FULL SYLLABUS TEST
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Subject : MATHEMATICS
Class X (SA - 01)

Time Allowed: 120 Minutes **Max. Marks: 60**

Q01. A) Find value of the following expression:

$$\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + ... + \sin^2 85^\circ .$$

B) If $2\sin(2x-15) = \sqrt{3}$ then, find the value of:

$$\sin^2(2x+15) + \tan^2(2x-15).$$

C) Simplify the expression given below:

$$\tan^2 60^\circ + 4\cos^2 45^\circ + 3\sec^2 30^\circ - 10\cos^2 90^\circ .$$

Q02. Let $p = \sec\theta + \tan\theta$, then find the value of the expression $\frac{1}{p} + p$.

Q03. A) If A, B, C are interior angles of ΔABC, then find the value of the following expression:

$$\sin\left(\frac{B+C}{2}\right)\cos\frac{A}{2} + \cos\left(\frac{B+C}{2}\right)\sin\frac{A}{2}.$$

B) In an acute angled ΔABC, if $\sin(A+B-C) = \frac{1}{2}$ and $\cos(B+C-A) = \frac{1}{\sqrt{2}}$ then, find the angles A, B and C.

C) If θ is an acute angle and $5\sin^2\theta + \cos^2\theta = 4$, then find the value of angle 'θ'.

Q04. A mobile company charges a fixed amount as monthly rental which includes 100 minutes free per month and charges a fixed amount then after for every additional minute. Reva paid `433 for 370 minutes and Ravi paid `398 for 300 minutes. Find the bill amount under the same plan, if Hina uses 400 minutes.

Q05. Solve the given system of equations:

$$\frac{2}{3x+2y} + \frac{3}{3x-2y} = \frac{17}{5}, \frac{5}{3x+2y} + \frac{1}{3x-2y} = 2.$$

Q06. Obtain all the zeroes of the polynomial $2x^4 - 2x^3 - 7x^2 + 3x + 6$ if $\left(x \pm \sqrt{\frac{3}{2}}\right)$ are two known factors of the given polynomial..

Q07. A) If α and β are zeroes of $2x^2 + 7x - 3$ then, find the sum of reciprocal of the zeroes.

B) If sum of the zeroes of $kx^2 + 3k + 2x$ is equal to their product then, write the value of k.

Q08. Show that one and only one of n, n +2, n +4 is divisible by 3 (n is any positive integer).

Q09. Verify if $(80)^n$ can end with the digit zero for some value of n.

Q10. State and prove basic proportionality theorem. Who gave this theorem?

Q11. Find the missing frequency f in the Table 1 if the mean is known to be 18. Hence find the mode.

Daily allowance	Number of children
11 – 13	7
13 – 15	6
15 – 17	9
17 – 19	13
19 – 21	f
21 – 23	5
23 – 25	4

Table 1

Q12. Find the median of the following data of Table 2.

Age (in years)	Number of patients
5 – 15	6
15 – 25	11
25 – 35	21
35 – 45	23
45 – 55	14
55 – 65	5

Table 2

Q13. Prove the following:

$$\frac{\cos A}{1-\tan A} + \frac{\cos A}{1-\cot A} = \cos A,\ A \neq 45^\circ .$$

Q14. If $\sin\alpha = a\sin\beta$ and $\tan\alpha = b\tan\beta$ then, prove that: $\cos^2\alpha = \frac{a^2-1}{b^2-1}$.

Q15. Prove the following:

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

Q16. Prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side.

Q17. ABCD is a trapezium in which $AB \| DC$ and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

Q18. If a line intersects sides AB and AC of a Δ ABC at D and E respectively and is parallel to BC, prove that $\frac{AD}{AB} = \frac{AE}{AC}$.