

Series : H4EFG



SET ~ 3

रोल नं.
Roll No.



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प्रश्न-पत्र कोड
Q.P. Code 430/4/3

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 15 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 छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- (IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथास्थान 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।

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NOTE

- (I) Please check that this question paper contains 15 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 students 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



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General Instructions :

Read the following instructions carefully and follow them :

1. This question paper contains **38** questions. **All** questions are compulsory.
2. Question paper is divided into **FIVE** sections – **SECTION A, B, C, D** and **E**.
3. In **section A**, question number **1** to **18** are multiple choice questions (MCQs) and question number **19** and **20** are Assertion – Reason based questions of 1 mark each.
4. In **section B**, question number **21** to **25** are very short answer (VSA) type questions of 2 marks each.
5. In **section C**, question number **26** to **31** are short answer (SA) type questions carrying 3 marks each.
6. In **section D**, question number **32** to **35** are long answer (LA) type questions carrying 5 marks each.
7. In **section E**, question number **36** to **38** are **case-based integrated units** of assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case study.
8. 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**.
9. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.
10. Use of calculators is **NOT allowed**.

SECTION – A

20×1 = 20

Question Nos. 1 to 20 are multiple choice questions of 1 mark each.

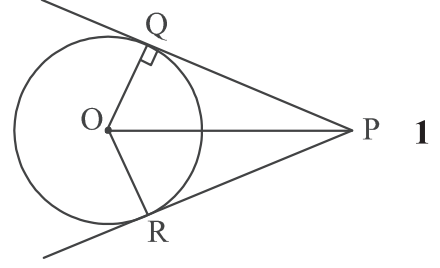
1. If $\sin A = \frac{2}{3}$, then $\cos A$ is equal to : 1
(a) $\frac{3}{2}$ (b) $\frac{\sqrt{5}}{3}$ (c) $\frac{1}{3}$ (d) $\frac{1}{\sqrt{3}}$
2. The curved surface area of a cone with base radius 7 cm, is 550 cm^2 . The slant height of the cone is : 1
(a) 25 cm (b) 14 cm (c) 20 cm (d) 24 cm
3. The value of m for which lines $14x + my = 20$ and $-3x + 2y = 16$ are parallel, is : 1
(a) $-\frac{3}{14}$ (b) $-\frac{7}{3}$ (c) $-\frac{28}{3}$ (d) $-\frac{3}{28}$
4. If α, β are zeroes of the polynomial $3x^2 + 14x - 5$, then the value of $3\left(\frac{\alpha + \beta}{\alpha\beta}\right)$ is : 1
(a) $\frac{14}{5}$ (b) $\frac{42}{5}$ (c) $-\frac{14}{5}$ (d) $-\frac{42}{5}$



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5. PQ तथा PR, त्रिज्या 3 cm तथा केन्द्र O वाले, वृत्त पर खींची गयी दो स्पर्श रेखायें हैं। यदि प्रत्येक स्पर्श रेखा की लम्बाई 4 cm है तो त्रिभुज OQP का परिमाण है :

(a) 5 cm (b) 12 cm
(c) 9 cm (d) 8 cm



6. दो संख्याओं का LCM 3600 है। निम्न में से कौन-सी संख्या इनका HCF नहीं हो सकती?

(a) 600 (b) 400 (c) 500 (d) 150

7. बिन्दुओं $(-6, 9)$ तथा $(2, 7)$ के बीच की दूरी है :

(a) $2\sqrt{17}$ (b) $4\sqrt{17}$ (c) $2\sqrt{5}$ (d) $2\sqrt{15}$

8. यदि $\sec\theta - \tan\theta = 2$ है, तो $\sec\theta + \tan\theta$ का मान है :

(a) $\frac{1}{2}$ (b) $\sqrt{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) 2

9. तीन सिक्कों को एक साथ उछाला जाता है। इसकी प्रायिकता कि सिर्फ एक सिक्का पट (T) दर्शाये, है :

(a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{7}{8}$ (d) 1

10. बहुपद $p(x) = kx^2 - 9x + 3$ का एक शून्यक $\left(-\frac{3}{2}\right)$ है। k का मान है :

(a) $\frac{22}{3}$ (b) $-\frac{14}{3}$ (c) $\frac{14}{3}$ (d) $-\frac{22}{3}$

11. समान आयतन वाले दो लंबवृत्तीय बेलन की ऊँचाइयों का अनुपात 1:2 है। इनकी त्रिज्याओं का अनुपात है :

