



INDIAN SCHOOL SOHAR
TERM II EXAMINATION (2019-20)
MATHEMATICS

STD: XI
DATE: 09.01.20

MAX. MARKS: 80
DURATION: 3Hrs

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 36 questions divided into four sections A, B, C and D. Section A comprises of 20 questions of one mark each, section B comprises of 6 questions of two marks each, section C comprises of 6 questions of four marks each and section D comprises of 4 questions of six marks each
3. All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
4. There is no overall choice. However, an internal choice has been provided. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

SECTION – A

Questions 1 to 20 carry 1 mark each.

(Q.1 to Q.10) are multiple choice type questions. Select the correct option.

1. For all sets A and B, $A - (A - B)$ is equal to
 a) $(A \cap B')$ b) $A' \cup B$ c) $(A \cap B)$ d) $A' \cap B$
2. The domain for which the functions defined by $f(x) = 3x^2 - 1$ and $g(x) = 3 + x$ are equal is:
 a) $\left\{-1, \frac{4}{3}\right\}$ b) $\left\{-1, -\frac{4}{3}\right\}$ c) $\left\{1, -\frac{4}{3}\right\}$ d) $\left\{1, \frac{4}{3}\right\}$
3. The value of $\sin \frac{\pi}{18} + \sin \frac{\pi}{9} + \sin \frac{2\pi}{9} + \sin \frac{5\pi}{18}$ is
 a) $\sin \frac{7\pi}{18} + \sin \frac{4\pi}{9}$ b) 1 c) $\cos \frac{\pi}{6} + \cos \frac{3\pi}{7}$ d) $\cos \frac{\pi}{9} + \sin \frac{\pi}{9}$
4. The value of $(z+3)(\bar{z}+3)$ is equivalent to
 a) $z+3$ b) $|z-3|$ c) z^2+3 d) $|z+3|^2$
5. The number of parallelograms that can be formed from a set of four parallel lines intersecting another set of three parallel lines is
 a) 6 b) 18 c) 12 d) 9
6. The total number of 9 digit numbers which have all different digits is
 a) 10! b) 9! c) $9 \times 9!$ d) $10 \times 10!$
7. If t_n denotes the nth term of the series $2 + 3 + 6 + 11 + 18 + \dots$ then t_{50} is
 a) $49^2 - 1$ b) 49^2 c) $50^2 + 1$ d) $49^2 + 2$
8. The difference between any two consecutive interior angles of a polygon is 5° . If the smallest angle is 120° , then the number of the sides of the polygon :
 a) 9 or 16 b) 9 or 12 c) 6 or 14 d) 9 or 14

9. The probabilities of happening of an event A are 0.5 and that of B is 0.3. if A and B are mutually exclusive events, then the probability of neither A nor B is:
- a) 0.8 b) 0.2 c) 0 d) 1

10. While shuffling a pack of 52 playing cards, 2 cards are accidentally dropped. Find the probability that the missing cards to be different colours
- a) $\frac{29}{52}$ b) $\frac{1}{2}$ c) $\frac{26}{51}$ d) $\frac{27}{51}$

(Q.11 to Q.15) Fill in the blanks

11. Range of $f(x) = \frac{1}{1-2\cos x}$ is _____
12. The value of $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ$ is equal to _____
13. A box contains 2 white balls, 3 black balls and 4 red balls. The number of ways three balls be drawn from the box if atleast two black ball is to be included in the draw is _____
14. If all the letters of the word "CLASS" be arranged as in a dictionary, then the rank of CLASS is _____
15. $6^{1/2} \cdot 6^{1/4} \cdot 6^{1/8} \dots \infty =$ _____

(Q. 16 to Q.20) Answer the following Question

16. Find principal argument of $(1+i\sqrt{3})^2$
17. Find the term independent of x in the expansion of $(2x - \frac{1}{x})^{10}$

OR

- Find the coefficient of $x^6 y^3$ in the expansion of $(x + 2y)^9$
18. Write the contrapositive of the statement: " If x and y are negative integers, then xy is positive".
19. Rewrite the following statement in the form of conditional statement; " The square of an odd number is odd".
20. Evaluate: $\lim_{x \rightarrow 0} \frac{\tan 2x - \sin 2x}{x^3}$

OR

Evaluate: $\lim_{x \rightarrow 0} \frac{\cot 2x - \operatorname{cosec} 2x}{x}$

SECTION - B

Questions 21 to 26 carry 2 marks each.

