

# FIITJEE

## CBSE PART TEST – III

ALL X<sup>TH</sup> STUDYING BATCHES

### MATHS

Time: 1:30 Hours

Max Marks: 40

**Instructions:**

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

**PART – A**

- i. It consists of two sections – I and II.
- ii. Section – I have 8 questions internal choices given in any three questions.
- iii. Section – II has two case study – based questions. Each case study has 5 case – based sub – parts. A student is to attempt any 4 out of 5 sub parts.

**PART – B**

- i. Question number 11 to 12 are very short answer type questions of 2 marks each.
- ii. Question number 13 to 17 are short answer type questions of 3 marks each.
- iii. Question number 18 are long answer type question of 5 marks.
- iv. Internal choice has been provided in few questions.

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**Name of the Candidate** : .....

**Enroll Number** : .....

**Date of Examination** : .....

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PART – A  
SECTION – I  
(8 question, 1 mark each)

1. A dice is thrown once. Find the probability of getting a number less than 3.

**OR**

A number of six digits is written down at random. What is the probability that the number is even?

2. Write the empirical relationship between the three measures of central tendency.
3. If the curved surface area of solid right circular cylinder of height  $h$  and radius  $r$  is one third of its total surface area then  $\frac{h}{r} = ?$
4. How many balls of radius 1 cm can be made from a sphere of radius 10 cm?
5. Sum of the numbers of given data is 100 and mean is 4, then the number of observation of given data is?

**OR**

The mean and median of same data are 24 and 26 respectively. The value of mode is?

6. One card is drawn at random from a well-shuffled pack of 52 cards. What is the probability that the card drawn is either a red card or a king?

**OR**

Cards marked with number 3, 4, 5,.....,50 are placed in a box and mixed through. A card is drawn at random from the box. Find the probability that the selected card bears a perfect square number.

7. The mean of first three terms is 14 and mean of next two terms is 18. Then find the mean of all the five terms .

8. Find the mean of the following data

Classes	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	3	5	9	5	3

SECTION – II  
(2 question, 4 mark each)  
(Out of 5 sub-parts, attempt any four)

9. **PARAGRAPH – 1**

The Mean, Median and Mode are the three measures of central tendency. Mean is the arithmetic average of a data set. This is found by adding the numbers in a data set and dividing by the number of observation in the data set. The median is the middle, number in a data set when the numbers are listed in either ascending or descending order. The mode is the value that occurs the most often in a data set and the range is the difference between the highest and lowest values in a data set.

1. Look at the frequency distribution table given below:

<b>Class interval</b>	35-45	45-55	55-65	65-75
<b>Frequency</b>	8	12	20	10

The median of the above distribution is

- (A) 56.5 (B) 57.5  
(C) 58.5 (D) 59

2. Consider the following table:

<b>Class interval</b>	10-14	14-18	18-22	22-26	26-30
<b>Frequency</b>	5	11	16	25	19

The mode of the above data is

- (A) 23.5 (B) 24  
(C) 24.4 (D) 25

3. The mean and mode of frequency distribution are 28 and 16 respectively. The median is

- (A) 22 (B) 23.5  
(C) 24 (D) 24.5

4. The median of first 8 prime numbers is

- (A) 7 (B) 9  
(C) 11 (D) 13

5. The mean of 20 numbers is zero. Of them, at the most, how many may be greater than zero?

- (A) 0 (B) 1  
(C) 10 (D) 19

10. **PARAGRAPH – 2**

Probability means possibility. It is a branch of mathematics that deals with the occurrence of a random event. The value is expressed from zero to one. Probability has been introduced in Maths to predict how likely events are to happen. Probability is a measure of the likelihood of an event to occur. Many events cannot be predicted with total certainty. We can predict only the chance of an event to occur i.e. how likely they are to happen, using it. Probability can range in from 0 to 1, where 0 means the event to be an impossible one and 1 indicates a certain event. The probability formula is defined as the possibility of an event to happen is equal to the ratio of the number of favourable outcomes and the total number of outcomes.

