# O. P. JINDAL SCHOOL, SAVITRI NAGAR

## Half Yearly Examination (2026 – 2027)

**Class: XI** **MM: 50**

**Subject: Mathematics** **Time: 2 Hrs.**

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*Fifteen Minutes Extra will be for reading the Question Paper.*

*General Instructions:*

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 10 MCQ's of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 4 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 2 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 2 case based questions of 4 marks each with sub parts.

## SECTION A

**This section comprises of Multiple Choice Questions (MCQ) of 1 mark each**

**1.** Which of the following is not a null set?

(a) Set of odd natural numbers divisible by 2 (b) Set of even prime numbers

(c) {x: x is a natural number, x > 5 and x < 6} (d) {y: y is a point common to any two parallel lines}

**2.** A and B are not singleton sets and $n(A \times B) = 21$. If $A \subset B$ then n(B) is equal to:

(a) 3 (b) 7 (c) 21 (d) 1

**3.** The range of f: R→R, $f(x) = x^2$ is...

(a) R (b) Z (c) $R_+ \cup \{0\}$ (d) $R - \{0\}$

**4.** A function f = {(1, 1), (2, 3), (3, 5), (4, 7)} is defined is f(x) = ax + b, then values of a and b are respectively

(a) 2, –1 (b) –2, 1 (c) –1, 2 (d) 1, 2

**5.** What is the value of cos(–1740°).

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

**6.** If tanA = 1/2 and tanB = 1/3,then the value of A+B=

(a) 45° (b) 60° (c) 30° (d) 0 °

**7.** Everybody in a room shakes hands with everybody else. The total number of handshakes is 66.Then the total number of person in the room is :

(a) 11 (b) 12 (c) 33 (d) 16

**8.** Total number of words formed by 2 vowels and 3 consonants taken from 4 distinct vowels and 5 distinct consonants are

(a) 60 (b) 120 (c) 7200 (d) 720

**9.** What is the the modulus of $\frac{1+i}{1-i} - \frac{1-i}{1+i}$?

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

**10.** If $z = -5i^{-15} - 6i^{-8}$ then $\bar{z}$ is equal to

(a) -6 - 5i (b) -6 + 5i (c) 6 - 5i (d) 6 + 5i

## SECTION B

**This section comprises of very short answer type-questions (VSA) of 2 marks each,**

**11.** Write the following sets in the roster form.

(i) A = {x | x is a positive integer less than 10 and $2^x - 1$ is an odd number}

(ii) C = {x : $x^2 + 7x - 8 = 0$, x ∈ R}

**12.** Find the domain and range of the real functions f (x) = – | x |.

**OR**

Find the domain of the real function : $f(x) = \frac{x^2+3x+2}{x^2-5x+6}$

**13.** How many words, with or without meaning, can be formed using all the letters of the word 'ALLAHABAD'.

**14.** Find the value of tan 225° cot 405° + tan 765° cot 675°.

**OR**

Show that tan 3x tan 2x tan x = tan 3x – tan 2x – tan x.

**15.** Express the complex number -1 + i in the polar form.

## SECTION C

**(This section comprises of short answer type questions (SA) of 3 marks each)**

**16.** If cot x = –5/12 and x lies in the second quadrant, Find the other five trigonometrical functions.

**OR**

Show that 2 $\sin^2\beta$ + 4 cos (α + β) sin α sin β + cos 2(α + β) = cos 2α.

**17.** Find the domain and the range of the real function f defined by $f(x) = \frac{1}{\sqrt{16-x^2}}$

**18.** If $^{2n+1}P_{n-1} : {}^{2n-1}P_n = 3:5$, find n.

**19.** If α and β are different complex numbers with | β | = 1, then find $\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$

## SECTION D

**(This section comprises of long answer-type questions (LA) of 5 marks each)**

**20.** Prove that: $\frac{sin8xcosx-sin6xcos3x}{cos2xcosx-sin4xsin3x} = tan2x$

**OR**

Prove that: $cos^2x + cos^2\left(x + \frac{\pi}{3}\right) + cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

**21.** If the letters of the word **'GOOGLE'** are permuted in all possible ways and the words thus formed are arranged in a dictionary order, then find the rank of the word **'GOOGLE'**

## SECTION E

**(This section comprises of 3 case based questions of 4 marks each with three sub-parts.)**

**22. Case-Study 1**: Read the following passage and answer the questions given below.

In a class of 60 students, 23 play hockey, 15 play basketball, 20 play cricket and 7 play hockey and basketball, 5 play cricket and basketball, 4 play hockey and cricket, 15 do not play any of the three games. Find

(i) How many students play hockey, basketball and cricket [1]

(ii) How many students play hockey but not cricket [1]

(iii) How many students play hockey and cricket but not basketball [2]

**OR**

How many students play only hockey?

**23. Case-Study 2**: Read the following passage and answer the questions given below.

The students of Class XI were given a task to arrange all the letters of the word **'EQUATIONS'** in all possible ways.

Based on the above information, answer the following questions:

(i) In how many ways can all letters of the word **EQUATIONS** be arranged? [1]

(ii) In how many ways can all letters of the word **EQUATIONS** be arranged so that all vowels occur together? [1]

(iii) In how many ways can all letters of the word **EQUATIONS** be arranged so that all consonants occur together? [2]

**OR**

In how many ways can all letters of the word **EQUATIONS** be arranged so that the positions of vowels and consonants are unaltered?