



### सामान्य निर्देश :

निम्नलिखित निर्देशों को बहुत सावधानी से पढ़िए और उनका पालन कीजिए :

1. इस प्रश्न-पत्र में 38 प्रश्न हैं। सभी प्रश्न अनिवार्य हैं।
2. प्रश्न-पत्र पाँच खण्डों में विभाजित है - खण्ड क, ख, ग, घ तथा ङ।
3. खण्ड क में प्रश्न संख्या 1 से 18 तक बहुविकल्पीय तथा प्रश्न संख्या 19 एवं 20 अभिकथन एवं कारण आधारित एक-एक अंक के प्रश्न हैं।
4. खण्ड ख में प्रश्न संख्या 21 से 25 तक अति लघु-उत्तरीय (VSA) प्रकार के दो-दो अंकों के प्रश्न हैं।
5. खण्ड ग में प्रश्न संख्या 26 से 31 तक लघु-उत्तरीय (SA) प्रकार के तीन-तीन अंकों के प्रश्न हैं।
6. खण्ड घ में प्रश्न संख्या 32 से 35 तक दीर्घ-उत्तरीय (LA) प्रकार के पाँच-पाँच अंकों के प्रश्न हैं।
7. खण्ड ङ में प्रश्न संख्या 36 से 38 स्रोत/प्रकरण इकाई आधारित चार-चार अंकों के प्रश्न हैं। आंतरिक विकल्प दो-दो अंकों के प्रश्न में दिया गया है।
8. प्रश्न-पत्र में समग्र विकल्प नहीं दिया गया है। यद्यपि, खण्ड ख के 2 प्रश्नों में, खण्ड ग के 2 प्रश्नों में, खण्ड घ के 2 प्रश्नों में तथा खण्ड ङ के 3 प्रश्नों में आंतरिक विकल्प का प्रावधान दिया गया है।
9. जहाँ आवश्यक हो स्वच्छ आकृतियाँ बनाएं। यदि आवश्यक हो तो  $\pi = 22/7$  लें।
10. कैलकुलेटर का उपयोग वर्जित है।

### खण्ड - क

खण्ड - क में बहुविकल्पीय प्रकार के प्रश्न हैं और प्रत्येक प्रश्न का 1 अंक है।

1.  $k$  का मान जिसके लिए समीकरण  $3x - y + 8 = 0$  और  $6x - ky + 16 = 0$  द्वारा निरूपित रेखाएँ संपाती हैं, है : 1  
 (a)  $\frac{1}{2}$  (b)  $-\frac{1}{2}$  (c) 2 (d) -2
2. त्रिज्या 5.2 सेमी. के एक वृत्त पर AB तथा CD दो समान्तर स्पर्श रेखाएँ हैं। इन स्पर्श रेखाओं के बीच की दूरी कितनी है ? 1  
 (a) 5.2 सेमी. (b) 10.4 सेमी.  
 (c) 20.8 सेमी. (d) दूरी नहीं निकाली जा सकती है
3. द्विघात बहुपदों, जिनके शून्यांक -3 और 4 हों, की संख्या है : 1  
 (a) 1 (b) 2 (c) 3 (d) 3 से अधिक
4. यदि एक वृत्त का परिमाप और क्षेत्रफल संख्यात्मक रूप से बराबर है, तो उस वृत्त की त्रिज्या है : 1  
 (a) 2 मात्रक (b)  $\pi$  मात्रक (c) 4 मात्रक (d)  $2\pi$  मात्रक
5. एक द्विघात समीकरण, जिसका एक मूल 2 और मूलों का योग शून्य है, है : 1  
 (a)  $x^2 + 4 = 0$  (b)  $x^2 - 2 = 0$  (c)  $4x^2 - 1 = 0$  (d)  $x^2 - 4 = 0$
6. निम्न में कौन, द्विघात समीकरण नहीं है ? 1  
 (a)  $2(x-1)^2 = 4x^2 - 2x + 1$  (b)  $2x - x^2 = x^2 + 5$   
 (c)  $(\sqrt{2}x + \sqrt{3})^2 + x^2 = 3x^2 - 5x$  (d)  $(x^2 + 2x)^2 = x^4 + 3 + 4x^3$



