

MATHEMATICS

(English version)

Parts A and B

Time : 3 hours]

[Maximum Marks : 80

Instructions :

1. Answer all the questions under Part-A on a separate answer book.
2. Write the answers to the questions under Part-B on the Question Paper itself and attach to the answer book of Part-A.

Part A

Time : 2 hours 30 minutes]

[Marks : 60

SECTION - I

6 × 2 = 12

- Note :**
1. Answer ALL the following questions.
 2. Each question carries 2 marks.

1. Find the centroid of the triangle whose vertices are (2, 3), (-4, 7) and (2, -4).
2. Find the probability of getting a 'vowel' if a letter is chosen randomly from the word "INNOVATION".
3. Express 'tan θ ' in terms of 'sin θ '.

4. An observer standing at a distance of 10m from the foot of a tower, observes its top with an angle of elevation of 60° . Draw a suitable diagram for this situation.

5. The sides of a triangle measure $2\sqrt{2}$, 4 and $2\sqrt{6}$ units. Is it a right-angled triangle? Justify.

6. Solve the quadratic equation

$$2\sin^2\theta - 3\sin\theta + 1 = 0, \text{ where } 0^\circ < \theta \leq 90^\circ.$$

$$6 \times 4 = 24$$

SECTION - II

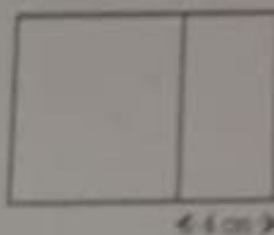
- Note :**
1. Answer **ALL** the following questions.
 2. Each question carries 4 marks.

7. Write the formula for Median of a grouped data and explain each term of it.

8. If $x^2 + y^2 = 10xy$, then prove that

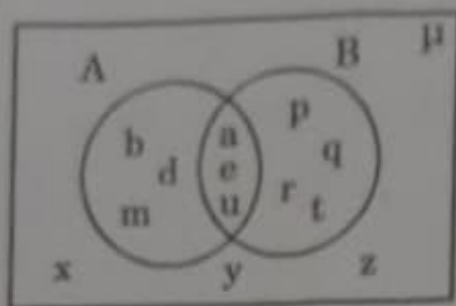
$$2 \log(x+y) = \log x + \log y + 2 \log 2 + \log 3.$$

9. A strip of width 4 cm is attached to one side of a square to form a rectangle. The area of the rectangle formed is 77 cm^2 , then find the length of the side of the square.



10. From the given Venn diagram show that

$$n(A \cup B) = n(A) + n(B) - n(A \cap B).$$



11. A box contains four slips numbered 1, 2, 3, 4 and another box contains five slips numbered 5, 6, 7, 8, 9. If one slip is taken randomly from each box,

- How many number pairs are possible?
- What is the probability of both being odd?
- What is the probability of getting the sum of the numbers 10?

12. Which term of the A.P. 21, 18, 15, is -81 ? Also find the term which becomes zero.

SECTION - III

$4 \times 6 = 24$

- Note :**
- Answer any 4 questions from the given six questions.
 - Each question carries 6 marks.

13. Draw the graph of the quadratic polynomial $p(x) = x^2 - 4x + 3$ and find the zeroes of the polynomial from the graph.

14. In an acute angled triangle ABC, if $\sin(A + B - C) = \frac{1}{2}$ and $\cos(B + C - A) = \frac{1}{2}$, then find $\angle A$, $\angle B$ and $\angle C$.

15. Find the mode for the following data.

Class interval	1000 - 1500	1500 - 2000	2000 - 2500	2500 - 3000	3000 - 3500	3500 - 4000	4000 - 4500	4500 - 5000
Frequency	24	40	33	28	30	22	16	7

16. If $A(-2, 2)$, $B(a, 6)$, $C(4, b)$ and $D(2, -2)$ are the vertices of a parallelogram ABCD, then find the values of a and b . Also find the lengths of its sides.

17. Construct triangle ABC with $BC = 7$ cm, $\angle B = 45^\circ$ and $\angle C = 60^\circ$. Then construct another triangle similar to ΔABC , whose sides are $\frac{3}{5}$ times of the corresponding sides of ΔABC .

18. Prove that $2\sqrt{3} + \sqrt{5}$ is an irrational number.