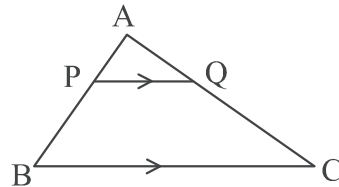
(a) $\sqrt{2}:1$ (b) 1:2 (c) 1:4 (d) $1:\sqrt{2}$

12. यदि $\sqrt{2}\sin\theta = 1$ है, तो $\cot\theta \times \operatorname{cosec}\theta$ बराबर है :

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2\sqrt{2}}$ (c) $\sqrt{2}$ (d) $\frac{1}{2}$

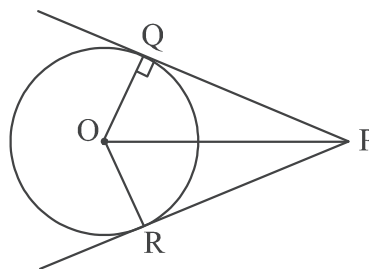
13. ΔABC में $PQ \parallel BC$ है। दिया गया है कि $AP = 2.4$ cm, $PB = 3.6$ cm तथा $BC = 5.4$ cm है। PQ की लम्बाई है :

(a) 2.7 cm (b) 1.8 cm
(c) 3.6 cm (d) 2.16 cm



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5. PQ and PR are tangents to the circle of radius 3 cm and centre O. If length of each tangent is 4 cm, then perimeter of ΔOQP is :



- (a) 5 cm (b) 12 cm
(c) 9 cm (d) 8 cm

1

6. The LCM of two numbers is 3600. Which of the following can not be their HCF ?

- (a) 600 (b) 400 (c) 500 (d) 150

1

7. The distance between the points $(-6, 9)$ and $(2, 7)$ is :

- (a) $2\sqrt{17}$ (b) $4\sqrt{17}$ (c) $2\sqrt{5}$ (d) $2\sqrt{15}$

1

8. If $\sec\theta - \tan\theta = 2$, then $\sec\theta + \tan\theta$ is equal to :

- (a) $\frac{1}{2}$ (b) $\sqrt{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) 2

1

9. Three coins are tossed together. The probability that only one coin shows tail, is :

- (a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{7}{8}$ (d) 1

1

10. One of the zeroes of the polynomial $p(x) = kx^2 - 9x + 3$ is $\left(-\frac{3}{2}\right)$. The value of k is :

- (a) $\frac{22}{3}$ (b) $-\frac{14}{3}$ (c) $\frac{14}{3}$ (d) $-\frac{22}{3}$

1

11. Two right circular cylinders of equal volumes have their heights in the ratio 1:2. The ratio of their radii is :

- (a) $\sqrt{2}:1$ (b) 1:2 (c) 1:4 (d) $1:\sqrt{2}$

1

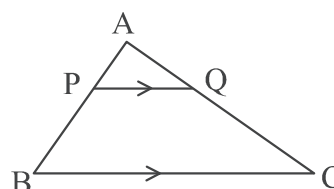
12. If $\sqrt{2}\sin\theta = 1$, then $\cot\theta \times \operatorname{cosec}\theta$ is equal to :

- (a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2\sqrt{2}}$ (c) $\sqrt{2}$ (d) $\frac{1}{2}$

1

13. In ΔABC , $PQ \parallel BC$. It is given that $AP = 2.4$ cm, $PB = 3.6$ cm and $BC = 5.4$ cm. PQ is equal to :

- (a) 2.7 cm (b) 1.8 cm
(c) 3.6 cm (d) 2.16 cm

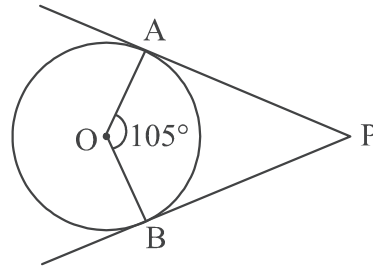


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14. PA and PB are tangents to a circle with centre O. If $\angle AOB = 105^\circ$ then $\angle OAP + \angle APB$ is equal to :



- (a) 75° (b) 175°
(c) 180° (d) 165°

1

15. In an A.P., $a_n - a_{n-4} = 32$. Its common difference is :

- (a) -8 (b) 8 (c) $4n$ (d) 4

1

16. The perimeter of a quadrant of a circle of radius 7 cm, is :

- (a) 18 cm (b) 11 cm (c) 22 cm (d) 25 cm

1

17. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability that drawn card shows number '9' is :

