

Series : **5LMKN**



SET ~ 2



रोल नं.



प्रश्न-पत्र कोड **30/5/2**
Q.P. Code

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 (मानक)

MATHEMATICS (Standard)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80



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 number **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 number **21** to **25** are Very Short Answer (VSA) type questions, carrying **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 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.*



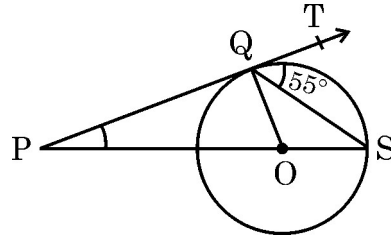
खण्ड – क

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

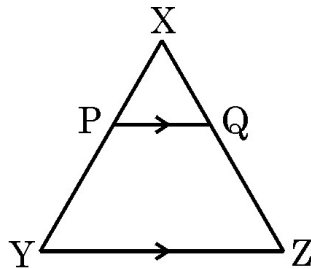
1. समरूपता की कसौटी SAS का प्रयोग करते हुए देवांश ने सिद्ध किया कि $\triangle ABC \sim \triangle PQR$ है। यदि $\angle C = \angle R$ है, तो निम्न में से कौन सा कथन सही पाया गया ?

- (A) $\frac{AC}{AB} = \frac{PR}{PQ}$ (B) $\frac{BC}{AC} = \frac{PR}{QR}$
(C) $\frac{AC}{BC} = \frac{PR}{PQ}$ (D) $\frac{AC}{BC} = \frac{PR}{QR}$

2. दी गयी आकृति में, केन्द्र O वाले वृत्त पर खींची गयी स्पर्श रेखा PQ है। बिन्दु S वृत्त पर इस प्रकार स्थित है कि $\angle SQT = 55^\circ$ है। $\angle QPS$ की माप है



- (A) 55° (B) 20°
(C) 35° (D) 70°
3. एक A.P. में यदि $a_{14} - a_8 = 24$ है, तो A.P. का सार्व अन्तर है
(A) 6 (B) 4
(C) ± 4 (D) 3
4. द्विघात समीकरण $x^2 - px + 6 = 0$ के मूल परिमेय हैं। p का निम्न में से कौन सा मान है ?
(A) 1 (B) -5
(C) 25 (D) $\sqrt{5}$
5. दी गयी आकृति में, $PQ \parallel YZ$ तथा $XP : PY = 2 : 3$ है। यदि $PQ = 5$ cm है, तो YZ बराबर है



- (A) 12.5 cm (B) 10 cm
(C) 15 cm (D) 7.5 cm



SECTION – A

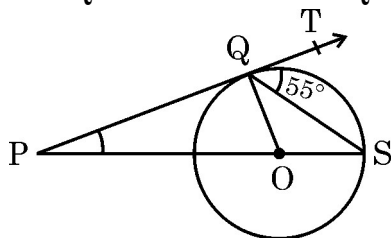
Q. Number 1 to 20 are multiple choice questions of 1 mark each.

1. Devansh proved that $\triangle ABC \sim \triangle PQR$ using SAS similarity criteria. If he found $\angle C = \angle R$, then which of the following was proved true ?

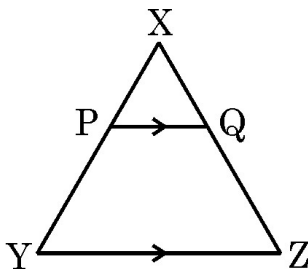
- (A) $\frac{AC}{AB} = \frac{PR}{PQ}$ (B) $\frac{BC}{AC} = \frac{PR}{QR}$
(C) $\frac{AC}{BC} = \frac{PR}{PQ}$ (D) $\frac{AC}{BC} = \frac{PR}{QR}$

2. In the given figure, PQ is tangent to the circle with centre O. S is a point on the circle such that $\angle SQT = 55^\circ$. The $m\angle QPS$ is

