

Series : **4MNKL**



SET ~ 1



रोल नं.



प्रश्न-पत्र कोड
Q.P. Code **430/4/1**

Roll No.

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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 :

- (I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं।
Please check that this question paper contains **23** 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 यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।
Please write down the Serial Number of the question in the answer-book at the given place 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 परीक्षार्थी 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 candidates will read the question paper only and will not write any answer on the answer-book during this period. **{ }**

गणित (बुनियादी)

MATHEMATICS (BASIC)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

430/4/1

1158-1

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P.T.O.



General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) *This question paper contains total **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 number **1** to **18** are Multiple Choice Questions (MCQs) and questions number **19** & **20** are Assertion-Reason based questions of **1** mark each.*
- (iv) *In **Section–B**, questions number **21** to **25** are Very Short Answer (VSA) type questions of **2** marks each.*
- (v) *In **Section–C**, questions number **26** to **31** are Short Answer (SA) type questions carrying **3** marks each.*
- (vi) *In **Section–D**, questions number **32** to **35** are Long Answer (LA) type questions carrying **5** marks each.*
- (vii) *In **Section–E**, questions number **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 calculator is **NOT** allowed.*

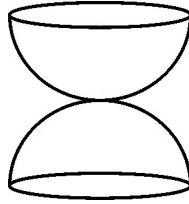


खण्ड – क
(बहुविकल्पीय प्रश्न)

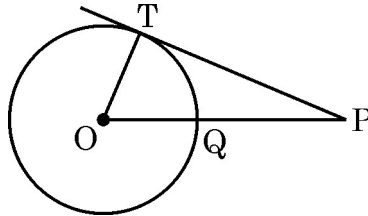
20 × 1 = 20

प्रश्न संख्या 1 से 20 तक बहुविकल्पीय प्रश्न हैं। प्रत्येक प्रश्न 1 अंक का है।

1. HCF (850, 325) = 25 दिया है। LCM (850, 325) है
 (A) 442 (B) 11050
 (C) 8450 (D) 2210
2. यदि समीकरण $2kx^2 - 6x + 3 = 0$ के मूल वास्तविक तथा समान हैं, तो k का मान है :
 (A) $\frac{3}{2}$ (B) $\frac{1}{2}$
 (C) $-\frac{3}{2}$ (D) 2
3. समान त्रिज्या r वाले लकड़ी के दो ठोस अर्धगोले चित्र में दर्शाये अनुसार एक बिंदु से जोड़े गये हैं। इस वस्तु का कुल पृष्ठीय क्षेत्रफल है :



- (A) $4\pi r^2$ (B) $6\pi r^2$
 (C) $3\pi r^2$ (D) $5\pi r^2$
4. PT एक वृत्त जिसका केन्द्र O तथा त्रिज्या 5 cm है, पर खींची गयी एक स्पर्शरिखा है। OP वृत्त को बिंदु Q पर काटती है। यदि $PQ = x$ है, तो PT^2 बराबर है :



- (A) $x^2 + 5x$ (B) $x^2 + 10x + 50$
 (C) $x^2 + 10x$ (D) $x^2 - 25$



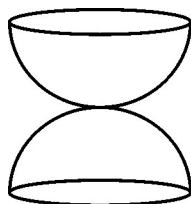
Section – A

20 × 1 = 20

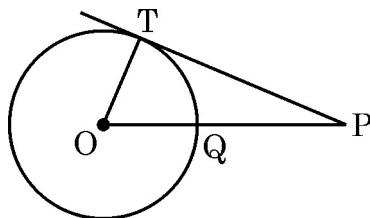
(Multiple Choice Questions)

Q. No. 1 to 20 are multiple choice questions of 1 mark each.

1. If HCF (850, 325) is 25, then LCM (850, 325) is :
(A) 442 (B) 11050
(C) 8450 (D) 2210
2. The value of k for which the equation $2kx^2 - 6x + 3 = 0$ has real and equal roots, is :
(A) $\frac{3}{2}$ (B) $\frac{1}{2}$
(C) $-\frac{3}{2}$ (D) 2
3. Two wooden solid hemispheres of same radii r , are joined at a point, as shown in the figure. The total surface area of the object is :



- (A) $4\pi r^2$ (B) $6\pi r^2$
(C) $3\pi r^2$ (D) $5\pi r^2$
4. PT is tangent to the circle with centre O and radius 5 cm. OP intersects the circle at Q. If $PQ = x$, then PT^2 equals :



