

Series C4ABD/4

SET~1

रोल नं.	
Roll No.	
1	6

प्रश्न-पत्र कोड  
Q.P. Code 30/4/1

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

Candidates must write the Q.P. Code on the title page of the answer-book.

नोट / NOTE :

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।  
Please check that this question paper contains 23 printed pages.
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।  
Please check that this question paper contains 38 questions.
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।

Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।

Please write down the serial number of the question in the answer-book before attempting it.

- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।

15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

गणित (मानक)

MATHEMATICS (STANDARD)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

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P.T.O.



### 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 – **A, B, C, D** and **E**.
- (iii) In **Section A**, Questions no. **1** to **18** are multiple choice questions (MCQs) and questions number **19** and **20** are Assertion-Reason based questions of **1** mark each.
- (iv) In **Section B**, Questions no. **21** to **25** are very short answer (VSA) type questions, carrying **2** marks each.
- (v) In **Section C**, Questions no. **26** to **31** are short answer (SA) type questions, carrying **3** marks each.
- (vi) In **Section D**, Questions no. **32** to **35** are long answer (LA) type questions carrying **5** marks each.
- (vii) In **Section E**, Questions no. **36** to **38** are case study based questions carrying **4** marks each. Internal choice is provided in **2** marks questions 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 in Section E.
- (ix) Draw neat diagrams wherever required. Take  $\pi = \frac{22}{7}$  wherever required, if not stated.
- (x) Use of calculators is **not** allowed.

### SECTION A

This section comprises Multiple Choice Questions (MCQs) of 1 mark each.  $20 \times 1 = 20$

1. If  $ax + by = a^2 - b^2$  and  $bx + ay = 0$ , then the value of  $x + y$  is :  
(A)  $a^2 - b^2$  (B)  $a + b$   
(C)  $a - b$  (D)  $a^2 + b^2$
2. The HCF of two numbers 65 and 104 is 13. If LCM of 65 and 104 is  $40x$ , then the value of  $x$  is :  
(A) 5 (B) 13  
(C) 40 (D) 8

3. If a polynomial  $p(x)$  is given by  $p(x) = x^2 - 5x + 6$ , then the value of  $p(1) + p(4)$  is :
- (A) 0 (B) 4  
(C) 2 (D) -4
4. If the discriminant of the quadratic equation  $3x^2 - 2x + c = 0$  is 16, then the value of  $c$  is :
- (A) 1 (B) 0  
(C) -1 (D)  $\sqrt{2}$
5. If an arc subtends an angle of  $90^\circ$  at the centre of a circle, then the ratio of its length to the circumference of the circle is :
- (A) 2 : 3 (B) 1 : 4  
(C) 4 : 1 (D) 1 : 3
6. The area of the sector of a circle of radius 12 cm is  $60\pi$  cm<sup>2</sup>. The central angle of this sector is :
- (A)  $120^\circ$  (B)  $6^\circ$   
(C)  $75^\circ$  (D)  $150^\circ$
7. If the difference of mode and median of a data is 24, then the difference of its median and mean is :
- (A) 12 (B) 24  
(C) 8 (D) 36
8. Two dice are tossed simultaneously. The probability of getting odd numbers on both the dice is :
- (A)  $\frac{6}{36}$  (B)  $\frac{3}{36}$   
(C)  $\frac{12}{36}$  (D)  $\frac{9}{36}$
9. The ratio of total surface area of a solid hemisphere to the square of its radius is :
- (A)  $2\pi : 1$  (B)  $4\pi : 1$   
(C)  $3\pi : 1$  (D)  $1 : 4\pi$



10. If  $\sin \theta = 1$ , then the value of  $\frac{1}{2} \sin \left( \frac{\theta}{2} \right)$  is :

- ~~(A)~~  $\frac{1}{2\sqrt{2}}$  (B)  $\frac{1}{\sqrt{2}}$   
(C)  $\frac{1}{2}$  (D) 0