1. In a throw of a pair of dice, the probability of getting a double is:

- (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$

(C)  $\frac{1}{6}$

(D)  $\frac{5}{12}$

2. The probability of getting an even number, when a dice is thrown once, is:

(A)  $\frac{1}{2}$

(B)  $\frac{1}{6}$

(C)  $\frac{1}{3}$

(D)  $\frac{5}{6}$

3. A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random from the box, the probability that it bears a prime number less than 23, is:

(A)  $\frac{7}{20}$

(B)  $\frac{4}{45}$

(C)  $\frac{10}{90}$

(D)  $\frac{9}{89}$

4. A letter of English alphabet is chosen at random. Determine the probability that the chosen letter is a consonant.

(A)  $\frac{21}{26}$

(B) 1

(C)  $\frac{5}{26}$

(D) None of these

5. A pair of dice is thrown once. Find the probability of getting the same number on each dice.

(A)  $\frac{1}{6}$

(B)  $\frac{5}{6}$

(C) 1

(D) None of these

PART – B

**2 Questions (2 Marks Each)**

11. Area of base of right circular cone is  $314 \text{ cm}^2$  and its height is 15 cm. Find volume of cone.

**OR**

The length, breadth and height of a cuboid are 12cm, 15cm and 6cm respectively. Find the length of longest possible iron-rod that can be kept inside the cuboid.

12. A box contains 5 red balls, 8 green balls and 10 pink balls. A ball is drawn at random from the box. What is the probability that the ball drawn is either red or green?

### 5 Questions (3 Marks Each)

13. If the mean of the following frequency distribution is 49, find the missing frequency  $p$ .

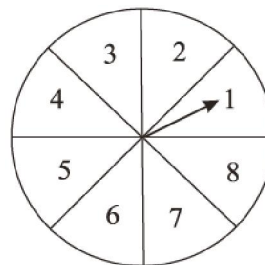
Class	Frequency
0 – 20	2
20 – 40	6
40 – 60	$p$
60 – 80	5
80 – 100	2

14. From a pack of 52 cards, red face cards are removed. After that a card is drawn at random from the pack. Find the probability that the card drawn is  
 (i) a queen      (ii) a red card      (iii) a spade card
15. A sphere of maximum volume is cut out from a solid hemisphere of radius 6 cm. What is the volume of the cut out sphere? (use  $\pi = 3.14$ )

**OR**

A wooden toy was made by scooping out a hemisphere of same radius from each end of a solid cylinder. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, find the volume of wood in the toy. [Use  $\pi = \frac{22}{7}$ ]

16. A game of chance consists of spinning an arrow on a circular board, divided into 8 equal parts, which comes to rest pointing at one of the numbers 1, 2, 3, ..., 8 (figure), which are equally likely outcomes. What is the probability that the arrow will point at (i) an odd number (ii) a number greater than 3 (iii) a number less than 9.



17. The mean of the following distribution is 22, find the missing frequency  $f$ :

<b>Class</b>	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
<b>Frequency</b>	12	16	6	$f$	9

**OR**

The median of the following data is given by

<b>Class</b>	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45
<b>Frequency</b>	5	6	15	10	5	4	2	2

**Section - D**  
**5 Mark Questions**

18. The mean of the following frequency distribution is 62.8 and the sum of frequencies is 50. Find the missing frequencies  $f_1$  and  $f_2$ .

