+1}{2\sqrt{2}}}=\frac{1}{2}\sqrt{2+\sqrt{2}}$

Sol.26. (b)

Consider

$\frac{\sin\theta+\cos\theta-\tan\theta}{\sec\theta+\cos ec\theta-\cot\theta}$

Now, put value of $\theta=\frac{3\pi}{4}$, we get

$\frac{\sin\frac{3\pi}{4}+\cos\frac{3\pi}{4}-\tan\frac{3\pi}{4}}{\sin\frac{3\pi}{4}+\cos ec\frac{3\pi}{4}-\cot\frac{3\pi}{4}}$

$=\frac{\sin\frac{\pi}{4}-\cos\frac{\pi}{4}+\tan\frac{\pi}{4}}{-\frac{1}{\cos\frac{\pi}{4}}+\frac{1}{\sin\frac{\pi}{4}}+\frac{1}{\tan\frac{\pi}{4}}}=\frac{\frac{1}{\sqrt{2}}-\frac{1}{\sqrt{2}}+1}{-\sqrt{2}+\sqrt{2}+1}=1$

Sol.27. (a)

Consider $15^0\sin 75^0$

$=\sin\left(45^0-30^0\right)\sin\left(45^0+30^0\right)$

$\left(\sin 45^0\cos 30^0-\cos 45^0\sin 30^0\right)$

$\left(\sin 45^0\cos 30^0+\cos 45^0\sin 30^0\right)$

(using $\sin(A+B)=\sin A\cos B+\cos A\sin B$ and

$\sin(A-B)\sin A\cos B-\cos A\sin B$

$=\left(\frac{1}{\sqrt{2}}\cdot\frac{\sqrt{3}}{2}-\frac{1}{\sqrt{2}}\cdot\frac{1}{2}\right)\left(\frac{1}{\sqrt{2}}\cdot\frac{\sqrt{3}}{2}+\frac{1}{\sqrt{2}}\cdot\frac{1}{2}\right)$

$=\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right)\left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)=\frac{3-1}{8}=\frac{2}{8}=\frac{1}{4}$

Sol.28. (d)

Consider

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

($\because \sin 2\theta=\frac{2\tan\theta}{1+\tan^2\theta}$ and

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

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

$=\frac{1+\tan\frac{\theta}{2}}{1-\tan\frac{\theta}{2}}=\frac{\cos\frac{\theta}{2}+\sin\frac{\theta}{2}}{\cos\frac{\theta}{2}-\sin\frac{\theta}{2}}$

Multiplied and divide by

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

$=\frac{\sin\theta+1-\cos\theta}{\sin\theta-1+\cos\theta}$

($\because \sin 2\theta=2$) sin θ $\cos\theta$ and

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

Sol.29. (c)

Sum of a number and its reciprocal is always greater than 2.

Sol.30. (d)

Consider $\sin 50^0-\sin 70^0+\sin 10^0$

$=2\cos\frac{70^0+50^0}{2}.\sin\frac{50^0-70^0}{2}+\sin 10^0$

$\left[\because \sin A-\sin B=2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)\right]$

$=-2\cos 60^0\sin 10^0+\sin 10^0=\sin 10^0+\sin 10^0=0$

$\left(\because \cos\ 60^0=\frac{1}{2}\right)$

Sol.31. (a)

Consider $\left(\frac{\sec 18^0}{\sec 144^0}+\frac{\cos ec\ 18^0}{\cos ec 144^0}\right)$

$=\frac{\sec 18^0}{\sec\left(180^0-36^0\right)}+\frac{\cos ec\ 18^0}{\cos ec\left(180^0-36^0\right)}$

$=-\frac{\sec 18^0}{\sec 36^0}+\frac{\cos 36^0}{\cos ec 36^0}$

($\because$ sin, cosec are +ve in 2nd quadrant and sec is –ve in 2nd quadrant)

$=\frac{\sin\ 36^0}{\sin 18^0}-\frac{\cos\ 36^0}{\cos 18^0}=$

$\frac{\sin 36^0\cos 18^0-\cos 36^0\sin\ 18^0}{\sin\ 18^0\cos 18^0}$

$=\frac{\sin\left(36^0-18^0\right)}{\sin\ 18^0\cos 18^0}=\frac{\sin 18^0}{\sin\ 18^0\cos 18^0}$

$= \sec\ 18^0$

$\left(\because \frac{1}{\cos x}=\sec.x\right)$

Sol.32. (d)

Let $\angle A=\frac{1}{2}$

radian, $\angle B = 99^0 = \frac{99^0 \times \pi}{180^0} = \frac{11\pi}{20}$

We know that, $\angle A + \angle B + \angle C = \pi$

(by angle sum property of triangle)

$\Rightarrow \frac{1}{2} + \frac{11\pi}{20} + \angle C = \pi$

$\Rightarrow \angle C = \pi \frac{11\pi}{20} - \frac{1}{2} = \frac{9\pi - 10}{20}$

Hence, the third angle in radian is $\frac{9\pi - 10}{20}$

Sol.33. (b)

Sol.34. (c)

Consider $\frac{\sin x}{1+\cos x} = \frac{2\sin x/2\cos\ x/2}{1+2\cos^2(x/2)-1}$

$\left(\because \sin 2x = 2\sin x \cos x \text{ and } \cos 2x = 2\cos^2 x - 1\right)$

$= \frac{2\sin\ x/2\ \cos\ x/2}{2\ \cos^2\ x/2} = \frac{\sin\ x/2}{\cos\ x/2} = \tan x/2$

Sol.35. (d)

$\frac{1+\tan 15^0}{1-\tan 15^0} = \frac{\tan 45^0 + \tan 15^0}{1-\tan 45^0 \tan 15^0} \left(\because \tan 45^0 = 1\right)$

$= \tan\left(45^0 + 15^0\right)$

$= \tan\ 60^0 = \sqrt{3}$

Sol.36. (b)

A , B, C are in AP than A + C = 2B given SinA + 2SinB +SinC =SinA + SinC + 2SinB

$2SinB + 2Sin\left(\frac{A+C}{2}\right)\cos\left(\frac{A-C}{2}\right)$

$2SinB + 2SinB\cos\left(\frac{A-C}{2}\right)$

$2SinB\left(1+\cos\left(\frac{A-C}{2}\right)\right)$

$2SinB\left(2\cos^2\left(\frac{A-C}{4}\right)\right)$

$4SinB\cos^2\left(\frac{A-C}{4}\right)$

Sol.37. (c)

$\tan\left(7\frac{1}{2}\right)^0 = \frac{\sin\left(7\frac{1}{2}\right)^0}{\cos\left(7\frac{1}{2}\right)^0}$

Multiply and divide by $2\sin\left(7\frac{1}{2}\right)^0$; we get

$\frac{2\sin^2\left(7\frac{1}{2}\right)^0}{2\sin\left(7\frac{1}{2}\right)^0\cos\left(7\frac{1}{2}\right)^0} = \frac{2\sin^2\left(\frac{15}{2}\right)^0}{2\sin\left(\frac{15}{2}\right)^0\cos\left(\frac{15}{2}\right)^0}$

$\frac{1-\cos\left(2\times\frac{15}{2}\right)^0}{\sin\left(2\times\frac{15}{2}\right)^0}$

$\left(\because \cos 2\theta = 1 - 2\sin^2\theta \text{ and } \sin 2\theta = 2\sin\theta\cos\theta\right)$

$= \frac{1-\cos 15^0}{\sin 15^0} = \frac{1-\left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)}{\frac{\sqrt{3}-1}{2\sqrt{2}}} = \sqrt{2}\left(\sqrt{3}+1\right) - \left(2+\sqrt{3}\right)$

$= \sqrt{6} + \sqrt{2} - 2 - \sqrt{3} = \sqrt{6} - \sqrt{3} + \sqrt{2} - 2$

Sol.38. (c)

Given equation is $4(\sin^2 x + \cos x) = 1$

$\Rightarrow 4\sin^2 x + 4\cos x = 1$

$\Rightarrow 4\sin^2 x + 4\cos x - 1 = 0$

$\Rightarrow 4\left(1-\cos^2 x\right) + 4\cos x - 1 = 0$

$\Rightarrow 4 - 4\cos^2 x + 4\cos x - 1 = 0$

$\Rightarrow -4\cos^2 x + 4\cos x + 3 = 0$

$\Rightarrow -4\cos^2 x - 4\cos x + 3 = 0$

This is the qu7adratic in cos x .

$\Rightarrow 4\cos^2 x - 6\cos x + 2\cos x - 3 = 0$

$\Rightarrow (2\cos x - 3)(2\cos x + 1) = 0$

$\cos x = \frac{3}{2}$ and $\cos x = -\frac{1}{2}$

$\cos x = \frac{3}{2}$ is not possible therefore

$\cos x = -\frac{1}{2}$

$\Rightarrow \cos A = -\frac{1}{2} = \cos 210^0$

$\Rightarrow A = 210^0$

Sol.39. (d)

Consider $\frac{\cos 15^0 + \cos 15^0}{\cos^3 15^0 + \cos^3 15^0}$

$\frac{\cos 15^0 + \cos 45^0}{\left(\cos 15^0 + \cos 45^0\right)\left(\cos^2 45^0 + \cos^2 15^0 - \cos 45^0 + \cos 15^0\right)}$

$\left(\because a^3 + b^3 = (a+b)\left(a^2 + b^2 - ab\right)\right)$

$= \frac{1}{\cos^2 45^0 + \cos^2 15^0 - \cos\ 45^0 \cos\ 15^0}$

$= \frac{1}{\frac{1}{2} + \left(\cos 45^0 \cos 30^0 + \sin\ 45^0 \sin 30^0\right)^2 - \frac{\cos 15^0}{\sqrt{2}}}$

$\left[\because \cos 15^0 = \cos\left(45^0 - 30^0\right)\right]$

$= \frac{1}{\frac{1}{2} + \left(\frac{\sqrt{3}}{2\sqrt{2}} + \frac{1}{2\sqrt{2}}\right) - \frac{1}{\sqrt{2}}\left(\frac{\sqrt{3}+1}{2\sqrt{2}}\right)}$

$= \frac{1}{\frac{1}{2} + \frac{3+1+2\sqrt{3}}{8} - \frac{\sqrt{3}+1}{4}}$

$= \frac{1}{4+4+2\sqrt{3}-2\sqrt{3}-2} = \frac{8}{6} = \frac{4}{3}$

NDA PYQ

1. If an angle α is divided into two parts A and B such that A–B = x and tan A : tan B = 2:1, then what is sin x equal to?