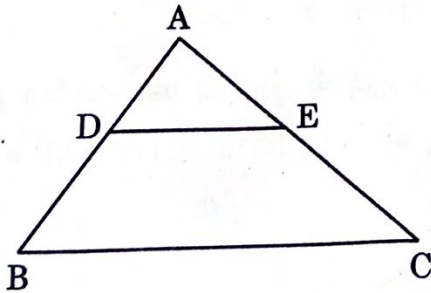
11. Two lines are given to be parallel. The equation of one of these lines is  $5x - 3y = 2$ . The equation of the second line can be :

- (A)  $-15x - 9y = 5$  (B)  $15x + 9y = 5$   
(C)  $9x - 15y = 6$  ~~(D)~~  $-15x + 9y = 5$

12. Three numbers in A.P. have the sum 30. What is its middle term ?

- (A) 4 ~~(B)~~ 10  
(C) 16 (D) 8

13. In  $\triangle ABC$ ,  $DE \parallel BC$  (as shown in the figure). If  $AD = 4$  cm,  $AB = 9$  cm and  $AC = 13.5$  cm, then the length of  $EC$  is :

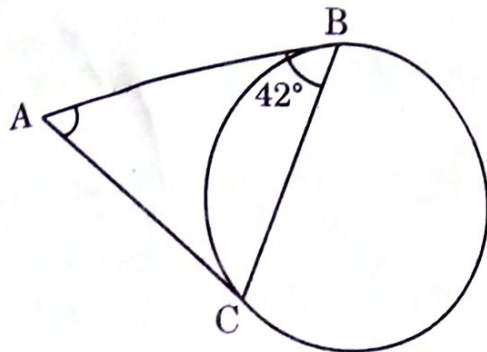


- (A) 6 cm ~~(B)~~ 7.5 cm  
(C) 9 cm (D) 5.7 cm

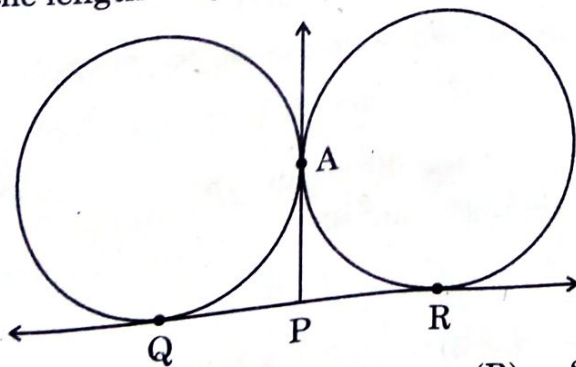
14. At some time of the day, the length of the shadow of a tower is equal to its height. Then, the Sun's altitude at that time is :

- (A)  $30^\circ$  ~~(B)~~  $45^\circ$   
(C)  $60^\circ$  (D)  $90^\circ$


15. In the given figure, AB and AC are tangents to the circle. If  $\angle ABC = 42^\circ$ , then the measure of  $\angle BAC$  is :



- (A)  $96^\circ$  (B)  $42^\circ$   
 (C)  $106^\circ$  (D)  $86^\circ$
16. The fourth vertex D of a parallelogram ABCD whose three vertices are  $A(-2, 3)$ ,  $B(6, 7)$  and  $C(8, 3)$  is :
- (A)  $(0, 1)$  (B)  $(0, -1)$   
 (C)  $(-1, 0)$  (D)  $(1, 0)$
17. For an event E, if  $P(E) + P(\bar{E}) = q$ , then the value of  $q^2 - 4$  is :
- (A)  $-3$  (B)  $3$   
 (C)  $5$  (D)  $-5$
18. In the given figure, QR is a common tangent to the two given circles touching externally at A. The tangent at A meets QR at P. If  $AP = 4.2$  cm, then the length of QR is :



- (A)  $4.2$  cm (B)  $2.1$  cm  
 (C)  $8.4$  cm (D)  $6.3$  cm



Questions number 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 the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the 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) : Mid-point of a line segment divides the line segment in the ratio 1 : 1.  
Reason (R) : The ratio in which the point (-3, k) divides the line segment joining the points (-5, 4) and (-2, 3) is 1 : 2.
20. Assertion (A) : If the circumference of a circle is 176 cm, then its radius is 28 cm.  
Reason (R) : Circumference =  $2\pi \times$  radius of a circle.

