Series : F6EGH

SET ~ 3

प्रश्न-पत्र कोड
Q.P. Code 30/6/3

रोल नं.

Roll No.

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

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 $\pi = \dfrac{22}{7}$ wherever required, if not stated.

(x) Use of calculators is NOT allowed.

SECTION – A

1. This section consists of 20 multiple choice questions of 1 mark each.
   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
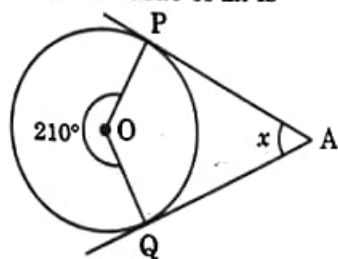   tangent is 5 cm.

   (A) P

   (B) Q

   (C) R

   (D) S

2. In the adjoining figure, AP and AQ are tangents to the circle with centre
   O. If reflex $\angle POQ = 210°$, the value of $2x$ is   1

   (A) 30°

   (B) 60°

   (C) 120°

   (D) 300°

3. If $x = 2 \sin 60° \cos 60°$ and $y = \sin^2 30° - \cos^2 30°$ and $x^2 = ky^2$, the value of
   k is   1

   (A) $\sqrt{3}$

   (B) $-\sqrt{3}$

   (C) 3

   (D) -3

4. 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°

5. 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) $3:1$

6. 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

7. 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.

8. The system of equations $y + a = 0$ and $2x = b$ has   1

   (A) No solution
   (B) $\left(-a, \dfrac{b}{2}\right)$ as its solution
   (C) $\left(\dfrac{b}{2}, -a\right)$ as its solution
   (D) Infinite solutions

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

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

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

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

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

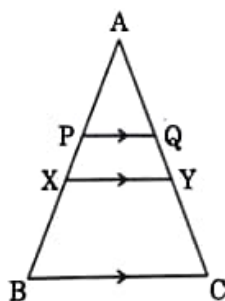   (A) 4
    (B) 2
    (C) 0
    (D) 6

• • •

12. Which of the following equations does not have a real root ? 1

(A) $x^2 = 0$

(C) $x^2 + 1 = 0$

(B) $2x - 1 = 3$

(D) $x^3 + x^2 = 0$

13. 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) $-\frac{1}{2}$

14. The distance of point $P(3a, 4a)$ from y-axis is 1

(A) 3a

(B) −3a

(C) 4a

(D) −4a

15. 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
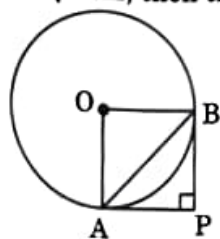

(A) 6 cm

(B) 4.5 cm

(C) 3 cm

(D) 5.25 cm

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

(A) 90°

(B) 120°

(C) 150°

(D) 180°

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

    (A) $\dfrac{1}{4}$

    (C) $\dfrac{3}{4}$

    (B) $\dfrac{1}{2}$

    (D) 1

18. 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

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

    (C) 3 cm

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

    (D) 6 cm

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. In an experiment of throwing a die,

    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 $P(E) + P(F) = 1$.

20. **Assertion (A)** : For two odd prime numbers x and y, $(x \neq y)$, $LCM(2x, 4y) = 4xy$

    Reason (R) : $LCM(x, y)$ is a multiple of $HCF(x, y)$.

11 | P a g e

This section has 5 very short answer type questions of 2 marks each.
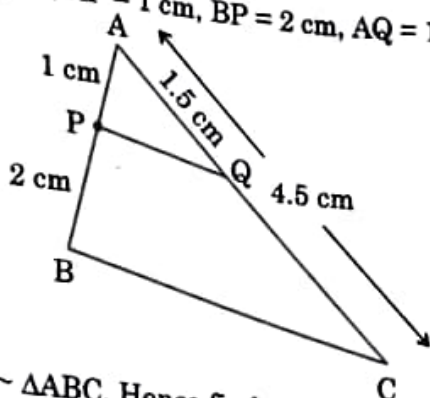
21. (a) If $a \sec \theta + b \tan \theta = m$ and $b \sec \theta + a \tan \theta = n$, prove that $a^2 + n^2 = b^2 + m^2$ 2

    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

22. 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

23. In the adjoining figure, $AP = 1$ cm, $BP = 2$ cm, $AQ = 1.5$ cm and $AC = 4.5$ cm.   2

Prove that $\triangle APQ \sim \triangle ABC$. Hence find the length of PQ, if $BC = 3.6$ cm.

24. A bag contains balls numbered 2 to 91 such that each ball bears a different number. A ball is drawn at random from the bag. Find the probability that
    (i) it bears a 2– digit number
    (ii) it bears a multiple of 1.   2

25. (a) Solve the following pair of equations algebraically :
    $$101x + 102y = 304$$
    $$102x + 101y = 305$$ 2

    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

SECTION – C

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

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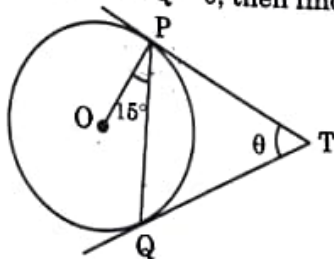$$x - 2y = 0$$
$$2x + y = 0$$
3

27. 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

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

OR

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

29. 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

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

OR

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

31. Find the zeroes of the polynomial $r(x) = 4x^2 + 3x - 1$. Hence, write a polynomial whose zeroes are reciprocal of the zeroes of polynomial $r(x)$.
3

SECTION – D

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

(a) If a line drawn parallel to one side of triangle intersecting the other two sides in distinct points divides the two sides in the same ratio, then it is parallel to third side.
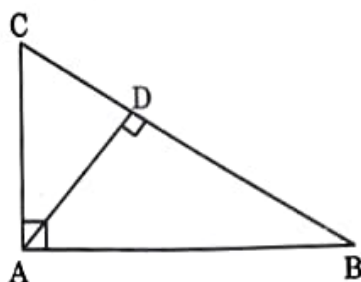
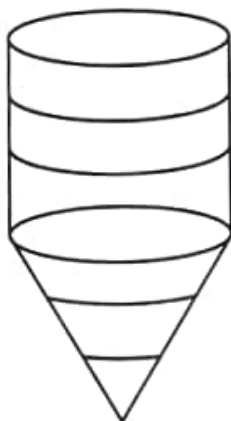State and prove the converse of the above statement.