(a) $3\sin\alpha$ (b) $\frac{2\sin\alpha}{3}$

(c) $\frac{\sin\alpha}{3}$ (d) $2\sin\alpha$

[NDA (I) - 2011]

2. If $x=\sin\theta + \cos\theta$ and $y = \sin\theta.\cos\theta$, then what is the value of $x^4 - 4x^2 y - 2x^2 + 4y^2 + 4y + 1$?

(a) 0 (b) 1
(c) 2 (d) None of these

[NDA (I) - 2011]

3. If $(1+\tan\theta)(1+\tan\phi)=2$, then what is $(\theta+\phi)$ equal to?

(a) 30° (b) 45°
(c) 60° (d) 90°

[NDA (II) - 2011]

4. Which one of the following statements is correct?

(a) $\sin^2 30°, \sin^2 45°, \sin^2 60°$ are in GP
(b) $\cos^2 30°, \cos^2 45°, \cos^2 60°$ are in GP
(c) $\cot^2 30°, \cot^2 45°, \cot^2 60°$ are in AP
(d) $\tan^2 30°, \tan^2 45°, \tan^2 60°$ are in GP

[NDA-2011(1)]

5. If, in general, the value of sin A is known, but the value of A is not known, then how many values of tan(A/2) can be calculated?

(a) 1 (b) 2
(c) 3 (d) 4

[NDA-2011(1)]

6. What is the range of f(x) = cos2x - sin2x ?

(a) [2,4] (b) [-1,1]
(c) $\left[-\sqrt{2}.\sqrt{2}\right]$ (d) $\left(-\sqrt{2}.\sqrt{2}\right)$

[NDA (I) - 2011]

7. If $x = y\cos\left(\frac{2\pi}{3}\right) = z\cos\left(\frac{4\pi}{3}\right)$, then what is xy + yz + zx equal to?

(a) –1 (b) 0
(c) 1 (d) 2

[NDA (II) - 2011]

8. What is the value of tan 9° – tan27° – tan63° + tan81°?

(a) 1 (b) 2
(c) 3 (d) 4

[NDA (II) - 2011]

9. If $\tan\theta = \sqrt{m}$, where m is a non-square natural number m, then sec 2θ is:

(a) A negative number
(b) A transcendental number
(c) An irrational number
(d) A rational number

[NDA (II) - 2011]

10. If sin 3A = 1, then how many distinct value can sin A assume?

(a) 1 (b) 2
(c) 3 (d) 4

[NDA (II) - 2011]

11. If sin A + sin B + sin C = 3, then what is cos A + cos B + cos C equal to?

(a) –1 (b) 0
(c) 1 (d) 3

[NDA (II) - 2011]

12. If $\sin\theta = \cos^2\theta$, then what is $\cos^2\theta(1+\cos^2\theta)$ equal to?

(a) 1 (b) 0'
(c) $\cos^2\theta$ (d) $2\sin\theta$

[NDA (II) - 2011]

13. If tan A – tan B = x and cot B – cot A = y, then what is cot (A–B) equal to?

(a) $\frac{1}{y}-\frac{1}{x}$ (b) $\frac{1}{x}-\frac{1}{y}$

(c) $\frac{1}{x}+\frac{1}{y}$ (d) $-\frac{1}{x}-\frac{1}{y}$

[NDA (II) - 2011]

14. What is the maximum value of 3cosx + 4sinx + 5?

(a) 5 (b) 7
(c) 10 (d) 12

[NDA (II) - 2011]

15. If tan A =1/2 and tan B =1/3, then what is the value of 4A + 4B?

(a) π/4 (b) π/2
(c) π (d) 2π

[NDA (II) - 2011]

16. What is $\frac{\sin x}{1+\cos x}+\frac{1+\cos x}{\sin x}$ equal to?

(a) 2tanx (b) 2cosecx
(c) 2cosx (d) 2sinx

[NDA (II) - 2011]

17. What is the value of tan 15° tan 195°.

(a) $7-4\sqrt{3}$ (b) $7+4\sqrt{3}$
(c) $7+2\sqrt{3}$ (d) $7+6\sqrt{3}$

[NDA (II) - 2011]

Directions (For Next Three):

Let sin (A+B) = 1 and sin (A–B) = ½ where $AB \in \left[0, \frac{\pi}{2}\right]$

18. What is the value of A?

(a) π/6 (b) π/3
(c) π/4 (d) π/8

[NDA (I) - 2012]

19. What is the value of tan (A+2B) tan (2A+B)?

(a) –1 (b) 0
(c) 1 (d) 2

[NDA (I) - 2012]

20. What is the value of $\sin^2 A - \sin^2 B$?

(a) 0 (b) ½
(c) 1 (d) 2

[NDA (I) - 2012]

21. Consider the following statements:
I.1° in radian measure is less than 0.02 radians
II.1 radian in degree measure is greater than 45°.
Which of the above statements is/are correct?

(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

[NDA (I) - 2012]

22. If $\tan\theta + \sec\theta = 4$, then what is the value of $\sin\theta$?
(a) 8/17 (b) 8/15
(c) 15/17 (d) 23/12
[NDA (I) - 2012]

23. What the value of sin A cos A tan A + cos A sin A cot A?
(a) sin A (b) cos A
(c) tan A (d) 1
[NDA (I) - 2012]

24. What is the maximum value of $\sin3\theta\cos2\theta + \cos3\theta\sin2\theta$?
(a) 1 (b) 2
(c) 4 (d) 10
[NDA (I) - 2012]

25. If cot A cot B = 2 then what is the value of cos (A+B) sec (A–B)?
(a) 1/3 (b) 2/3
(c) 1 (d) –1
[NDA (I) - 2012]

26. What is the value of sin (1920°)?
(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$
(c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{3}$
[NDA (I) - 2012]

27. Which one of the following is positive in the third quadrant?
(a) $\sin\theta$ (b) $\cos\theta$
(c) $\tan\theta$ (d) $\sec\theta$
[NDA (I) - 2012]

28. If $\operatorname{cosec}\theta - \cot\theta = \frac{1}{\sqrt{3}}$, where $\theta \neq 0$, then what is the value of $\cos\theta$?
(a) 0 (b) $\frac{\sqrt{3}}{2}$
(c) $\frac{1}{2}$ (d) $\frac{1}{\sqrt{2}}$
[NDA (I) - 2012]

29. What is the maximum value of $\sin^2 x$?
(a) –1 (b) 0
(c) 1 (d) Infinity
[NDA (I) - 2012]

30. What is the value of $\frac{\sin\theta}{\operatorname{cosec}\theta} + \frac{\cos\theta}{\sec\theta}$?
(a) 1 (b) 1/2
(c) 1/3 (d) 2
[NDA (I) - 2012]

31. What is $\tan\left(\frac{\pi}{12}\right)$ equal to?
(a) 2–√3 (b) 2+√3
(c) √3-√3 (d) √3-√2
[NDA(I)-2012]

32. If $\theta=18°$, then what is the value of $4\sin^2\theta + 2\sin\theta$?
(a) –1 (b) 1
(c) 0 (d) 2
[NDA(I)-2012]

33. If ABCD is a cyclic quadrilateral then what is sin A + sin B – sin C – sin D equal to?
(a) 0 (b) 1
(c) 2 (d) 2(sinA + sinB)
[NDA(I)-2012]

34. What is the value of $\sin420°.\cos390° + \cos(-300°)\sin(-330°)$?
(a) 0 (b) 1
(c) 2 (d) –1
[NDA (I) - 2012]

35. If $\sin A = \frac{2}{\sqrt{5}}$ and $\cos B = \frac{1}{\sqrt{10}}$, where A and B are acute angles, then what is the value of A+B?
(a) 135° (b) 90°
(c) 75° (d) 60°
[NDA (I) - 2012]

36. If $4\sin^2\theta = 1$, where $0 < \theta < 2\pi$, how many values does θ take?
(a) 1 (b) 2
(c) 4 (d) None of these
[NDA (II) - 2012]

37. What is the value of sin 15°?
(a) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (b) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
(c) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$ (d) $\frac{\sqrt{3}+1}{\sqrt{3}-1}$
[NDA (II) - 2012]

38. The line making an angle (–120°) with x-axis is situated in the:
(a) First quadrant (b) Second quadrant
(c) Third quadrant (d) Fourth quadrant
[NDA (II) - 2012]

