Series : F6EGH

SET ~ 2

रोल नं.
Roll No.

प्रश्न-पत्र कोड
Q.P. Code **30/6/2**

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

(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं ।

(II) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं ।

(III) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।

(IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें ।

(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 ।

NOTE

(I) Please check that this question paper contains 23 printed pages.

(II) Please check that this question paper contains 38 questions.

(III) 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.

(IV) **Please write down the serial number of the question in the answer-book at the given place before attempting it.**

(V) 15 minutes 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

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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** *question numbers 1 to 18 are Multiple Choice Questions (MCQs) and question numbers 19 and 20 are Assertion-Reason based questions of 1 mark each.*

(iv) *In Section–***B** *question numbers 21 to 25 are Very Short Answer (VSA) type questions, carrying 2 marks each.*

(v) *In Section–***C** *question numbers 26 to 31 are Short Answer (SA) type questions, carrying 3 marks each.*

(vi) *In Section–***D** *question numbers 32 to 35 are Long Answer (LA) type questions, carrying 5 marks each.*

(vii) *In Section–***E** *question numbers 36 to 38 are* ***Case Study based integrated*** *question carrying 4 marks each. Internal choice is provided in 2 marks question 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 calculators is* ***NOT*** *allowed.*

SECTION – A

This section consists of 20 multiple choice questions of 1 mark each.

1. The system of equations $x + 5 = 0$ and $2x - 1 = 0$, has 1

(A) No solution
(B) Unique solution
(C) Two solutions
(D) Infinite solutions

2. In a right triangle ABC, right-angled at A, if $\sin B = \frac{1}{4}$, then the value of sec B is 1

(A) 4
(B) $\frac{\sqrt{15}}{4}$
(C) $\sqrt{15}$
(D) $\frac{4}{\sqrt{15}}$

3. $\sqrt{0.4}$ is a/an 1

(A) natural number
(B) integer
(C) rational number
(D) irrational number

4. Which of the following cannot be the unit digit of 8^n, where n is a natural number ? 1

(A) 4
(B) 2
(C) 0
(D) 6

5. Which of the following quadratic equations has real and distinct roots ? 1

(A) $x^2 + 2x = 0$
(B) $x^2 + x + 1 = 0$
(C) $(x - 1)^2 = 1 - 2x$
(D) $2x^2 + x + 1 = 0$

6. If the zeroes of the polynomial $ax^2 + bx + \frac{2a}{b}$ are reciprocal of each other, then the value of b is 1

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

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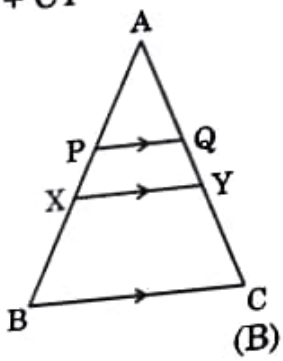
7. The distance of point (a, –b) from x-axis is 1

(A) a (B) –a

(C) b (D) –b

8. In the adjoining figure, PQ ∥ XY ∥ BC, AP = 2 cm, PX = 1.5 cm and BX = 4 cm. If QY = 0.75 cm, then AQ + CY = 1



(A) 6 cm (B) 4.5 cm

(C) 3 cm (D) 5.25 cm

9. Given $\Delta ABC \sim \Delta PQR$, $\angle A = 30°$ and $\angle Q = 90°$. The value of $(\angle R + \angle B)$ is 1

(A) 90° (B) 120°

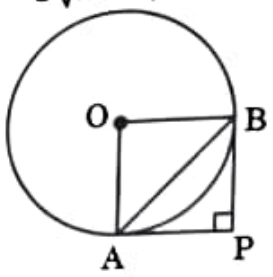
(C) 150° (D) 180°

10. Two coins are tossed simultaneously. The probability of getting atleast one head is 1

(A) $\frac{1}{4}$ (B) $\frac{1}{2}$

(C) $\frac{3}{4}$ (D) 1

11. In the adjoining figure, PA and PB are tangents to a circle with centre O such that $\angle P = 90°$. If $AB = 3\sqrt{2}$ cm, then the diameter of the circle is 1



(A) $3\sqrt{2}$ cm (B) $6\sqrt{2}$ cm

(C) 3 cm (D) 6 cm

12. If $x = \cos 30° - \sin 30°$ and $y = \tan 60° - \cot 60°$, then 1

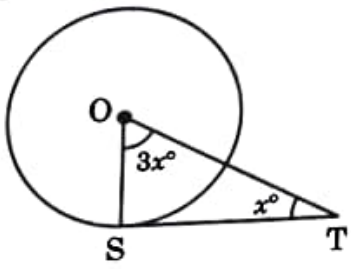
(A) $x = y$
(B) $x > y$
(C) $x < y$
(D) $x > 1, y < 1$

13. For a circle with centre O and radius 5 cm, which of the following statements is true ? 1

P : Distance between every pair of parallel tangents is 5 cm.
Q : Distance between every pair of parallel tangents is 10 cm.
R : Distance between every pair of parallel tangents must be between 5 cm and 10 cm.
S : There does not exist a point outside the circle from where length of tangent is 5 cm.