**General Instructions :****Read the following instructions carefully and follow them :**

1. This question paper contains **38** questions. *All* questions are compulsory.
2. Question paper is divided into **FIVE** sections - Section **A, B, C, D** and **E**.
3. In section **A**, question number **1** to **18** are multiple choice questions (MCQs) and question number **19** and **20** are Assertion - Reason based questions of 1 mark each.
4. In section **B**, question number **21** to **25** are very short answer (VSA) type questions of 2 marks each.
5. In section **C**, question number **26** to **31** are short answer (SA) type questions carrying 3 marks each.
6. In section **D**, question number **32** to **35** are long answer (LA) type questions carrying 5 marks each.
7. In section **E**, question number **36** to **38** are **case based integrated units** of assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case study.
8. 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 in Section **E**.
9. Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.
10. Use of calculators is **not allowed**.

**SECTION - A****Section - A consists of Multiple Choice type questions of 1 mark each.**

1. The value of  $k$  for which the equations  $3x - y + 8 = 0$  and  $6x - ky + 16 = 0$  represent coincident lines is : **1**  
 (a)  $\frac{1}{2}$  (b)  $-\frac{1}{2}$  (c) 2 (d) -2
2. A circle of radius 5.2 cm has two tangents AB and CD parallel to each other. What is the distance between the two tangents ? **1**  
 (a) 5.2 cm (b) 10.4 cm (c) 20.8 cm (d) can't find
3. The number of polynomials having zeroes - 3 and 4 is : **1**  
 (a) 1 (b) 2 (c) 3 (d) more than 3
4. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is : **1**  
 (a) 2 units (b)  $\pi$  units (c) 4 units (d)  $2\pi$  units
5. A quadratic equation whose one root is 2 and the sum of whose roots is zero, is : **1**  
 (a)  $x^2 + 4 = 0$  (b)  $x^2 - 2 = 0$  (c)  $4x^2 - 1 = 0$  (d)  $x^2 - 4 = 0$
6. Which of the following is **not** a quadratic equation ? **1**  
 (a)  $2(x-1)^2 = 4x^2 - 2x + 1$  (b)  $2x - x^2 = x^2 + 5$   
 (c)  $(\sqrt{2}x + \sqrt{3})^2 + x^2 = 3x^2 - 5x$  (d)  $(x^2 + 2x)^2 = x^4 + 3 + 4x^3$





7. How many tangents can be drawn to a circle from a point on it ? 1  
(a) One (b) Two (c) Infinite (d) Zero
8. Which of the following **cannot** be the probability of an event ? 1  
(a) 0.1 (b)  $\frac{5}{3}$  (c) 3% (d)  $\frac{1}{3}$
9. The angle of elevation of the top of a 30 m high tower at a point 30 m away from the base of the tower is : 1  
(a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$
10. The mode of the numbers 2, 3, 3, 4, 5, 4, 4, 5, 3, 4, 2, 6, 7 is : 1  
(a) 2 (b) 3 (c) 4 (d) 5
11. If the pair of linear equations  $x - y = 1$ ,  $x + ky = 5$  has a unique solution  $x = 2$ ,  $y = 1$ , then the value of  $k$  is : 1  
(a) -2 (b) -3 (c) 3 (d) 4
12. (HCF  $\times$  LCM) for the numbers 70 and 40 is : 1  
(a) 10 (b) 280 (c) 2800 (d) 70
13. The number  $(5 - 3\sqrt{5} + \sqrt{5})$  is : 1  
(a) an integer (b) a rational number  
(c) an irrational number (d) a whole number
14. If  $p(x) = x^2 + 5x + 6$ , then  $p(-2)$  is : 1  
(a) 20 (b) 0 (c) -8 (d) 8
15. If  $\triangle ABC \sim \triangle DEF$  and  $\angle A = 47^\circ$ ,  $\angle E = 83^\circ$ , then  $\angle C$  is equal : 1  
(a)  $47^\circ$  (b)  $50^\circ$  (c)  $83^\circ$  (d)  $130^\circ$
16. From a well-shuffled deck of 52 playing cards, a card is drawn at random. What is the probability of getting a red queen ? 1  
(a)  $\frac{1}{52}$  (b)  $\frac{1}{26}$  (c)  $\frac{1}{13}$  (d)  $\frac{12}{13}$
17. What is the length of arc of a circle of radius 7 cm which subtends an angle of  $90^\circ$  at the centre of the circle ? 1  
(a) 22 cm (b) 11 cm (c)  $\frac{77}{2}$  cm (d)  $\frac{11}{2}$  cm
18.  $(3 \sin^2 30^\circ - 4 \cos^2 60^\circ)$  is equal to : 1  
(a)  $\frac{5}{4}$  (b)  $-\frac{3}{4}$  (c)  $-\frac{1}{4}$  (d)  $-\frac{9}{4}$





