



Series WX1YZ/2



SET~3

रोल नं.

Roll No.

प्रश्न-पत्र कोड

Q.P. Code

430/2/3

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.

गणित (बुनियादी)

MATHEMATICS (BASIC)

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निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

नोट / NOTE :

- (i) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 27 हैं।  
Please check that this question paper contains 27 printed pages.
- (ii) 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.
- (iii) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।  
Please check that this question paper contains 38 questions.
- (iv) 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.
- (v) 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.



### 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.

1. If the HCF of 360 and 64 is 8, then their LCM is :  
(a) 2480 (b) 2780  
(c) 512 (d) 2880
  
2. The curved surface area of a cone of radius 7 cm is  $550 \text{ cm}^2$ . Its slant height is :  
(a) 24 cm (b) 25 cm  
(c) 14 cm (d) 20 cm



3. Two coins are tossed together. The probability of getting atmost two heads, is :

- (a)  $\frac{1}{2}$  (b)  $\frac{1}{4}$   
(c)  $\frac{3}{4}$  (d) 1

4. If the quadratic equation  $9x^2 + bx + \frac{1}{4} = 0$  has equal roots, then the value of b is :

- (a) 0 (b) -3 only  
(c) 3 only (d)  $\pm 3$

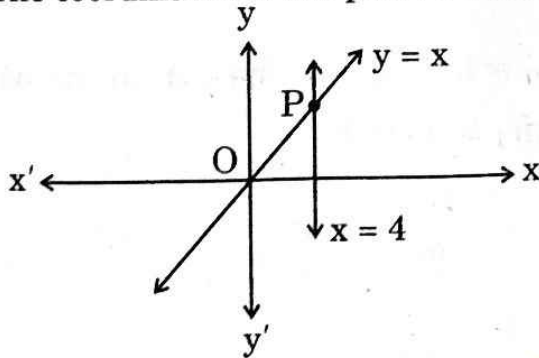
5. If  $\tan A = \frac{2}{5}$ , then the value of  $\frac{1 - \cos^2 A}{1 - \sin^2 A}$  is :

- (a)  $\frac{25}{4}$  (b)  $\frac{4}{25}$   
(c)  $\frac{4}{5}$  (d)  $\frac{5}{4}$

6. Median and Mode of a distribution are 25 and 21 respectively. Mean of the data using empirical relationship is :

- (a) 27 (b) 29  
(c) 18 (d)  $\frac{29}{3}$

7. The lines represented by the linear equations  $y = x$  and  $x = 4$  intersect at P. The coordinates of the point P are :



- (a) (4, 0) (b) (4, 4)  
(c) (0, 4) (d) (-4, 4)



8. The value of  $\frac{\sin 90^\circ + \cos 60^\circ}{\sec 45^\circ + \tan 45^\circ}$  is :

(a) 1

(b)  $\frac{3}{2}(\sqrt{2} + 1)$

(c)  $\frac{3}{2}(\sqrt{2} - 1)$

(d)  $\frac{1 + \sqrt{3}}{\sqrt{2} + 1}$

9. How many terms are there in the A.P. given below ?

14, 19, 24, 29, ....., 119

(a) 18

(b) 14

(c) 22

(d) 21

10. y-axis divides the line segment joining the points  $(-6, 2)$  and  $(2, -6)$  in the ratio :

(a) 1 : 3

(b) 3 : 2

(c) 3 : 1

(d) 2 : 3

11.  $9 \sec^2 A - 9 \tan^2 A$  is equal to :

(a) 9

(b) 0

(c) 8

(d)  $\frac{1}{9}$

12. The string of a kite in air is 50 m long and it makes an angle of  $60^\circ$  with the horizontal. Assuming the string to be straight, the height of the kite from the ground is :

