Series : 4MNKL

SET ~ 3

प्रश्न-पत्र कोड
Q.P. Code **30/4/3**

रोल नं.
Roll No. 3220090 2

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.

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# गणित (मानक)
# MATHEMATICS (Standard)

*निर्धारित समय : 3 घण्टे*
*Time allowed : 3 hours*

*अधिकतम अंक : 80*
*Maximum Marks : 80*

## SECTION - A

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

1. The distance between the points $(a \cos\theta + b \sin\theta, 0)$ and $(0, a \sin\theta - b \cos\theta)$ is

(A) $\sqrt{a^2 + b^2}$ (B) $a^2 - b^2$

(C) $\sqrt{a^2 - b^2}$ (D) $a^2 + b^2$

2. An ice-cream cone of radius r and height h is completely filled by two spherical scoopes of ice-cream. If radius of each spherical scoop is $\frac{r}{2}$, then h : 2r equals

(A) 1 : 8 (B) 1 : 2

(C) 1 : 1 (D) 2 : 1

3. The value of k for which the system of linear equations $kx - y - 2 = 0$ and $6x - 2y - 3 = 0$ has infinitely many solutions, is (does)

(A) $\frac{1}{2}$ (B) 3

(C) 4 (D) Not exist

4. A circle is divided into 16 identical sectors. If radius of the circle is 7 cm, area of each sector is

(A) $\frac{77}{4}$ cm$^2$ (B) 77 cm$^2$

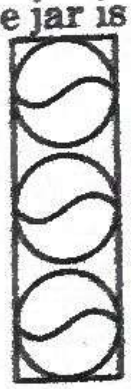
(C) 154 cm$^2$ (D) $\frac{77}{8}$ cm$^2$

5. Mean and Median of a frequency distribution are 43 and 40 respectively. The value of mode is

(A) 34 (B) 43

(C) 38.5 (D) 41.5

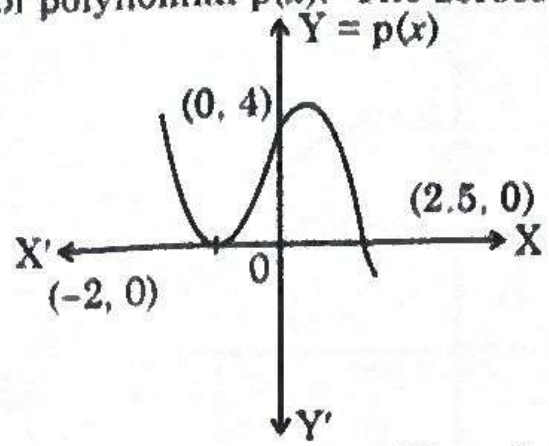
6. Three tennis balls are just packed in a cylindrical jar. If radius of each ball is r, volume of air inside the jar is



(A) $2\pi r^3$ (B) $3\pi r^3$

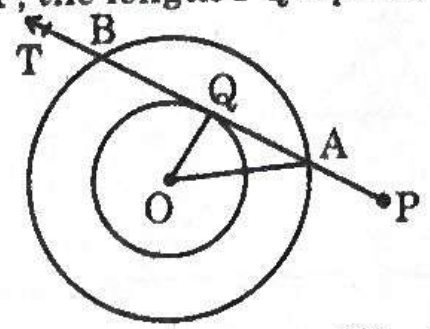
(C) $6\pi r^3$ (D) $4\pi r^3$

7. Observe the graph of polynomial p(x). The zeroes of the polynomial are




(A) –2, 0, 2.5
(B) –2, 2.5
(C) 0, 4
(D) –2, 0

8. From an external point P, a tangent PT has been drawn to a circle with centre at O and radius 3 cm, intersecting its concentric circle at A and B. If AB = 8 cm and OA = AP, the length PQ equals.