1



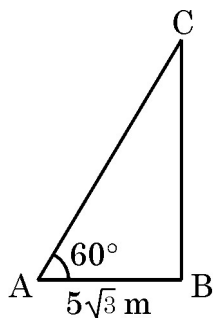
- (A) 55° (B) 20°
(C) 35° (D) 70°
3. In an A.P., if $a_{14} - a_8 = 24$, then the common difference of the A.P. is
- (A) 6 (B) 4
(C) ± 4 (D) 3
4. The value of p for which roots of the quadratic equation $x^2 - px + 6 = 0$ are rational, is
- (A) 1 (B) -5
(C) 25 (D) $\sqrt{5}$
5. In the given figure, $PQ \parallel YZ$ such that $XP : PY = 2 : 3$. If $PQ = 5$ cm, then YZ equals



- (A) 12.5 cm (B) 10 cm
(C) 15 cm (D) 7.5 cm



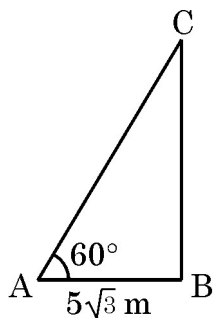
6. न्यून कोण θ के लिये यदि $\cos \theta = \frac{1}{8}$ है, तो $\frac{8 \sec \theta + 1}{8 \sec \theta - 1}$ बराबर है
- (A) $\frac{64}{63}$ (B) 0
- (C) $\frac{65}{63}$ (D) 1
7. ताश की 52 पत्तों की अच्छे प्रकार से फेंटी गयी गड्डी में से एक पत्ता यादृच्छया निकाला जाता है। निकाले गये पत्ते के दस या बादशाह होने की प्रायिकता है
- (A) $\frac{1}{26}$ (B) $\frac{2}{13}$
- (C) $\frac{1}{13}$ (D) $\frac{8}{26}$
8. बिंदुओं P(-4, -2) तथा Q(10, 4) को जोड़ने वाले रेखाखंड को y-अक्ष निम्न अनुपात में विभाजित करती है
- (A) 2 : 5 (B) 1 : 2
- (C) 2 : 1 (D) 5 : 2
9. $\frac{\sec A}{\sqrt{\sec^2 A - 1}}$ का सरलतम रूप है
- (A) $\sin A$ (B) $\tan A$
- (C) $\operatorname{cosec} A$ (D) $\cos A$
10. भूमि पर एक बिन्दु A से एक खम्भे BC के शिखर 60° का उन्नयन कोण बनाते हुए एक तार बाँधा गया है। यदि $AB = 5\sqrt{3}$ m है, तो तार की लम्बाई है



- (A) 10 m (B) $10\sqrt{3}$ m
- (C) 15 m (D) $\frac{5}{2}\sqrt{3}$ m



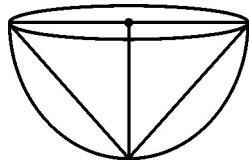
6. For an acute angle θ , if $\cos \theta = \frac{1}{8}$, then $\frac{8 \sec \theta + 1}{8 \sec \theta - 1}$ equals
- (A) $\frac{64}{63}$ (B) 0
(C) $\frac{65}{63}$ (D) 1
7. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability that it is either a ten or a king is
- (A) $\frac{1}{26}$ (B) $\frac{2}{13}$
(C) $\frac{1}{13}$ (D) $\frac{8}{26}$
8. The line segment joining the points P(-4, -2) and Q(10, 4) is divided by y-axis in the ratio
- (A) 2 : 5 (B) 1 : 2
(C) 2 : 1 (D) 5 : 2
9. Simplest form of $\frac{\sec A}{\sqrt{\sec^2 A - 1}}$ is
- (A) $\sin A$ (B) $\tan A$
(C) $\operatorname{cosec} A$ (D) $\cos A$
10. A wire is attached from a point A on the ground to the top of a pole BC, making an angle of elevation as 60° . If $AB = 5\sqrt{3}$ m, then length of the wire is