5

OR

(b) In the adjoining figure, $\triangle CAB$ is a right triangle, right angled at A and $AD \perp BC$. Prove that $\triangle ADB \sim \triangle CDA$. Further, if $BC = 10$ cm and $CD = 2$ cm, find the length of AD.

5

Fermentation tanks are designed in the form of cylinder mounted on a cone as shown below :

5

The total height of the tank is 3.3 m and height of conical part is 1.2 m. The diameter of the cylindrical as well as conical part is 1 m. Find the capacity of the tank. If the level of liquid in the tank is 0.7 m from the top, find the surface area of the tank in contact with liquid.

34. The population of lions was noted in different regions across the world in the following table : 5

Number of lions	Number of regions
0 – 100	2
100 – 200	5
200 – 300	9
300 – 400	12
400 – 500	x
500 – 600	20
600 – 700	15
700 – 800	9
800 – 900	y
900 – 1000	2
	100

If the median of the given data is 525, find the values of x and y.

35. (a) There is a circular park of diameter 65 m as shown in the following figure, where AB is a diameter. 5
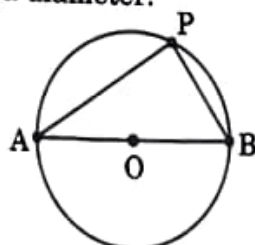
An entry gate is to be constructed at a point P on the boundary of the park such that distance of P from A is 35 m more than the distance of P from B. Find distance of point P from A and B respectively.

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

SECTION – E

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

36. 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.
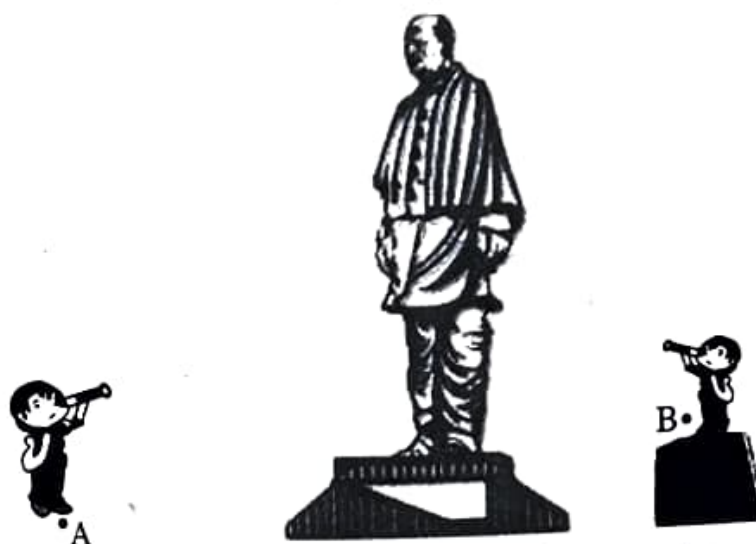
He noted following observations from two places :

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.
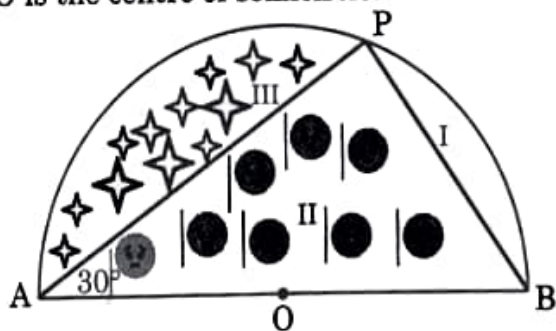

Based on given information, answer the following questions :

(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

37. 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

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 :

330′ - 360′ / 100 m - 110 m

210′-240′ 64m-73m
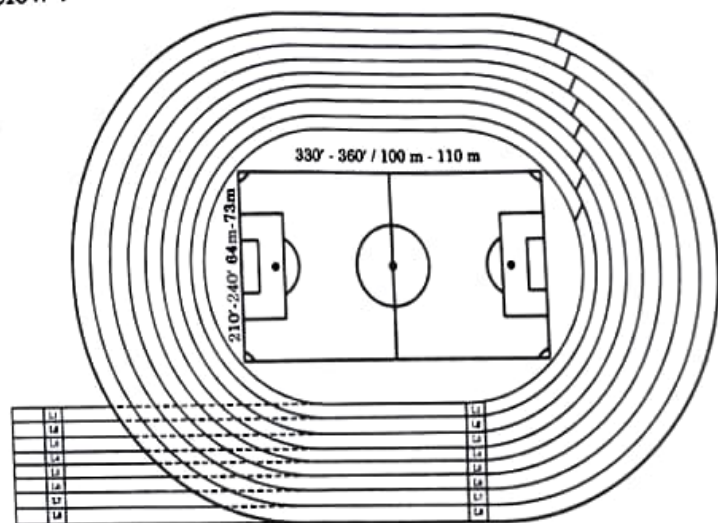
The length of innermost lane of the track is 400 m and each subsequent lane is 7.6 m longer than the preceding lane.

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

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

(ii) How long is the 8th lane than that of 4th 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