

**General Instructions :**

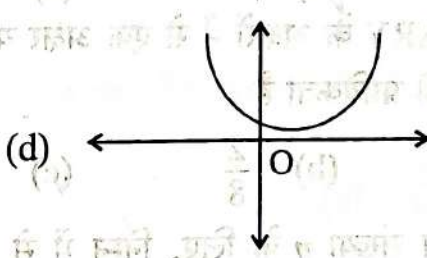
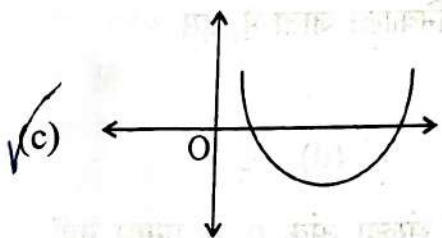
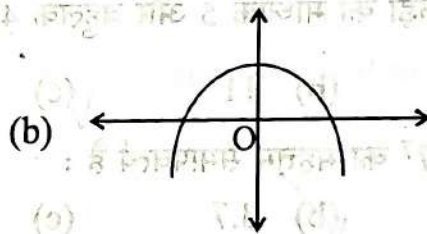
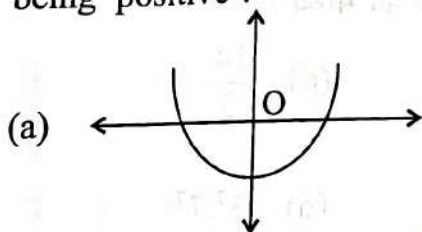
Read the following instructions very carefully and strictly follow them :

- (i) This question paper contains 38 questions. All questions are compulsory.
- (ii) This question paper is divided into FIVE sections – Section A, B, C, D and E.
- (iii) In Section A, question numbers 1 to 18 are multiple choice questions (MCQs) and question numbers 19 and 20 are Assertion – Reason based questions of 1 mark each.
- (iv) In Section B, question numbers 21 to 25 are very short answer (VSA) type questions, carrying 2 marks each.
- (v) In Section C, question numbers 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
- (vi) In Section D, question numbers 32 to 35 are long answer (LA) type questions, carrying 5 marks each.
- (vii) In Section E, question numbers 36 to 38 are case-based questions, carrying 4 marks each. Internal choice is provided in 2 marks question in each case study.
- (viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions of 2 marks in Section E.
- (ix) Draw neat diagrams wherever required. Take  $\pi = \frac{22}{7}$  wherever required, if not stated.
- (x) Use of calculator is **not allowed**.

**SECTION – A****20×1 = 20**

Question numbers 1 to 20 are multiple choice questions of 1 mark each.

1. Which of the following graphs represents a polynomial with both zeroes being positive ?



2. The system of equations  $x = 2$  and  $x = 3$  has :

- (a) unique solution (2, 3)      (b) two solutions (2, 0) and (3, 0)  
(c) no solution      (d) infinitely many solutions

3. If the numbers  $1-a$ ,  $3-a$  and  $5-a$  are in A.P., then the common difference is :

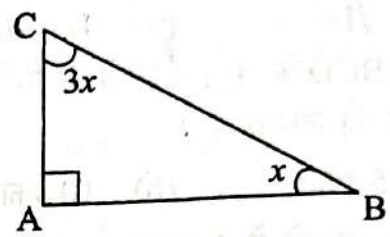
- (a)  $1-a$       (b)  $-2+a$       (c) 2      (d)  $2-a$



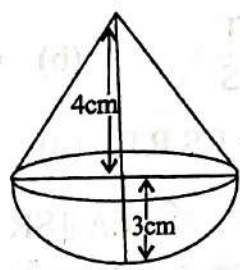
4. Which of the following statements is **not** true ? 1  
 (a)  $\sin 0^\circ = \cos 0^\circ$  (b)  $\tan 30^\circ = \cot 60^\circ$   
 (c)  $\sin 30^\circ = \cos 60^\circ$  (d)  $\sin 45^\circ = \frac{1}{\sec 45^\circ}$

5. If  $\tan \theta - \cot \theta = 0$ , then the value of  $\theta$  is : 1  
 (a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$

6. In the adjoining figure, the angle of elevation of the point C from the point B, is : 1  
 (a)  $30^\circ$   
 (b)  $45^\circ$   
 (c)  $22.5^\circ$   
 (d)  $67.5^\circ$



7. In the adjoining figure, the slant height of the conical part is : 1  
 (a) 4 cm  
 (b) 7 cm  
 (c) 5 cm  
 (d) 25 cm



8. 