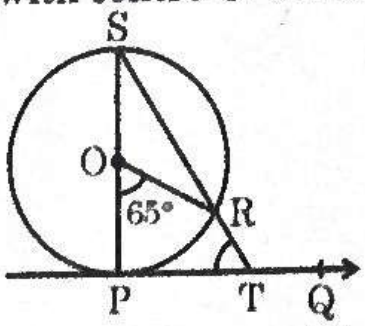



(A) 8 cm
(B) 10 cm
(C) 9 cm
(D) 12 cm

9. $\frac{\sec^2 A - 1}{\sin^2 A}$ is same as

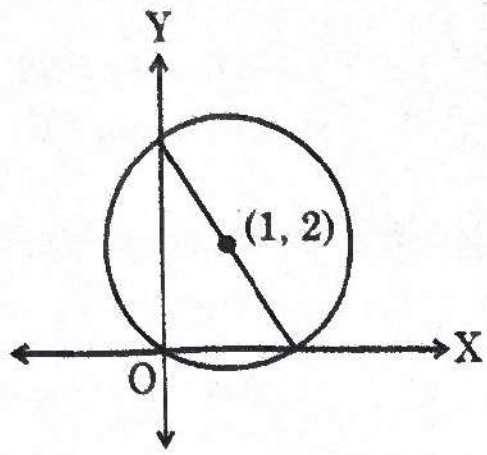
(A) $\cos^2 A$
(B) $\sec^2 A$
(C) $-\sec^2 A$
(D) $\cot^2 A$

10. PQ is tangent to a circle with centre O. If $\angle POR = 65°$, then $m\angle PTR$ is



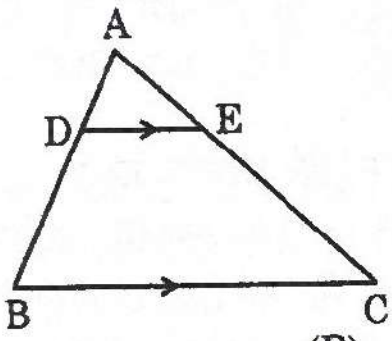

(A) 65°
(B) 58.5°
(C) 57.5°
(D) 45°

11. In the given figure, a circle is centred at (1, 2). The diameter of the circle is




(A) 4
(B) $2\sqrt{2}$
(C) $\sqrt{5}$
(D) $2\sqrt{5}$

12. In the given figure, DE || BC. If $\frac{AD}{DB} = \frac{1}{3}$ and AC = 6 cm, then length AE is




(A) 1.5 cm
(B) 1 cm
(C) 2 cm
(D) 3 cm

13. It is given that $\Delta ABC \sim \Delta EDF$. Which of the following is not true ?

(A) $\frac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta EDF} = \frac{AB}{ED}$
(B) $\frac{AB}{ED} = \frac{AC}{EF}$
(C) $\angle A = \angle D, \angle C = \angle F$
(D) $\frac{AB + BC}{AC} = \frac{DE + DF}{EF}$

14. If the quadratic equation $9x^2 + 8kx + 16 = 0$ has real and equal roots, then the value of k is

(A) 3
(B) –3
(C) –4
(D) $\frac{3}{2}$

15. $\frac{1 + \tan^2 A}{1 + \cot^2 A}$ equals to :

(A) $\tan^2 A$
(B) –1
(C) $-\tan^2 A$
(D) $\cot^2 A$

16. If sum of first ten terms of an A.P. is zero with a as the first term and d, the common difference, which of the following relation is true ?

(A) $10a + 9d = 0$ (B) $2a = 9d$

(C) $a_{10} = -a$ (D) $a_{10} = a$

17. Two dice are rolled together. The probability that sum of the numbers obtained is atmost 12, is

(A) 1 (B) 0

(C) $\frac{1}{2}$ (D) $\frac{35}{36}$

18. Arc PQ subtends an angle $\theta$ at the centre of the circle with radius 6.3 cm.

If $\overset{\frown}{PQ} = 11$ cm, then the value of $\theta$ is

(A) $10^\circ$ (B) $60^\circ$

(C) $45^\circ$ (D) $100^\circ$

**(Assertion and Reason based Questions)**

**Direction :** Question Numbers **19** and **20** are Assertion (A) and Reason (R) based questions. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (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 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) :** If probability of happening of an event is $0.2p$, $p > 0$, then p can't be more than 5.

**Reason (R) :** $P(\overline{E}) = 1 - P(E)$ for an event E.

20. **Assertion (A) :** $(\sqrt{3} + \sqrt{5})$ is an irrational number.

**Reason (R) :** Sum of the any two irrational numbers is always irrational.

## SECTION – B

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

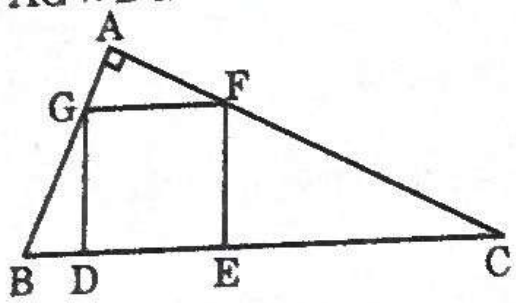
21. (a) Prove that : $\frac{\tan\theta}{1+\tan^2\theta}+\frac{\cot\theta}{1+\cot^2\theta}=2\sin\theta\cos\theta$.