Classes	Frequencies
0-20	5
20-40	$f_1$
40-60	10
60-80	$f_2$
80-100	7
100-120	8

## HINTS AND SOLUTIONS

1. Favourable cases =  $\{1,2\}$

$$\therefore \text{Required probability} = \frac{\text{Favourable cases}}{\text{Total cases}}$$

$$= \frac{2}{6} = \frac{1}{3}$$

**OR**

1. Probability of getting an even digit in the unit's place is  $P(E) = \frac{5}{10} = \frac{1}{2}$ .

2. mode = 3 median – 2 mean

2. Empirical Relationship between the three measures of central tendency.

mode = 3 median – 2 mean

3.  $CSA = \frac{TSA}{3}$

$$2\pi rh = \frac{2\pi r(h+r)}{3}$$

$$3h = h + r$$

$$\frac{h}{r} = \frac{1}{2}$$

4.  $x \times \frac{4}{3} \pi (1)^3 = \frac{4}{3} \pi (10)^3$

$$x = 1000$$

5.  $\frac{100}{n} = 4 \Rightarrow n = 25$

**OR**

5. Mean of the data = 24

Median = 26

Mode = 3 median – 2 mean

$$= 3 \times 26 - 2 \times 24$$

$$= 78 - 48$$

Mode = 30

6. Total red cards = 26

Black kings = 2

$$P(E) = \frac{26+2}{52} = \frac{28}{52} = \frac{7}{13}$$

**OR**

6.  $\frac{1}{8}$

6. Favourable cases =  $\{4,9,16,25,36,49\}$

$$\therefore \text{Required probability} = \frac{6}{48} = \frac{1}{8}$$

$$\begin{aligned} 7. \quad & \frac{x_1 + x_2 + x_3 + x_4 + x_5}{5} \\ &= \frac{14 \times 3 + 18 \times 2}{5} \\ &= \frac{78}{5} = 15.6 \end{aligned}$$

$$\begin{aligned} 8. \quad \text{Mean} &= \frac{\sum x_i f_i}{\sum f_i} = \frac{5 \times 3 + 15 \times 5 + 25 \times 9 + 35 \times 5 + 45 \times 3}{3 + 5 + 9 + 5 + 3} \\ &= \frac{625}{25} = 25 \end{aligned}$$

9.

1. B

1. We have

Class interval	35-45	45-55	55-65	65-75
Frequency	8	12	20	10
Cumulative frequency	8	20	40	50

Here  $N = 50 \Rightarrow \frac{N}{2} = 25$ , which lies in class interval 55-65

$$\text{Median} = l + \left\{ h \times \frac{\left( \frac{N}{2} - cf \right)}{f} \right\} = 55 + \frac{(65 - 55)}{20} \times (25 - 20) = 57.5$$

2. C

2. The maximum frequency is 25 and the modal class is 22 – 26

$$\therefore x_k = 22, f_k = 25, f_{k-1} = 16, f_{k+1} = 19 \text{ and } h = 4$$

$$\begin{aligned} \therefore \text{mode} &= x_k + h \cdot \left\{ \frac{(f_k - f_{k-1})}{(2f_k - f_{k-1} - f_{k+1})} \right\} \\ &= \left\{ 22 + 4 \times \frac{(25 - 16)}{(50 - 16 - 19)} \right\} = \left( 22 + 4 \times \frac{9}{15} \right) = \left( 22 + \frac{12}{5} \right) = (22 + 2.4) = 24.4 \end{aligned}$$

3. C

$$3 \times \text{median} = (\text{mode} + 2 \text{ mean}) = (16 + 2 \times 28) = 72$$

$$\Rightarrow \text{median} = \frac{72}{3} = 24$$

4. B

4. First 8 prime numbers are 2, 3, 5, 7, 11, 13, 17, 19.

Required median = mean of fourth and fifth observations

$$= \frac{7 + 11}{2} = 9$$

5. D

5. Mean of 20 numbers = 0

$$\therefore \text{sum of 20 numbers} = 0 \times 20 = 0$$

It is possible that 19 of these numbers may be positive and if their sum is a, the 20<sup>th</sup> number is (-a).

10.