### SECTION B

This section comprises Very Short Answer (VSA) type questions of 2 marks each. 5×2=10

21. Three bells toll at intervals of 9, 12 and 15 minutes respectively. If they start tolling together, after what time will they next toll together ?
22. (a) The minute hand of a clock is 14 cm long. Find the area on the face of the clock described by the minute hand in 5 minutes:

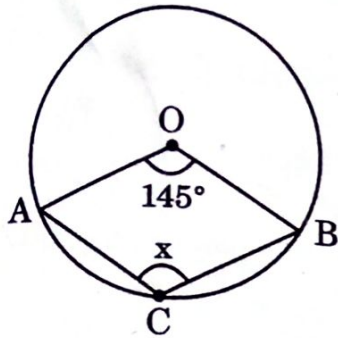
**OR**

- (b) Find the length of the arc of a circle which subtends an angle of  $60^\circ$  at the centre of the circle of radius 42 cm.
23. (a) Evaluate : 
$$\frac{5 \cos^2 60^\circ + 4 \sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \sin^2 60^\circ}$$

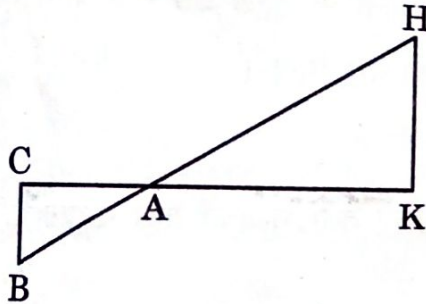
**OR**

- (b) If  $\sin (A - B) = \frac{1}{2}$ ,  $\cos (A + B) = \frac{1}{2}$ ;  $0 < A + B \leq 90^\circ$ ,  $A > B$ ; find  $\angle A$  and  $\angle B$ .

24. In the given figure, O is the centre of the circle. If  $\angle AOB = 145^\circ$ , then find the value of  $x$ .



25. In the given figure,  $\Delta AHK \sim \Delta ABC$ . If  $AK = 8$  cm,  $BC = 3.2$  cm and  $HK = 6.4$  cm, then find the length of  $AC$ .



### SECTION C

This section comprises Short Answer (SA) type questions of 3 marks each.  $6 \times 3 = 18$

26. Prove that  $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$
27. (a) Three coins are tossed simultaneously. What is the probability of getting
- at least one head?
  - exactly two tails?
  - at most one tail?

OR



- (b) A box contains 90 discs which are numbered 1 to 90. If one disc is drawn at random from the box, find the probability that it bears a :
- 2-digit number less than 40.
  - number divisible by 5 and greater than 50.
  - a perfect square number.

28. Rehana went to a bank to withdraw ₹ 2,000. She asked the cashier to give her ₹ 50 and ₹ 100 notes only. Rehana got 25 notes in all. Find how many notes of ₹ 50 and ₹ 100 did she receive.

29. (a) Find the zeroes of the polynomial  $4x^2 + 4x - 3$  and verify the relationship between zeroes and coefficients of the polynomial.

**OR**

(b) If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $x^2 + x - 2$ , then find the value of  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ .

30. Prove that  $\frac{2 - \sqrt{3}}{5}$  is an irrational number, given that  $\sqrt{3}$  is an irrational number.

31. Prove that the parallelogram circumscribing a circle is a rhombus.





### SECTION D

This section comprises Long Answer (LA) type questions of 5 marks each.  $4 \times 5 = 20$

32. Two pillars of equal lengths stand on either side of a road which is 100 m wide, exactly opposite to each other. At a point on the road between the pillars, the angles of elevation of the tops of the pillars are  $60^\circ$  and  $30^\circ$ . Find the length of each pillar and distance of the point on the road from the pillars. (Use  $\sqrt{3} = 1.732$ )

33. (a) E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that  $\Delta ABE \sim \Delta CFB$ .