**OR**

(b) Evaluate : $\frac{1-2\tan^2 30^\circ-\sec^2 45^\circ}{\sin^2 60^\circ}$

22. $\alpha$ and $\beta$ are the zeroes of the polynomial $5x^2-16x-10$. Find the value of $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$.

23. In the given figure, DEFG is a square. $\Delta ABC$ is right angle triangle with $\angle A = 90^\circ$. Prove that AG × DG = AF × DB.




24. Verify that roots of the quadratic equation $(p-q)x^2+(q-r)x+(r-p)=0$ are equal when $q+r=2p$.

25. (a) Prove that $2+3\sqrt{5}$ is an irrational number given that $\sqrt{5}$ is irrational number.

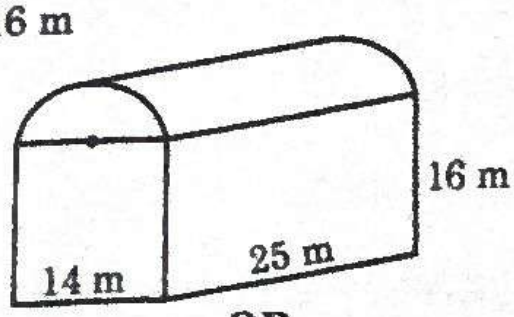
**OR**

(b) If the HCF of 210 and 55 is expressed as $210\times5+55m$, then find the value of m.

## SECTION – C

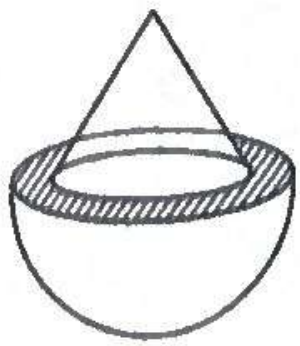
**Q. Numbers 26 to 31 are short answer type questions of 3 marks each.**

26. (a) To protect plants from heat, a shed of iron rods covered with green cloth is made. The lower part of the shed is a cuboid mounted by semi-cylinder as shown in the figure. Find the area of the cloth required to make this shed, if dimensions of the cuboid are 14 m × 25 m × 16 m




**OR**

(b) The internal and external radii of a hollow hemisphere are $5\sqrt{2}$ cm and 10 cm respectively. A cone of height $5\sqrt{7}$ cm and radius $5\sqrt{2}$ cm is surmounted on the hemisphere as shown in the figure. Find the total surface area of the object in terms of $\pi$. (Use $\sqrt{2} = 1.4$)



27. A bag contains 30 balls out of which 'm' number of balls are blue in colour.

(i) Find the probability that a ball drawn at random from the bag is not blue.

(ii) If 6 more blue balls are added in the bag, then the probability of drawing a blue ball will be $\frac{5}{4}$ times the probability of drawing a blue ball in the first case. Find the value of m.

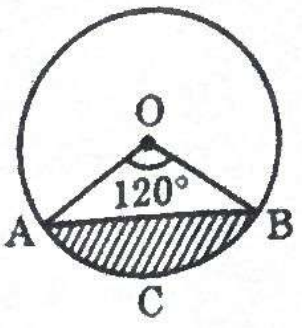
28. Find the greatest number which divides 764 and 1198, leaving remainders 8 and 10 respectively.

29. (a) In a class test, Veer scored 6 more than twice as many marks as Kevin scored. If one of them had scored 4 more marks, their total score would have been 40. Find the marks obtained by Veer and Kevin.

**OR**

(b) Solve the linear equations $3x + y = 14$ and $y = 2$ graphically.

30. Chord AB subtends an angle of 120° at the centre O of the circle with radius $\frac{21}{2}$ cm. Find the perimeter of shaded segment ACB. (Use $\sqrt{3} = 1.7$)




$\frac{120}{360} \times 2 \times \frac{22}{7} \times \frac{21}{2}$

31. If $\sec\theta + \tan\theta = m$, show that $\frac{m^2 - 1}{m^2 + 1} = \sin\theta$.

## SECTION – D

**Q. Numbers 32 to 35 are long answer type questions of 5 marks each.**

32. A kite is flying at a height of 60 m above the ground level. Ravi, standing at the roof of the house is holding the string straight and observes the angle of elevation of kite as 30°. From the bottom of the same building, the angle of elevation of kite is 45°. Find the length of the string and height of roof from the ground. (Use $\sqrt{3} = 1.73$)

33. (a) A person on tour has ₹ 5,400 for his expenses. If he extends his tour by 5 days, he has to cut down his daily expenses by ₹ 180. Find the original duration of the tour and daily expense.

