

# 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:

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

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

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:

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

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  $\alpha$  and  $\beta$  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:

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

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  $AB \parallel DC$  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  $\triangle ABC$  at D and E respectively and is parallel to BC, prove that  $\frac{AD}{AB} = \frac{AE}{AC}$ .

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