**(Assertion - Reason type questions)**

In question numbers **19** and **20**, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option :

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) gives the correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true but Reason (R) does not give 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) :** A tangent to a circle is perpendicular to the radius through the point of contact.

**Reason (R) :** The lengths of tangents drawn from an external point to a circle are equal. 1

**20. Assertion (A) :** If one root of the quadratic equation  $4x^2 - 10x + (k - 4) = 0$  is reciprocal of the other, then value of k is 8.

**Reason (R) :** Roots of the quadratic equation  $x^2 - x + 1 = 0$  are real. 1

**SECTION - B**

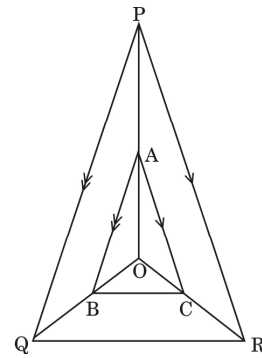
**Section - B comprises of Very Short Answer (VSA) questions of 2 marks each.**

**21. (A)** Find the discriminant of the quadratic equation  $3x^2 - 2x + \frac{1}{3} = 0$  and hence find the nature of its roots. 2

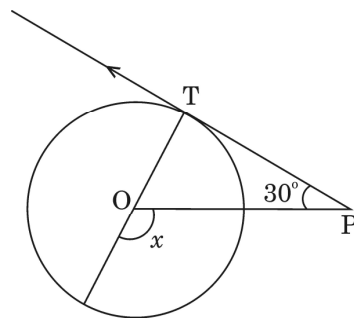
**OR**

**(B)** Find the roots of the quadratic equation  $x^2 - x - 2 = 0$ . 2

**22.** In the adjoining figure, A, B and C are points on OP, OQ and OR respectively such that  $AB \parallel PQ$  and  $AC \parallel PR$ . Show that  $BC \parallel QR$ . 2



**23.** In the adjoining figure, PT is a tangent at T to the circle with centre O. If  $\angle TPO = 30^\circ$ , find the value of x. 2



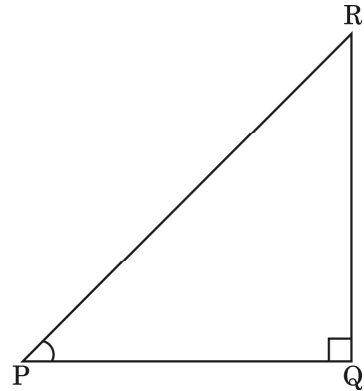


24. (A) Find the coordinates of the point which divides the join of A  $(-1, 7)$  and B  $(4, -3)$  in the ratio  $2 : 3$ . 2

**OR**

- (B) If the points A  $(2, 3)$ , B  $(-5, 6)$ , C  $(6, 7)$  and D  $(p, 4)$  are the vertices of a parallelogram ABCD, find the value of  $p$ . 2

25. In a right triangle PQR, right angled at Q. If  $\tan P = \sqrt{3}$ , then evaluate  $2 \sin P \cos P$ . 2



### SECTION - C

**Section - C comprises of Short Answer (SA) type questions of 3 marks each.**

26. Prove that  $\frac{1 + \sec \theta}{\sec \theta} = \frac{\sin^2 \theta}{1 - \cos \theta}$  3

27. An unbiased coin is tossed twice. Find the probability of getting : 3  
 (a) at least one head.  
 (b) exactly one tail.  
 (c) at most one head.