**OR**

(b) The total cost of certain piece of cloth was ₹ 2,100. During special sale time, the shopkeeper offered 2 m extra cloth for free thus reducing the price of cloth per metre by ₹ 120. What was the original per metre price of cloth and its length ?

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

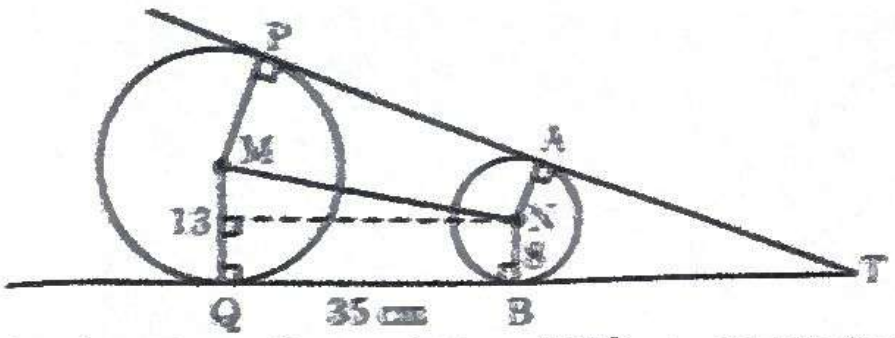
| Class : | 10–30 | 30–50 | 50–70 | 70–90 | 90–110 | 110–130 | 130–150 |
|---|---|---|---|---|---|---|---|
| Frequency : | 6 | 8 | 12 | 10 | 14 | 11 | 9 |

**OR**

(b) If the median of the distribution given below is 28.5, find the values of $x$ and $y$.

| Class : | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 | Total |
|---|---|---|---|---|---|---|---|
| Frequency : | 5 | $x$ | 20 | 15 | $y$ | 5 | 60 |

35.




In the given figure, TP and TQ are tangents to a circle with centre M, touching another circle with centre N at A and B respectively. It is given that MQ = 13 cm, NB = 8 cm, BQ = 35 cm and TP = 80 cm.

(i) Name the quadrilateral MQBN. 1

(ii) Is MN parallel to PA ? Justify your answer. 1

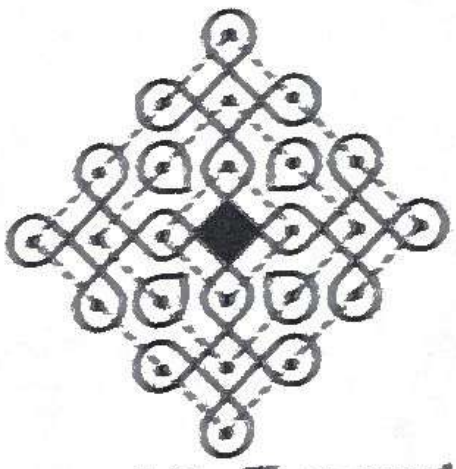
(iii) Find length TB. 1

(iv) Find length MN. 2

## SECTION – E

**Q. Numbers 36 to 38 are case based questions of 4 marks each.**

36. 'Kolam' is a decorative art which is made with rice flour in South Indian States. It is drawn on grid pattern of dots. One such art work is shown below.



Observe the given figure carefully. There are 4 dots in first square, 8 dots in second square, 12 dots in third square and so on.