39. That is the value of tan (–585°)?
(a) 1 (b) –1
(c) $-\sqrt{3}$ (d) $-\sqrt{3}$
[NDA (II) - 2012]

40. If $\sec\alpha = \frac{13}{5}$, where $270° < \alpha < 360°$, then what is the value of $\sin\alpha$?
(a) 5/13 (b) 12/13
(c) –12/13 (d) –13/12
[NDA (II) - 2012]

41. Consider the following statements:
I. The value of cos 46°–sin46° is positive
II. The value of cos 44°–sin44° is negative
Which of the above statements is/are correct?
(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II
[NDA (II) - 2012]

42. What is the value of sin 18° cos 36°?
(a) 4 (b) 2
(c) 1 (d) 1/4
[NDA (II) - 2012]

43. The angle subtended at the centre of a circle of radius 3cm by an arc of length 1cm is:
(a) $\frac{30°}{\pi}$ (b) $\frac{60°}{\pi}$
(c) 60° (d) none of the above
[NDA-2012(2)]

44. What is the value of tan 105°?
(a) $\frac{\sqrt{3}+1}{\sqrt{3}-1}$ (b) $\frac{\sqrt{3}+1}{1-\sqrt{3}}$

(c) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$ (d) $\frac{\sqrt{3}+2}{\sqrt{3}-1}$

[NDA (I) - 2013]

45. If $\sin\theta + 2\cos\theta = 1$, then what is $2\sin\theta - \cos\theta$ equal to?
(a) 0 (b) 1
(c) 2 (d) 4

[NDA (I) - 2013]

46. What is $\frac{1-\tan^2\frac{x}{2}}{1+\tan^2\frac{x}{2}}$ equal to?
(a) sinx cosx (b) tanx
(c) sinx (d) cosx

[NDA (I) - 2013]

47. The expression $\frac{\cot x + \cos\sec x - 1}{\cot x - \operatorname{cosec} x + 1}$ is equal to:
(a) $\frac{\sin x}{1-\cos x}$ (b) $\frac{1-\cos x}{\sin x}$
(c) $\frac{1+\cos x}{\sin x}$ (d) $\frac{\sin x}{1+\cos x}$

[NDA (I) - 2013]

48. What is the value of $(\sin^4\theta - \cos^4\theta + 1)\operatorname{cosec}^2\theta$.
(a) –2 (b) 0
(c) 1 (d) 2

[NDA (I) - 2013]

49. If tan A = x + 1 and tan B = x –1, then x^2 tan (A–B) has the value.
(a) 1 (b) x
(c) 0 (d) 2

[NDA (I) - 2013]

50. If A + B = 90°, then what is the value of $\sqrt{\sin A\sec B - \sin A\cos B}$?
(a) sin A (b) cos A
(c) tan A (d) 0

[NDA (I) - 2013]

51. What is $\tan^4 A - \sec^4 A + \tan^2 A + \sec^2 A$ equal to?
(a) 0 (b) 1
(c) 2 (d) –1

[NDA (I) - 2013]

52. If $\operatorname{cosec}\theta + \cot\theta = c$, then what is $\cos\theta$ equal to?
(a) $\frac{c}{c^2-1}$ (b) $\frac{c}{c^2+1}$
(c) $\frac{c^2-1}{c^2+1}$ (d) None of these

[NDA (I) - 2013]

53. If d is the number of degrees contained in an angle, m is the number of minutes and s is the number of seconds, then the value of (s–m)/(m–d) is:
(a) 1 (b) 60
(c) 1/60 (d) none of the above

[NDA-2013(1)]

54. Consider the following:
I. $\tan\left(\frac{\pi}{6}\right)$ II. $\tan\left(\frac{3\pi}{4}\right)$
III. $\tan\left(\frac{5\pi}{4}\right)$ IV. $\tan\left(\frac{2\pi}{3}\right)$
Which one of the following is the correct order?
(a) I<IV<II<III (b) IV<II<I<III
(c) IV<II<III<I (d) I<II<III<II

[NDA (II) - 2013]

55. What is $(1-\sin^2\theta)(1+\tan^2\theta)$ equal to?
(a) $\sin^2\theta$ (b) $\cos^2\theta$
(c) $\tan^2\theta$ (d) 1

[NDA (II) - 2013]

56. What is $\sin^2 20° + \sin^2 70°$ equal to?
(a) 1 (b) 0
(c) –1 (d) $\frac{1}{2}$

[NDA (II) - 2013]

57. If cos x = 1/3. Then, what is sin x. cot x cosec x. tan x equal to?
(a) 2/3 (b) 3/2
(c) 2 (d) 1

[NDA (II) - 2013]

58. What is $\frac{\cot 54°}{\tan 36°} + \frac{\tan 20°}{\cot 70°}$ equal to?
(a) 0 (b) 1
(c) 2 (d) 3

[NDA (II) - 2013]

59. What is tan15° equal to?
(a) $2-\sqrt{3}$ (b) $2+\sqrt{3}$
(c) $1-\sqrt{3}$ (d) $1+\sqrt{3}$

[NDA (II) - 2013]

60. What is the angle (in circular measure) between the hour hand and the minute hand of a clock when the time is half past 4?
(a) π/3 (b) π/4
(c) π/6 (d) none of the above

[NDA-2013(II)]

61. What is the value of $\frac{1+\sin A}{1-\sin A} - \frac{1-\sin A}{1+\sin A}$?
(a) sec A – tan A (b) 2sec A. tan A
(c) 4sec A. tan A (d) 4cosec A.cot A

[NDA (I) - 2014]

62. If A + B + C = π, then what is cos (A+B) + cos C equal to?
(a) 0 (b) 2cosC
(c) cosC – sinC (d) 2sinC

[NDA (I) - 2014]

63. What is cos20° + cos 100° + cos 140° equal to?
(a) 2 (b) 1
(c)1/2 (d) 0

[NDA (I) - 2014]

64. What is $\sin^2(3\pi) + \cos^2(4\pi) + \tan^2(5\pi)$ equal to?
(a) 0 (b) 1
(c) 2 (d) 3

[NDA (I) - 2014]

65. Consider the following statements:
I. Value of sinθ oscillates between –1 and 1
II. Value of cosθ oscillates between 0 to 1
Which of the above statements is/are correct?
(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

[NDA (I) - 2014]

66. Consider the following statements
I. sin|x| + cos |x| is always positive
II. $\sin(x^2) + \cos(x^2)$ is always positive
Which of the above statement is/are correct?
(a) Only I (b) Only II

(c) Both I and II (d) Neither I nor II

[NDA (I) - 2014]

67. What is the value of $\frac{\cot 224^\circ - \cot 134^\circ}{\cot 226^\circ + \cot 316^\circ}$?

(a) $-\text{cosec}88^\circ$ (b) $-\text{cosec}2^\circ$
(c) $-\text{cosec}44^\circ$ (d) $-\text{cosec}45^\circ$

[NDA (I) - 2014]

68. What is the value of cos 36°?

(a) $\frac{\sqrt{5}-1}{4}$ (b) $\frac{\sqrt{5}+1}{4}$

(c) $\frac{\sqrt{10+2\sqrt{5}}}{4}$ (d) $\frac{\sqrt{10-2\sqrt{5}}}{4}$

[NDA (I) - 2014]

69. Consider the following statements:

I.n $\left(\sin^2 67\frac{1^\circ}{2} - \sin^2 22\frac{1^\circ}{2}\right) > 1$ for all positive integers $n \geq 2$.

II.If x is any positive real number, then nx > 1 for all positive integers n≥2.

Which of the above statements is/are correct?

(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

[NDA (I) - 2014]

70. Consider the following statements:

I. If 3θ is an acute angle such that sin3θ = cos2θ,then the measurement of θ in radian equals to π/10.

II. One radian is the angle subtended at the centre of a circle by an arc of the same circle chose length is equal to the diameter of that circle.

Which of the above statements is/are correct?

(a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

[NDA (I) - 2014]

71. The complete solution of $3\tan^2 x = 1$ is given by:

(a) $x = n\pi \pm \frac{\pi}{3}$ (b) $x = n\pi + \frac{\pi}{3}$ only

(c) $x = n\pi \pm \frac{\pi}{6}$ (d) $x = n\pi + \frac{\pi}{6}$ only

Where $n \in Z$

[NDA-2014(1)]

Directions (For Next Three):

Read the following information carefully and answer the questions given below.

Given, $16\sin^5 x = p\sin 5x + q\sin 3x + r\sin x$

72. What is the value of p?

(a) 1 (b) 2
(c) –1 (d) –2

[NDA (II) - 2014]

73. What is the value of q?

(a) 3 (b) 5
(c) 10 (d) –5

[NDA (II) - 2014]

74. What is the value of r?

(a) 5 (b) 8
(c) 10 (d) –10

[NDA (II) - 2014]

75. What is $\frac{\cos 7x - \cos 3x}{\sin 7x - 2\sin 5x + \sin 3x}$ equal to?

(a) tan x (b) cot x
(c) tan 2x (d) cot 2x

[NDA (II) - 2014]

76. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then what is $\frac{\tan x}{\tan y}$ equal to?