Class	0-10	10-20	20-30	30-40	40-50
Frequency	3	5	7	9	11

- The upper limit of the median class of the above data is : 1  
 (a) 10 (b) 20 (c) 30 (d) 40

9. If for a data, median is 5 and mode is 4, then mean is equal to : 1  
 (a) 7 (b) 11 (c)  $\frac{11}{2}$  (d)  $\frac{14}{3}$

10. The HCF of  $3^{7.73}$  and  $3^{3.77}$  is : 1  
 (a) 1 (b) 3.7 (c)  $3^{3.73}$  (d)  $3^{7.77}$

11. A letter is selected from the letters of the word FEBRUARY. The probability that it is a vowel is : 1  
 (a)  $\frac{1}{8}$  (b)  $\frac{2}{8}$  (c)  $\frac{3}{8}$  (d)  $\frac{3}{7}$

12. Which of the following numbers will not end with 0 for any natural number  $n$  ? 1  
 (a)  $4n$  (b)  $4^n$  (c)  $3^n + 1$  (d)  $10^{n+1}$

13. The system of linear equations  $px + qy = r$  and  $p_1x + q_1y = r_1$  has a unique solution, if : 1  
 (a)  $pq \neq p_1q_1$  (b)  $pp_1 \neq qq_1$  (c)  $pq_1 \neq qp_1$  (d)  $pqr \neq p_1q_1r_1$





14. Which of the following equations is/are **not** quadratic ? 1

$$q_1 : (x-1)^2 = x^2, \quad q_2 : (x-1)^3 = x^3$$

$$q_3 : (x+1)^3 = 3x^2, \quad q_4 : (\sqrt{x}+1)^2 = 2\sqrt{x}$$

- (a)  $q_1, q_3$  and  $q_4$  (b)  $q_2$  and  $q_3$  (c)  $q_2, q_3$  and  $q_4$  (d)  $q_1$  and  $q_4$

15. The discriminant of the quadratic equation  $ax^2 + x + a = 0$  is : 1

(a)  $\sqrt{1-4a^2}$  (b)  $1-4a^2$  (c)  $4a^2-1$  (d)  $\sqrt{4a^2-1}$

16. The coordinates of opposite vertices of the square ABCD are A (-5, 0) and C(0, 5). The length of a diagonal of the square ABCD is : 1

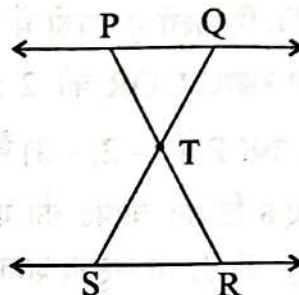
- (a) 5 units (b) 10 units (c)  $\sqrt{10}$  units (d)  $\sqrt{50}$  units

17. In the adjoining figure,  $\Delta PQT \sim \Delta RST$ . 1

Which of the following is true ?

(a)  $\frac{PQ}{ST} = \frac{QT}{RS}$  (b)  $QT \cdot RT = PT \cdot ST$

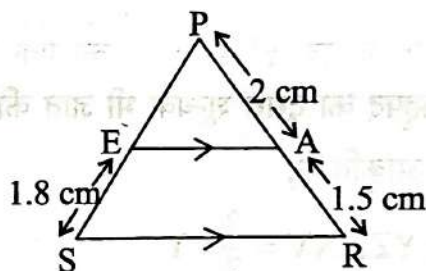
(c)  $PQ \cdot PT = RS \cdot RT$  (d)  $\frac{PQ}{PT} = \frac{RT}{RS}$



18. In the adjoining figure, if  $EA \parallel SR$  and 1

$PE = x$  cm, then the value of  $5x$  is :

- (a) 2.4 cm  
(b) 12 cm  
(c) 1.35 cm  
(d) 6.75 cm



**Directions :** Question numbers 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

- (a) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).  
(b) Both, Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).  
(c) Assertion (A) is true, but Reason (R) is false.  
(d) Assertion (A) is false, but Reason (R) is true.

19. **Assertion (A) :** From a bag containing 5 red balls, 2 white balls and 3 green balls, the probability of drawing a non-white ball is  $\frac{4}{5}$ .

**Reason (R) :** For any event E,  $P(E) + P(\text{not } E) = 1$  1



20. Assertion (A) :  $7 \times 2 + 3$  is a composite number.

Reason (R) : A composite number has more than two factors.

1

### SECTION - B

Question numbers 21 to 25 are very short answer type questions of 2 marks each.