- (A) 10 m (B) $10\sqrt{3}$ m
(C) 15 m (D) $\frac{5}{2}\sqrt{3}$ m



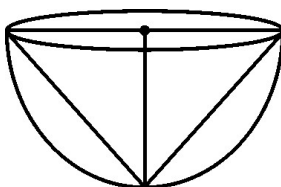
11. यदि किसी बहुपद के शून्यकों का योग तथा गुणनफल क्रमशः (-3) तथा (-2) है, तो वह बहुपद है
 (A) $x^2 - 3x - 2$ (B) $-x^2 - 3x + 2$
 (C) $-x^2 + 3x - 2$ (D) $x^2 + 3x + 2$
12. मीना ने हिसाब लगाया कि लॉटरी में उसके प्रथम पुरस्कार जीतने की प्रायिकता 0.08 है। यदि कुल 800 टिकट बिके हों, तो मीना द्वारा खरीदे गये टिकटों की संख्या है
 (A) 64 (B) 640
 (C) 100 (D) 10
13. 10 cm त्रिज्या वाले, लकड़ी से बने एक ठोस अर्धगोले में से अधिकतम आयतन का एक शंकु काटकर निकाला जाता है। प्राप्त शंकु का वक्र पृष्ठीय क्षेत्रफल है : ($\pi = 3.14$ लीजिए)



- (A) $314\sqrt{2} \text{ cm}^2$ (B) 314 cm^2
 (C) $\frac{3140}{3} \text{ cm}^2$ (D) $3140\sqrt{2} \text{ cm}^2$
14. एक वर्गीकृत बारम्बारता सारणी का माध्य ज्ञात करते हुए पग विचलन विधि का प्रयोग किया गया।
 $\left(\frac{x-a}{h} = u\right)$ यदि प्राप्त $\bar{x} = 64$, $h = 5$ तथा $a = 62.5$ है तो u का मान है :
 (A) 0.5 (B) 1.5
 (C) 0.3 (D) 7.5
15. 10 cm त्रिज्या वाले वृत्त के एक त्रिज्यखंड का क्षेत्रफल $\frac{55}{3} \text{ cm}^2$ है। केन्द्रीय कोण की माप है
 (A) $\frac{21^\circ}{2}$ (B) 42°
 (C) 105° (D) 21°
16. एक तंबू अर्धगोले के आकार का है। इसकी त्रिज्या 1.4 m है तथा इसमें दरवाजे के लिए 0.50 m^2 क्षेत्रफल वाली खुली जगह दी है। तंबू का बाहरी पृष्ठीय क्षेत्रफल है
 (A) 11.78 m^2 (B) 12.32 m^2
 (C) 11.82 m^2 (D) 12.86 m^2



11. If sum and product of zeroes of a polynomial are (-3) and (-2) respectively, then a polynomial is
(A) $x^2 - 3x - 2$ (B) $-x^2 - 3x + 2$
(C) $-x^2 + 3x - 2$ (D) $x^2 + 3x + 2$
12. Meena calculates that the probability of her winning the first prize in a lottery is 0.08. If total 800 tickets were sold, the number of tickets bought by her, is
(A) 64 (B) 640
(C) 100 (D) 10
13. A conical cavity of maximum volume is carved out from a wooden solid hemisphere of radius 10 cm. Curved surface area of the cavity carved out is (use $\pi = 3.14$)