(a) b/a (b) a/b
(c) ab (d) 1

[NDA (II) - 2014]

77. What is $\sqrt{1+\sin 2\theta}$ equal to?

(a) cosθ – sinθ (b) cosθ + sinθ
(b) 2cosθ (d) cosθ + 2sinθ

[NDA (II) - 2014]

78. If cot A = 2 and cot B = 3, then what is the value of (A+B)?

(a) π/6 (b) π
(c) π/2 (d) π/4

[NDA (II) - 2014]

79. What is $\sin^2 66\frac{1^\circ}{2} - \sin^2 23\frac{1^\circ}{2}$ equal to:

(a) sin47° (b) cos47°
(c) 2sin47° (d) 2cos47°

[NDA (II) - 2014]

80. If sin A sin(60°–A) sin(60°+A)=k sin 3A, then what is k equal to?

(a) 1/4 (b) 1/2
(c) 1 (d) 4

[NDA (II) - 2014]

81. Which one of the following in one of the solutions of the equation tan 2θ tanθ = 1?

(a) π/12 (b) π/6
(c) π/4 (d) π/3

[NDA (II) - 2014]

82. The line y=√3 meets the graph y=tan x, where $x \in \left(0, \frac{\pi}{2}\right)$, in k points. What is k equal to?

(a) one (b) two
(c) three (d) infinity

[NDA(II)-2014]

Directions (For Next Two)

Let α be the root of the equation $25\cos^2\theta + 5\cos\theta - 12 = 0$, where $\frac{\pi}{2} < \alpha < \pi$.

83. What is the tanα equal to?

(a) –3/4 (b) 3/4
(c) –4/5 (d) –4/5

[NDA (I) - 2015]

84. What is sin 2α equal to?

(a) 24/25 (b) –24/25
(c) –5/12 (d) –21/25

[NDA (I) - 2015]

85. $(1-\text{sinA} + \text{cosA})^2$ is equal to:

(a) 2(1–cosA) (1+sinA) (b) 2(1–sinA) (1+cosA)
(c) 2(1–cosA) (1–sinA) (d) None of these

[NDA (I) - 2015]

86. What is $\frac{\cos\theta}{1-\tan\theta} + \frac{\sin\theta}{1-\cot\theta}$ equal to?

(a) sinθ–cosθ (b) sinθ + cosθ
(c) 2sinθ (d) 2cosθ

[NDA (I) - 2015]

87. Let θ be a positive angle. If the number of degrees in θ is divided by the number of radians in θ, then an irrational number $\frac{180}{\pi}$ results. If the number of degrees in θ is

multiplied by the number of radians in θ, then an irrational number $\frac{125\pi}{9}$ results. The angle θ must be equal to:

(a) 30° (b) 45°
(c) 50° (d) 60°

[NDA (I) - 2015]

88. If sin x + sin y = a and cos x + cos y = b, than $\tan^2\left(\frac{x+y}{2}\right)+\tan^2\left(\frac{x-y}{2}\right)$ is equal to:

(a) $\frac{a^4+b^4+4b^2}{a^2b^2+b^4}$ (b) $\frac{a^4-b^4+4b^2}{a^2b^2+b^4}$

(c) $\frac{a^4-b^4+4a^2}{a^2b^2+a^4}$ (d) None of these

[NDA (II) - 2015]

89. If $p=\tan\left(-\frac{11\pi}{6}\right), q=\tan\left(\frac{21\pi}{4}\right)$ and $r=\cot\left(\frac{383\pi}{6}\right)$, then which of the following is/are correct?
1. The value of p × r is 2
2. p, q and r are in G.P.
Select the correct answer using the code given below:
(a) Only 1 (b) Only 2
(c) Both 1 and 2 (d) Neither 1 nor 2

[NDA (II) - 2015]

90. The value of $\sin^2 5° + \sin^2 10° + \sin^2 15° + \sin^2 20° + \ldots. + \sin^2 90°$ is:
(a) 7 (b) 8
(c) 9 (d) 19/2

[NDA (II) - 2015]

91. On simplifying $\frac{\sin^3 A+\sin 3A}{\sin A}+\frac{\cos^3 A-\cos 3A}{\cos A}$ we get
(a) sin3A (b) cos3A
(c) sinA + cosA (d) 3

[NDA (II) - 2015]

92. If A = (cos12° – cos 36°) (sin96°–sin24°) and B = (sin 60° – sin12°) (cos 48° – cos 72°), then what is A/B equal to?
(a) –1 (b) 0
(c) 1 (d) 2

[NDA (I) - 2016]

93. Sin A + 2sin 2A + sin3A is equal to which of the following?
1. $4\sin 2A \cos^2\left(\frac{A}{2}\right)$
2. $2\sin 2A \left(\sin\frac{A}{2}+\cos\frac{A}{2}\right)^2$
3. $8 \sin A \cos A \cos^2\left(\frac{A}{2}\right)$
Select the correct answer using the codes given below:
(a) Both 1 and 2 (b) Both 2 and 3
(c) Both 1 and 3 (d) 1, 2 and 3

[NDA (II) - 2016]

94. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 + \sin\theta_4 = 4$, then what is the value of $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 + \cos\theta_4$?
(a) 0 (b) 1
(c) 2 (d) 4

[NDA (II) - 2016]

95. If x cosθ + y sinθ = z, then what is the value of $(x \sin\theta - y\cos\theta)^2$?
(a) $x^2 + y^2 – z^2$ (b) $x^2 – y^2 – z^2$
(c) $x^2 – y^2 + z^2$ (d) $x^2 + y^2 + z^2$

[NDA (II) - 2016]

96. If x = sin 70°. Sin50° and y=cos60°. cos80°, then what is xy equal to?
(a) 1/16 (b) 1/8
(c) 1/4 (d) 1/2

[NDA (II) - 2016]

97. What is the value of:
$\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)$?

(a) $\frac{1}{2}$ (b) $\frac{1}{2}+\frac{1}{2\sqrt{2}}$

(c) $\frac{1}{2}-\frac{1}{2\sqrt{2}}$ (d) $\frac{1}{8}$

[NDA (II) - 2016]

98. If $\sin 18° = \frac{\sqrt{5}-1}{4}$, then what is the value of sin 81°.

(a) $\frac{\sqrt{3+\sqrt{5}}+\sqrt{5-\sqrt{5}}}{4}$ (b) $\frac{\sqrt{3+\sqrt{5}}+\sqrt{5+\sqrt{5}}}{4}$

(c) $\frac{\sqrt{3-\sqrt{5}}+\sqrt{5-\sqrt{5}}}{4}$ (d) $\frac{\sqrt{3+\sqrt{5}}-\sqrt{5-\sqrt{5}}}{4}$

[NDA (II) - 2016]

99. What is $\frac{1-\tan 2°\cot 62°}{\tan 152°-\cot 88°}$ equal to?
(a) $\sqrt{3}$ (b) $-\sqrt{3}$
(c) $\sqrt{2}-1$ (d) $1-\sqrt{2}$

[NDA (II) - 2016]

100. If sin A =3/5 ,where 450° < A < 540°, then cos A/2 is equal to:

(a) $\frac{1}{\sqrt{10}}$ (b) $-\sqrt{\frac{3}{10}}$

(c) $\frac{\sqrt{3}}{\sqrt{10}}$ (d) None of these

[NDA (I) - 2017]

101. The expression $\frac{\sin\alpha+\sin\beta}{\cos\alpha+\cos\beta}$ is equal to:

(a) $\tan\left(\frac{\alpha+\beta}{2}\right)$ (b) $\cot\left(\frac{\alpha+\beta}{2}\right)$

(c) $\sin\left(\frac{\alpha+\beta}{2}\right)$ (d) $\cos\left(\frac{\alpha+\beta}{2}\right)$

[NDA (I) - 2017]

102. What is the value of tan 18°?

(a) $\frac{\sqrt{5}-1}{\sqrt{10+2\sqrt{5}}}$ (b) $\frac{\sqrt{5}-1}{\sqrt{10+\sqrt{5}}}$

(c) $\frac{\sqrt{10+2\sqrt{5}}}{\sqrt{5}-1}$ (d) $\frac{\sqrt{10+\sqrt{5}}}{\sqrt{5}-1}$

[NDA (I) - 2017]

103. If tan (α + β) = 2 and tan (α – β) = 1, then tan (2α) is equal to:
(a) –3 (b) –2
(c) –1/3 (d) 1

[NDA (I) - 2017]

104. What is $\frac{1}{\sin 10°}-\frac{\sqrt{3}}{\cos 10°}$ equal to?
(a) 0 (b) 1
(c) 2 (d) 4

[NDA (I) - 2017]

105. The maximum value of:

$\sin\left(x+\frac{\pi}{6}\right)+\cos\left(x+\frac{\pi}{6}\right)$ in the interval $\left(0,\frac{\pi}{2}\right)$ is attained at:

(a) $\pi/12$ (b) $\pi/6$

(c) $\pi/3$ (d) $\pi/2$

[NDA (I) - 2017]

106. If k=$\sin\left(\frac{\pi}{18}\right)\sin\left(\frac{5\pi}{18}\right)\sin\left(\frac{7\pi}{18}\right)$, then what is the value of K?