✓ 21. A box consists of 60 wall clocks, out of which 40 are good, 15 have minor defects and the remaining are broken. A trader will reject the box, if the clock taken out from the box is broken. The trader randomly takes out one clock from the box. What is the probability that :

(i) the box will be rejected ?

(ii) the clock taken out of the box has minor defect ?

2

22. A point P divides a line segment OR in the ratio 2 : 1. If the coordinates of O are (0, 0) and that of P are (-2, -3), find the coordinates of R.

2

23. (A) One zero of a quadratic polynomial is twice the other. If the sum of zeroes is (-6), find the polynomial.

2

OR

(B) If one zero of the polynomial  $x^2 - 5x - c$  is (-1), find the value of c.

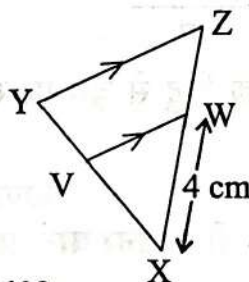
Also, find the other zero.

2

24. In the adjoining figure,

$$VW \parallel YZ, XV = \frac{3}{2} VY$$

and  $WX = 4$  cm. Find the length of XZ.



2

✓ 25. (A) Evaluate :  $\sin^2 30^\circ - \cos^2 45^\circ + \cot^2 60^\circ$

2

$\frac{7}{12}$

OR

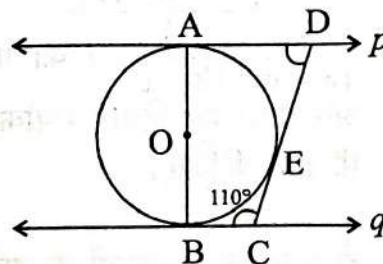
(B) If  $\sin(A + 2B) = 2 \cos 60^\circ$  and  $A = 3B$ , find the measures of A and B.

2

### SECTION - C

Question numbers 26 to 31 are short answer type questions of 3 marks each.

26. In the adjoining figure, AB is the diameter of the circle with centre O. Two tangents p and q are drawn to the circle at points A and B respectively. Prove that  $p \parallel q$ . Further, a line CD touches the circle at E and  $\angle BCD = 110^\circ$ . Find the measure of  $\angle ADC$ .



3





✓27. Given that  $\sqrt{3}$  is an irrational number, prove that  $2-5\sqrt{3}$  is also an irrational number. 3

✓28. (A) Solve the following system of equations graphically :

$$x+3y=6 \text{ and } 2x-3y=12$$

Also, find the area of the triangle formed by the lines  $x+3y=6$ ,  $x=0$  and  $y=0$ . 3

OR

(B) One of the supplementary angles exceeds the other by  $120^\circ$ . Express the given information as a system of linear equations in two variables. Hence, find the measure of both the angles. 3

✓29. If the point D ( $x, y$ ) is equidistant from the points E (0, 3) and F (3, 0), prove that  $x=y$ . Hence, find the  $x$  coordinate of the point D, if  $\triangle DEF$  is an equilateral triangle. 3

30. (A) Prove that :  $\frac{\sin A - \tan A}{\sin A + \tan A} = \frac{1 - \sec A}{1 + \sec A}$  3

OR

(B) If  $\sin x = p$ , then prove that :

$$(i) \cot x = \frac{\sqrt{1-p^2}}{p}$$

$$(ii) \frac{1 + \tan^2 x}{1 + \cot^2 x} = \frac{p^2}{1-p^2}$$

3

✓31. Prove that the lengths of tangents drawn from an external point to a circle are equal. 3

### SECTION - D

Question numbers 32 to 35 are long answer type questions of 5 marks each.

✓32. Find the **median** and the **mode** for the following data : 5

Class	Frequency
0-20	15
20-40	18
40-60	21
60-80	29
80-100	17

33. (A) Express  $\frac{24}{18-x} - \frac{24}{18+x} = 1$  as a quadratic equation in standard form and find the discriminant of the quadratic equation, so obtained. Also, find the roots of the equation. 5

OR

(B) The sum of squares of two positive numbers is 100. If one number exceeds the other by 2, find the numbers. 5

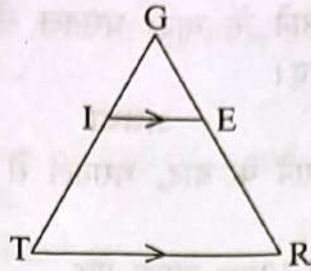




34. In the adjoining figure,

$$IE \parallel TR \text{ and } \frac{GI}{IT} = \frac{1}{2}.$$

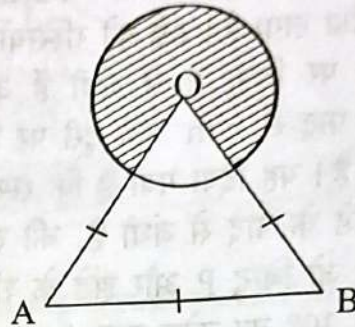
Find  $\frac{TR}{IE}$ .