- (a) $\frac{1}{26}$ (b) $\frac{4}{13}$ (c) $\frac{1}{52}$ (d) $\frac{1}{13}$

1

18. The 20th term of the A.P. : $10\sqrt{2}, 6\sqrt{2}, 2\sqrt{2}, \dots$ is :

- (a) $-76 + 10\sqrt{2}$ (b) $-62\sqrt{2}$ (c) $-66\sqrt{2}$ (d) $86\sqrt{2}$

1

Directions :

Question numbers 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions 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 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) :** Median marks of students in a class test is 16. It means half of the class got marks less than 16.

Reason (R) : Median divides the distribution in two equal parts.

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20. **Assertion (A) :** If E is an event such that $P(E) = \frac{1}{999}$,
then $P(\bar{E}) = 0.001$.

Reason (R) : $P(E) + P(\bar{E}) = 1$

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SECTION – B

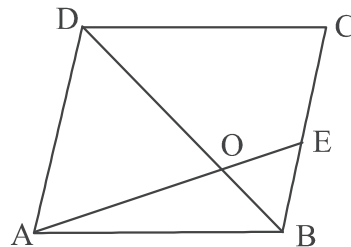
Question Nos. 21 to 25 are very short answer questions of 2 marks each.

21. (A) Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre. 2

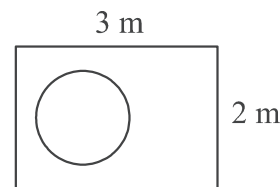
OR

- (B) Prove that the tangents drawn at the ends of a diameter of a circle are parallel. 2
22. Find the ratio in which the segment joining the points $(2, -5)$ and $(5, 3)$ is divided by x -axis. Also, find coordinates of the point on x -axis. 2
23. Show that 45^n can not end with the digit 0, n being a natural number. Write the prime number ' a ' which on multiplying with 45^n makes the product end with the digit 0. 2

24. The diagonal BD of parallelogram ABCD is divided by segment AE in the ratio 1 : 2. If $BE = 1.8$ cm, find the length of AD. 2



25. (A) A coin is dropped at random on the rectangular region shown in the figure. What is the probability that it will land inside the circle with radius 0.7 m ? 2



OR

- (B) A die is thrown twice. What is the probability that (i) difference between two numbers obtained is 3 ? (ii) sum of the numbers obtained is 8 ? 2

SECTION – C

Question Nos. 26 to 31 are short answer questions of 3 marks each.

26. Prove that the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. 3



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27. (A) If points A(− 5, y), B(2, − 2), C(8, 4) and D(x, 5) taken in order, form a parallelogram ABCD, then find the values of x and y. Hence, find lengths of sides of the parallelogram. 3

OR

- (B) A(6, − 3), B(0, 5) and C(− 2, 1) are vertices of ΔABC . Points P(3, 1) and Q(2, − 1) lie on sides AB and AC respectively. Check whether $\frac{AP}{PB} = \frac{AQ}{QC}$. 3

28. Find the zeroes of the polynomial $p(x) = 9x^2 - 6x - 35$ and verify the relationship between zeroes and its coefficients. 3

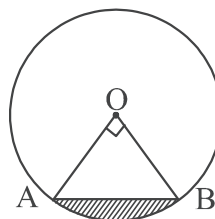
29. Prove that $\sqrt{2}$ is an irrational number. 3

30. (A) Find the sum of the A.P. 7, $10\frac{1}{2}$, 14, 84. 3

OR

- (B) If the sum of first n terms of an A.P. is given by $S_n = \frac{n}{2}(2n + 8)$. Then, find its first term and common difference. Hence, find its 15th term. 3

31. A chord of a circle of radius 14 cm subtends an angle of 90° at the centre. Find perimeter of shaded region. (Use $\sqrt{2} = 1.41$)



3

SECTION – D

Question Nos. 32 to 35 are long answer questions of 5 marks each.

