

**PRE-BOARD EXAMINATION-2020-21**

**SUBJECT - MATHEMATICS**

Class: XI (CBSE)

Total Marks: 80

Date.....

Time: 3 hrs

**General Instructions:**

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

**Part – A:**

1. It consists two sections- I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 2 questions on case study. Each case study has 5 case-based sub-parts. An Examinee is to attempt any 4 out of 5 sub-parts.

**Part – B:**

1. Question No 19 to 28 are Very short answer Type questions of 2 mark each,
2. Question No 29 to 35 are Short Answer Type questions of 3 marks each
3. Question No 36 to 38 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 3 questions of 2 marks, 2 questions of 3 marks and 2 question of 5 marks.

**PART A**

**SECTION I**

**All questions are compulsory. In case of internal choices attempt any one.**

1. If A and B are two sets such that *A is a subset of B*, then what is  $A \cup B$ ? (1)

OR

If  $A = \{x: x \text{ is a prime number}\}$ ,  $B = \{x: x \text{ is an odd natural number}\}$ , find  $A \cap B$ ?

2. If the element A has 3 elements and the set  $B = \{6, 7, 8\}$ , then find the number of elements in  $A \times B$  (1)

3. Find the range of the following function: (1)

$$f(x) = x^2 + 2, x \text{ is a real number}$$

OR

Let  $A = \{a, b, c\}$  and  $B = \{5, 6\}$ , find the number of relations from A to B.

4. Find the degree measure corresponding to  $\frac{5\pi}{6}$  (1)
5. Find the value of  $\tan \frac{19\pi}{3}$  (1)

OR

Find the radian measure of  $520^\circ$

6. Express the following in the form  $a + ib$  (1)
- $2i\left(\frac{2}{3}i\right)$
7. Find the equation of circle with centre  $(0, 2)$  and radius 2 (1)

OR

Find the centre and radius of the circle:  $(x + 5)^2 + (y - 3)^2 = 36$

8. Write the length of latus rectum of ellipse,  $\frac{x^2}{36} + \frac{y^2}{25} = 1$  (1)
9. Find the solution set of  $2x - 5 < 7$ , when  $x$  is an integer. (1)

OR

Solve the inequality:  $2 \leq 3x - 4 \leq 5$

10. Evaluate  $5i - 2i$  (1)
11. How many 4 digit numbers are there with no digit repeated? (1)
12. Find the common ratio of  $\sqrt{7}, \sqrt{21}, 3\sqrt{7}, \dots$  (1)
13. A man starts repaying a loan as first instalments of ₹ 50. If he increases the instalment by ₹ 5 every month, what amount he will pay in the 30<sup>th</sup> instalment? (1)
14. Evaluate  $\lim_{x \rightarrow -1} \frac{x^{10} + x^3 + 1}{x - 1}$  (1)
15. Find the derivative of  $\sin x \cos x$  (1)

16. Adie is thrown. Describe the following events: (1)

A: an even number greater than 4

B: a multiple of 3

### SECTION II

**Both the Case study based questions are compulsory. Attempt any 4 sub parts (Q17 and Q 18). Each question carries 1 mark**

17. In a school, the students of class 11 were given different activities. One group was given the activity to record the weights of the students of class 11 and submit a grouped data to the teacher. After working for 3 days students submitted the following data. Answer the questions based on the submitted data. (4)

Weight( in kg)	Number of students
40-44	4
44-48	6
48-52	10
52-56	14
56-60	7
60-64	9

(a) What is the median class of the data?

- (i) 44-48
- (ii) 48-52
- (iii) 52-56
- (iv) 56-60

(b) What is the cumulative frequency of the class 60-64?

- (i) 31

(ii) 50

(iii) 40

(iv) 21

(c) What is the median of the given data?

(i) 53.43

(ii) 55.33

(iii) 49.43

(iv) None of these

(d) Choose the correct option from the following.

(i) Range, Quartile deviation mean deviation and standard deviation are the measures of dispersion

(ii) Mean, median and mode are the measures of dispersion

(iii) Range, mean and mean deviation are the measures of dispersion

(iv) None of these.