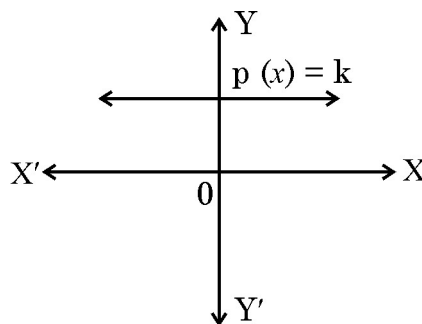
- (A) $x^2 + 5x$ (B) $x^2 + 10x + 50$
(C) $x^2 + 10x$ (D) $x^2 - 25$



5. Probability of getting an irrational number at random from the numbers $\sqrt{3}, \sqrt{4}, 3\sqrt{9}, 3\sqrt{8}, \sqrt{5}, 0, 4^{\frac{3}{2}}$ is :

(A) 0 (B) $\frac{4}{7}$
(C) $\frac{3}{7}$ (D) 1

6. The graph of polynomial $p(x) = k$ is shown here. Number of zeroes of polynomial $p(x)$ is :



- (A) 0 (B) 1
(C) 2 (D) infinitely many
7. The sum of first n terms of an A.P. is $50\sqrt{2}$. If the first and the last terms are $\sqrt{2}$ and $19\sqrt{2}$ respectively, then the value of n is :
- (A) 10 (B) 5
(C) 15 (D) 20

8. While calculating mean of a grouped frequency distribution using step deviation method $\left(u = \frac{x - a}{h}\right)$ it was found that $\bar{x} = 62$, $a = 47.5$, $h = 5$. The

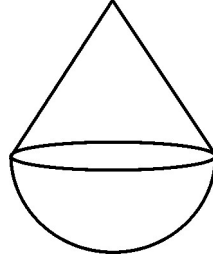
value of $\bar{u}$ is :

- (A) 3 (B) 14.5
(C) 2.9 (D) 3.1
9. A card is drawn from a well shuffled deck of 52 cards. The probability of getting an ace or a ten is :

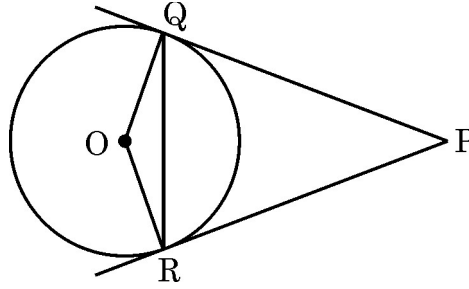
(A) $\frac{1}{13}$ (B) $\frac{2}{13}$
(C) $\frac{1}{26}$ (D) $\frac{4}{13}$



10. बिंदुओं $(-4, 2)$ तथा $(1, 0)$ के बीच की दूरी है :
 (A) $\sqrt{13}$ इकाइयाँ (B) 3 इकाइयाँ
 (C) 9 इकाइयाँ (D) $\sqrt{29}$ इकाइयाँ
11. त्रिज्या 6 cm तथा तिर्यक ऊँचाई 10 cm वाला शंकु, समान त्रिज्या वाले अर्धगोले पर अध्यारोपित है। खिलौने की ऊँचाई है :



- (A) 12 cm (B) 16 cm
 (C) 14 cm (D) 10 cm
12. दी गयी आकृति में, PQ तथा PR केन्द्र O वाले वृत्त पर खींची गयी दो स्पर्श-रेखाएँ हैं। यदि $\angle ORQ = 25^\circ$ हो, तो $\angle PQR$ की माप है :



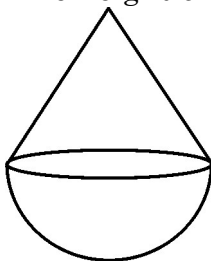
- (A) 65° (B) 25°
 (C) 50° (D) 75°
13. $\sin 90^\circ \cos 90^\circ - \sin^2 60^\circ$ का मान है :
 (A) $\frac{1}{4}$ (B) $\frac{3}{4}$
 (C) $-\frac{3}{4}$ (D) $\frac{5}{4}$

14. समांतर श्रेणी $\frac{-3}{2}, \frac{3}{2}, \frac{9}{2}, \dots$ का n वाँ पद है :