1. **C**  
 1. Favourable cases =  $\{(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)\}$   
 $\therefore$  Required probability =  $\frac{6}{36} = \frac{1}{6}$
2. **A**  
 2. Favourable cases =  $\{2,4,6\}$   
 $\therefore$  Required probability =  $\frac{3}{6} = \frac{1}{2}$
3. **B**  
 3. Favourable cases =  $\{2,3,5,7,11,13,17,19\}$   
 $\therefore$  Required probability =  $\frac{8}{90} = \frac{4}{45}$
4. **A**  
 4. There are 21 consonants in English alphabets.  
 $\therefore$  Required probability =  $\frac{21}{26}$
5. **A**  
 5. Favourable cases =  $\{(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)\}$   
 $\therefore$  Required probability =  $\frac{6}{36} = \frac{1}{6}$

11.  $V(\text{cone}) = \frac{1}{3}\pi r^2 h$   
 $\pi r^2 = 314, h = 15$   
 $V(\text{cone}) = \frac{1}{3} \times 314 \times 15 = 1570 \text{ cm}^3$

Or

$$\sqrt{12^2 + 15^2 + 6^2} = 9\sqrt{5} \text{ cm}$$

12.  $P(E) = \frac{5+8}{5+8+10} = \frac{13}{23}$

13.  $p = 5$

Class	Frequency	Class Marks (x)	(x × f)
0 – 20	2	10	20
20 – 40	6	30	180
40 – 60	P	50	50p
60 – 80	5	70	350
80 – 100	2	90	180
	15 + p		730 + 50p

$$\text{Mean} = \frac{\sum x \times f}{\sum f} = \frac{730 + 50p}{15 + p} = 49$$

$$730 + 50p = 735 + 49p$$

Then  $p = 5$

14. (i)  $\frac{1}{23}$   
(ii)  $\frac{10}{23}$   
(iii)  $\frac{13}{46}$

14. (i) Favourable cases = 2  
 $\therefore$  Required probability =  $\frac{2}{46} = \frac{1}{23}$   
(ii) Favourable cases = 20  
Required probability =  $\frac{20}{46} = \frac{10}{23}$   
(iii) Favourable cases = 13  
Required probability =  $\frac{13}{46}$

15. 113.04

15. Volume of cut out sphere =  $\frac{4}{3}\pi r^3$

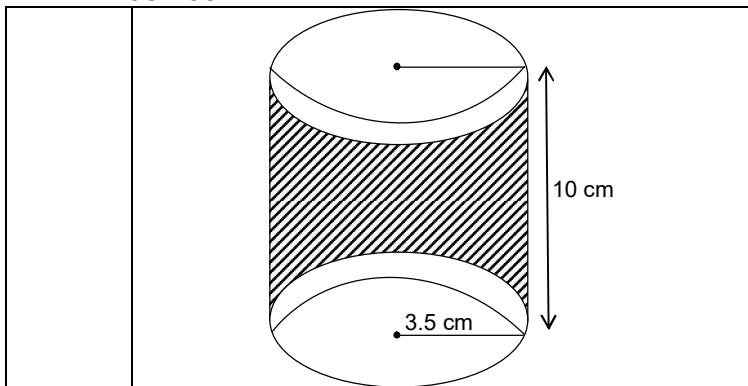
Radius of sphere = 3 cm

$$\therefore \frac{4}{3} \times \pi \times (3)^3 = 36\pi$$

$$= 36 \times 3.14 = 113.04 \text{ cm}^3$$

Or

205.205



Height of cylinder ( $h$ ) = 10 cm

Radius of cylinder = radius of each hemisphere =  $r = 3.5$  cm

Volume of wood in the toy = volume of the cylinder – 2 × volume of each Hemisphere

$$\Rightarrow \pi r^2 h - 2 \times \left[ \frac{2}{3} \pi r^3 \right]$$

$$\Rightarrow \frac{22}{7} \times 3.5 \times 3.5 \times 10 - \frac{4}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 3.5$$