21. Find the domain and the range of the real function f defined by $f(x) = \frac{1}{1-x^2}$
22. Find the ratio in which the line segment joining the points (4, 6, 1) and (-6, 3, 4) is divided by the YZ-plane.

23. Find the square root of $7 - 24i$

OR

If $Z_1 = 1 - i$, $Z_2 = -2 + 4i$, find $\text{Im}\left(\frac{Z_1 Z_2}{Z_1}\right)$

24. Differentiate the following: $\frac{(2x+1)^2 \sin x}{\sqrt{5x}}$

25. Three digit numbers are formed using the digits 0, 2, 4, 6, 8. A number is chosen at random out of these numbers. What is the probability that this number has the same digits?

OR

A and B toss a coin alternately till one of them tosses heads and wins the game. Find the probability that A wins the game assuming that A starts the game.

26. Differentiate the following using the first principle: $\sin^2 x$

SECTION - C

Questions 27 to 32 carry 4 marks each.

27. If $a_1, a_2, a_3, \dots, a_n$ are in A.P., where $a_i > 0$ for all i , show that

$$\frac{1}{\sqrt{a_1} + \sqrt{a_2}} + \frac{1}{\sqrt{a_2} + \sqrt{a_3}} + \dots + \frac{1}{\sqrt{a_{n-1}} + \sqrt{a_n}} = \frac{n-1}{\sqrt{a_1} + \sqrt{a_n}}$$

28. A beam is supported at its ends by supports which are 12 metres apart. Since the load is concentrated at its centre, there is a deflection of 3 cm at the centre and the deflected beam is in the shape of a parabola. How far from the centre is the deflection 1 cm?

29. Find the general solution for the following equation: $2 \tan x - \cot x + 1 = 0$

30. If the slope of a line passing through the point $A(3, 2)$ is $\frac{3}{4}$, then find points on the line which are 5 units away from the point A.

OR

If one diagonal of a square is along the line $8x - 15y = 0$ and one of its vertex is at $(1, 2)$, then find the equation of sides of the square passing through this vertex.

31. Prove the following by using the principle of mathematical induction for all $n \in N$:

$$1^2 + 2^2 + 3^2 + \dots + n^2 > \frac{n^3}{3} \text{ for all } n \in N$$

OR

$$\frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} + \dots + \frac{1}{(2n+1)(2n+3)} = \frac{n}{3(2n+3)}$$

32. Solve the following system of inequalities graphically:

$$x + 2y \leq 10, x > y, x \geq 0, y \geq 0$$

SECTION – D

Questions 33 to 36 carry 6 marks each.

33. In a group of 500 students, the number of students studying Hindi, English and Sanskrit are found to be as follows; Hindi = 170, English = 130, Sanskrit = 150, Hindi and English = 90, English and Sanskrit = 40, Hindi and Sanskrit = 50, Hindi, English and Sanskrit = 30. Find the number of students who study i) only Hindi ii) English and Sanskrit but not Hindi iii) none of the three languages.

34. Prove that: $(1 + \cos \frac{\pi}{8}) (1 + \cos \frac{3\pi}{8}) (1 + \cos \frac{5\pi}{8}) (1 + \cos \frac{7\pi}{8}) = \frac{1}{8}$.

OR

Prove that: $\sin^3 x + \sin^3 \left(\frac{2\pi}{3} + x\right) + \sin^3 \left(\frac{4\pi}{3} + x\right) = -\frac{3}{4} \sin 3x$

35. The coefficients of $(r-1)^{\text{th}}$, r^{th} , $(r+1)^{\text{th}}$ terms in the expansion of $(x+1)^n$ are in the ratio 1 : 3 : 5. Find n and r.

OR

The 2nd, 3rd and 4th terms in the expansion of $(x+a)^n$ are respectively 240, 720 and 1080. Find the values of x, a and n.

36. Calculate mean, standard deviation and C. V for the following distribution.

Classes	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 - 90
Frequency	3	51	122	141	130	51	2

**** THE END ****