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INDIAN SCHOOL SOHAR

FIRST TERM EXAMINATION (2019-20)

MATHEMATICS

STD: XI **MAX. MARKS: 80**

DATE: 29 .09.19 **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.
(Choose the correct answer out of the given four options in question 1 to 10).

1. The set $(A \cap B')' \cup (B \cap C)$ is equal to
   a) $A' \cup B \cup C$ b) $A' \cup B$ c) $A' \cup C'$ d) $A' \cap B$
2. The number of terms in the expansion of $(x + y + z)^n$ are:
   a) n+1 b) $\frac{n(n+1)}{2}$ c) 3n d) $\frac{(n+1)(n+2)}{2}$
3. Which term of the following sequences: 2, $2\sqrt{2}$, 4 ,… is 128 ?
   a)7 b) 6 c) 12 d) 13
4. The sum of the digits in unit place of all the numbers formed with the help of 2,3,4 and 5 taking all at a time is
   a)108 b) 84 c) 236 d)144
5. For all n∈N, $3.5^{2n+1} + 2^{3n+1}$ is divisible by
   a)17 b) 19 c) 21 d) 25
6. $|z_1 + z_2| = |z_1| + |z_2|$ is possible if
   a) $Z_2 = \bar{z_1}$ b) $z_2 = \frac{1}{z_1}$ c) $\arg(z_1) = \arg(z_2)$ d) $|z_1| = |z_2|$
7. Let A = {1, 2,{3,4}, 5}. Which of the following statement is incorrect?
   a) {3, 4} ⊂ A b) {3,4} ∈ A c) { {3,4}}⊂ A d) ∅⊂ A
8. The domain and range of the function f given by f(x) = 2- $|x - 5|$
   a) R^+, $(-\infty, 1]$ b) R , $(-\infty, 2]$ c) R , $(-\infty, 2)$ d) R^+ , $(-\infty, 2]$

9. If $(\frac{a}{3}+1, b-\frac{2}{3}) = (\frac{5}{3}, \frac{1}{3})$, the values of a and b are

   a) 1 , 2 b) 2, -1 c) 2, 1 d) -1, 2

10. The radian measure corresponding to $7° 30' is$

    a) $\frac{\pi}{12}$ $b) \frac{15\pi}{2}$ $c) \frac{\pi}{24}$ $d) \frac{\pi}{48}$

11. If $\alpha + \beta = \frac{\pi}{4}$, then find the value of $(1 + \tan\alpha)(1 + \tan\beta)$

12. Evaluate : cosec 390^0 + cot $\left(\frac{-15\pi}{4}\right)$

13. If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$, then find (a, b).

14. Solve for x: $\frac{5}{x+1} \leq 2 \leq \frac{7}{x+1}$

15. There are 3 books of Mathematics, 4 on Physics and 5 on English. How many different collections can be made such that each collection consists of one book of each subject.

16. If $^n P_r = 840$, $^n C_r = 35$, then find r.

17. Find the middle term in the expansion of $\left(\frac{x}{a} - \frac{a}{x}\right)^{10}$

    OR

    Find the 11th term from the end in the expansion of $\left(2x - \frac{1}{x^2}\right)^{25}$

18. Write the negation of the statement: " 101 is not a multiple of 3".

    OR

    Identify the quantifier in the following statement: For all real numbers x and y, xy = yx.

19. If A.M. and G.M. of two positive numbers a and b are 10 and 8, respectively, find the numbers.

20. Evaluate: $\sum_{k=1}^{10}(5 + 3^k)$

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. For sets A, B and C using properties of sets , prove that :
    $A - (B \cup C) = (A - B) \cap (A - C)$

22. Let f be the subset of Z x Z defined by f = { (xy, x+y): x,y ϵ Z }. Is f a function from Z to Z? Justify your answer. Also write the relation R = { (xy, x+y) : $x < 4$, $y < 2$, x, y ϵ N} in roster form.

23. If a+ ib = $\frac{c+i}{c-i}$, where c is real , prove that $|a + ib| = 1$

    OR

    Solve the equation $z^2 = \bar{z}$, where $z = x + iy$

24. Find the sum of first 24 terms of the A.P. a_1, a_2, a_3, ... if it is known that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$.

    OR

    Let S be the sum, P be the product and R be the sum of the reciprocals of 3 terms of a G.P. Then find $P^2 R^3 : S^3$

25. The letters of the word 'SOLVE' are written in all possible orders and these words are written out as in a dictionary. What is the 87th word?

26. Write the contrapositive and converse of the following statement:

"If a number is divisible by 9, then it is divisible by 3".

SECTION – C

Questions 27 to 32 carry 4 marks each.

27. Find the sum of the series to n terms: $(3^3 - 2^3) + (5^3 - 4^3) + (7^3 - 6^3) + ...$

28. Find the domain and range of the function f (x) = $\frac{6}{4-x^2}$

29. Find the general solution for the following equation: $\cot\theta = \sqrt{3} - cosec\theta$

30. There are 10 persons named P1, P2, P3, ... P10. Out of 10 persons, 5 persons are to be arranged in a line such that in each arrangement P1 must occur whereas P5 and P6 do not occur. Find the number of such possible arrangements.

OR

Using the digits 1,2,3,4,5,6,7 a number of 4 different digits are formed. Find how many of these are exactly divisible by 25?

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

$11^{n+2} + 12^{2n+1}$ is divisible by 133

OR

n(n+1) (2n+1) is divisible by 6

32. Convert the complex number z = $\frac{-4}{1+i\sqrt{3}}$ in the polar form

SECTION – D

Questions 33 to 36 carry 6 marks each.

33. In a survey of 220 students of a school, it was found that 120 study Mathematics, 90 study Physics and 70 study Chemistry, 40 study mathematics and Physics, 30 study physics and Chemistry, 50 study Chemistry and mathematics and 40 study none of these subjects. Find the number of students who study i) all the three subjects ii) exactly 2 subjects iii) only Mathematics.

34. If x cos$\theta = y \cos\left(\theta + \frac{2\pi}{3}\right) = z \cos(\theta + \frac{4\pi}{3})$, then find the value of xy + yz + zx.

OR

Prove that :$cos^4\frac{\pi}{8} + cos^4\frac{3\pi}{8} + cos^4\frac{5\pi}{8} + cos^4\frac{7\pi}{8} = \frac{3}{2}$

35. The 3^{rd}, 4^{th} and 5^{th} terms in the expansion of $(x + a)^n$ are respectively 84, 280 and 560. Find the values of x, a and n.

OR

If the coefficient of second, third and fourth terms in the expansion of $(1+ x)^{2n}$ are in A.P, show that $2n^2 - 9n + 7 = 0$

36. Solve the following system of inequalities graphically:

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

**** THE END ****