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INDIAN SCHOOL SOHAR

FIRST TERM EXAMINATION– 2014

SUBJECT: MATHEMATICS

STD: XI **MARKS: 100**
DATE: 24 .09.14 **TIME: 3Hrs**

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 marks each. You have to attempt only one of the alternatives in all such questions.*
5. *Use of calculators is not permitted.*

SECTION – A

1. If ${}^{n}P_{r}$= 720 and ${}^{n}C_{r}$ = 120, find r.
2. Let z_1 = 2-3i , z_2 = 6 -i. Find Re ($z_1\bar{z}_2$).
3. Write the following intervals in set-builder form: (-5, 7] .
4. In a circle of diameter 40cm, the length of a chord is 20cm. Find the length of minor arc of the chord.
5. State the negation of the statement: Every natural number is greater than 0.
6. State the contrapositive of the statement: If a triangle is equilateral, it is isosceles.

SECTION – B

7. Find the domain and range of the function f (x) = $\sqrt{4 - x^2}$
8. If A and G be A.M and G.M, respectively between two positive numbers, prove that the numbers are A $\pm\sqrt{(A+G)(A-G)}$
9. If p, q, r are in G.P and the equations $px^2 + 2qx + r = 0$ and $dx^2 + 2ex + f = 0$ have a common root, then show that $\frac{d}{p}$, $\frac{e}{q}$, $\frac{f}{r}$ are in A.P.

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

$1.3 + 2.\ 3^2 + 3.3^3 + \ldots + n\ .3^n = \frac{(2n-1)3^{n+1} + 3}{4}$

OR

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

$(2n+7) < (n+3)^2$

11. Write the polar form of the following: $\frac{1}{1+i}$

12. Find the Square root of the following: -15 – 8i

13. If A, B and C are any three sets, then prove that: $A - (B \cap C) = (A - B) \cup (A - C)$

14. If $\alpha\ , \beta$ are two different values of θ lying between 0 and 2π which satisfy the equation $6cos\theta + 8\sin\theta = 9$. Find the value of $\sin(\alpha + \beta)$.

15. Solve sin2x – sin4x + sin 6x = 0

OR

In any triangle ABC, show that:

$$\frac{\sin(B - C)}{\sin(B + C)} = \frac{b^2 - c^2}{a^2}$$

16. Solve the following inequation and represent it on the number line:

$$3x - \frac{4}{3} \leq x + 2 < 4x + 5$$

17. The letters of the word 'GREEN' are written in all possible orders and these words are written out as in a dictionary, what will be the 32nd word? Find the rank of the word 'GREEN'.

18. Show that the middle term in the expansion of $(1 + x)^{2n}$ is $\frac{1.3.5....(2n-1)}{n!} 2^n x^n$, where n is a positive integer.

OR

If a and b are distinct integers, prove that a-b is a factor of $a^n - b^n$, whenever n is a positive integer.

19. How many different words can be formed with the letters of the word " PUNCTUAL" so that

i)the vowels always come together?

ii)the vowels never come together?

Explain the importance of punctuality in your life.

OR

A cricket team of 11 players is to be selected from 16 players including 5 bowlers and 2 wicket keepers. In how many ways can a team be selected so as to consist of exactly 3 bowlers and one wicket keeper? Explain the importance of sports in your life.

SECTION – C

20. Prepare the inequations and find the solution region for the following situations graphically: A small firm manufactures items A and B. The total number of items A and B can manufacture is atmost 30. Item A takes 2 hours to make while item B takes only half an hour. The maximum time available per day is 20 hours.
21. In a class of 50 students 27 study History, 27 study Civics, 25 study Economics, 15 study both History and Civics, 16 study both Civics and Economics , 14 study both History and Economics and 9 study all the three subjects. How many students do not study any of the three subjects?
22. Prove that : $\frac{\sin A + \sin 3A + \sin 5A + \sin 7A}{cosA + \cos 3A + \cos 5A + \cos 7A} = \tan 4A$
23. Prove that $cos\frac{2\pi}{7} + cos\frac{4\pi}{7} + cos\frac{6\pi}{7} = -\frac{1}{2}$

OR

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

24. Let S be the sum, P the product and R the sum of reciprocals of n terms in a GP. Prove that $P^2R^n=S^n$
25. Find the sum of the following series up to n terms: $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2)$ ...
26. The third, fourth and fifth terms in the binomial expansion $(x + a)^n$ are 84, 280 and 560 respectively. Find x, a and n.

OR

The coefficients of three consecutive terms in the expansion of $(1 + a)^n$ are in the ratio 1: 7 : 42. Find n and r.

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