(a) 1/2 (b) 1/4

(c) 1/8 (d) 1/16

[NDA (I) - 2017]

107. If $\sin\theta = 3\sin(\theta+2\alpha)$, then the value of $\tan(\theta+\alpha) + 2\tan\alpha$ is equal to:

(a) –1 (b) 0

(c) 1 (d) 2

[NDA (I) - 2017]

108. If $\sec\theta - \operatorname{cosec}\theta = \frac{4}{3}$, then what is $(\sin\theta - \cos\theta)$ equal to?

(a) Only –2 (b) Only 1/2

(c) Both–2 and 1/2 (d) Neither 1/2 nor –2

[NDA (I) - 2017]

109. The value of $\tan 9° - \tan 27° - \tan 63° + \tan 81°$ is equal to:

(a) –1 (b) 0

(c) 1 (d) 4

[NDA (II) - 2017]

110. The value of $\sqrt{3}\operatorname{cosec} 20° - \sec 20°$ is equal to:

(a) 4 (b) 2

(c) 1 (d) –4

[NDA (II) - 2017]

111. Angle α is divided into two parts A and B such that A – B = x and tan A: tan B = p:q. The value of sin x is equal to:

(a) $\frac{(p+q)\sin\alpha}{p-q}$ (b) $\frac{p\sin\alpha}{p+q}$

(c) $\frac{p\sin\alpha}{p-q}$ (d) $\frac{(p-q)\sin\alpha}{p+q}$

[NDA (II) - 2017]

112. $\sqrt{1+\sin A} = -\left(\sin\frac{A}{2}+\cos\frac{A}{2}\right)$ is true if:

(a) $\frac{3\pi}{2} < A < \frac{5\pi}{2}$ (b) $\frac{\pi}{2} < A < \frac{3\pi}{2}$

(c) $\frac{3\pi}{2} < A < \frac{7\pi}{2}$ (d) $0 < A < \frac{3\pi}{2}$

[NDA (II) - 2017]

113. The maximum value of

$\sin\left(x+\frac{\pi}{5}\right)+\cos\left(x+\frac{\pi}{5}\right)$, where $x \in \left(0,\frac{\pi}{2}\right)$, is attained at:

(a) $\pi/20$ (b) $\pi/15$

(c) $\pi/10$ (d) $\pi/2$

[NDA (I) - 2018]

114. If $\cos\alpha + \cos\beta + \cos\gamma = 0$, where $0 < \alpha \le \frac{\pi}{2}$, $0 < \beta \le \frac{\pi}{2}, 0 < \gamma \le \frac{\pi}{2}$, then what is the value of $\sin\alpha + \sin\beta + \sin\gamma$?

(a) 0 (b) 3

(c) $\frac{5\sqrt{2}}{2}$ (d) $\frac{3\sqrt{2}}{2}$

[NDA (I) - 2018]

115. Suppose cos A is given. If only one value of cos (A/2) is possible, then A must be:

(a) An odd multiple of 90°

(b) A multiple of 90°

(c) An odd multiple of 180°

(d) A multiple of 180°

[NDA (I) - 2018]

116. If $\sin\alpha + \sin\beta = 0 = \cos\alpha + \cos\beta$, where $0 < \beta < \alpha < 2\pi$, then which one of the following is correct?

(a) $\alpha=\pi-\beta$ (b) $\alpha = \pi + \beta$

(c) $\alpha = 2\pi - \beta$ (d) $2\alpha = \pi + 2\beta$

[NDA (I) - 2018]

117. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then what is $\frac{\tan x}{\tan y}$ equal to?

(a) $\frac{a}{b}$ (b) $\frac{b}{a}$

(c) $\frac{a+b}{a-a}$ (d) $\frac{a-b}{a+a}$

[NDA (I) - 2018]

118. What is $\sin 105° + \cos 105°$ equal to:

(a) $\sin 50°$ (b) $\cos 50°$

(c) $1/\sqrt{2}$ (d) 0

[NDA (I) - 2018]

119. What is $\frac{\sin 5x - \sin 3x}{\cos 5x + \cos 3x}$ equal to?

(a) sin x (b) cos x

(c) tan x (d) cot x

[NDA (I) - 2018]

120. If $\sin x = \frac{1}{\sqrt{5}}$, $\sin y = \frac{1}{\sqrt{10}}$, where $0 < x < \frac{\pi}{2}$, $0 < y < \frac{\pi}{2}$, then what is (x+y) equal to?

(a) π (b) $\pi/2$

(c) $\pi/4$ (d) 0

[NDA (I) - 2018]

121. If $A = \sin^2\theta + \cos^4\theta$, the for real θ, which one of the following is correct?

(a) $1 \le A \le 2$ (b) $\frac{3}{4} \le A \le 1$

(c) $\frac{13}{16} \le A \le 1$ (d) $\frac{3}{4} \le A \le \frac{13}{16}$

[NDA (II) - 2018]

122. If $\theta = \frac{\pi}{8}$, then what is the value of $(2\cos\theta+1)^{10}(2\cos2\theta-1)^{10}(2\cos\theta-1)^{10}(2\cos4\theta-1)^{10}$?

(a) 0 (b) 1
(c) 2 (d) 4

[NDA (II) - 2018]

123. What is/are the solutions of the trigonometric equation cosec x + cot x = $\sqrt{3}$, where 0 < x < 2x?

(a) $\frac{5\pi}{3}$ only (b) $\frac{\pi}{3}$ only

(c) π only (d) $\pi, \frac{\pi}{3}, \frac{5\pi}{3}$

[NDA (II) - 2018]

124. A is an angle in the fourth quadrant. If satisfies the trigonometric equation $3(3-\tan^2 A-\cot A)^2 = 1$. Which one of the following is a value of A?

(a) 300° (b) 315°
(c) 330° (d) 345°

[NDA (II) - 2018]

125. If sec(θ–α), secθ and sec(θ+α) are in AP, where cos α≠1, then what is the value of $\sin^2\theta + \cos\alpha$?

(a) 0 (b) 1
(c) –1 (d) 1/2

[NDA (II) - 2018]

126. What is $\frac{2\tan\theta}{1+\tan^2\theta}$ equal to?

(a) cos2 θ (b) tan 2θ
(c) sin2θ (d) cosec2θ

[NDA (II) - 2018]

127. If $\sin\theta = -\frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$ then in which quadrant does θ lie?

(a) First (b) Second
(c) Third (d) Fourth

[NDA (I) - 2019]

128. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$ then what $\cos\theta - \sin\theta$ equal to

(a) $-\sqrt{2}\cos\theta$ (b) $-\sqrt{2}\sin\theta$

(c) $\sqrt{2}\sin\theta$ (d) 2 sin θ

[NDA (I) - 2019]

129. In a circle of diameter 44 cm, the length of chord is 22cm. What is the length of minor arc of the chord?

(a) $\frac{484}{21}cm$ (b) $\frac{242}{21}cm$

(c) $\frac{121}{21}cm$ (d) $\frac{44}{7}cm$

[NDA (I) - 2019]

130. What is $(1 + \tan\alpha\tan\beta)^2 + (\tan\alpha - \tan\beta)^2 - \sec^2\alpha\sec^2\beta$ equal to ?

(a) 0 (b) 1
(c) 2 (d) 4

[NDA (I) - 2019]

131. If $p=\operatorname{cosec}\theta-\cot\theta$ and $q=(\operatorname{cosec}\theta+\cot\theta)^{-1}$ then which one of the following is correct ?

(a) pq = 1 (b) p = q
(c) p + q = 1 (d) p + q = 0

[NDA (I) - 2019]

132. What is the value of

$$\frac{\sin34^0\cos236^0-\sin56^0\sin124^0}{\cos28^0\cos88^0+\cos178^0\sin208^0}$$

(a) – 2 (b) – 1
(c) 2 (d) 1

[NDA (I) - 2019]

133. tan54° can be expressed as

(a) $\frac{\sin9^0+\cos9^0}{\sin9^0-\cos9^0}$ (b) $\frac{\sin9^0-\cos9^0}{\sin9^0+\cos9^0}$

(c) $\frac{\cos9^0+\sin9^0}{\cos9^0-\sin9^0}$ (d) $\frac{\sin36^0}{\cos36^0}$

[NDA (I) - 2019]

Consider the following (for next three) items:

If p = X cosθ − Y sinθ, q = X sinθ + Y cosθ and $p^2 + 4pq + q^2 = AX^2 + BY^2$, $0 \le \theta \le \frac{\pi}{2}$

134. What is the value θ?

(a) π/2 (b) π/3
(c) π/4 (d) π/6

[NDA (I) - 2019]

135. What is the value of A?

(a) 4 (b) 3
(c) 2 (d) 1

[NDA (I) - 2019]

136. What is the value of B?

(a) −1 (b) 0
(c) 1 (d) 2

[NDA (I) - 2019]

Consider the following (for next three) items:

It given that cos(θ–α) = a, cos(θ–β) = b.

137. What is cos (α–β) equal to?

(a) $ab + \sqrt{1-a^2}\sqrt{1-b^2}$ (b) $ab - \sqrt{1-a^2}\sqrt{1-b^2}$

(c) $a\sqrt{1-b^2} - b\sqrt{1-a^2}$ (d) $a\sqrt{1-b^2} + b\sqrt{1-a^2}$

[NDA (I) - 2019]

138. What is $\sin^2(\alpha-\beta) + 2ab\cos(\alpha-\beta)$ equal to

(a) $a^2 + b^2$ (b) $a^2 - b^2$
(c) $b^2 - a^2$ (d) $-(a^2 + b^2)$

[NDA (I) - 2019]

139. If sinα + cosα = p, then what is $\cos^2(2\alpha)$ =

(a) p^2 (b) $p^2 - 1$
(c) $p^2(2-p^2)$ (d) $p^2 + 1$

[NDA (I) - 2019]

140. If tanθ = (1/2), tanφ = (1/3), then what is the value of (θ + φ) ?

(a) 0 (b) π/6
(c) π/4 (d) π/2

[NDA (I) - 2019]

141. If cos A = 3/4, then what is the value of $\sin\left(\frac{A}{2}\right)\sin\left(\frac{3A}{2}\right)$?

(a) 5/8 (b) 5/16
(c) 5/24 (d) 7/32

[NDA (I) - 2019]

142. What is the value of tan75° + cot75° ?

(a) 2 (b) 4
(c) $2\sqrt{3}$ (d) $4\sqrt{3}$

[NDA (I) - 2019]

143. What is the value of cos46° cos47° cos48° cos49° cos50°.....cos135°

(a) −1 (b) 0
(c) 1 (d) Greater than 1

[NDA (I) - 2019]

144. If $\sin2\theta = \cos3\theta$, where $0 \le \theta \le \frac{\pi}{2}$, then what is $\sin\theta$ equal to?

(a) $\frac{\sqrt{5}+1}{4}$ (b) $\frac{\sqrt{5}-1}{4}$

(c) $\frac{\sqrt{5}+1}{16}$ (d) $\frac{\sqrt{5}-1}{16}$

[NDA (I) - 2019]

145. What is the least value of $25\ \text{cosec}^2x + 36\ \sec^2 x$?

(a) 1 (b) 11

(c) 120 (d) 121

[NDA-2019(1)]

146. What is the minimum value of $\frac{a^2}{\cos^2 x} + \frac{b^2}{\sin^2 x}$ where $a>0$ and $b<0$?

(a) $(a+b)^2$ (b) $(a-b)^2$

(c) a^2+b^2 (d) $|a^2+b^2|$

[NDA-2019(2)]

147. If $\text{cosec}\theta = \frac{29}{21}$, where $0 < \theta < 90°$, then what is the value of $4\sec\theta + 4\tan\theta$?