$$\Rightarrow \frac{22}{7} \times (3.5)^2 \left[ 10 - \frac{4}{3} \times 3.5 \right]$$

$$\Rightarrow 38.5 \times [10 - 4.67]$$

$$\Rightarrow 38.5 \times 5.33 = 205.205 \text{ cm}^3$$

16. (i)  $\frac{1}{2}$   
 (ii)  $\frac{5}{8}$   
 (iii) 1

16. (i) Favourable cases = {1,3,5,7}  
 $\therefore$  Probability =  $\frac{4}{8} = \frac{1}{2}$   
 (ii) Favourable cases = {4,5,6,7,8}  
 $\therefore$  Probability =  $\frac{5}{8}$   
 (iii) Favourable cases = {1,2,3,4,5,6,7,8}  
 $\therefore$  Probability =  $\frac{8}{8} = 1$

17.

Class	Frequency	Class marks (x)	$x \times f$
0 – 10	12	5	60
10 – 20	16	15	240
20 – 30	6	25	150
30 – 40	f	35	35f
40 – 50	9	45	405
	43 + f		855 + 35f

$$\text{Mean} = \frac{\sum xf}{\sum f} = \frac{855 + 35f}{43 + f}$$

$$22 = \frac{855 + 35f}{43 + f}$$

$$= 22[43 + f] = 855 + 35f$$

$$\Rightarrow 946 + 22f = 855 + 35f$$

$$\Rightarrow 946 - 855 = 35f - 22f$$

$$\Rightarrow 91 = 13f$$

$$f = \frac{91}{13} = 7$$

**OR**

17. CF = 49

$$\frac{CF}{2} = 24.5 \text{ So CI} \Rightarrow (15 - 20)$$

$$\text{Median} = \ell + \left( \frac{\frac{n}{2} - CF}{f} \right) \times h$$

$$= 15 + \frac{\left(\frac{49}{2} - 11\right)}{15} \times 5$$

$$= 15 + 4.5 = 19.5$$

18.

Classes (C.I.)	Frequencies (f <sub>i</sub> )	x <sub>i</sub>	x <sub>i</sub> f <sub>i</sub>
0-20	5	10	50
20-40	f <sub>1</sub>	30	30f <sub>1</sub>
40-60	10	50	500
60-80	f <sub>2</sub>	70	70f <sub>2</sub>
80-100	7	90	630
100-120	8	110	880
	$\sum f_i = 50$		$\sum f_i x_i = 2060 + 30f_1 + 70f_2$

$$5 + f_1 + 10 + f_2 + 7 + 8 = 50 \quad \dots[\text{Given}]$$

$$\Rightarrow 30 + f_1 + f_2 = 50$$

$$\Rightarrow f_2 = 50 - 30 - f_1 \quad \dots(\text{i})$$

$$\therefore \text{Mean} = \frac{\sum f_i x_i}{\sum f_i} \quad \dots[ \because \text{Mean} = 62.8 \text{ (Given)}]$$

$$\therefore \frac{62.8}{1} = \frac{2060 + 30f_1 + 70f_2}{50}$$

$$\Rightarrow 2060 + 30f_1 + 70f_2 = 3140$$

$$\Rightarrow 30f_1 + 70f_2 = 3140 - 2060 = 1080$$

$$\Rightarrow 3f_1 + 7f_2 = 108 \dots[\text{Dividing by 10}]$$

$$\Rightarrow 3f_1 + 7(20 - f_1) = 108 \dots(\text{From (i)})$$

$$\Rightarrow 3f_1 + 140 - 7f_1 = 108$$

$$\Rightarrow -4f_1 = 108 - 140 = -32$$

$$\therefore f_1 = 8$$

Putting the value of f<sub>1</sub> into (i), we get

$$f_2 = 20 - 8 = 12$$

$$\therefore f_2 = 12$$