

# INTERNATIONAL INDIAN SCHOOL, DAMMAM

## FIRST TERM EXAMINATIONS JULY-2017

### SET-A

GRADE: XI

Max Marks-100

SUBJECT: MATHEMATICS

Time –3hours

#### General Instructions

1. All questions are compulsory.
2. The question paper consists of 29 questions divided into four sections A, B, C and D.
3. Section A consists 4 questions of 1 mark each, section B consists 8 questions of 2 marks each and section C consists 11 questions of 4 marks each and section D consists 6 questions of 6 marks each.

#### SECTION – A

- 1) If set  $A = \{1, 2, 3\}$ , how many elements will be in Power set of A.
- 2) A central angle of  $60^\circ$  subtend an arc of length  $\frac{\pi}{6}$  cm. Find the radius of the circle.
- 3) Write the multiplicative inverse of  $\sqrt{3} + 3i$
- 4) If  $A = \{a, b\}$ ,  $B = \{c, d\}$ ,  $C = \{d, e\}$  then find  $A \times (B \cup C)$

#### SECTION – B

- 5) Find the real values of  $x$  and  $y$ , if  $\frac{x-1}{3+i} + \frac{y-1}{3-i} = i$
- 6) Solve:  $5x + 1 > -24$ ,  $5x - 1 < 24$ , on number line.
- 7) Find the value of  $2\sin^2 \frac{\pi}{6} + \operatorname{Cosec}^2 \frac{7\pi}{6} \cos^2 \frac{\pi}{3}$
- 8) Prove that:  $\tan 56^\circ = \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$
- 9) If  $A \times A$  has 9 elements &  $(-1, 0)$ ,  $(0, 1) \in A \times A$ , find set A and  $A \times A$



10) By P.M.I prove that  $7^n - 3^n$  is divisible by 7

11) Convert  $\frac{1+7i}{(2-i)^2}$  into polar form.

12) Let  $U = \{x: x \in N, x \leq 9\}$ ,  $A = \{1,3,5\}$ ,  $B = \{1,2,3,4,5\}$ ,  $C = \{2,4,6\}$ , determine  $A' \cup B'$

### SECTION - C

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

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

15) A seller has 600 liters 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?

16) Reduce into standard form  $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right) \left(\frac{3-4i}{5+i}\right)$

17) If  $A = \{x : x = 2n + 1, n \leq 5, n \in N\}$ ,  $B = \{x : x = 3n - 2, n \leq 3, n \in N\}$ , then prove that  $(A \cup B)' = A' \cap B'$ , if  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

18) Find the general solutions of  $3 \sin^2 x + 2\sqrt{3} \sin x \cos x - 3 \cos^2 x = 0$

19) Find the domain and range of the function:  $f(x) = \sqrt{9 - x^2}$

20) Find the square roots of  $8 - 15i$

21) By P.M.I Prove that:  $\left(1 + \frac{3}{1}\right) \left(1 + \frac{5}{4}\right) \left(1 + \frac{7}{9}\right) \dots \dots \dots \left(1 + \frac{2n+1}{n^2}\right) = (n+1)^2$

22) Let  $A$  and  $B$  be sets .If  $A \cap X = B \cap X = \emptyset$  and  $A \cup X = B \cup X$  for some set  $X$ , show that  $A = B$ .

23) If a function  $f : R \rightarrow R$  be defined by  $f(x) = \begin{cases} 3x - 2, & x < 0 \\ 1, & x = 0 \\ 4x + 1, & x > 0 \end{cases}$  find

$f(1), f(-1), f(0), f(2)$

SECTION – D

24) For what value of  $\theta$ ,  $\frac{3+2i \sin\theta}{1-2i \sin\theta}$  is purely real & purely imaginary.

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

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

27) By P.M.I, Prove that:

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

28) In a school, out of 100 students, 15 like reading newspapers only, 12 like learning computers only and 8 like watching movies only on TV in the spare time, 40 like reading newspapers and watching movies, 20 like learning computers and watching movies, 10 like reading newspapers and learning computer, 65 like watching movies on TV. Draw a Venn diagram; hence evaluate the number of students who (a) like reading newspapers, (b) like learning computers, (c) Don't like any of three activities. Which value do you get from above information?

29) (A) Let  $A = \{1,2\}, B = \{1,2,3,4\}, C = \{5,6\}$  &  $D = \{5,6,7,8\}$ , then prove that

$$A \times (B \cap C) = (A \times B) \cap (A \times C)$$

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