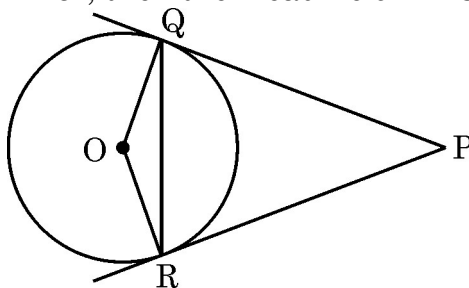
- (A) $\frac{3n}{2} - 3$ (B) $3n - \frac{9}{2}$
 (C) $\frac{3n - 9}{2}$ (D) $3n + \frac{3}{2}$



10. The distance between the points $(-4, 2)$ and $(1, 0)$ is :
(A) $\sqrt{13}$ units (B) 3 units
(C) 9 units (D) $\sqrt{29}$ units
11. A cone with slant height 10 cm and radius 6 cm is surmounted on a hemisphere of same radius. The height of the toy is :



- (A) 12 cm (B) 16 cm
(C) 14 cm (D) 10 cm
12. In the given figure, PQ and PR are two tangents drawn to a circle with centre O. If $\angle ORQ = 25^\circ$, then the measure of $\angle PQR$ is :



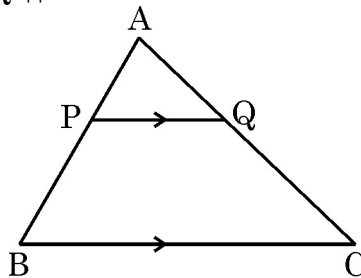
- (A) 65° (B) 25°
(C) 50° (D) 75°
13. The value of $\sin 90^\circ \cos 90^\circ - \sin^2 60^\circ$ is :
(A) $\frac{1}{4}$ (B) $\frac{3}{4}$
(C) $-\frac{3}{4}$ (D) $\frac{5}{4}$

14. n^{th} term of the A.P. $-\frac{3}{2}, \frac{3}{2}, \frac{9}{2}, \dots$ is :

- (A) $\frac{3n}{2} - 3$ (B) $3n - \frac{9}{2}$
(C) $\frac{3n - 9}{2}$ (D) $3n + \frac{3}{2}$



15. In the given figure, $PQ \parallel BC$. If $AP : AB = 3 : 7$ then, $AQ : QC$ equals :



- (A) $3 : 7$ (B) $3 : 10$
(C) $7 : 3$ (D) $3 : 4$
16. If $\sin \theta = \frac{1}{7}$, then $\tan \theta$ is :
(A) $\frac{1}{4\sqrt{3}}$ (B) $\frac{1}{2\sqrt{3}}$
(C) $\frac{4\sqrt{3}}{7}$ (D) $\frac{6}{7}$
17. $7 \times 29 \times 23 + 1$ is :
(A) a prime number. (B) divisible by 23.
(C) an odd number. (D) a composite number.
18. Chord AB subtends an angle of 40° at the centre of the circle of radius 9 cm. The length of arc AB is :
(A) $\frac{22}{7}$ cm (B) $\frac{198}{7}$ cm
(C) $\frac{44}{7}$ cm (D) $\frac{54}{7}$ cm

(Assertion – Reason based questions)

Directions : In questions number **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) is correct explanation of Assertion (A).
(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not correct explanation for 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 an event can not be $\frac{1}{0.9}$.

Reason (R) : $0 \leq P(E) \leq 1$ for an event E.



20. **Assertion (A)** : 4^n can not end with the digit zero.

Reason (R) : Prime factorisation of 4^n is unique.

Section – B

(Very Short Answer Type Questions)

$5 \times 2 = 10$

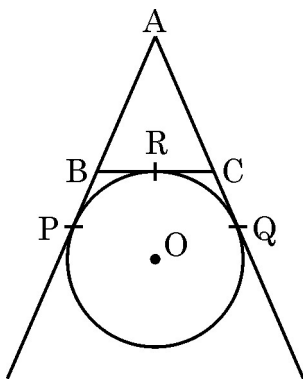
Q. Nos. 21 to 25 are Very Short Answer type questions of 2 marks each.

21. If $\sin (A - B) = \frac{1}{2}$ and $\tan (A + B) = \sqrt{3}$, $0^\circ \leq A + B < 90^\circ$, $A > B$ then find the values of A and B.