(a)  $50\sqrt{3}$  m

(b)  $\frac{100}{\sqrt{3}}$  m

(c)  $\frac{50}{\sqrt{3}}$  m

(d)  $25\sqrt{3}$  m



13. The area of a sector of angle  $\alpha$  (in degrees) of a circle with radius  $R$  is :

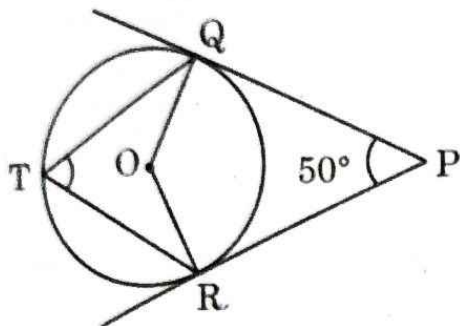
(a)  $\frac{\alpha}{180} \times 2\pi R$

(b)  $\frac{\alpha}{360} \times 2\pi R$

(c)  $\frac{\alpha}{180} \times \pi R^2$

(d)  $\frac{\alpha}{360} \times \pi R^2$

14. From a point  $P$ , two tangents  $PQ$  and  $PR$  are drawn to a circle with centre at  $O$ .  $T$  is a point on the major arc  $QR$  of the circle. If  $\angle QPR = 50^\circ$ , then  $\angle QTR$  equals :



(a)  $50^\circ$

(b)  $130^\circ$

(c)  $65^\circ$

(d)  $90^\circ$

15. The pair of linear equations  $x + 2y - 5 = 0$  and  $2x - 4y + 6 = 0$  :

(a) is inconsistent

(b) is consistent with many solutions

(c) is consistent with a unique solution

(d) is consistent with two solutions

16. Which of the following numbers **cannot** be the probability of an event ?

(a) 0.5

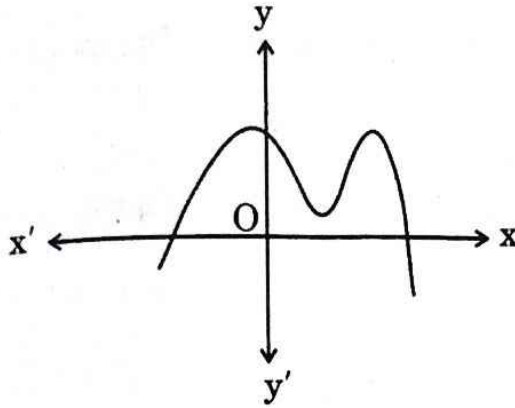
(b) 5%

(c)  $\frac{1}{0.5}$

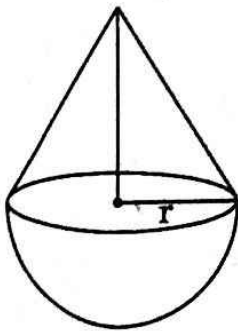
(d)  $\frac{0.5}{14}$



17. Graph of a polynomial  $p(x)$  is given in the figure. The number of zeroes of  $p(x)$  is :



- (a) 2 (b) 3  
(c) 4 (d) 5
18. A solid is of the form of a cone of radius ' $r$ ' surmounted on a hemisphere of the same radius. If the height of the cone is the same as the diameter of its base, then the volume of the solid is :



- (a)  $\pi r^3$  (b)  $\frac{4}{3}\pi r^3$   
(c)  $3\pi r^3$  (d)  $\frac{2}{3}\pi r^3$





Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. 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) : The probability of getting a prime number, when a die is thrown once, is  $\frac{2}{3}$ .

Reason (R) : On the faces of a die, prime numbers are 2, 3, 5.

9

20. Assertion (A) : Polynomial  $x^2 + 4x$  has two real zeroes.

Reason (R) : Zeroes of the polynomial  $x^2 + ax$  ( $a \neq 0$ ) are 0 and  $a$ .

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### SECTION B

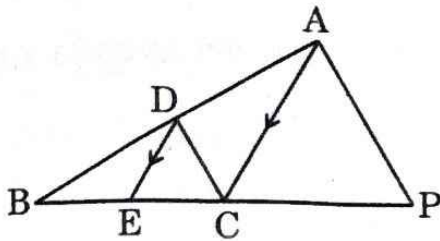
This section comprises very short answer (VSA) type questions of 2 marks each.

21. If  $(-3)$  is one of the zeroes of the polynomial  $(k - 1)x^2 + kx + 1$ , find the value of  $k$ .



22. A box contains 90 discs, numbered from 1 to 90. If one disc is drawn at random, then find the probability that it bears a multiple of 15.

23. In the given figure,  $DE \parallel AC$  and  $\frac{BE}{EC} = \frac{BC}{CP}$ . Prove that  $DC \parallel AP$ .



24. (a) Find the HCF of the numbers 540 and 630, using prime factorization method.