5

35. (A) In the adjoining figure,  $\Delta OAB$  is an equilateral triangle and the area of the shaded region is  $750\pi \text{ cm}^2$ .

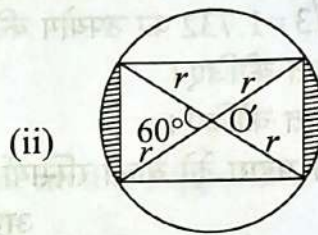
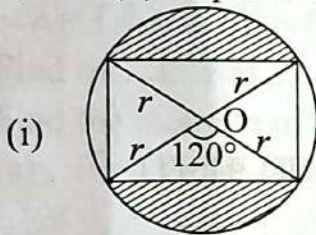
Find the perimeter of the shaded region.



5

OR

(B) O and O' are the centres of the circles of radius  $r$  as shown in figures (i) and (ii) respectively.



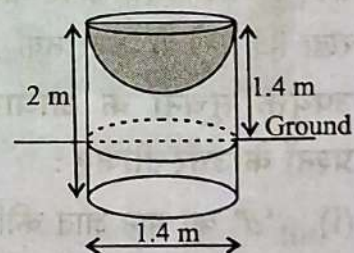
Find the ratio of area of shaded region in figure (i) to that of area of shaded region in figure (ii).

5

### SECTION - E

Question numbers 36 to 38 are case-based questions of 4 marks each.

36. As a part of school project, Mishika and Sahaj created a bird-bath from the cylindrical log of wood by scooping out the hemispherical depression from one end of the cylinder as shown in the figure given. Cylinder has a length 2 m out of which 0.6 m is in earth and the diameter is 1.4 m.



On the basis of the above information, answer the following questions :

- Write the radius of the hemispherical depression.
- Find the volume of water that can be filled in the hemispherical depression in terms of  $\pi$ .

1

1



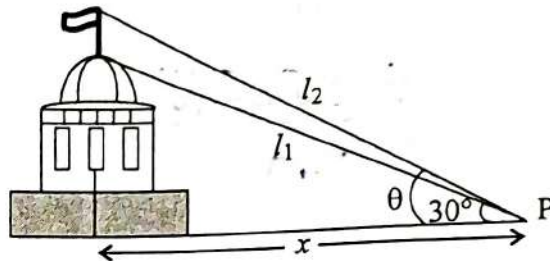


- (iii) (a) Find the total surface area of log of wood above the ground after making the bird-bath. 2

OR

- (iii) (b) Compute the volume of log of wood above the ground after making the bird-bath. 2

37. A flagstaff, 7.32 m long is fitted at the top of 10 m tall building. The flagstaff is supported by the ropes which are tied to the point P on the ground which is  $x$  m away from the base of the building. It is given that  $l_1$  is the length of rope from point P to the base of the flagstaff and  $l_2$  is the length of rope from point P to the top of flagstaff. Rope  $l_1$  makes an angle of  $30^\circ$  with the horizontal and  $\theta$  be the angle which rope  $l_2$  makes with the horizontal as shown in the figure.



Based on the above information, answer the following questions :  
(Use  $\sqrt{2} = 1.4$  and  $\sqrt{3} = 1.732$ )

- (i) Find the value of  $x$ . 1  
(ii) Find the measure of angle  $\theta$ . 1  
(iii) (a) Find the total length of ropes needed to support the flagstaff. 2

OR

- (iii) (b) Which rope is longer  $l_1$  or  $l_2$  and by how much ? 2

38. A watermelon vendor arranged the watermelons similar to shown in the adjoining picture :

The number of watermelons in subsequent rows differ by ' $d$ '. The bottommost row has 101 watermelons and the topmost row has 1 watermelon. There are 21 rows from bottom to top.



Based on the above information, answer the following questions :

- (i) Find the value of ' $d$ '. 1  
(ii) How many watermelons will be there in the 15th row from the bottom ? 1  
(iii) (a) Find the total number of watermelons from bottom to top. 2

OR

- (iii) (b) If the number of watermelons in the  $n$ th row from top is equal to number of watermelons in the  $n$ th row from bottom, find the value of  $n$ . 2