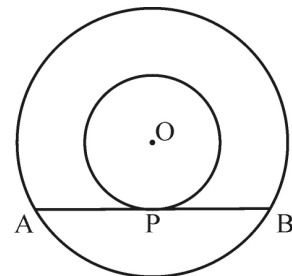
28. Find the zeroes of the quadratic polynomial  $x^2 + 6x + 8$  and verify the relationship between the zeroes and the coefficients. 3

29. Find the area of the sector of a circle of radius 7 cm and of central angle  $90^\circ$ . Also, find the area of corresponding major sector. 3

30. (A) Prove that the lengths of tangents drawn from an external point to a circle are equal. 3

**OR**

- (B) Two concentric circles with centre O are of radii 3 cm and 5 cm. Find the length of chord AB of the larger circle which touches the smaller circle at P. 3





31. (A) A lending library has a fixed charge for first three days and an additional charge for each day thereafter. Rittik paid ₹ 27 for a book kept for 7 days and Manmohan paid ₹ 21 for a book kept for 5 days. Find the fixed charges and the charge for each extra day. 3

**OR**

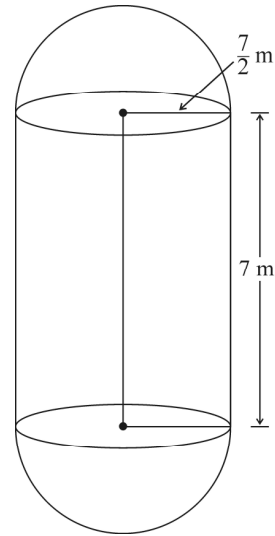
- (B) Find the values of 'a' and 'b' for which the system of linear equations  $3x + 4y = 12$ ,  $(a + b)x + 2(a - b)y = 24$  has infinite number of solutions. 3

### SECTION - D

**Section - D comprises of Long Answer (LA) type questions of 5 marks each.**

32. The boilers are used in thermal power plants to store water and then used to produce steam. One such boiler consists of a cylindrical part in middle and two hemispherical parts at its both ends. Length of the cylindrical part is 7m and radius of cylindrical part is  $\frac{7}{2}$  m.

Find the total surface area and the volume of the boiler. Also, find the ratio of the volume of cylindrical part to the volume of one hemispherical part.



5

33. The following table gives the monthly consumption of electricity of 100 families :

| Monthly Consumption (in units) | 130-140 | 140-150 | 150-160 | 160-170 | 170-180 | 180-190 | 190-200 |
|--------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Number of families             | 5       | 9       | 17      | 28      | 24      | 10      | 7       |

Find the median of the above data.

5

34. (A) The first term of an A.P. is  $-5$  and the last term is  $45$ . If the sum of all the terms of the A.P. is  $120$ , find the number of terms and the common difference. 5

**OR**

- (B) If the sum of first 7 terms of an A.P. is  $49$  and that of first 17 terms is  $289$ , find the sum of first  $n$  terms. 5





35. (A) As observed from the top of a 75 m high light house from the sea-level, the angles of depression of two ships are  $30^\circ$  and  $45^\circ$ . If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships. (use  $\sqrt{3} = 1.73$ )

5

OR

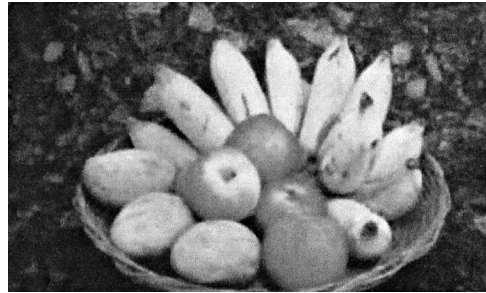
- (B) From a point P on the ground, the angle of elevation of the top of a 10 m tall building is  $30^\circ$ . A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is  $45^\circ$ . Find the length of the flagstaff and the distance of the building from the point P. (use  $\sqrt{3} = 1.73$ )

5

### SECTION - E

Section - E comprises of 3 Case Study / Passage Based questions of 4 marks each.

36. Khushi wants to organize her birthday party. Being health conscious, she decided to serve only fruits in her birthday party. She bought 36 apples and 60 bananas and decided to distribute fruits equally among all.