**OR**

(b) Show that  $(15)^n$  cannot end with the digit 0 for any natural number 'n'.

25. (a) Find the value(s) of 'x' so that  $PQ = QR$ , where the coordinates of P, Q and R are (6, -1), (1, 3) and (x, 8) respectively.

**OR**

(b) The vertices of a triangle are (-2, 0), (2, 3) and (1, -3). Is the triangle equilateral, isosceles or scalene?







## SECTION C

*This section comprises short answer (SA) type questions of 3 marks each.*

26. Show that the points A(-3, 2), B(-5, -5), C(2, -3) and D(4, 4) are vertices of a rhombus ABCD. Is it also a square ?

27. Find the zeroes of the polynomial  $p(x) = 2x^2 - 7x - 15$  and verify the relationship between its coefficients and zeroes.

28. (a) Prove that :

$$\frac{1 - \cos \theta}{1 + \cos \theta} = (\operatorname{cosec} \theta - \cot \theta)^2$$

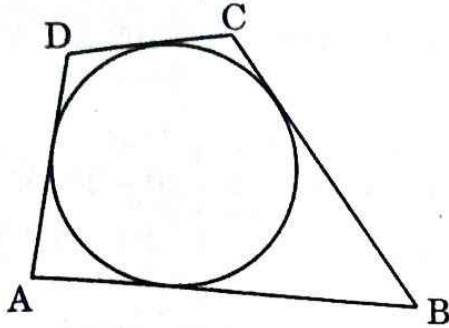
**OR**

(b) Prove that :

$$\left(1 + \frac{1}{\tan^2 A}\right) \left(1 + \frac{1}{\cot^2 A}\right) = \frac{1}{\sin^2 A - \sin^4 A}$$



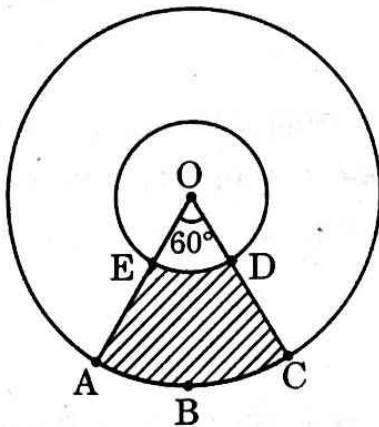
29. (a) A quadrilateral ABCD is drawn to circumscribe a circle, as shown in the figure. Prove that  $AB + CD = AD + BC$ .



OR

- (b) Prove that the parallelogram circumscribing a circle is a rhombus.

30. In the given figure, two concentric circles with centre O are shown. Radii of the circles are 2 cm and 5 cm respectively. Find the area of the shaded region.



31. Prove that  $10 + 2\sqrt{3}$  is an irrational number, given that  $\sqrt{3}$  is an irrational number.





## SECTION D

This section comprises long answer (LA) type questions of 5 marks each.

32. Find the mean and the median of the marks of 100 students of a class, given in the following table :

Marks	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30
Number of students	4	11	13	15	31	26

33. (a) The sum of the first 8 terms of an A.P. is 100 and the sum of its first 19 terms is 551. Find the sum of its first 'n' terms.

**OR**

- (b) If the sum of the first p terms of an A.P. is the same as the sum of its first q terms, ( $p \neq q$ ), then show that the sum of its first (p + q) terms is zero.

34. (a) From the top of a building 60 m high, the angles of depression of the top and bottom of a tower are observed to be  $30^\circ$  and  $60^\circ$  respectively. Find the height of the tower. Also, find the distance between the building and the tower. (Use  $\sqrt{3} = 1.732$ )

**OR**

- (b) The angle of elevation of the top of a building from a point A on the ground is  $30^\circ$ . On moving a distance of 30 m towards its base to the point B, the angle of elevation changes to  $45^\circ$ . Find the height of the building and the distance of its base from point A. (Use  $\sqrt{3} = 1.732$ )

35. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.