- (A) $314\sqrt{2} \text{ cm}^2$ (B) 314 cm^2
(C) $\frac{3140}{3} \text{ cm}^2$ (D) $3140\sqrt{2} \text{ cm}^2$
14. While calculating mean of a grouped frequency distribution, step deviation method was used $\left(\frac{x-a}{h} = u\right)$. It was found that $\bar{x} = 64$, $h = 5$ and $a = 62.5$. The value of $\bar{u}$ is
(A) 0.5 (B) 1.5
(C) 0.3 (D) 7.5
15. The area of a sector of a circle of radius 10 cm is $\frac{55}{3} \text{ cm}^2$. The value of central angle is
(A) $\frac{21^\circ}{2}$ (B) 42°
(C) 105° (D) 21°
16. A camping tent in hemispherical shape of radius 1.4 m, has a door opening of area 0.50 m^2 . Outer surface area of the tent is
(A) 11.78 m^2 (B) 12.32 m^2
(C) 11.82 m^2 (D) 12.86 m^2



17. Which of the following can not be the probability of an event ?
- (A) $\frac{39}{100}$ (B) $\frac{0.001}{20}$
(C) $\frac{10}{0.2}$ (D) 10%
18. The value of k for which the equation $kx^2 - 6x - 4 = 0$ has real and equal roots, is
- (A) $\frac{9}{4}$ (B) -4
(C) $-\frac{9}{4}$ (D) -2

(Assertion and Reason Based Questions)

Directions : Questions number **19** and **20** are Assertion and Reason based questions. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the codes (A), (B), (C) and (D) as given below :

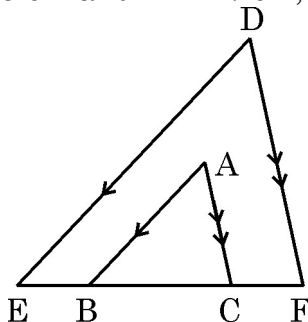
- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.
19. **Assertion (A) :** The system of linear equations $3x - 5y + 7 = 0$ and $-6x + 10y + 14 = 0$ is inconsistent.
Reason (R) : When two linear equations don't have unique solution, they always represent parallel lines.
20. **Assertion (A) :** H.C.F. $(36m^2, 18m) = 18m$, where m is a prime number.
Reason (R) : H.C.F. of two numbers is always less than or equal to the smaller number.



SECTION – B

Q. Numbers 21 to 25 are very short answer questions of 2 marks each.

21. In the given figure, $AB \parallel DE$ and $AC \parallel DF$. Show that $\triangle ABC \sim \triangle DEF$. If $BC = 10$ cm, $EB = CF = 5$ cm and $AB = 7$ cm, then find the length DE .



22. (a) For acute angles A and B , if $\sec(2A - B) = \sqrt{2}$ and $\operatorname{cosec}(A + B) = 2$, then find the values of A and B .

OR

- (b) Evaluate : $\frac{2 \cos 30^\circ - \cot^3 60^\circ}{\tan 30^\circ}$

23. Prove that $4 - 2\sqrt{5}$ is an irrational number given that $\sqrt{5}$ is irrational.
24. A bag contains 25 balls. Some of them are yellow and others are green. One ball is drawn at random. If probability of getting a green ball is $\frac{3}{5}$, then find the number of yellow balls.
25. (a) Vertices of a right triangle ABC with $\angle B = 90^\circ$ are $A(3, 4)$, $B(1, 1)$ and $C(-8, 7)$. Find the value of $\tan A$.

OR

- (b) Using distance formula, prove that the points $A(2, 3)$, $B(-7, 0)$ and $C(-1, 2)$ are collinear.

SECTION – C

Q. Numbers 26 to 31 are short answer questions of 3 marks each :

26. (a) A circle centered at $(2, 1)$ passes through the points $A(5, 6)$ and $B(-3, K)$. Find the value(s) of K . Hence find length of chord AB .

OR

- (b) Prove that the point P dividing the line segment joining the points $A(-1, 7)$ and $B(4, -3)$ in the ratio $3 : 2$, lies on the line $x - 3y = -1$. Also find length of PA and PB .