22. (a) If α, β are the zeroes of polynomial $p(x) = 6x^2 - 5x - 3$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.

OR

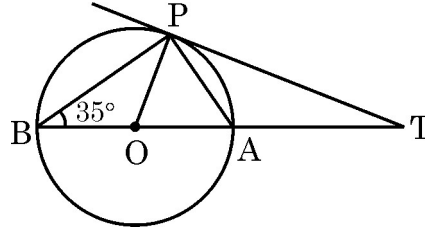
- (b) One zero of the polynomial $4x^2 - 12x + (2k + 1)$ is five times the other. Find the value of k.
23. A $(-2, 3)$ and B $(4, 1)$ are end points of the diameter of a semi-circle. The semi-circle intersects y-axis at point P. Find the co-ordinates of the point P.
24. (a) In the given figure, AP, AQ and BC are tangents to the circle with centre O. If $AB = 6$ cm, $AC = 7$ cm and $BC = 5$ cm, then what is the length of AP ?



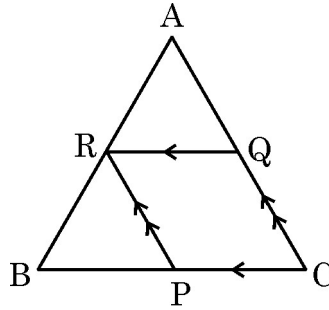
OR



- (b) दी गयी आकृति में, TP केन्द्र O वाले वृत्त की स्पर्श-रेखा है। व्यास BA, बढ़ाने पर स्पर्श-रेखा को बिंदु T पर काटता है। यदि $\angle ABP = 35^\circ$ है, तो $\angle PTA$ का माप ज्ञात कीजिए।



25. दी गयी आकृति में, $QR \parallel CB$ है तथा $RP \parallel AC$ है। यदि $BR = 10$ cm, $QA = 12$ cm, $BP = 12$ cm तथा $PC = 18$ cm है, तो AR तथा QC की लम्बाइयाँ ज्ञात कीजिए।



खण्ड - ग

(लघु-उत्तरीय प्रश्न)

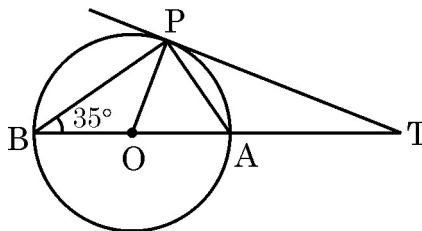
6 × 3 = 18

प्रश्न संख्या 26 से 31 तक लघु-उत्तरीय प्रकार के प्रश्न हैं तथा प्रत्येक प्रश्न के 3 अंक हैं।

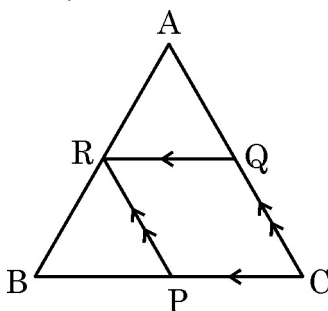
26. सिद्ध कीजिए कि किसी वृत्त के परिगत समांतरचतुर्भुज एक समचतुर्भुज होता है।
27. त्रिज्या 14 cm वाले वृत्त की एक जीवा केन्द्र पर एक समकोण अंतरित करती है। संगत (i) लघु वृत्तखंड तथा (ii) दीर्घ वृत्तखंड का क्षेत्रफल ज्ञात कीजिए।
28. (a) सिद्ध कीजिए : $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\sec A - \tan A}{\sec A + \tan A}$
अथवा
(b) सिद्ध कीजिए : $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$
29. सिद्ध कीजिए कि $\sqrt{5}$ एक अपरिमेय संख्या है।



- (b) In the given figure, TP is tangent to a circle with centre O. Diameter BA when produced meets the tangent at T. If $\angle ABP = 35^\circ$, then find the measure of $\angle PTA$.



25. In the given figure, $QR \parallel CB$ and $RP \parallel AC$. If $BR = 10$ cm, $QA = 12$ cm, $BP = 12$ cm and $PC = 18$ cm, then find the lengths of AR and QC .