**OR**

(b) Sides AB, BC and the median AD of  $\Delta ABC$  are respectively proportional to sides PQ, QR and the median PM of another  $\Delta PQR$ . Prove that  $\Delta ABC \sim \Delta PQR$ .

34. (a) A train travels a distance of 90 km at a constant speed. Had the speed been 15 km/h more, it would have taken 30 minutes less for the journey. Find the original speed of the train.

**OR**

(b) Find the value of 'c' for which the quadratic equation

$$(c + 1)x^2 - 6(c + 1)x + 3(c + 9) = 0; c \neq -1$$

has real and equal roots.

35. The following table shows the ages of the patients admitted in a hospital during a year :

Age (in years)	5 - 15	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65
Number of patients	6	11	21	23	14	5

Find the mode and mean of the data given above.



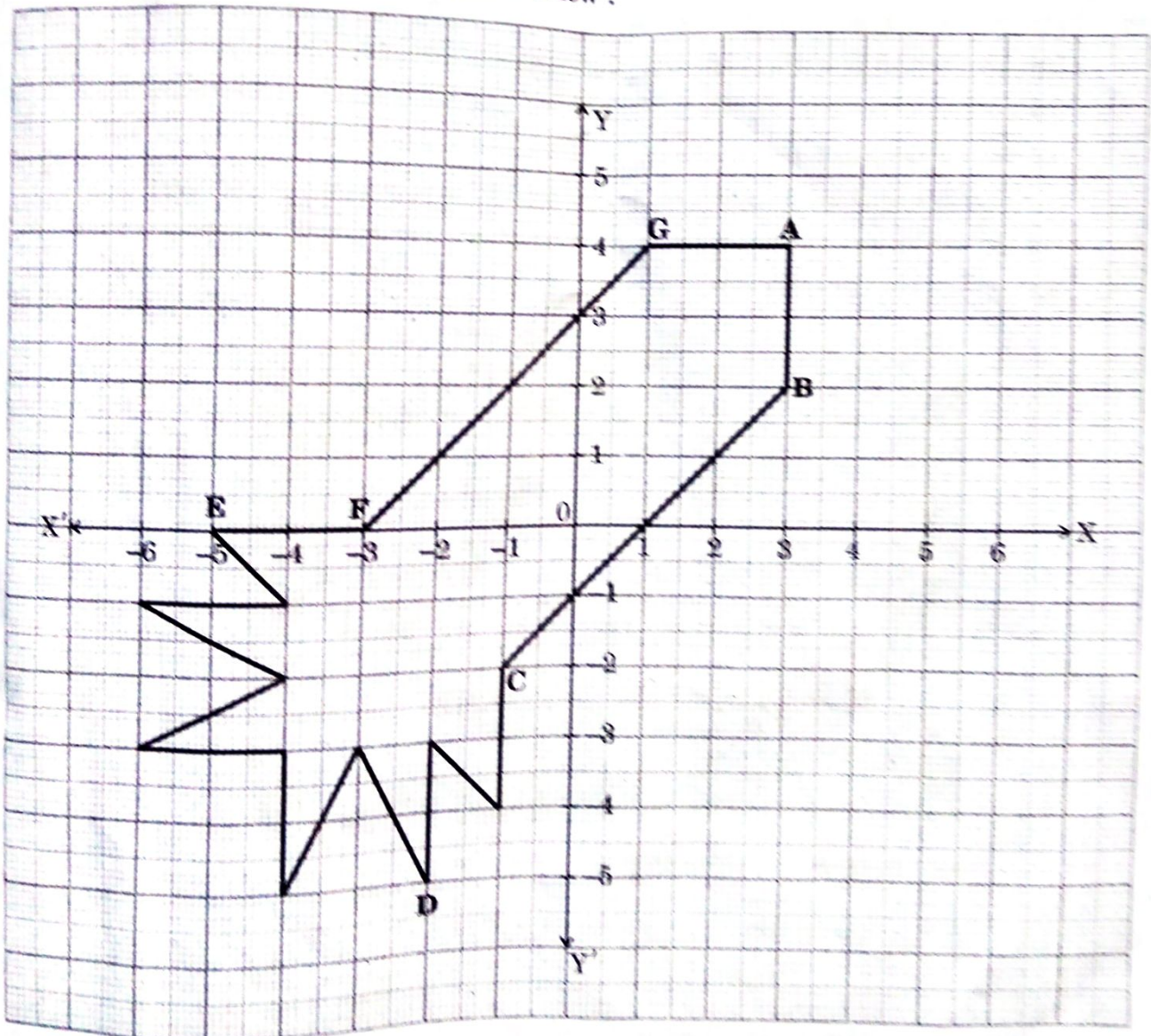
### SECTION E

This section comprises 3 case study based questions of 4 marks each.

3×4=12

#### Case Study - 1

36. Ryan, from a very young age, was fascinated by the twinkling of stars and the vastness of space. He always dreamt of becoming an astronaut one day. So he started to sketch his own rocket designs on the graph sheet. One such design is given below :



Based on the above, answer the following questions :

- (i) Find the mid-point of the segment joining F and G.

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- (ii) (a) What is the distance between the points A and C? 2

**OR**

- (b) Find the coordinates of the point which divides the line segment joining the points A and B in the ratio 1 : 3 internally. 2
- (iii) What are the coordinates of the point D? 1