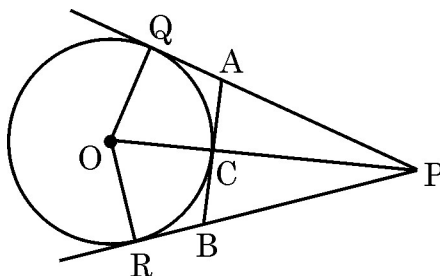


27. The dimensions of a window are $156 \text{ cm} \times 216 \text{ cm}$. Arjun wants to put grill on the window creating complete squares of maximum size. Determine the side length of the square and hence find the number of squares formed.
28. Use graphical method to solve the system of linear equations : $y = -3$ and $x + 2y = 4$.
29. (a) In an A.P., 15^{th} term exceeds the 8^{th} term by 21. If sum of first 10 terms is 55, then form the A.P.
- OR**
- (b) The sum of first n terms of an A.P. is $2n^2 + 13n$. Find its n^{th} term and hence 10^{th} term.
30. A circle of diameter 20 cm is equally divided into five sectors. Find the area and perimeter of one of the sectors.
31. Prove that :
- $$(1 + \cot \theta - \operatorname{cosec} \theta) (1 + \tan \theta + \sec \theta) = 2$$

SECTION – D

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

32. By selling an article for ₹ 48, a trader loses as much percent as half of the cost price of the article. Calculate the cost price and loss amount of the article.
33. PQ and PR are two tangents to a circle with centre O and radius 5 cm. AB is another tangent to the circle at C which lies on OP. If $OP = 13 \text{ cm}$, then find the length AB and PA.



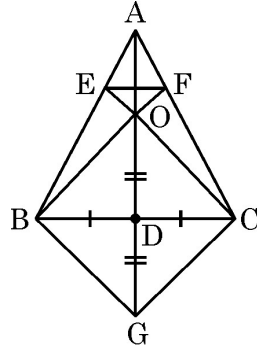


34. (a) $\triangle ABC$ की भुजा BC का मध्यबिंदु D है। BF तथा CE का प्रतिच्छेद बिंदु O, AD पर स्थित है। AD को बिंदु G तक इस प्रकार बढ़ाया गया कि $OD = DG$ है। सिद्ध कीजिए।

(i) OBGC एक समांतर चतुर्भुज है।

(ii) $EF \parallel BC$ है।

(iii) $\triangle AEF \sim \triangle ABC$



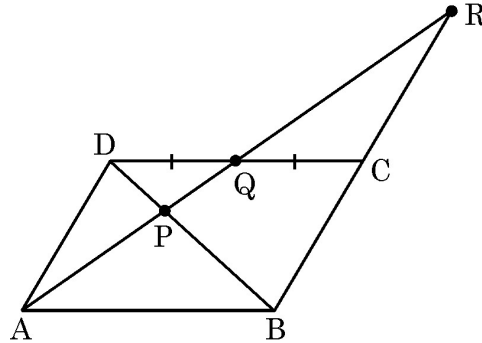
अथवा

- (b) एक समांतर चतुर्भुज ABCD की भुजा CD के मध्यबिंदु Q से होकर जाती हुई रेखा AR खींची गयी है जो BD को बिंदु P तथा बढ़ाई गयी भुजा BC को बिंदु R पर काटती है। सिद्ध कीजिए।

