



INDIAN SCHOOL SOHAR
TERM II EXAMINATION (2018-19)
MATHEMATICS

STD: XI
DATE: 22 .11.18

MAX. MARKS: 100
DURATION: 3Hrs

General Instructions:

- (i) **All** questions are compulsory.
- (ii) This question paper contains **29** questions.
- (iii) Question **1- 4** in **Section A** are very short-answer type questions carrying **1** mark each.
- (iv) Question **5-12** in **Section B** are short-answer type questions carrying **2** marks each.
- (v) Question **13-23** in **Section C** are long-answer-I type questions carrying **4** marks each.
- (vi) Question **24-29** in **Section D** are long-answer-II type questions carrying **6** marks each.

SECTION – A

Questions 1 to 4 carry 1 mark each

1. Write down the converse and the contrapositive of the following statement :
 “If S is a cyclic quadrilateral, then the opposite angles of S are supplementary”.
2. Find the ratio in which the line segment joining the points (2, 4, 5) and (3, 5, – 4) is divided by the xz-plane.

OR

A point R with x-coordinate 4 lies on the line segment joining the points P (2, –3, 4) and Q (8, 0, 10). Find the coordinates of the point R.

3. Identify the quantifier and write the negation of the following statement:
 “For all even integers x , x^2 is also even”.
4. Convert 6 radians into degree measure.

SECTION – B

Questions 5 to 12 carry 2 marks each.

5. Find the domain of the function $f(x) = \sqrt{2-x} + \frac{1}{\sqrt{x^2-1}}$
6. Evaluate: $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ$
7. Find the number of ways of dividing 15 things into a group of 8, 4 and 3 respectively.

OR

There are 8 periods in each working day of a school. In how many ways can one arrange 7 subjects such that each subject is allowed atleast one period?

8. Which is greater $(1.01)^{1000000}$ or 10000? Justify.

9. If a, b, c are in A.P, b, c, d are in G.P and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in A.P. Prove that a, c, e are in G.P

OR

If a, b, c are in G.P and x, y be the A.M's of a, b and b, c respectively, prove that:

$$\frac{a}{x} + \frac{b}{y} = 2$$

10. Find the ratio in which the line $3x+4y+2=0$ divides the distance between the lines $3x+4y+5=0$ and $3x+4y-5=0$.

OR

Find the equation of the line passing through the intersection of the lines $x+2y-3=0$ and $4x-y+7=0$ and which is parallel to $5x+4y-20=0$.

11. Show that the line $x+2y=4$ touches the ellipse $3x^2+4y^2=12$.
12. If a parallelepiped is formed by planes drawn through the points $(3, 4, 5)$ and $(5, 7, 8)$ parallel to the coordinate planes, then find the length of edges of a parallelepiped and length of the diagonal.

SECTION – C

Questions 13 to 23 carry 4 marks each.

13. For sets A, B and C using properties of sets, prove that $A - (B - C) = (A - B) \cup (A \cap C)$.
14. Find the domain and range of the function $f(x) = \frac{4}{9-x^2}$
15. If $x \cos \theta = y \cos \left(\theta + \frac{2\pi}{3} \right) = z \cos \left(\theta + \frac{4\pi}{3} \right)$, then find the value of $xy + yz + zx$.
16. Find the general solution : $(\sqrt{3} - 1) \cos \theta + (\sqrt{3} + 1) \sin \theta = 2$
17. Prove the following by using the principle of mathematical induction for all $n \in N$:
 $(1+x)^n \geq (1+nx)$, where $x > -1$

OR

$$\frac{1}{1.2.3} + \frac{1}{2.3.4} + \frac{1}{3.4.5} + \dots + \frac{1}{n(n+1)(n+2)} = \frac{n(n+3)}{4(n+1)(n+2)}$$

18. Find the modulus and argument of the complex number : $\frac{i-1}{\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}}$

OR

If the imaginary part of $\frac{2z+1}{iz+1}$ is -2 , then show that the locus of the point representing z in the argand plane is a straight line

19. The letters of the word 'OUGHT' are written in all possible orders and these words are written out as in a dictionary. Find the rank of the word 'TOUGH' in this dictionary

OR

A boy has 4 library tickets and 7 books of his interest in the library. Of these 7, he does not want to borrow Mathematics Part II, unless Mathematics Part I is also borrowed. In how many ways can he choose the four books to be borrowed?

20. The ratio of the A.M. and G.M. of two positive numbers a and b , is $m : n$. Show that
 $a : b = (m + \sqrt{m^2 - n^2}) : (m - \sqrt{m^2 - n^2})$
21. Find the direction in which a straight line must be drawn through the point $(-1, 2)$ so that its point of intersection with the line $x + y = 4$ may be at a distance of 3 units from this point

22. Find the equation of the two straight lines through (7, 9) and making an angle of 60° with the line $x - \sqrt{3}y - 2\sqrt{3} = 0$.
23. Find the coordinates of the foci and the vertices, the eccentricity and the length of the latus rectum of the following conic: $5y^2 - 9x^2 = 36$.

SECTION – D

Questions 24 to 29 carry 6 marks each.

24. From 500 students taking examinations in Biology, Physics and Chemistry, each of the student has passed in at least one of the subject, 370 passed Biology, 240 Physics and 430 Chemistry. Atmost 190 passed Biology and Physics, atmost 290 in Biology and Chemistry and 200 in Physics and Chemistry. What is the largest possible number that could have passed all three examinations? Also find the maximum number that could have passed exactly two subjects
25. Prove that : $\cos \frac{\pi}{5} \cos \frac{2\pi}{5} \cos \frac{4\pi}{5} \cos \frac{8\pi}{5} = -\frac{1}{16}$

OR

If α and β are the solutions of the equation $a \tan \theta + b \sec \theta = c$, then show that

$$\tan (\alpha + \beta) = \frac{2ac}{a^2 - c^2}$$

26. Find the sum of the first n terms of the series: $3+ 7 +13 +21 +31 +\dots$

OR

Shamshad Ali buys a scooter for Rs 22000. He pays Rs 4000 cash and agrees to pay the balance in annual instalment of Rs 1000 plus 10% interest on the unpaid amount. How much will the scooter cost him?

27. Solve the following system of inequalities graphically:

$$x \geq 0, y \geq 0, x + y \geq 6, x + 2y \leq 8, x - y \leq 0$$

28. If a_1, a_2, a_3 and a_4 are the coefficient of any four consecutive terms in the expansion of $(1 + x)^n$, prove that: $\frac{a_1}{a_1+a_2} + \frac{a_3}{a_3+a_4} = \frac{2a_2}{a_2+a_3}$

29. The Find the equation of the circle passing through the three points (1,2), (3,-4) and (5, -6). Also find its centre and radius.

OR

i)A beam is supported at its ends by supports which are 20m apart. Since the load is concentrated at its centre, there is a deflection of 5cm at the centre and the deflected beam is in the shape of a parabola. How far from the centre is the deflection 2cm?

ii)Prove that the length of latus rectum of a parabola $x^2 = 4ay$ is $4a$.

**** THE END ****