DON BOSCO SCHOOL - ALAKNANDA - NEW DELHI-110 019

CLASS XI FIRST TERMINAL EXAMINATIONS 14.09.2015

TIME: 3HRS MATHEMATICS (041) M.M: 100

GENERAL INSTRUCTIONS:

(i) *All questions are compulsory*

(ii) *The question paper consists of 29 questions divided into four sections*

*Section A comprises of 4 questions of **one** mark each.*

*Section B comprises of 8 questions of **two** marks each*

*Section C comprises of 11 questions of **four** marks each.*

Section D comprises of 6 questions of six marks each.

(iii) *Questions 26 and 29 are **value based questions***

(iv) *Use of calculators is **not** permitted.*

Section A (1 mark)

1. Show that $(A \cup B) \cap (A \cup B') = A$
2. Evaluate cosec (-1410^0)
3. Find $i^9 + i^{31}$
4. Solve $3x + 4 < 17$ when $x \in N$

Section B (2 marks)

5. Let $A = \{ 0, \phi, \{\phi\} \}$. Write $P(A)$
6. Consider $A = \{1, 2, 3, 5\}$ and $B = \{4, 6, 9\}$. Define a relation R from A to B by $R = \{ (x, y) :$ the difference between x and y is odd, $x \in A$, $y \in B \}$. Write R in roster form
7. Prove that $\tan 50^0 = \tan 40^0 + 2 \tan 10^0$
8. Solve: $\cos x - \sin x = \frac{1}{\sqrt{2}}$
9. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then find the value of m
10. Solve the following inequalities and represent the solution on a number line :

    $3x - 7 > 2(x - 6)$, $6 - x \geq 11 - 2x$
11. The longest side of a triangle is twice the shortest side and the third side is 2 cm longer than the shortest side. If the perimeter of the triangle is not less than 166 cm , then find the minimum length of the sides
12. A polygon has 90 diagonals. Find its numbers of sides

Section C (4 marks)

13. Using the properties of sets show that $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$. Also draw the Venn diagram of $(A - B) \cup (B - A)$
14. Find the domain and range of the function $f(x) = \frac{x^2}{1+x^2}$
15. Draw the graph of the following function and find its range

$$f(x) = \begin{cases} x^2 & , x \leq 0 \\ x & , 0 < x < 1 \\ \frac{1}{x} & , x \geq 1 \end{cases}$$

Time: 3 hrs

General Instructions: **M.M - 100**

1. All questions are compulsory.
2. The question paper consists of 26 questions divided into three sections A, B and C.
3. Section A consists 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.
4. All question in section A are to be answered in one sentence or as per the exact requirement of the question.
5. There is no overall choice. However internal choice has been prepared.
6. Use of calculator is not permitted. You may ask for logarithmic tables, if required.

$1^\circ = \frac{\pi}{180}$ rad

SECTION – A

1. Express i^{-2013} in form of a+ ib.
2. Solve: $\frac{3(x-2)}{5} \leq \frac{5(2-x)}{3}$.
3. Evaluate: $(99)^5$ using Binomial Theorem.
4. How many elements has P (A), if A=Φ?
5. How many digits can be formed by using the digit 1 to 9, if no digit is repeated?
6. In a triangle ABC, if $\cos A = \frac{\sin B}{2 \sin C}$, then prove that the triangle is isosceles

SECTION – B

7. For any non-empty sets A and B, if P (A) = P (B), then prove that A = B. **OR**
   State and prove De Morgan's law by definition.
8. If $\tan x = \frac{3}{4}, \pi < x < \frac{3\pi}{2}$, find the value of $\sin\frac{x}{2}, \cos\frac{x}{2}$ and $\tan\frac{x}{2}$.
9. Prove that: $\sin 3x + \sin 2x - \sin x = 4 \sin x \cos\frac{x}{2} \cos\frac{3x}{2}$.
10. Using PMI, Prove that:
$$1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \frac{1}{1+2+3+4} + \cdots + \frac{1}{1+2+\cdots+n} = \frac{2n}{n+1}$$
11. Using PMI, prove that $n^3 - 7n + 3$ is divisible by 3, for all natural numbers n.
12. Find real Ø such that $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely real. **OR**
    If $(x+iy)^3 = u+iv$, then show that: $\frac{u}{x} + \frac{v}{y} = 4(x^2-y^2)$
13. In triangle ABC, prove that : $\frac{b^2-c^2}{a^2} \sin 2A + \frac{c^2-a^2}{b^2} \sin 2B + \frac{a^2-b^2}{c^2} \sin 2C = 0$
14. Solve graphically: $3x + 2y \leq 150, x+4y \leq 80, x \geq 0, y \geq 0$.
15. How many numbers greater than 1000000 can be formed by using the digits 1, 2, 0, 2, 4, 2, 4?
16. If the fourth term in the expansion of $\left(ax + \frac{1}{x}\right)^n$ is $\frac{5}{2}$, then find the value of a and n.
17. Find the middle term in expansion of $\left(\frac{3x-x^3}{6}\right)^9$
18. The sum of the first four terms of an A.P. is 56. The sum of last four terms is 112. If its first term is 11, then find its common ratio. no. of terms
19. In how many ways can the letters of the words ASSASINATION be arranged so that all the S's are together? **OR**
    How many five-letter words containing 3 vowels and 2 consonants can be formed using the letters of the word EQUATION so that the two consonants occur together?

vowels together

$\cos 2A = 2\cos^2 A - 1$

$\cos A = 2\cos^2\frac{A}{2} - 1$

$\cos A + 1 = 2\cos^2\frac{A}{2}$

$\sqrt{\frac{\cos A + 1}{2}}$