(A) P
(B) Q
(C) R
(D) S

14. In the adjoining figure, TS is a tangent to a circle with centre O. The value of $2x°$ is 1



(A) 22.5
(B) 45
(C) 67.5
(D) 90

15. A peacock sitting on the top of a tree of height 10 m observes a snake moving on the ground. If the snake is $10\sqrt{3}$ m away from the base of the tree, then angle of depression of the snake from the eye of the peacock is 1

(A) 30°
(B) 45°
(C) 60°
(D) 90°

16. If a cone of greatest possible volume is hollowed out from a solid wooden cylinder, then the ratio of the volume of remaining wood to the volume of cone hollowed out is 1

(A) 1 : 1
(B) 1 : 3
(C) 2 : 1
(D) 3 : 1

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17. If the mode of some observations is 10 and sum of mean and median is 25, then the mean and median respectively are 1

(A) 12 and 13 (B) 13 and 12

(C) 10 and 15 (D) 15 and 10

18. If the maximum number of students has obtained 52 marks out of 80, then 1

(A) 52 is the mean of the data. (B) 52 is the median of the data.

(C) 52 is the mode of the data. (D) 52 is the range of the data.

Directions : In Question Numbers **19** and **20**, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option from the following :

(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 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) :** For two prime numbers x and y ($x < y$), HCF(x, y) = x and LCM(x, y) = y. 1

Reason (R) : HCF(x, y) ≤ LCM(x, y), where x, y are any two natural numbers.

20. In an experiment of throwing a die, 1

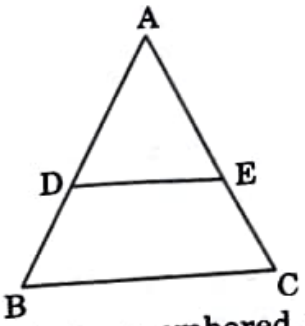
Assertion (A) : Event E_1 : getting a number less than 3 and Event E_2 : getting a number greater than 3 are complementary events.

Reason (R) : If two events E and F are complementary events, then P(E) + P(F) = 1.

SECTION – B

This section has 5 very short answer type questions of 2 marks each.

21. In the adjoining figure, $\frac{AD}{BD} = \frac{AE}{EC}$ and $\angle BDE = \angle CED$, prove that ΔABC is an isosceles triangle. **2**



22. A bag contains cards which are numbered from 5 to 100 such that each card bears a different number. A card is drawn at random. Find the probability that number on the card is **2**

(i) a perfect square

(ii) a 2-digit number **2**

23. (a) Solve the following pair of equations algebraically :

$$101x + 102y = 304$$
$$102x + 101y = 305$$

OR

(b) In a pair of supplementary angles, the greater angle exceeds the smaller by 50°. Express the given situation as a system of linear equations in two variables and hence obtain the measure of each angle. **2**

2

24. (a) If $a \sec\theta + b \tan\theta = m$ and $b \sec\theta + a \tan\theta = n$, prove that $a^2 + n^2 = b^2 + m^2$

OR

(b) Use the identity : $\sin^2 A + \cos^2 A = 1$ to prove that $\tan^2 A + 1 = \sec^2 A$.

Hence, find the value of tan A, when sec $A = \frac{5}{3}$, where A is an acute angle. **2**

25. Prove that abscissa of a point P which is equidistant from points with coordinates A(7, 1) and B(3, 5) is 2 more than its ordinate. **2**

SECTION – C

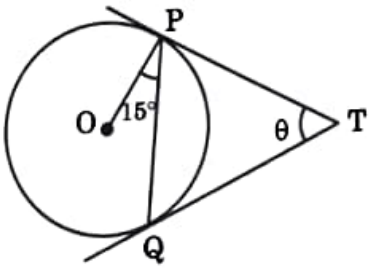
This section has 6 short answer type questions of 3 marks each.

