

INTERNATIONAL INDIAN SCHOOL, DAMMAM

FIRST TERM EXAMINATIONS JUNE-2015

SET-A

GRADE: XI

Max Marks-100

SUBJECT: MATHEMATICS

Time –3hours

General Instructions

1. All questions are compulsory.
2. the question paper consists of 26 questions divided into three sections A, B, C
3. Section A contains 6 questions of 1 mark each, section B contains 13 questions of 4 marks each and section C contains 7 questions of 6 marks each.

SECTION-A (6X1 = 6 Marks)

- 1) Solve for $x : \frac{x-5}{x+2} < 0$
- 2) Write real and imaginary parts of $\sqrt{37} + \sqrt{-19}$
- 3) If $(x - 1, y + 3) = (2, x + 4)$, find x and y .
- 4) Describe the set $\{x : x \in N, x \text{ is a prime number}, 10 \leq x \leq 20\}$ in roster form
- 5) If $P(n)$ is the statement " $9^n - 8^n - 1$ is a multiple of 8", are $P(2)$ & $P(4)$ true?
- 6) Express $104^\circ 36'$ in radian.

SECTION-B (13X4 = 52 Marks)

- 7) If $A = \{x : x = 2n + 1, n \leq 6, n \in N\}$, $B = \{x : x = 3n - 2, n \leq 3, n \in N\}$, then prove that $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$ if $U = \{x : x \in N, x \leq 15\}$
- 8) Write the complex number $\frac{1+7i}{(2-i)^2}$ into the polar form.
- 9) Solve the following trigonometric equation:

$$\tan^2 x - (\sqrt{3} - 1)\tan x - \sqrt{3} = 0$$

10) Prove that: $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$

11) By P.M.I, prove that: $(1 + \frac{3}{1})(1 + \frac{5}{4})(1 + \frac{7}{9}) \dots (1 + \frac{2n+1}{n^2}) = (n + 1)^2$

OR

$x^{2n} - y^{2n}$ is divisible by $x + y$.

12) Evaluate: $\sin \frac{7\pi}{12} \cos \frac{\pi}{4} - \cos \frac{7\pi}{12} \sin \frac{\pi}{4}$

13) Prove that: $\tan 4x = \frac{4\tan x(1 - \tan^2 x)}{1 - 6\tan^2 x + \tan^4 x}$

14) Let set **A** and **B** be two sets such that **A X B** consists 6 elements. If three elements are (1, 4), (2, 6), (3, 6), find **A X B** and **B X A**.

15) Draw the graph of the function:

$$f(x) = \begin{cases} 1 - x, & x < 0 \\ 1, & x = 0 \\ x + 1, & x > 0 \end{cases}$$

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 square roots of $-7 + 24i$

18) A seller has 600 litres milk of 80% concentration. He diluted the milk by adding some water to it so that the concentration is more than 65% but less than 70%, how much water has been added? Which value the seller is lacking?

19) Solve the following quadratic equation: $21x^2 - 28x + 10 = 0$

OR

Find the modulus of $\frac{1+i}{1-i} - \frac{1-i}{1+i}$

SECTION-C (7X6 = 42 Marks)

20) For what values of x , $\frac{3+2i \sin x}{1-2i \sin x}$ is purely real.

21) Solve graphically: $x + y \geq 1, 7x + 9y \leq 63, x \leq 6, y \leq 5, x, y \geq 0$

22) By P.M.I, prove that:

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

23) In a class of 60 students, 23 play Hockey, 15 play Basketball and 20 play Cricket. 7 play Hockey and Basketball, 5 play Cricket and Basketball, 4 play Hockey and Cricket and 15 do not play any of these games. Find: (i) How many play all three games? (ii) How many play Hockey but not Cricket? (iii) How many play Hockey and Cricket but not Basketball?

24) Find the domain and range of the following functions:

(i) $\sqrt{9 - x^2}$ (ii) $\frac{1}{\sqrt{x-4}}$

25) Prove that: $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3}\right) + \cos^2 \left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

26) If $\tan x = \frac{3}{4}$ and x lies in the 3rd quadrant, find the values of $\sin \frac{x}{2}, \cos \frac{x}{2}, \tan \frac{x}{2}$

OR

$$\frac{\sin x \sin 2x + \sin 3x \sin 6x}{\sin x \cos 2x + \sin 3x \cos 6x} = \tan 5x$$