Based on the above, answer the following questions :

(i) Show that number of dots given above forms an A.P. Write the first term and common difference. 1

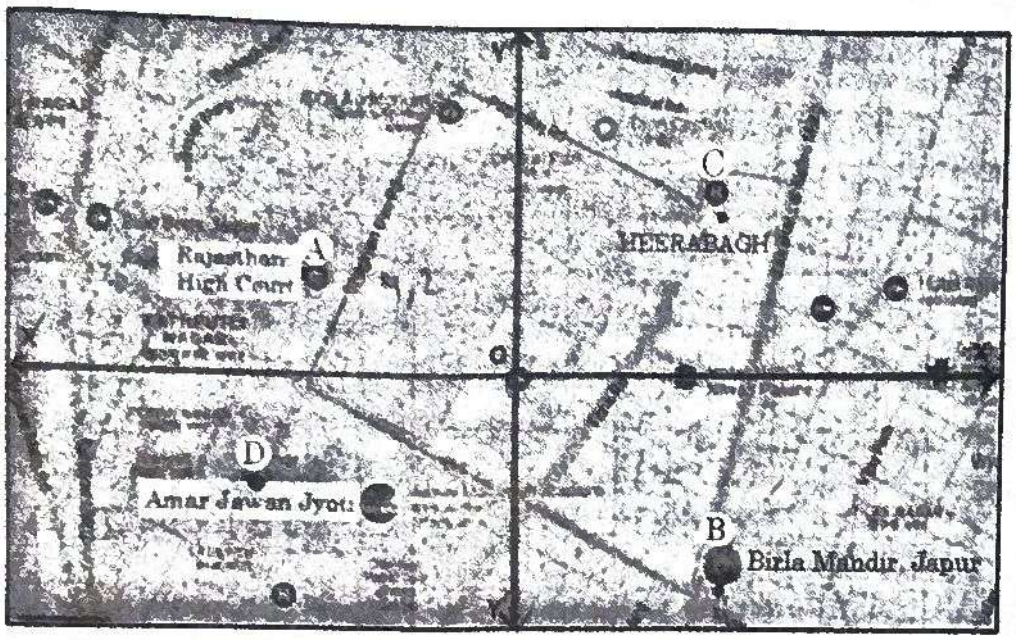
(ii) Write $n^{th}$ term of the A.P. formed. 1

(iii) (a) The pattern is expanded on a large ground. If total 220 dots are used, then find the number of squares formed. 2

**OR**

(b) Is it possible to complete n number of squares using 100 dots ? If yes, then find the value of n.

P.T.O.

37. 


Observe the map of Jaipur city placed on a Cartesian plane. Taking Rambagh Palace as origin, the location of some places are given below :

Point A : (–4, 2) Rajasthan High Court

Point B : (4, –4) Birla Mandir

Point C : (4, 3) Heera Bagh

Point D : (–5, –2) Amar Jawan Jyoti

Based on the above, answer the following questions :

(i) Advocate Rehana stays at Heera Bagh. How much distance she has to cover daily to go to the court and coming back home ? 1

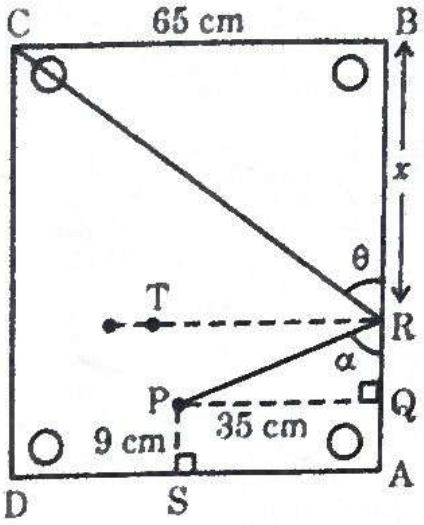
(ii) There is a crossing on X-axis which divides AD in a certain ratio. Find the ratio. 1

(iii) (a) Is Birla Mandir equidistant from Heera Bagh and Amar Jawan Jyoti ? Justify your answer. 2

**OR**

(b) Using section formula, show that points A, O and B are not collinear.

38.




Carom board is a very popular game. The board is a square of side length 65 cm. It has circular pockets in each corner.

Ansh strikes a disc, kept at position P with a striker. The disc, hits the boundary of the board at R and goes straight to pocket at corner C. It is given that PS = 9 cm, PQ = 35 cm, BR = $x$, $\angle PRQ = \alpha$ and $\angle CRB = \theta$.

Based on the above information, answer the following questions :

(i) Using law of reflection i.e. $\angle PRT = \angle CRT$, prove that $\theta = \alpha$. **1**

(ii) Prove that $\Delta PQR \sim \Delta CBR$ given that PQ is perpendicular to AB. **1**

(iii) (a) Find the value of $x$ using similarity of triangles. **2**

**OR**

(b) If $\frac{\text{Area } \Delta PQR}{\text{Area } \Delta CBR} = \frac{PQ^2}{CB^2}$, then find the value of $x$.