(a) 5 (b) 10

(c) 15 (d) 20

[NDA (II) - 2019]

148. Consider the following statements:

1. $\cos\theta + \sec\theta$ can never be equal to 1.5
2. $\tan\theta + \cot\theta$ can never be less than 2

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

[NDA (II) - 2019]

149. What is the length of the chord of a unit circle which subtends an angle θ at the centre?

(a) $\sin\left(\frac{\theta}{2}\right)$ (b) $\cos\left(\frac{\theta}{2}\right)$

(c) $2\sin\left(\frac{\theta}{2}\right)$ (d) $2\cos\left(\frac{\theta}{2}\right)$

[NDA (II) - 2019]

150. If $\tan A - \tan B = x$, and $\cot B - \cot A = y$, then what is the value of $\cot(A-B)$?

(a) $\frac{1}{x}+\frac{1}{y}$ (b) $\frac{1}{y}-\frac{1}{x}$

(c) $\frac{xy}{x+y}$ (d) $1+\frac{1}{xy}$

[NDA (II) - 2019]

151. What is $\sin(\alpha+\beta) - 2\sin\alpha\cos\beta + \sin(\alpha-\beta) =$

(a) 0 (b) $2\sin\alpha$

(c) $2\sin\beta$ (d) $\sin\alpha + \sin\beta$

[NDA (II) - 2019]

152. If $2\tan A = 3\tan B = 1$, then what is $\tan(A-B)$ equal to ?

(a) 1/5 (b) 1/6

(c) 1/7 (d) 1/9

[NDA (II) - 2019]

153. What is $\cos80° + \cos40° - \cos20°$ equal to ?

(a) 2 (b) 1

(c) 0 (d) −19

[NDA (II) - 2019]

154. What is $\cot(A/2) - \tan(A/2)$ equal to ?

(a) tanA (b) cotA

(c) 2tanA (d) 2cotA

[NDA (II) - 2019]

155. What is $\cot\theta + \text{cosec}\theta$ equal to?

(a) $\tan\left(\frac{\theta}{2}\right)A$ (b) $\cot\left(\frac{\theta}{2}\right)A$

(c) $2\tan\left(\frac{\theta}{2}\right)A$ (d) $2\cot\left(\frac{\theta}{2}\right)A$

[NDA (II) - 2019]

156. What is $\tan25°\tan15° + \tan15°\tan50° + \tan25°\tan50°$ equal to ?

(a) 0 (b) 1

(c) 2 (d) 4

[NDA (II) - 2019]

Direction (For next three):

Read the following information and answer the given items

Let $a\sin^2 x + b\cos^2 x = c$; $b\sin^2 y + a\cos^2 y = d$; and $p\tan x = q\tan y$.

157. What is $\tan^2 x$ equal to?

(a) $\frac{c-b}{a-c}$ (b) $\frac{a-c}{c-b}$

(c) $\frac{c-a}{c-b}$ (d) $\frac{c-b}{c-a}$

[NDA 2020]

158. What is $\frac{d-a}{b-d}$ equal to?

(a) $\sin^2 y$ (b) $\cos^2 y$

(c) $\tan^2 y$ (d) $\cot^2 y$

159. What is $\frac{p^2}{q^2}$ equal to?

(a) $\frac{(b-c)(b-d)}{(a-d)(a-c)}$ (b) $\frac{(a-d)(c-a)}{(b-c)(d-b)}$

(c) $\frac{(d-a)(c-a)}{(b-c)(d-b)}$ (d) $\frac{(b-c)(b-d)}{(c-a)(a-d)}$

[NDA 2020]

Direction (For next three)

Read the following information and answer the given items:

Let $t_n = \sin^n\theta + \cos^n\theta$

160. What is $\frac{t_3 - t_5}{t_5 - t_7}$ equal to?

(a) $\frac{t_1}{t_3}$ (b) $\frac{t_3}{t_5}$

(c) $\frac{t_5}{t_7}$ (d) $\frac{t_1}{t_7}$

[NDA 2020]

161. What is $t_1^2 - t_2$ equal to?

(a) $\cos2\theta$ (b) $\sin2\theta$

(c) $2\cos\theta$ (d) $2\sin\theta$

[NDA 2020]

162. What is the value to t_{10} where $\theta = 45°$?

(a) 1 (b) 1/4

(c) 1/16 (d) 1/32

[NDA 2020]

Direction (For next three)

Read the following information and answer the given items

Let $\alpha = \beta = 15°$

163. What is the value of $\sin\alpha + \cos\beta$

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2\sqrt{2}}$

(c) $\frac{\sqrt{3}}{2\sqrt{2}}$ (d) $\frac{\sqrt{3}}{\sqrt{2}}$

[NDA 2020]

164. What is the value of $\sin 7\alpha - \cos 7\beta$

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2\sqrt{2}}$

(c) $\frac{\sqrt{3}}{2\sqrt{2}}$ (d) $\frac{\sqrt{3}}{\sqrt{2}}$

[NDA 2020]

165. What is $\sin(\alpha + 1°) + \cos(\beta + 1°)$ equal to?

(a) $\sqrt{3}\cos1° + \sin1°$

(b) $\sqrt{3}\cos1° - \frac{1}{2}\sin1°$

(c) $\frac{1}{\sqrt{2}}(\sqrt{3}\cos1° + \sin1°)$

(d) $\frac{1}{2}(\sqrt{3}\cos1° + \sin1°)$

[NDA 2020]

166. If $\sin x + \sin y = \cos y - \cos x$, where $0 < x < y < \frac{\pi}{2}$, then what is $\tan\left(\frac{x-y}{2}\right)$ equal to ?

(a) 0 (b) 1/2

(c) 1 (d) 2

[NDA 2020]

167. If $\cot\alpha$ and $\cot\beta$ are the roots of equation $x^2 - 3x + 2 = 0$, then what is $\cot(\alpha + \beta)$ equal to?

(a) 1/2 (b) 1/3

(c) 2 (d) 3

[NDA 2020]

Direction (For next two):

Read the following information and answer the given items

Let $\frac{\tan 3A}{\tan A} = K, \textit{where } \tan A \neq 0 \text{ and } K \neq \frac{1}{3}$

168. What is $\tan^2 A$ equal to?

(a) $\frac{K+3}{3K-1}$ (b) $\frac{K-3}{3K-1}$

(c) $\frac{3K-3}{K-3}$ (d) $\frac{K+3}{3K+1}$

[NDA 2020]

169. For real value of tan A , K cannot lie between

(a) 1/3 and 3 (b) 1/2and 2

(c)1/5 and 5 (d)1/7 and 7

[NDA 2020]

170. If $\tan\theta = \frac{\cos17° - \sin17°}{\cos17° + \sin17°}$, then what is the value of θ ?

(a) 0° (b) 28°

(c) 38° (d) 52°

[NDA 2020]

171. A and B are positive acute angles such that $\cos 2B = 3\sin^2 A$ and $3\sin 2A = 2\sin 2B$. What is the value of (A + 2B)?