(i) $AQ = QR$

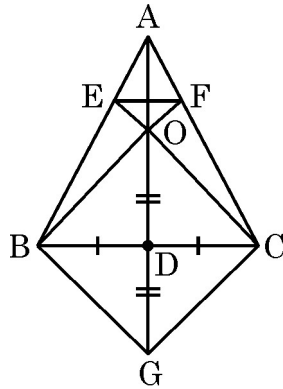
(ii) $AP = 2PQ$

(iii) $PR = 2AP$



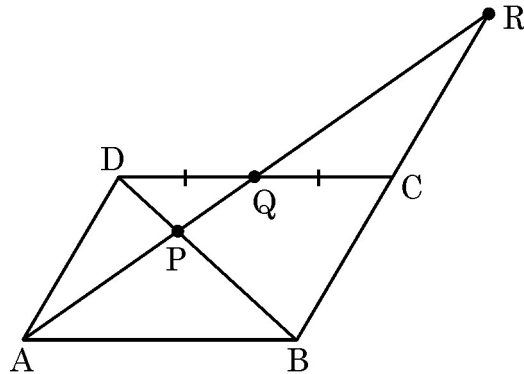


34. (a) D is the mid-point of side BC of $\triangle ABC$. CE and BF intersect at O, a point on AD. AD is produced to G such that $OD = DG$. Prove that
- (i) OBGC is a parallelogram.
 - (ii) $EF \parallel BC$
 - (iii) $\triangle AEF \sim \triangle ABC$



OR

- (b) Through the mid-point Q of side CD of a parallelogram ABCD, the line AR is drawn which intersects BD at P and produced BC at R. Prove that
- (i) $AQ = QR$
 - (ii) $AP = 2PQ$
 - (iii) $PR = 2AP$





35. (a) Find the mean and mode of the following frequency distribution :

Class Interval : 400-450 450-500 500-550 550-600 600-650 650-700

Frequency : 15 18 20 23 22 12

OR

- (b) If the median of the following frequency distribution is 32.5 and sum of all frequencies is 40, then find the values of f_1 and f_2 :

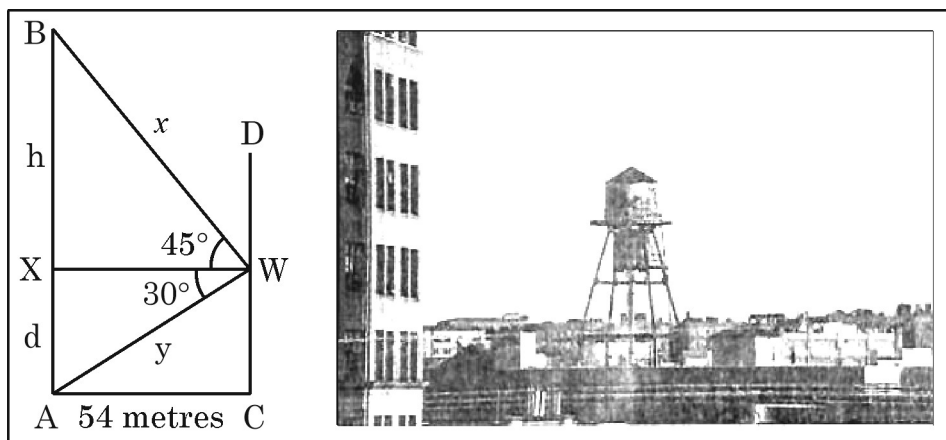
Class Interval : 0-10 10-20 20-30 30-40 40-50 50-60 60-70

Frequency : 3 f_1 9 12 6 f_2 2

SECTION – E

This section (Q. 36 to 38) has 3 case study based questions of 4 marks each.

36.



Elevated water storage tanks are built to store and supply water to nearby colonies. In the diagram given above, AB is an elevated water tank and CD is a nearby multistorey building. The building is 54 metres away from the water tank.

From a window (W) of the building, the angle of elevation of top of the tank is 45° and angle of depression of its foot is 30° .