Section – C

(Short Answer Type Questions)

$6 \times 3 = 18$

Q. Nos. 26 to 31 are Short Answer type questions of 3 marks each.

26. Prove that a parallelogram circumscribing a circle, is a rhombus.
27. A chord of a circle of radius 14 cm subtends a right angle at the centre. Find the area of the corresponding (i) minor segment (ii) major segment.
28. (a) Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\sec A - \tan A}{\sec A + \tan A}$
- OR**
- (b) Prove that $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$
29. Prove that $\sqrt{5}$ is an irrational number.



30. Two dice are rolled together. Find the probability that :
- the sum of the numbers obtained is 10.
 - the product of the numbers obtained is 6.
31. (a) The vertices of a rhombus ABCD are A(- 3, - 4), B(5, - 3), C(1, 4) and D(- 7, 3). Find the length of both the diagonals. Hence, find area of the rhombus ABCD.

OR

- (b) The line segment joining the points A (- 5, 1) and B (7, 6) is trisected at the points P and Q such that P is nearer to A. If P lies on the line $x + y = k$, then find the value of k.

Section – D

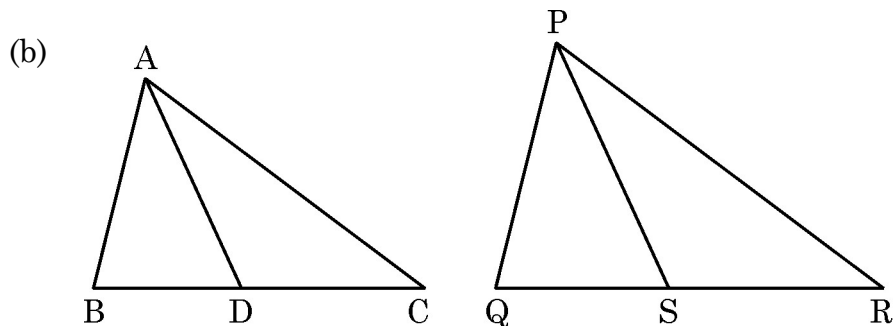
(Long Answer Type Questions)

4 × 5 = 20

Q. Nos. 32 to 35 are Long Answer type questions of 5 marks each.

32. The third and ninth term of an A.P. are 4 and - 8 respectively.
- Which term of the A.P. is zero ?
 - Find the value of n if $S_n = - 36$.
33. (a) 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.

OR



AD and PS are respectively, the medians of $\triangle ABC$ and $\triangle PQR$. If $\triangle ABC \sim \triangle PQR$, then prove that

- $\triangle ADC \sim \triangle PSR$
- $\frac{AD}{PS} = \frac{BC}{QR}$



34. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . If the tower is 60 m high, find the height of the building and distance between the building and the tower. (Use $\sqrt{3} = 1.73$)
35. (a) The difference between two numbers is 12. The greater number is 6 less than twice the smaller one.
- (i) Representing the above situation, frame two linear equations in two variables.
 - (ii) Show that the equations have unique solution.
 - (iii) Solve the equations and hence find the numbers.

OR

- (b) Solve the following equations graphically :

$$x + y = 7 \text{ and } 2x - 5y = 7$$

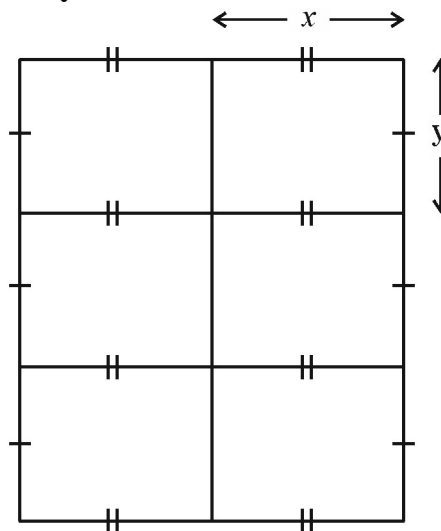
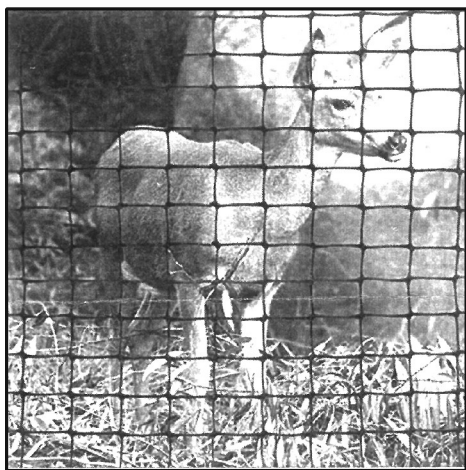
Section – E

(Case-study based Questions)

$$3 \times 4 = 12$$

Q. Nos. 36 to 38 are Case-study based Questions of 4 marks each.

36.