(a) π/6 (b) π/4

(c) π/3 (d) π/2

[NDA 2020]

172. What is $\sin 3x + \cos 3x + 4\sin^3 x - 3\sin x + 3\cos x - 4\cos^3 x$ equal to?

(a) 0 (b) 1

(c) 2 sin 2x (d) 4 cos 4x

[NDA 2020]

173. The value of ordinate of the graph of $y = 2 + \cos x$ lie in the interval ?

(a) [0,1] (b) [0,3]

(c) [−1,1] (d) [1,3]

[NDA 2020]

174. What is the value of $8\cos10°\cos20°\cos40°$?

(a) tan 10° (b) cot 10°

(c) cosec 10° (d) sec 10°

[NDA 2020]

175. What is the value of $\cos48° - \cos12°$

(a) $\frac{\sqrt{5}-1}{4}$ (b) $\frac{1-\sqrt{5}}{4}$

(c) $\frac{\sqrt{5}+1}{4}$ (d) $\frac{1-\sqrt{5}}{8}$

[NDA 2020]

176. If $\tan A = 1/7$, then what is $\cos 2A$ equal to?

(a) 24/25 (b) 18/25

(c) 12/25 (d) 6/25

[NDA (I) - 2021]

177. What is the value of the following $\tan31°\tan33°\tan35°.....\tan57°\tan59°$

(a) −1 (b) 0

(c) 1 (d) 2

[NDA (I) - 2021]

178. What is the value of the following $(\sin24° + \cos66°)(\sin24° - \cos66°)$?

(a) −1 (b) 0

(c) 1 (d) 2

[NDA (I) - 2021]

179. What is $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \tan\theta + \sec\theta)$ equal to ?

(a) 1 (b) 2

(c) 3 (d) 4

[NDA (I) - 2021]

180. What is $\frac{1+\tan^2\theta}{1+\cot^2\theta} - \left(\frac{1-\tan\theta}{1-\cot\theta}\right)^2$ equal to?

(a) 0 (b) 1

(c) $2\tan\theta$ (d) $2\cot\theta$

[NDA (I) - 2021]

181. What is the interior angle of a regular octagon of side length 2 cm?

(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{4}$

(c) $\frac{3\pi}{5}$ (d) $\frac{3\pi}{8}$

[NDA (I) - 2021]

182. If $7\sin\theta + 24\cos\theta = 25$, then what is the value of $(\sin\theta + \cos\theta)$?

(a) 1 (b) 26/25

(c) 6/5 (d) 31/25

[NDA (I) - 2021]

183. If $3\cos\theta = 4\sin\theta$, then what is the value of $\tan(45°+\theta)$?
(a) 10 (b) 7
(c) 7/2 (d) 7/4

[NDA (I) - 2021]

184. The number of integer values of k, for which the equation $2\sin x = 2k + 1$ has a solution , is
(a) zero (b) one
(c) two (d) four

[NDA (I) - 2021]

185. What is the value of the following:
$\cot 2x.\cot 4x - \cot 4x.\cot 6x - \cot 6x.\cot 2x$?
(a) −1 (b) 0
(c) 1 (d) 2

[NDA (I) - 2021]

186. If $\tan x = -3/4$ and x is in second quadrant, then what is the value of $\sin x.\cos x$?
(a) 6/25 (b)12/25
(c) –6/25 (d) –12/25

[NDA (I) - 2021]

187. What is the value of $\text{cosec}\left(\frac{7\pi}{6}\right)\sec\left(\frac{5\pi}{3}\right)$?
(a) 4/3 (b) 4
(c) –4 (d) $\frac{-4}{\sqrt{3}}$

[NDA (I) - 2021]

188. Let $4\sin^2 x = 3$, here $0 \le x \le \pi$. What is $\tan 3x$ equal to?
(a) –2 (b) –1
(c) 0 (d) 1

[NDA (II) - 2021]

189. Let the equation $\sec x.\ \text{cosec}\ x = p$ have a solution, where p is a positive real number. What should be the smallest value of p?
(a) $\frac{1}{2}$
(b) 1
(c) 2
(d) Minimum does not exist

[NDA (II) - 2021]

190. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 + bx + c = 0$, then which one of the following is correct?
(a) $a^2 + b^2 - 2ac = 0$ (b) $-a^2 + b^2 + 2ac = 0$
(c) $a^2 - b^2 + 2ac = 0$ (d) $a^2 + b^2 + 2ac = 0$

[NDA (II) - 2021]

191. If $\sin(A + B) = 1$ and $2\sin(A - B) = 1$, where $0 < A, B < \frac{\pi}{2}$, then what is $\tan A : \tan B$ equal to?
(a) 1 : 2 (b) 2 : 1
(c) 1 : 3 (d) 3 : 1

[NDA (II) - 2021]

192. Let $\sin x + \sin y = \cos x + \cos y$ for all $x, y \in R$. What is $\tan\left(\frac{x}{2} + \frac{y}{2}\right)$ equal to?
(a) 1 (b) 2
(c) $\sqrt{2}$ (d) $2\sqrt{2}$

[NDA (II) - 2021]

193. If $\tan\theta = -\frac{5}{12}$, then what can be the value of $\sin\theta$?
(a) $\frac{5}{13}$ but cannot be $-\frac{5}{13}$
(b) $-\frac{5}{13}$ but cannot be $\frac{5}{13}$
(c) $\frac{5}{13}$ or $-\frac{5}{13}$
(d) None of the above

[NDA (I) - 2022]

194. What is the value of $\cos^4\frac{7\pi}{8} + \cos^4\frac{5\pi}{8}$?
(a) 3/2 (b) 3/4
(c) 3/8 (d) 3/16

[NDA (I) - 2022]

195. What is $\sin^2\left(\frac{\pi}{4}+\theta\right) - \sin^2\left(\frac{\pi}{4}-\theta\right)$ equal to?
(a) $\sin 2\theta$ (b) $\cos 2\theta$
(c) $2\sin\theta$ (d) $2\cos\theta$

[NDA (I) - 2022]

196. If $\tan\alpha + \tan\beta = 1 - \tan\alpha.\tan\beta$, where $\tan\alpha.\tan\beta \neq 1$, then which of the following is one of the value of $(\alpha + \beta)$?
(a) $\pi/6$ (b) $\pi/4$
(c) $\pi/3$ (d) $\pi/2$

[NDA (I) - 2022]

197. If $(1 + \tan\theta)(1 + \tan 9\theta) = 2$, then what is the value of $\tan(10\theta)$?
(a) 0 (b) 1
(c) 2 (d) infinite

[NDA (I) - 2022]

198. What is the value of $\sin 0° + \sin 10° + \sin 20° + \sin 30° + \ldots. + \sin 360°$?
(a) –1 (b) 0
(c) 1 (d) 2

[NDA (I) - 2022]

199. What is value of $\cot^2 15° + \tan^2 15°$?
(a) 12 (b) 14
(c) $8\sqrt{3}$ (d) 4

[NDA (I) - 2022]

200. If $\alpha + \beta = \frac{\pi}{4}$ and $2\tan\alpha = 1$, then what is $\tan 2\beta$ equal to?
(a) 1/3 (b) 2/3
(c) 3/4 (d) 3/5

[NDA (I) - 2022]

201. If $\tan(45° + \theta) = 1 + \sin 2\theta$, where $-\pi/4 < \theta < \frac{\pi}{4}$, then what is the value of $\cos 2\theta$?
(a) 0 (b)1/2
(c) 1 (d) 2

[NDA (I) - 2022]

202. Let $\sin 2\theta = \cos 3\theta$ where θ is acute angle. What is the value of $1 + 4\sin\theta$? (given that $\sin 18° = \frac{\sqrt{5}-1}{4}$)
(a) $\sqrt{3}$ (b) 2
(c) $\sqrt{5}$ (d) 3

[NDA (I) - 2022]

203. What is the value of $\text{cosec}\left(-\frac{73\pi}{3}\right)$?
(a) $\frac{2}{\sqrt{3}}$ (b) $-\frac{2}{\sqrt{3}}$
(c) 2 (d) –2

[NDA 2022 (II)]

204. What is the value of $\cos\left(\frac{5\pi}{17}\right)+\cos\left(\frac{7\pi}{17}\right)+2\cos\left(\frac{11\pi}{17}\right)\cos\left(\frac{\pi}{17}\right)$?

(a) 0
(b) 1
(c) $4\cos\left(\frac{6\pi}{17}\right)\cos\left(\frac{\pi}{17}\right)$
(d) $4\cos\left(\frac{11\pi}{17}\right)\cos\left(\frac{\pi}{17}\right)$

[NDA 2022 (II)]

205. What is the value of $\tan\left(\frac{3\pi}{8}\right)$?

(a) $\sqrt{2}-1$ (b) $\sqrt{2}+1$
(c) $1-\sqrt{2}$ (d) $-(\sqrt{2}+1)$

[NDA 2022 (II)]

206. What is cos36°–cos72° equal to?

(a) $\frac{\sqrt{5}}{2}$ (b) $-\frac{\sqrt{5}}{2}$
(c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

[NDA 2022 (II)]

207. If sec x = $\frac{25}{24}$ and x lies in the fourth quadrant, then what is the value of tan x + sin x?

(a) $-\frac{625}{168}$ (b) $-\frac{343}{600}$
(c) $\frac{625}{168}$ (d) $\frac{343}{600}$

[NDA 2022 (II)]

208. What is the value of $\tan^2 165° + \cot^2 165°$?

(a) 7 (b) 14
(c) $4\sqrt{3}$ (d) $8\sqrt{3}$

[NDA 2022 (II)]

209. What is the value of $\sin\left(2n\pi+\frac{5\pi}{6}\right)\sin\left(2n\pi-\frac{5\pi}{6}\right)$, where $n\in Z$?

(a) –1/4 (b) –3/4
(c) 1/4 (d) 3/4

[NDA 2022 (II)]

210. If 1 + 2 (sin x + cos x) (sin x – cos x) = 0 where 0 < x < 360°, then how many values does x take?

(a) only one value (b) only two values
(c) only three values (d) four values

[NDA 2022 (II)]

211. What is the maximum value of $3(\sin x - \cos x) + 4(\cos^3 x - \sin^3 x)$?

(a) 1 (b) $\sqrt{2}$
(c) $\sqrt{3}$ (d) 2

[NDA 2022 (II)]

212. What is the diameter of a circle inscribed in a regular polygon of 12 sides, each of length 1 cm?

(a) $1+\sqrt{2}cm$ (b) $2+\sqrt{2}cm$
(c) $2+\sqrt{3}cm$ (d) $3+\sqrt{3}cm$

[NDA 2022 (II)]

Consider the following for the next two (02) items that follow:

Given that:
Sinx + cosx + tanx + cotx + secx + cosecx = 7

213. The given equation can be reduced to:
(a) $\sin^2 2x - 44\sin 2x + 36 = 0$
(b) $\sin^2 2x + 44\sin 2x - 36 = 0$
(c) $\sin^2 2x - 22\sin 2x + 18 = 0$
(d) $\sin^2 2x + 22\sin 2x - 18 = 0$

[NDA – 2023 (1)]

214. If $\sin 2x = a - b\sqrt{c}$, where a and b are natural numbers and c is prime number, then what is the value of a – b + 2c?