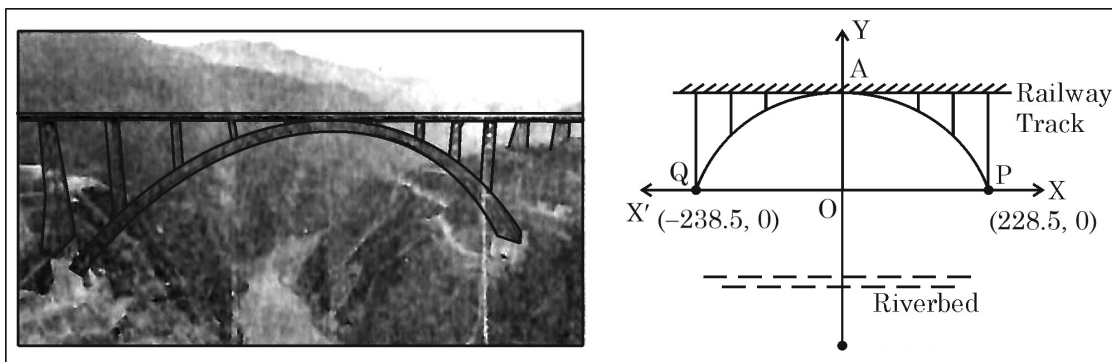
- (i) Write a relation between d (the height of window) and y . 1
- (ii) Determine the value of h . 1
- (iii) (a) Determine height of the water tank. 2

OR

- (iii) (b) Find the value of x and height of the window above ground level. 2



37.



An arch of a railway bridge, built on Chenab riverbed, is shown in the above diagram. It is a parabolic arch connecting two hills at P and Q. If the parabolic curve is represented by the polynomial $p(x) = -0.0025x^2 - 0.025x + 136$.

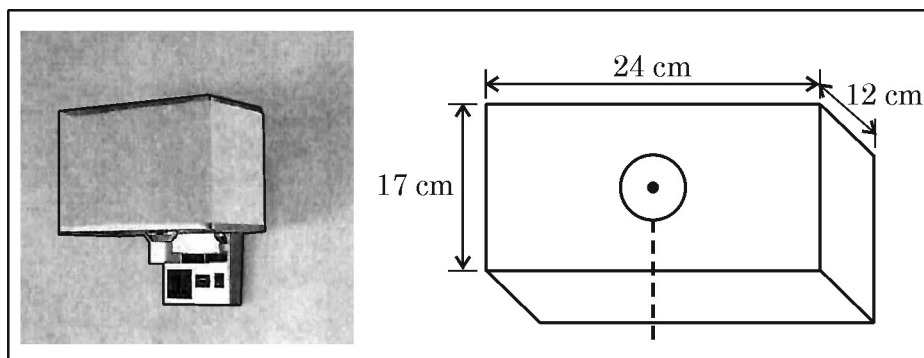
Observe the diagram and based on above information, answer the following questions :

- (i) Write the co-ordinates of point A. 1
- (ii) Find the span of the arch. 1
- (iii) (a) Write the zeroes of the polynomial using diagram and verify the relationship between sum of zeroes and polynomials. 2

OR

- (iii) (b) Find the values of $p(x)$ at $x = 100$ and $x = -100$. Are they same ? 2

38. A wall mounted lamp, made of fabric, is shown below. Lamp has cuboidal shape, open from top and bottom. A spherical bulb of diameter 7 cm is latched with a very thin rod. (Ignore the rod while making calculations.)



Dimensions of the cuboid are 24 cm × 12 cm × 17 cm.



- (i) बल्ब का पृष्ठीय क्षेत्रफल ज्ञात कीजिए । 1
- (ii) यदि हर तरफ से कम से कम 1 cm जगह छोड़नी जरूरी हो तो बल्ब का अधिकतम व्यास क्या हो सकता है ? 1
- (iii) (a) कपड़ा लगाते समय ऊपर तथा नीचे के किनारों पर 2 cm कपड़ा अंदर की तरफ मोड़ा गया है । प्रयुक्त कपड़े का क्षेत्रफल ज्ञात कीजिए । 2
- अथवा**
- (iii) (b) लैंप के अंदर उपलब्ध रिक्त स्थान ज्ञात कीजिए । 2
-



- (i) Find the surface area of the bulb. 1
- (ii) What could be the maximum diameter of the bulb if at least 1 cm space is left from each side ? 1
- (iii) (a) Find the area of the fabric used if there is a fold of 2 cm on top and bottom edges. 2

OR

- (iii) (b) Find the space available inside the lamp. 2