### Case Study - 2

37. Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize.

While playing a treasure hunt game, some clues (numbers) are hidden in various spots collectively forming an A.P. If the number on the  $n^{\text{th}}$  spot is  $20 + 4n$ , then answer the following questions to help the players in spotting the clues :



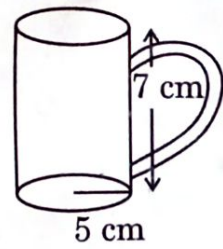
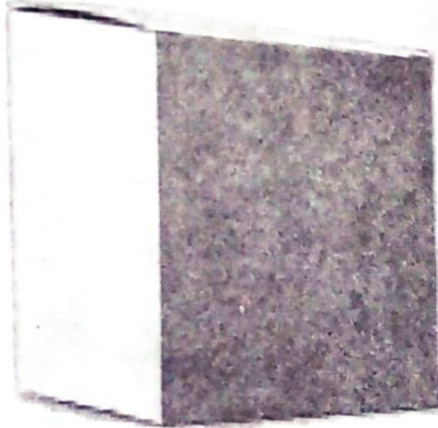
- (i) Which number is on first spot? 1
- (ii) (a) Which spot is numbered as 112? 2
- OR**
- (b) What is the sum of all the numbers on the first 10 spots? 2
- (iii) Which number is on the  $(n - 2)^{\text{th}}$  spot? 1



### Case Study - 3

38.

Tamper-proof tetra-packed milk guarantees both freshness and security. This milk ensures uncompromised quality, preserving the nutritional values within and making it a reliable choice for health-conscious individuals.



500 mL milk is packed in a cuboidal container of dimensions  $15\text{ cm} \times 8\text{ cm} \times 5\text{ cm}$ . These milk packets are then packed in cuboidal cartons of dimensions  $30\text{ cm} \times 32\text{ cm} \times 15\text{ cm}$ .

Based on the above given information, answer the following questions :

- (i) Find the volume of the cuboidal carton. 1
- (ii) (a) Find the total surface area of a milk packet. 2

**OR**

- (b) How many milk packets can be filled in a carton ? 2
- (iii) How much milk can the cup (as shown in the figure) hold ? 1

thank you so much sir ..

.aapke saare lectures delhe maine.

.subeh bhi join kiya tha maine aapka lecture

hoping for 75+ coz of u sir