(a) 0 (b) 14
(c) 21 (d) 28

[NDA – 2023 (1)]

Consider the following for the next two (02) items that follows:

Let sinβ be the GM of sinα and cosα; tan□ be the AM of sinα and cosα.

215. What is cos2β equal to?

(a) $(\cos\alpha-\sin\alpha)^2$ (b) $(\cos\alpha+\sin\alpha)^2$
(c) $(\cos\alpha-\sin\alpha)^3$ (d) $\frac{(\cos\alpha-\sin\alpha)^2}{2}$

[NDA – 2023 (1)]

216. What is the value of sec2□ ?

(a) $\frac{3-\sin 2\alpha}{5+2\sin 2\alpha}$ (b) $\frac{5+\sin 2\alpha}{3-\sin 2\alpha}$
(c) $\frac{3-2\sin 2\alpha}{4+\sin 2\alpha}$ (d) $\frac{3-\sin 2\alpha}{4+3\sin 2\alpha}$

[NDA – 2023 (1)]

217. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, $0 < \theta < \pi/2$; then what is the value of $8\sin^2\left(\theta+\frac{\pi}{4}\right)$?

(a) 16 (b) 2
(c) 1 (d) 1/2

[NDA-2023 (2)]

218. If $\tan\alpha = 1/7$, $\sin\beta = \frac{1}{\sqrt{10}}$; $0 < \alpha, \beta < \pi/2$, then what is the value of $\cos(\alpha + 2\beta)$?

(a) –1/2 (b) $-1/\sqrt{2}$
(c) $1\sqrt{2}$ (d) 1/2

[NDA-2023 (2)]

Consider the following for the next (02) items that follow

Let $p = \cos\left(\frac{\pi}{5}\right)\cos\left(\frac{2\pi}{5}\right)$ and $q = \cos\left(\frac{4\pi}{5}\right)\cos\left(\frac{8\pi}{5}\right)$

219. What is the value of p + q?

(a) –1/2 (b) –1/4
(c) 0 (d) 1/2

[NDA-2023 (2)]

220. What is the value of pq?

(a) –1/16 (b) –1/4
(c) 1/4 (d) 1/16

[NDA-2023 (2)]

Consider the following for the next (02) items that follow

Let $p = \frac{1}{3}-\frac{\tan 3x}{\tan x}$ and $q = 1 - 3\tan^2 x$, $0 < x < \pi$, $x \neq \pi/2$

221. What is pq equal to?

(a) 1 (b) 2
(c) 8/3 (d) –8/3

[NDA-2023 (2)]

222. For how many values of x does 1/p become zero?

(a) no value (b) only one value
(c) only two values (d) only three values

[NDA-2023 (2)]

Consider the following for the next (02) items that follow

Let $\sin x + \sin y = \sqrt{3}(\cos y - \cos x)$; $x + y = \pi/2$, $0 < x, y < \pi/2$.

223. What is a value of $\sin 3x + \sin 3y$?

(a) –1 (b) 0

(c) 1 (d) 3

[NDA-2023 (2)]

224. What is a value of $\cos^3 x + \cos^3 y$?

(a) $\frac{3\sqrt{3}}{8}$ (b) $\frac{3\sqrt{6}}{8}$

(c) $\frac{3\sqrt{6}}{4}$ (d) 1

[NDA-2023 (2)]

225. What is the value of
$\sin10°\cdot\sin50° + \sin50°\cdot\sin250° + \sin250°\cdot\sin10°$
equal to?

(a) $-\frac{1}{4}$ (b) $-\frac{3}{4}$

(c) $\frac{3\sin10°}{4}$ (d) $-\frac{3\cos10°}{4}$

[NDA-2024 (1)]

226. If $f(\theta) = \frac{1}{1+\tan\theta}$ and $\alpha + \beta = \frac{5\pi}{4}$, then what is the value of $f(\alpha)\, f(\beta)$?

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$

(c) 1 (d) 2

[NDA-2024 (1)]

227. If $\tan\alpha$ and $\tan\beta$ are the roots of the equation $x2 - 6x + 8 = 0$, then what is the value of $\cos(2\alpha + 2\beta)$?

(a) $\frac{13}{75}$ (b) $\frac{13}{85}$

(c) $\frac{17}{85}$ (d) $\frac{19}{85}$

[NDA-2024 (1)]

228. What is the value of $\tan 65° + 2\tan 45° - 2\tan 40° - \tan 25°$?

(a) 0 (b) 1

(c) 2 (d) 4

[NDA-2024 (1)]

229. What is $\frac{\sqrt{3}\cos10° - \sin10°}{\sin25°\cos25°}$ equal to?

(a) 1 (b) $\sqrt{3}$

(c) 2 (d) 4

[NDA-2024 (1)]

230. What is $(\sin 9° - \cos 9°)$ equal to?

(a) $-\frac{\sqrt{5-\sqrt{5}}}{2}$ (b) $-\frac{\sqrt{5-\sqrt{3}}}{2}$

(c) $\frac{\sqrt{5-\sqrt{5}}}{2}$ (d) $\frac{\sqrt{5-\sqrt{5}}}{4}$

[NDA-2024 (1)]

231. What is the number of solutions of $(\sin\theta - \cos\theta)^2 = 2$ where $-\pi < \theta < \pi$?

(a) Only one (b) Only two

(c) Four (d) No solution

[NDA-2024 (1)]

ANSWER KEY

1.	c	**2.**	a	**3.**	b	**4.**	d	**5.**	b	**6.**	c	**7.**	b	**8.**	d	**9.**	a	**10.**	b
11.	b	**12.**	a	**13.**	c	**14.**	c	**15.**	c	**16.**	d	**17.**	a	**18.**	b	**19.**	c	**20.**	b
21.	c	**22**	c	**23.**	d	**24.**	a	**25.**	a	**26.**	c	**27.**	c	**28.**	c	**29.**	c	**30.**	a
31.	c	**32.**	b	**33.**	a	**34.**	b	**35.**	a	**36.**	c	**37.**	a	**38.**	c	**39.**	b	**40.**	c
41.	d	**42.**	d	**43.**	b	**44.**	b	**45.**	c	**46.**	d	**47.**	c	**48.**	d	**49.**	d	**50.**	b
51.	a	**52.**	c	**53.**	c	**54.**	b	**55.**	d	**56.**	a	**57.**	d	**58.**	c	**59.**	a	**60.**	b
61.	c	**62.**	a	**63.**	d	**64.**	b	**65.**	a	**66.**	d	**67.**	b	**68.**	b	**69.**	a	**70.**	a
71.	c	**72.**	a	**73.**	d	**74.**	c	**75.**	b	**76.**	b	**77.**	b	**78.**	d	**79.**	b	**80.**	a
81.	b	**82.**	a	**83.**	a	**84.**	b	**85.**	b	**86.**	b	**87.**	c	**88.**	b	**89.**	b	**90.**	d
91.	d	**92.**	c	**93.**	c	**94.**	a	**95.**	b	**96.**	a	**97.**	d	**98.**	a	**99.**	c	**100.**	d
101.	a	**102.**	a	**103.**	a	**104.**	d	**105.**	a	**106.**	c	**107.**	b	**108.**	b	**109.**	d	**110.**	a
111.	d	**112.**	c	**113.**	a	**114.**	b	**115.**	c	**116.**	b	**117.**	a	**118.**	c	**119.**	c	**120.**	c
121.	d	**122.**	b	**123.**	b	**124.**	a	**125.**	a	**126.**	c	**127.**	c	**128.**	c	**129.**	a	**130.**	a
131.	b	**132.**	a	**133.**	c	**134.**	c	**135.**	b	**136.**	a	**137.**	a	**138.**	a	**139.**	c	**140.**	c

141.	b	**142.**	b	**143.**	b	**144.**	b	**145.**	d	**146.**	a	**147.**	b	**148.**	a	**1490**	c	**150.**	a
151.	a	**152.**	c	**153.**	c	**154.**	d	**155.**	b	**156.**	b	**157.**	a	**158.**	c	**159.**	a	**160.**	a
161.	b	**162.**	c	**163.**	d	**164.**	d	**165.**	c	**166.**	c	**167.**	b	**168.**	b	**169.**	a	**170.**	b
171.	d	**172.**	a	**173.**	d	**174.**	b	**175.**	b	**176.**	a	**177.**	c	**178.**	b	**179.**	b	**180.**	a
181.	b	**182.**	d	**183.**	b	**184.**	c	**185.**	c	**186.**	d	**187.**	d	**188.**	c	**189.**	c	**190.**	c
191.	d	**192.**	a	**193.**	c	**194.**	b	**195.**	a	**196.**	b	**197.**	b	**198.**	b	**199.**	b	**200.**	c
201.	c	**202.**	c	**203.**	b	**204.**	a	**205.**	b	**206.**	c	**207.**	b	**208.**	b	**209.**	a	**210.**	d
211.	b	**212.**	c	**213.**	a	**214.**	d	**215.**	a	**216.**	b	**217.**	a	**218.**	c	**219.**	c	**220.**	b
221.	d	**222.**	c	**223.**	b	**224.**	b	**225.**	b	**226.**	b	**227.**	b	**228.**	c	**229.**	d	**230.**	a
231.	b																		