26. (a) Prove that : $\frac{\cos\theta - 2\cos^3\theta}{\sin\theta - 2\sin^3\theta} + \cot\theta = 0$. 3

OR

(b) Given that $\sin\theta + \cos\theta = x$, prove that $\sin^4\theta + \cos^4\theta = \frac{2 - (x^2 - 1)^2}{2}$. 3

27. In the adjoining figure, TP and TQ are tangents drawn to a circle with centre O. If $\angle OPQ = 15°$ and $\angle PTQ = \theta$, then find the value of $\sin 2\theta$. 3



28. (a) Prove that $\sqrt{5}$ is an irrational number. 3

OR

(b) Let p, q and r be three distinct prime numbers. 3

Check whether $p \cdot q \cdot r + q$ is a composite number or not.

Further, give an example for 3 distinct primes p, q, r such that

(i) $p \cdot q \cdot r + 1$ is a composite number.

(ii) $p \cdot q \cdot r + 1$ is a prime number.

1 × 24
2 × 12
3 × 8
4 × 6

29. Find the zeroes of the polynomial $q(x) = 8x^2 - 2x - 3$. Hence, find a polynomial whose zeroes are 2 less than the zeroes of $q(x)$. 3

$8x^2 - 6x + 4x - 3$

$= 2x(4x - 3) + 1(4x - 3)$

$= (4x - 3)(2x + 1)$

30. Check whether the following system of equations is consistent or not. If consistent, solve graphically 3
$x - 2y + 4 = 0$, $2x - y - 4 = 0$

31. If the points A(6, 1), B(p, 2), C(9, 4) and D(7, q) are the vertices of a parallelogram ABCD, then find the values of p and q. Hence, check whether ABCD is a rectangle or not. 3

SECTION – D

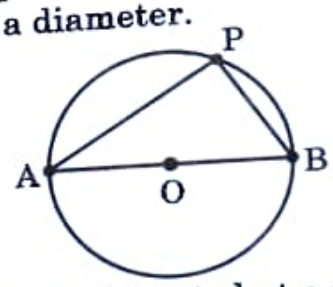
This section has 4 long answer questions of 5 marks each.

32. Following data shows the number of family members living in different bungalows of a locality : 5

Number of Members	0 – 2	2 – 4	4 – 6	6 – 8	8 – 10	Total
Number of Bungalows	10	p	60	q	5	120

If the median number of members is found to be 5, find the values of p and q.

33. (a) There is a circular park of diameter 65 m as shown in the following figure, where AB is a diameter. 5

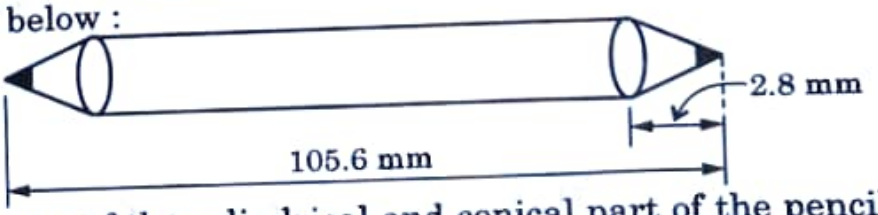


An entry gate is to be constructed at a point P on the boundary of the park such that distance of P from A is 35 m more than the distance of P from B. Find distance of point P from A and B respectively.

OR

(b) Find the smallest value of p for which the quadratic equation $x^2 - 2(p + 1)x + p^2 = 0$ has real roots. Hence, find the roots of the equation so obtained. 5

34. On the day of her examination, Riya sharpened her pencil from both ends as shown below : 5



The diameter of the cylindrical and conical part of the pencil is 4.2 mm. If the height of each conical part is 2.8 mm and length of entire pencil is 105.6 mm, find the total surface area of the pencil.

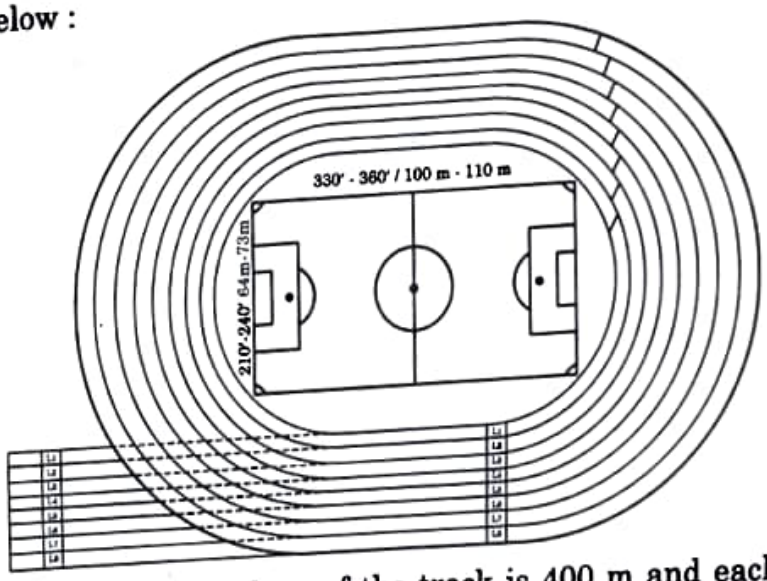
35. From one face of a solid cube of side 14 cm, the largest possible cone is carved out. Find the volume and surface area of the remaining solid. 5