32. The angle of elevation of the top of a tower, 300 m high, from a point on the ground is observed as 30° . At an instant a hot air balloon passes vertically above the tower and at that instant its angle of elevation from same point on the ground is 60° . Find height of the balloon from the ground and distance of tower from point of observation. (Use $\sqrt{3} = 1.73$) 5
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. 5



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OR

- (B) In a ΔABC , P and Q are points on AB and AC respectively such that $PQ \parallel BC$. Prove that the median AD, drawn from A to BC, bisects PQ. 5

34. (A) It is given that $p^2x^2 + (p^2 - q^2)x - q^2 = 0$; ($p \neq 0$)
- (i) Show that the discriminant (D) of above equation is a perfect square.
- (ii) Find the roots of the equation. 5

OR

- (B) Three consecutive positive integers are such that the sum of the square of smallest and product of other two is 67. Find the numbers, using quadratic equation. 5

35. Find 'mean' and 'mode' of the following data : 5

Class	20-25	25-30	30-35	35-40	40-45	45-50
Frequency	9	8	11	13	4	5

SECTION – E

Question Nos. 36 to 38 are case-based questions of 4 marks each.

36. Playing in a ball pool is good entertainment for kids. Suhana bought 600 new balls of diameter 7 cm to fill in the pool for her kids. The cuboidal box containing 600 balls has dimensions $42 \text{ cm} \times 91 \text{ cm} \times 50 \text{ cm}$ ($l \times b \times h$).



Based on above information, answer the following questions :

- (i) Find the volume of one ball. 1
- (ii) 10 balls are painted with neon colours. Determine the area of painted surface. 1
- (iii) (a) Find the volume of empty space in the box. 2

OR

- (iii) (b) The lowermost layer of the balls covers the base of the box edge to edge when balls are placed evenly adjacent to each other. (A) How much area is covered by one ball? (B) How many balls are there in lowermost layer? 2

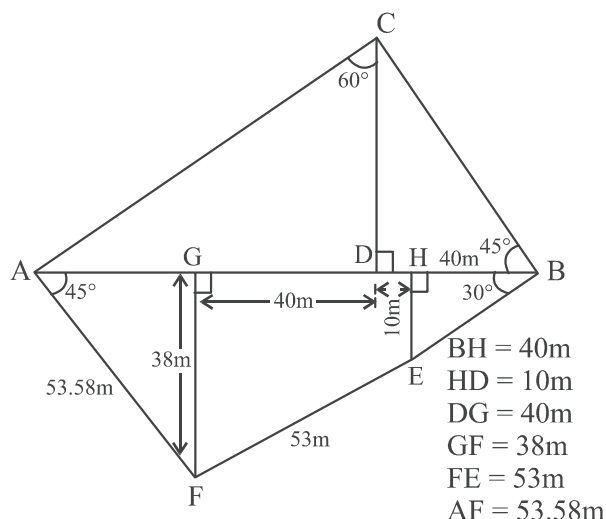


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37. Rahim and Nadeem are two friends whose plots are adjacent to each other. Rahim's son made a drawing of the plots with necessary details.

It is decided that Rahim will fence the triangular plot ABC and Nadeem will fence along the sides AF, FE and BE.

Observe the diagram carefully and answer the following questions :



(Use $\sqrt{2} = 1.41$ and $\sqrt{3} = 1.73$)

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|--|---|
| (i) Find length BC. | 1 |
| (ii) Find length AG. | 1 |
| (iii) (a) Calculate perimeter of $\triangle ABC$. | 2 |

OR

- | | |
|--|---|
| (iii) (b) Calculate length of $(AF + FE + EB)$. | 2 |
|--|---|

38. A telecommunication company came up with two plans—plan A and plan B for its customers. The plans are represented by linear equations where ' t ' represents the time (in minutes) bought and ' C ' represents the cost. The equations are :

Plan A : $3C = 20t$

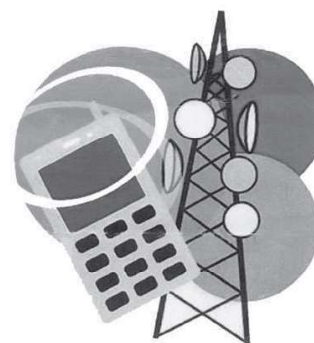
Plan B : $3C = 10t + 300$

Based on above information, answer the following questions :

- | | |
|---|---|
| (i) If you purchase plan B, how much initial amount you have to pay ? | 1 |
| (ii) Charu purchased plan A. How many minutes she bought for ₹ 250 ? | 1 |
| (iii) (a) At how many minutes, do both the plans charge the same amount? What is that amount? | 2 |

OR

- | | |
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| (iii) (b) Which plan is better if you want to buy 60 minutes? Give reason for your answer. | 2 |
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