(e) Mean deviation about median is equal to

(i)  $\frac{\sum f_i |x_i - \bar{x}|}{N}$

(ii)  $\frac{\sum f_i |x_i - \bar{x}|}{n}$

(iii)  $\frac{\sum f_i |x_i - \bar{M}|}{N}$

(iv)  $\frac{\sum |x_i - \bar{x}|}{N}$

18. Let  $X = \{Ram, Geeta, Amal\}$ , be the set of students of class XI, who are in school hockey Team. Let  $Y = \{Geeta, Ashok, David\}$  be the set of students from class XI who are in the school football team. Choose the correct option from the following. (4)

(a)  $X \cup Y =$

1.  $\emptyset$

2.  $\{Ram, Geeta, Amal, Ashok\}$

3.  $\{Ram, Geeta, Amal, Ashok, David\}$

4.  $\{Geeta\}$

- (b)  $X \cap Y =$
1.  $\emptyset$
  2. {Ram, Geeta, Amal, Ashok}
  3. { Ram, Geeta, Amal, Ashok, David}
  4. {Geeta}
- (c) Write the intersection of two sets A and B symbolically
1.  $A \cap B = \{x: x \in A \text{ or } x \in B\}$
  2.  $A \cap B = \{x: x \in A \text{ and } x \in B\}$
  3.  $A \cap B = \{x: x \in A \text{ and not in } B\}$
  4. None of these
- (d) A set A is said to be a subset of a set B
1. if every elements of A and B are same
  2. if every elements of A and B are different
  3. if every elements of A is also an elements of B
  4. none of these
- (e) X and Y are disjoint sets. True or false
1. True
  2. False

## PART - B

### SECTION III

19.  $A = \{x: x \in R \text{ and } x \text{ satisfy, } x^2 + 8x + 12\}$ ,  $B = \{-2, -4, -6\}$ . Check whether A is a subset of B. Give reason (2)
20. Let  $A = \{1, 2, 3, \dots \dots 14\}$ . Define a relation R from A to A by  $R = \{(x, y): 3x - y = 0, \text{ where } x, y \in A\}$ . Write down its domain and range. (2)

OR

Find the domain and range of the following real function:

$$f(x) = \sqrt{4 - x^2}$$

21. Prove that  $\frac{\sin 5x + \sin 3x}{\cos 5x + \cos 3x} = \tan 4x$  (2)
22. Find the modulus and multiplicative inverse of  $\sqrt{3} + 3i$  (2)
23. Find the coordinates of the focus, axis of the parabola, the equation of the directrix and the length of the latus rectum of the following : (2)
- $$y^2 = 8x$$

OR

Find the equation of a circle with Centre (2, 2) and passing through (4, 5).

24. It is required to seat 5 men and 4 women in a row so that women occupy even places. How many such arrangements are possible (2)
25. The number of bacteria in a certain culture doubles every hour. If there were 40 bacteria present in the culture originally, how many bacteria will be present at the end of 2<sup>nd</sup> hour and 4<sup>th</sup> hour? (2)
26. The perpendicular from the origin to a line meets it at the point (-2, 9). Find the equation of the line? (2)
27. Evaluate  $\lim_{x \rightarrow \pi} \frac{\sin(\pi-x)}{\pi(\pi-x)}$  (2)

OR

Show that  $\lim_{x \rightarrow 2} \frac{|x-2|}{x-2}$  does not exist.

28. Two dice are thrown. The events A, and B are as follows: (2)
- A: getting an odd number on the first die*
- B: getting the sum of the numbers on the dice is less than 4.*
- (i) Describe the events
- (ii) Check whether A and B are mutually exclusive. Give reason for your answer.

#### SECTION IV

**All questions are compulsory. In case of internal choices attempt any one.**

29. Find the values of other five trigonometric functions. (3)
- $\cos x = -\frac{1}{2}$ , where  $x$  lies in third quadrant.
30. Find the modulus of  $\frac{1+i}{1-i} - \frac{1-i}{1+i}$  (3)
31. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these (3)
- (i) Four cards of the same suit.
- (ii) Are face cards.
32. Find the sum to  $n$  terms of the sequence, 6, 66, 666, 6666... (3)
- OR
- The sum of  $n$  terms of two A.P.'S are in the ratio  $(3n + 8) : (7n + 15)$ . Find the ratio of their 12th terms.

33. Find the coordinates of the point which divides the line segment joining the points  $(-2, 3, 5)$  and  $(1, -4, 6)$  in the ratio 2: 3 internally. (3)

OR

Verify the given points  $(0, 7, -10)$ ,  $(1, 6, -6)$  and  $(4, 9, -6)$  are the vertices of an isosceles triangle.

34. Find the derivative of  $f(x) = \frac{2x+3}{x-2}$  (3)

35. Find the variance and standard deviation for the following data. (3)

$x_i$	3	6	9	12	13	15	21	22
$f_i$	3	4	5	2	4	5	4	3

### SECTION V

**All questions are compulsory. In case of internal choices attempt any one.**

36. Prove that  $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$  (5)

OR

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

37. Solve the following system of linear inequalities graphically. (5)

$$x + 2y \leq 12, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$$

38. The line through the points  $(h, 3)$  and  $(4, 1)$  intersects the line  $7x - 9y - 19 = 0$  at right angle. Find the value of  $h$ ? (5)

OR

Find the points on the x-axis, whose distance from the line  $\frac{x}{3} + \frac{y}{4} = 1$  are 4 units.

**-END-**