Based on the above information, answer the following questions :

- How many guests Khushi can invite at the most ?
- How many apples and bananas will each guest get ?
- (a) If Khushi decides to add 42 mangoes, how many guests Khushi can invite at the most ?

1

1

2

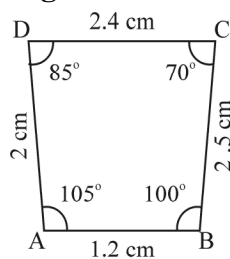
OR

- (b) If the cost of 1 dozen of bananas is ₹ 60, the cost of 1 apple is ₹ 15 and cost of 1 mango is ₹ 20, find the total amount spent on 60 bananas, 36 apples and 42 mangoes.

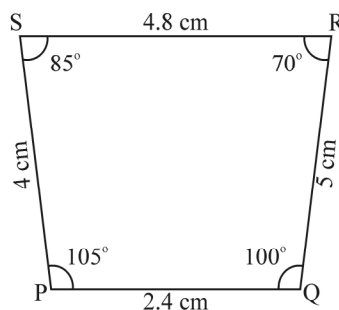
2

37. Observe the figures given below carefully and answer the questions :

Figure A



A (i)

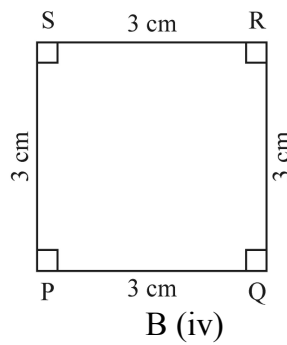
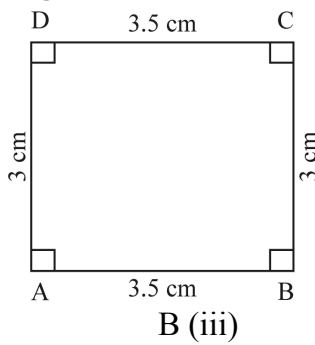


A (ii)

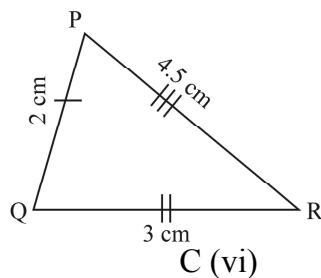
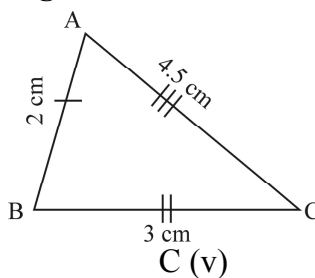




**Figure B**



**Figure C**

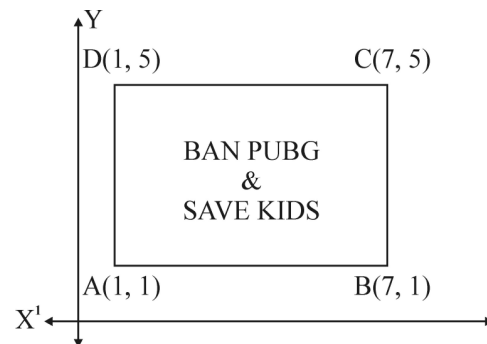


- (i) Name the figure(s) wherein two figures are similar. **1**
- (ii) Name the figure(s) wherein the figures are congruent. **1**
- (iii) (a) Prove that congruent triangles are also similar but not the converse. **2**

**OR**

- (b) What more is least needed for two similar triangles to be congruent ? **2**

- 38.** Use of mobile screen for long hours makes your eye sight weak and give you headaches. Children who are addicted to play “PUBG” can get easily stressed out. To raise social awareness about ill effects of playing PUBG, a school decided to start ‘BAN PUBG’ campaign, in which students are asked to prepare campaign board in the shape of a rectangle. One such campaign board made by class X student of the school is shown in the figure.



Based on the above information, answer the following questions :

- (i) Find the coordinates of the point of intersection of diagonals AC and BD. **1**
- (ii) Find the length of the diagonal AC. **1**
- (iii) (a) Find the area of the campaign Board ABCD. **2**

**OR**

- (b) Find the ratio of the length of side AB to the length of the diagonal AC. **2**