$\left(\text{Use } \pi = \frac{22}{7}, \sqrt{5} = 2.2\right)$

SECTION – E

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

36. In order to organise, Annual Sports Day, a school prepared an eight lane running track with an integrated football field inside the track area as shown below :



The length of innermost lane of the track is 400 m and each subsequent lane is 7.6 m longer than the preceding lane.

Based on given information, answer the following questions, using concept of Arithmetic Progression.

(i) What is the length of the 6^{th} lane ? 1

(ii) How long is the 8^{th} lane than that of 4^{th} lane ? 1

(iii) (a) While practicing for a race, a student took one round each in first six lanes. Find the total distance covered by the student. 2

OR

(iii) (b) A student took one round each in lane 4 to lane 8. Find the total distance covered by the student. 2

37. The Statue of Unity situated in Gujarat is the world's largest Statue which stands over a 58 m high base. As part of the project, a student constructed an inclinometer and wishes to find the height of Statue of Unity using it.

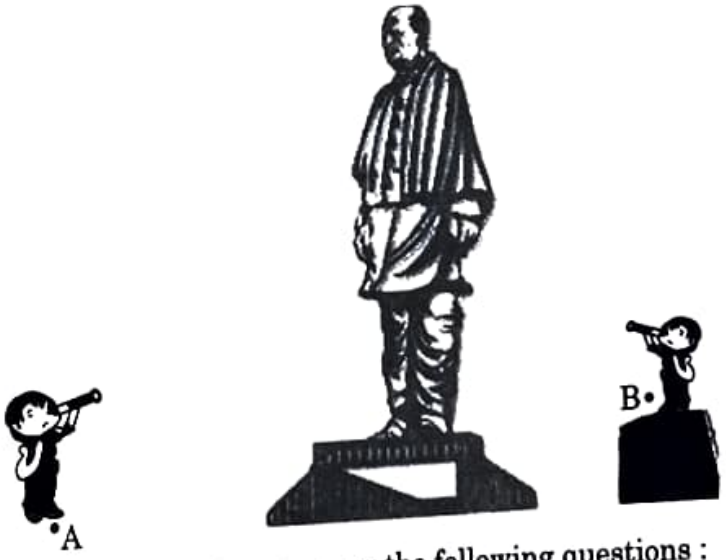
He noted following observations from two places :

Situation – I :

The angle of elevation of the top of Statue from Place A which is $80\sqrt{3}$ m away from the base of the Statue is found to be 60°.

Situation – II :

The angle of elevation of the top of Statue from a Place B which is 40 m above the ground is found to be 30° and entire height of the Statue including the base is found to be 240 m.



Based on given information, answer the following questions :

(i) Represent the Situation – I with the help of a diagram. 1

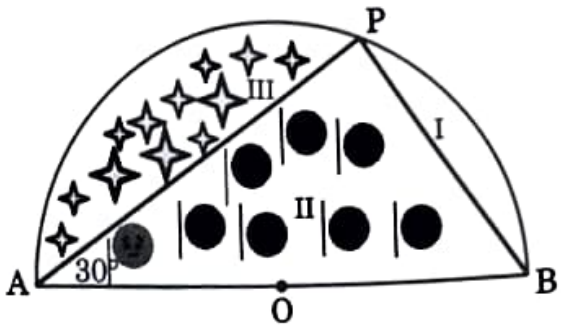
(ii) Represent the Situation – II with the help of a diagram. 1

(iii) (a) Calculate the height of Statue excluding the base and also find the height including the base with the help of Situation – I. 2

OR

(iii) (b) Find the horizontal distance of point B (Situation – II) from the Statue and the value of tan α, where α is the angle of elevation of top of base of the Statue from point B. 2

38. Anurag purchased a farmhouse which is in the form of a semicircle of diameter 70 m. He divides it into three parts by taking a point P on the semicircle in such a way that $\angle PAB = 30°$ as shown in the following figure, where O is the centre of semicircle.



In part I, he planted saplings of Mango tree, in part II, he grew tomatoes and in part III, he grew oranges. Based on given information, answer the following questions.

(i) What is the measure of $\angle POA$? 1

(ii) Find the length of wire needed to fence entire piece of land. 1

(iii) (a) Find the area of region in which saplings of Mango tree are planted. 2

OR

(iii) (b) Find the length of wire needed to fence the region III. 2