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Test / Exam Name: Maths - Trigonometric Functions | **Standard: 11th Science** | **Subject: Mathematics**

Student Name: ..... **Section:** ..... **Roll No.:** .....

Questions: 27 | Time: 01:45 hh:mm | Marks: 50

Instructions

1. Rough work at the last page should be in proper manner too
2. New section on new page
3. Honesty is the best policy.

SECTION-A

Q1. In $(0,\ \pi)$ the number of solutions of the equation$\tan x + \tan 2x + \tan 3x = \tan x \tan 2x \tan 3x$ is: **1 Mark**

A 7 **B** 5 **C** 4 **D** 2

Q2. If $\tan px - \tan qx = 0$, then the values of θ form a series in: **1 Mark**

A AP **B** GP **C** HP **D** None of these

Q3. $\frac{\cos 10^\circ + \sin 10^\circ}{\cos 10^\circ - \sin 10^\circ}$ is equal to: **1 Mark**

A $\tan 55^\circ$ **B** $\cot 55^\circ$ **C** $-\tan 35^\circ$ **D** $-\cot 35^\circ$

Q4. If $0 < x < \frac{\pi}{2}$, and if $\frac{y+1}{1-y} = \sqrt{\frac{1+\sin x}{1-\sin x}}$, then y is equal to: **1 Mark**

A $\cot \frac{x}{2}$ **B** $\tan \frac{x}{2}$

C $\cot \frac{x}{2} + \tan \frac{x}{2}$ **D** $\cot \frac{x}{2} - \tan \frac{x}{2}$

Q5. If $\frac{3\pi}{4} < a < \pi$, then $\sqrt{2\cot a + \frac{1}{\sin^2 a}}$ is equal to: **1 Mark**

A $1 - \cot a$ **B** $1 + \cot a$ **C** $-1 + \cot a$ **D** $-1 - \cot a$

Q6. If $\cos P = \frac{1}{7}$ then $\cos Q = \frac{13}{14}$, where P and Q both are acute angles. Then, the value of P - Q is: **1 Mark**

A $\frac{\pi}{6}$ **B** $\frac{\pi}{3}$ **C** $\frac{\pi}{4}$ **D** $\frac{5\pi}{12}$

Q7. The value of $\cos^2 48^\circ - \sin^2 12^\circ$ is: **1 Mark**

A $\frac{\sqrt{5}+1}{8}$ **B** $\frac{\sqrt{5}-1}{8}$

C $\frac{\sqrt{5}+1}{5}$ **D** $\frac{\sqrt{5}+1}{2\sqrt{2}}$

Q8. $\sec^2 x = \frac{4xy}{(x+y)^2}$ is true if and only if **1 Mark**

A $x+y \neq 0$ **B** $x=y,\ x \neq 0$

C $x=y$ **D** $x \neq 0, y \neq 0$

Q9. If $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 = \lambda \cos^2\left(\frac{\alpha-\beta}{2}\right)$, write the value of λ. **1 Mark**

Q10. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$, then write the valuue of $\cos\theta_1 + \cos\theta_2 + \cos\theta_3$. **1 Mark**

Q11. If $\frac{\pi}{4} < x < \frac{\pi}{2}$, then write the value of $\sqrt{1 - \sin 2x}$ **1 Mark**

Q12. Find the degree measure corresponding to the following radian measures: $(\text{Use } \pi = \frac{22}{7})$ **1 Mark**

(-3)^c

Q13. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following: **1 Mark**

If A + B + C = 180°, then

Assertion: $\cos^2\frac{A}{2} + \cos^2\frac{B}{2} - \cos^2\frac{C}{2}$
$= 2\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$.

Reason: $\cos C + \cos D = 2\cos\left(\frac{C+D}{2}\right)\cos\left(\frac{C+D}{2}\right)$.

A Assertion and Reason both are correct statements and Reason is the correct explanation of Assertion.

B Assertion and Reason both are correct statements but Reason is not the correct explanation of Assertion.

C Assertion is correct statement but Reason is wrong statement.

D Assertion is wrong statement but Reason is correct statement.

Q14. Find the area of the triangle $\triangle ABC$ in which a = 1, b = 2 and $\angle C = 60^\circ$. **1 Mark**

Q15. Write the number of points of intersection of the curves $2y = 1$ and $y = \cos x, 0 \leq x \leq 2\pi$. **1 Mark**

SECTION-B

Q16. Find the value of the following trigonometric ratios: **2 Marks**

$\sin\frac{5\pi}{3}$

Q17. Prove that: **2 Marks**

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

Q18. Prove that: **2 Marks**

$\cos\left(\frac{\pi}{4}+x\right) - \cos\left(\frac{\pi}{4}-x\right) = \sqrt{2}\cos x$

Q19. Find the value of the following trigonometric ratio: **2 Marks**

$\sin\left(\frac{151\pi}{6}\right)$

Q20. Prove that: **2 Marks**

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

Q21. If $\cot x(1+\sin x) = 4$ m and $\cot x(1-\sin x) = 4$ n,prove that $(m^2 - n^2)^2 = mn$. **3 Marks**

Q22. If $\cos\alpha + \cos\beta = \frac{1}{3}$ and $\sin\alpha + \sin\beta = \frac{1}{4}$, prove that $\cos\frac{\alpha-\beta}{2} = \pm\frac{5}{24}$ **3 Marks**

Q23. Prove that: **3 Marks**

$3x + \sin 2x - \sin x = 4\sin x \cos\frac{x}{2}\cos\frac{3x}{2}$

Q24. If $\tan x = \frac{b}{a}$, then find the value of $\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}}$ **3 Marks**

SECTION-C

Q25. Prove that: **4 Marks**

$\cos\frac{\pi}{15}\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{7\pi}{15} = \frac{1}{16}$

Q26. Prove the following identities: **4 Marks**

$(1+\tan\alpha\tan\beta)^2 + (\tan\alpha - \tan\beta)^2 = \sec^2\alpha\sec^2\beta$

Q27. prove that: **5 Marks**

$\frac{\cos(A+B+C)+\cos(-A+B+C)+\cos(A-B+C)+\cos(A+B-C)}{\sin(A+B+C)+\sin(-A+B+C)+\sin(A-B+C)-\sin(A+B-C)} = \cot C$