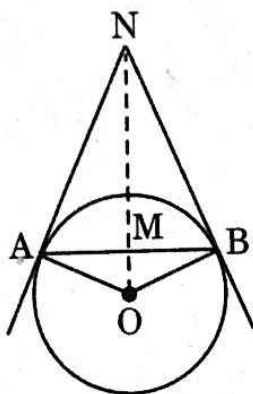


## SECTION E

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

### Case Study - 1

36. Circles play an important part in our life. When a circular object is hung on the wall with a cord at nail N, the cords NA and NB work like tangents. Observe the figure, given that  $\angle ANO = 30^\circ$  and  $OA = 5$  cm.



Based on the above, answer the following questions :

- (i) Find the distance AN. 1
- (ii) Find the measure of  $\angle AOB$ . 1
- (iii) (a) Find the total length of cords NA, NB and the chord AB. 2

**OR**

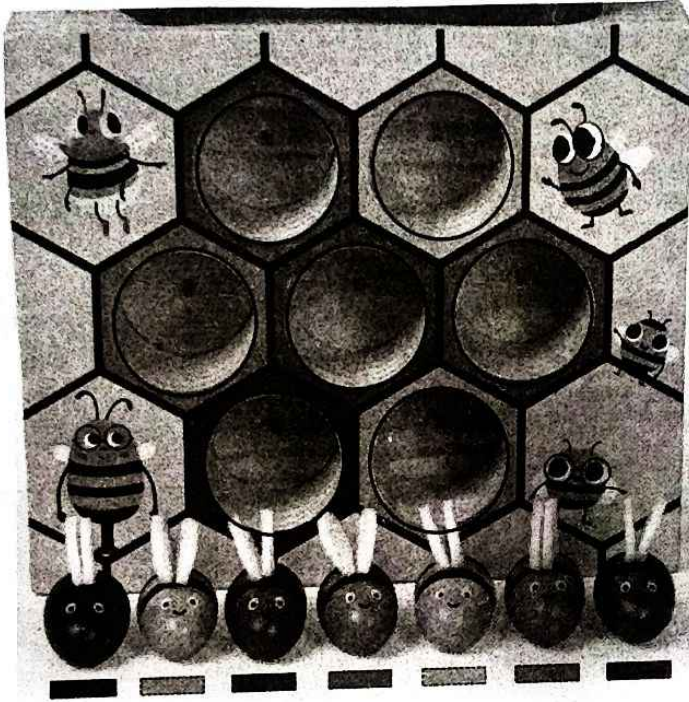
- (iii) (b) If  $\angle ANO$  is  $45^\circ$ , then name the type of quadrilateral OANB.  
Justify your answer. 2





### Case Study - 2

37. A wooden toy is shown in the picture. This is a cuboidal wooden block of dimensions  $14\text{ cm} \times 17\text{ cm} \times 4\text{ cm}$ . On its top there are seven cylindrical hollows for bees to fit in. Each cylindrical hollow is of height  $3\text{ cm}$  and radius  $2\text{ cm}$ .



Based on the above, answer the following questions :

- (i) Find the volume of wood carved out to make one cylindrical hollow. 1
- (ii) Find the lateral surface area of the cuboid to paint it with green colour. 1
- (iii) (a) Find the volume of wood in the remaining cuboid after carving out seven cylindrical hollows. 2

**OR**

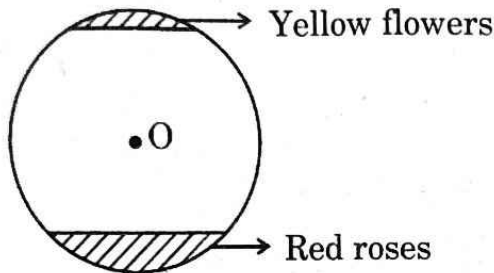
- (iii) (b) Find the surface area of the top surface of the cuboid to be painted yellow. 2





### Case Study - 3

38. Flower beds look beautiful growing in gardens. One such circular park of radius 'r' m, has two segments with flowers. One segment which subtends an angle of  $90^\circ$  at the centre is full of red roses, while the other segment with central angle  $60^\circ$  is full of yellow coloured flowers. [See figure]



It is given that the combined area of the two segments (of flowers) is  $256\frac{2}{3}$  sq m.

Based on the above, answer the following questions :

- (i) Write an equation representing the total area of the two segments in terms of 'r'. 1
- (ii) Find the value of 'r'. 1
- (iii) (a) Find the area of the segment with red roses. 2
- OR**
- (iii) (b) Find the area of the segment with yellow flowers. 2