Observe the figure given above. It shows six identical rectangular enclosures made by using fencing wire mesh. These enclosures are used to protect baby animals in a zoo. Dimensions of each enclosure is x feet $\times$ y feet. The total length of fencing required is 152 feet and area of each enclosure is 80 square feet.



Based on the above, answer the following questions :

- (i) Write an expression for length of fencing required in terms of x and y . 1
- (ii) Write the area of each enclosure in terms of x . 1
- (iii) (a) Write the above equation in quadratic equation form and thus find the dimensions of each enclosure using factorisation method. 2

OR

- (b) Using above equation in quadratic form, solve the equation and find the dimensions of each enclosure using quadratic formula. 2

37.

**CENTRAL POLLUTION CONTROL BOARD'S
AIR QUALITY STANDARDS**

AIR QUALITY INDEX (AQI)	CATEGORY
0-50	Good
51-100	Satisfactory
101-200	Moderate
201-300	Poor
301-400	Very Poor
401-500	Severe

The Air Quality Index (AQI) is a scale from 0 to 500 that indicates air quality, with higher numbers signifying more pollution and greater health concerns.

Mansi collected the daily data of AQI of her city for a month and presented it as given below :

AQI Range : 1 – 100 101 – 200 201 – 300 301 – 400 401 – 500

Number of Days : 3 9 12 4 2

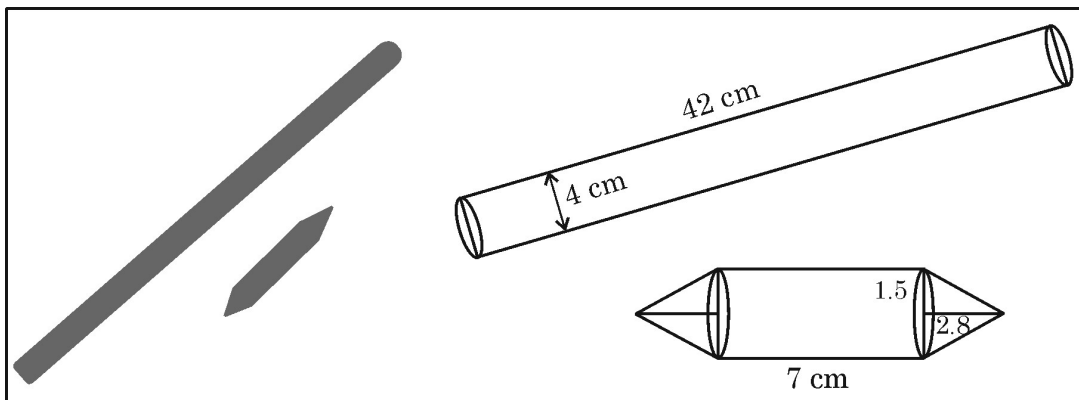
- (i) Convert the data to continuous frequency distribution. 1
- (ii) What is the quality of air in most of the days of the month ? 1
- (iii) (a) Using table formed in part (i), find mode of the data. 2

OR

- (b) Using table formed in part (i), find median of the data. 2



38. 'Gilli Danda' is a very popular traditional game of India which is played with two wooden sticks – the larger one is called 'Danda' and smaller one 'Gilli'.



'Danda' – It is cylindrical in shape with diameter 4 cm and length 42 cm.

Gilli – It is cylindrical in middle with identical conical ends of same radius 1.5 cm and length 2.8 cm. The length of cylindrical part is 7 cm.

Based on the above, answer the following questions :

- | | | |
|-----------|--|---|
| (i) | Find the volume of wood used in making both the conical parts of Gilli. | 1 |
| (ii) | Find the volume of wood used in making cylindrical part of Gilli. | 1 |
| (iii) (a) | A cylindrical log of wood of radius 1.5 cm and length 14 cm is used to make Gilli. Find the volume of the wood scrapped. | 2 |

OR

- | | | |
|-----|---|---|
| (b) | Find the total surface area of 'Danda'. | 2 |
|-----|---|---|

