

**Tripura
Class XI
Mathematics
Sample Paper**

Time allowed: 3hours

Maximum Marks: 100

Section-A

Question numbers 1 to 6 carry 1 mark each. For each question four options are provided out of which only one is correct.

Write the correct option.

1x6=6

1. Which term of the following sequence is 64?

$2, 2\sqrt{2}, 4, 4\sqrt{2}, \dots$

- (i) 10
- (ii) 11
- (iii) 8
- (iv) 12

2. The Geometric mean $\frac{3}{2}$ and $\frac{27}{2}$ is

- (i) 9
- (ii) $\frac{1}{9}$
- (iii) $\frac{2}{9}$
- (iv) $\frac{9}{2}$

3. Sachin scored 70 and 75 runs in his two innings. Find the minimum run he should score in third innings to have an average of 60 runs, if x is the minimum run he scores.

- (i) $x \geq 35$
- (ii) $x = 35$
- (iii) $x > 35$
- (iv) $x < 35$

4. If $n(P) = 5$, $n(Q) = 12$ and $n(P \cup Q) = 14$ then $n(P \cap Q) = ?$

- (i) 3
- (ii) 4
- (iii) 5

- (iv) 7
5. The slope of line passing through the point A (5, 4) and B (4, 6).
- (i) 2
(ii) 3
(iii) -4
(iv) -2
6. If $\frac{2}{7}$ is the probability of an event, then the probability of the event 'not A' is :
- (i) $\frac{2}{7}$
(ii) $\frac{5}{7}$
(iii) 0
(iv) none of these

Section-B

Question numbers 7 to 12 carry two marks each.

2x6=12

7. Simplify: $\frac{1+3i}{1-2i}$
8. What is the eccentricity of the curve $4x^2 + y^2 = 100$?
9. Find the new co-ordinates of the point (4, 7) if the origin is shifted to the point (3, 2) by a translation of axes.
10. Let $A = \{1, 2\}$ and $B = \{3, 4\}$. Find the number of relations from A to B.
11. Find the equation of the circle, the co-ordinates of the end points of whose diameter are (-1, 2) and (4, -3).
12. If $\lim_{x \rightarrow 2} \frac{x^n - 2^n}{x - 2} = 80$ and $n \in \mathbb{N}$, find n?

Section-C

Questions numbers 13 to 25 carry 4 marks each.

4x13=52

13. From a frequency distribution consisting of 18 observations the mean and the standard deviation were found to be 7 and 4 respectively. But on comparison of the original data, it was found that a figure 12 was misread as 21 in calculations. Calculate the correct mean and standard deviation.
14. Find the sum of n terms of the following series $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \dots$

OR

The sum of two number is 6 times their geometric mean, show that the numbers are in the ratio $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$.

15. A manufacturer has 600 ℓ of a 12% solution of acid. How many liters of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%?

OR

Using principle of mathematical induction prove that $5^n - 5$ is divisible by 4 for all $n \in \mathbb{N}$.
Hence, prove that $2 \times 7^n + 3 \times 5^n - 5$ is divisible by 24 for all $n \in \mathbb{N}$.

16. Find $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$ where $\tan x = -\frac{4}{3}$, x is in quadrant II

17. Find the derivative using the first principle of $f(x)$, where $f(x)$ is given by $f(x) = x + \frac{1}{x}$

18. Prove that: $(\cos 3x - \cos x) \cos x + (\sin 3x + \sin x) \sin x = 0$

OR

Simplify the expression: $\sin 7x + \sin x + \sin 3x + \sin 5x$

19. Evaluate the limits of the following two functions of x :

(i) $\lim_{x \rightarrow 0} \left[\frac{x-2}{x^2-x} - \frac{1}{x^3-3x^2+2x} \right]$

(ii) $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 2x}$

20. In an university, out of 100 students 15, offered Mathematics only; 12 offered Statistics only; 8 offered Physics only; 40 offered Physics and Mathematics; 20 offered Physics and Statistics; 10 offered Mathematics and Statistics, 65 offered Physics. Find the number of students who

- (i) Offered Mathematics
(ii) Offered Statistics
(iii) Did not offer any of the above three subjects

21. The scores of two batsmen A and B, in ten innings during a certain season are given below:

A	B
32	19
28	31
47	48
63	53
71	67
39	90
10	10
60	62
96	40
14	80

22. Find n, if the ratio of the fifth term from the beginning to the fifth term from the end in the

expansion of $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6} : 1$.

Find which batsman is more consistent in scoring.

23. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains

- (i) All kings
- (ii) 3 kings
- (iii) Atleast 3 kings

24. If 4 digit numbers greater than or equal to 5000 are randomly formed from the digits 0, 1, 2, 5 and 7, what is the probability of forming a number divisible by 5 when:

- (i) the digits may be repeated
- (ii) the repetition of digits is not allowed

25. Find the mean deviation about the median for the following data:

Marks	No. of students
0-10	5
10-20	10
20-30	20
30-40	5
40-50	10

Section-D

Question numbers 26 to 30 carry 6 marks each

6x5=30

26. If three lines whose equations are $y = m_1x + c_1$, $y = m_2x + c_2$ and $y = m_3x + c_3$ are concurrent, then find (i) the condition of concurrence of the three lines(ii) the point of concurrence.

27. Find the length of the perpendicular drawn from the points,

$(\sqrt{a^2 - b^2}, 0)$ and $(-\sqrt{a^2 - b^2}, 0)$ to the line $\frac{x}{a} \cos \theta + \frac{y}{b} \sin \theta = 1$

Show that their product is b^2 .

28. Find the mean and variance of the following data

Classes	0 - 30	30 - 60	60 - 90	90 - 120	120 - 150	150 - 180	180 - 210
Frequency	2	3	5	10	3	5	2

OR

The mean and standard deviation of 100 observations were calculated as 40 and 5.1 respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct mean and the standard deviation?

Two straight lines passing through the point (2,3) make an angle 60° with each other. If the slope of one straight line is 2 find the equation of the other straight line.

29. Two students Avni and Ragini appeared in an examination. The probability that Avni will qualify the examination is 0.05 and that Ragini will qualify is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that
- Both Avni and Ragini will not qualify the examination
 - At least one of them will not qualify the examination
 - Only one of them will qualify the examination
30. Let R be a relation defined on N such that
 $R = \{(a, b)/a, b \in N \text{ such that } b \text{ is a multiple of } a\}$.
Then which of the following is/are true?
- $(a, a) \in R$ for all a in N
 - $(a, b) \in R$ implies $(b, a) \in R$
 - $(a, b) \in R, (b, c) \in R$ implies $(a, c) \in R$