INDIANSCHOOL SOHAR
FINAL EXAM – 2014-15
MATHEMATICS

STD: XI   MARKS: 100
DATE: 03.03.15   TIME: 3Hrs

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GENERAL INSTRUCTIONS

1. *All questions are compulsory.*
2. *The question paper consists of 26 questions divided into three sections A, B and C. Section A comprises of 6 questions of one mark each, section B comprises of 13 questions of four marks each and section C comprises of 7 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 in 4 questions of four marks each and 2 questions of six mark each. You have to attempt only one of the alternatives in all such questions.*
5. *Use of calculators is not permitted.*

SECTION - A

1. In a circle of diameter 40cm, the length of a chord is 20cm. Find the length of minor arc of the chord.

2. Solve for z : $z + 2 = \dfrac{1}{4-3i}$

3. Find the ratio in which the line segment joining the points (4, 8, 10) and (6, 10, -8) is divided by the YZ- plane.

4. Find the distance of the point (1, -2, 4) from z-axis.

5. Write the converse of the following statement:

   "If a number n is even, then n^2 is even".

6. Find the component statements of the following compound statement:

   "A square is the quadrilateral and its four sides are equal".

SECTION – B

7. Prove the following by using the principle of mathematical induction for all n∈ N:

   $10^n + 3 \cdot 4^{n+2} + 5$ is divisible by 9

8. Write the following complex numbers in the polar form: $\dfrac{1+2i}{1-3i}$

   OR

   Find the Square root of the following: - 16 – 30 i

9. In a group there are 3 men and 2 women. 3 persons are selected at random from this group. Find the probability that 1 man and 2 women or 2 men and 1 woman are selected.

OR

In a class of 100 students, 60 opted for Maths, 50 opted for Biology and 30 opted for both Maths and Biology. If one of these students is selected at random, find the probability that:

(i)The students has opted for Maths or Biology.

(ii)The students has opted neither Maths nor Biology.

10. Solve: $\sin x + \sin 3x + \sin 5x = 0$

11. Find $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$ in quadrant II, if $\sin x = \frac{1}{4}$

12. How many words can be formed using all the letters of the word EQUATION so that i)all the vowels are together ii) consonants occupy the odd places.

13. Find n if: $^{2n}P_3 = 100 \cdot {}^{n}P_2$

14. If A and G be A.M and G.M, respectively between two positive numbers, prove that the numbers are $A \pm \sqrt{(A + G)(A - G)}$

OR

If S_1, S_2, S_3 are the sum of first n natural numbers, their squares and their cubes, respectively, show that $9(S_2)^2 = S_3 (1 + 8S_1)$

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

16. Let A, B and C be three sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C.$ Show that $B = C.$

17. Find the derivative of $f(x) = x + \frac{1}{x}$ from the first principle with respect to x.

OR

Evaluate $\lim_{x \to 0} f(x)$ where $f(x) = \begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

18. Find the domain and the range of the real function f defined by $f(x) = \frac{x^2}{1+x^2}$

19. Find the equation of the lines through the point (3,2) which makes an angle of 45^0 with the line $x - 2y = 3$.

SECTION – C

20. The report of one survey of 100 students studying languages English, Hindi and Sanskrit are as follows: All the three languages 5 students, Hindi and English 10students, English and Sanskrit 8 students, Sanskrit and Hindi 20 students, English 30 students, Hindi 23 students, Sanskrit 50 students. The surveyor who prepared the report was shown the door. Why?

21. Prove that: $\sin^2 A = \cos^2 (A - B) + \cos^2 B - 2 \cos(A - B) \cos A \cos B$

    OR

    If $tan\dfrac{\theta}{2} = \sqrt{\dfrac{1-c}{1+c}} \, tan\dfrac{\varphi}{2} \; prove \; that \; \cos \varphi = \dfrac{\cos \theta - c}{1 - c \cos \theta}$

22. Solve the following system of inequalities graphically:

    $3x + 2y \le 150, \; x + 4y \le 80, \; x \le 15, y \ge 0$

23. Find a, b and n in the expansion of $(a + b)^n$ if the first three terms of the expansion are 729, 7290 and 30375 respectively.

    OR

    The coefficients of three consecutive terms in the expansion of $(1 + x)^n$ are in the ratio

    1 : 7 : 42. Find n.

24. If p and q are the lengths of perpendiculars from the origin to the lines $x\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + y \, cosec\theta = k$ respectively. Prove that $p^2 + 4q^2 = k^2$.

25. Find the equation of the ellipse passing through (6, 4), foci on y-axis, centre at origin and having eccentricity $\dfrac{3}{4}$.

26. Calculate mean, variance and Standard Deviation for the following distribution.

Classes	0 - 30	30 – 60	60 – 90	90 – 120	120 –150	150 –180	180 -210
Frequency	2	3	5	10	3	5	2

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