



Series DA2AB/2

SET~3

रोल नं. Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **430/2/3**

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 / 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) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
Please check that this question paper contains 38 questions.
- (iii) 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.
- (iv) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
Please write down the serial number of the question in the answer-book 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 (बुनियादी)

MATHEMATICS (BASIC)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

430/2/3/DA2AB/21

110 C

Page 1

अधिकतम अंक : 80

Maximum Marks : 80

P.T.O.



General Instructions :

Read the following instructions carefully and follow them :

- (i) *This question paper contains 38 questions. All questions are compulsory.*
- (ii) *Question Paper is divided into five Sections – Section A, B, C, D and E.*
- (iii) *In Section–A question number 1 to 18 are Multiple Choice Questions (MCQs) and question number 19 & 20 are Assertion-Reason based questions of 1 mark each.*
- (iv) *In Section–B question number 21 to 25 are Very Short Answer (VSA) type questions of 2 marks each.*
- (v) *In Section–C question number 26 to 31 are Short Answer (SA) type questions carrying 3 marks each.*
- (vi) *In Section–D question number 32 to 35 are Long Answer (LA) type questions carrying 5 marks each.*
- (vii) *In Section–E question number 36 to 38 are Case Study based questions 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 in Section-E.*
- (ix) *Draw neat diagram wherever required. Take $\pi = 22/7$ wherever required if not stated.*
- (x) *Use of calculators is not allowed.*



खण्ड – क

20 × 1 = 20

(बहुविकल्पीय प्रश्न)

इस खण्ड में 20 बहुविकल्पीय प्रश्न हैं, जिनमें प्रत्येक का 1 अंक है।

1. 20 cm भुजा के एक घन का कुल पृष्ठीय क्षेत्रफल है : 1
 (A) 240 cm^2 (B) 160 cm^2
 (C) 2400 cm^2 (D) 1600 cm^2
2. बहुपद $3x^2 + 8x - 3$ के शून्यक हैं : 1
 (A) $\frac{1}{3}, 3$ (B) $\frac{1}{3}, -3$
 (C) $-\frac{1}{3}, 3$ (D) $-\frac{1}{3}, -3$
3. दो चरों x और y में बने रैखिक समीकरण युग्म $a_1x + b_1y = c_1$ और $a_2x + b_2y = c_2$ का आलेख समांतर रेखाएँ निरूपित करता है, यदि 1
 (A) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
 (C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
4. मूल बिंदु से बिंदु (5, 4) की दूरी है : 1
 (A) 41 (B) $\sqrt{41}$
 (C) 3 (D) 9
5. $\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$ बराबर है : 1
 (A) $\cos 60^\circ$ (B) $\sin 60^\circ$
 (C) $\tan 60^\circ$ (D) $\sin 30^\circ$
6. यदि एक 6 m ऊँचे खंभे की छाया भूमि पर $2\sqrt{3}$ m लम्बी है, तो सूर्य का उन्नतांश है : 1
 (A) 30° (B) 45°
 (C) 60° (D) 90°



Section – A

20 × 1 = 20

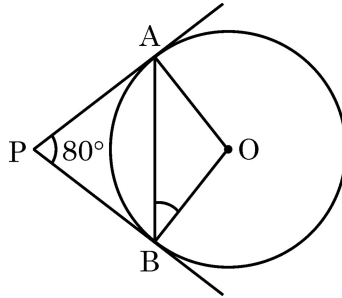
(Multiple Choice Questions)

Section-A consists of 20 Multiple Choice Questions of 1 mark each.

1. The total surface area of a cube of side 20 cm is 1
(A) 240 cm² (B) 160 cm²
(C) 2400 cm² (D) 1600 cm²
2. The zeroes of the polynomial $3x^2 + 8x - 3$ are : 1
(A) $\frac{1}{3}, 3$ (B) $\frac{1}{3}, -3$
(C) $-\frac{1}{3}, 3$ (D) $-\frac{1}{3}, -3$
3. The graph of a pair of linear equations $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ in two variables x and y represents parallel lines, if 1
(A) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
(C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
4. The distance of the point (5, 4) from the origin is 1
(A) 41 (B) $\sqrt{41}$
(C) 3 (D) 9
5. $\frac{2 \tan 30^\circ}{1 - \tan^2 30^\circ}$ is equal to 1
(A) $\cos 60^\circ$ (B) $\sin 60^\circ$
(C) $\tan 60^\circ$ (D) $\sin 30^\circ$
6. If a pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the sun's elevation is : 1
(A) 30° (B) 45°
(C) 60° (D) 90°



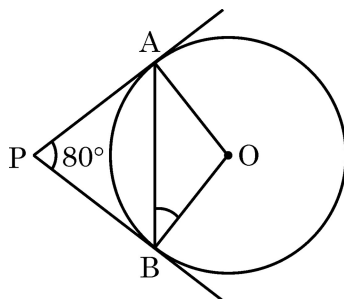
7. यदि $P(A)$ किसी घटना A की प्रायिकता को दर्शाता हो, तो 1
- (A) $P(A) < 0$ (B) $P(A) > 1$
 (C) $0 \leq P(A) \leq 1$ (D) $-1 \leq P(A) \leq 1$
8. एक रेखा जो एक वृत्त को दो अलग-अलग बिंदुओं पर काटती है, कहलाती है : 1
- (A) छेदक रेखा (B) जीवा
 (C) व्यास (D) स्पर्श-रेखा
9. यदि n एक प्राकृत संख्या है, तो निम्न में से कौन सी संख्या अंक 0 पर समाप्त होगी ? 1
- (A) $(3 \times 2)^n$ (B) $(5 \times 2)^n$
 (C) $(6 \times 2)^n$ (D) $(4 \times 2)^n$
10. यदि $5 \cos A - 4 = 0$ है, तो $\tan A$ का मान है : 1
- (A) $\frac{3}{4}$ (B) $\frac{4}{3}$
 (C) $\frac{3}{5}$ (D) $\frac{4}{5}$
11. दी गई आकृति में एक बिंदु P से O केंद्र वाले किसी वृत्त पर PA और PB स्पर्श-रेखाएँ परस्पर 80° के कोण पर झुकी हैं। $\angle ABO$ की माप है : 1



- (A) 40° (B) 80°
 (C) 100° (D) 50°
12. निम्न में से किस समीकरण का मूल 2 है ? 1
- (A) $x^2 - 4x + 5 = 0$ (B) $x^2 + 3x - 12 = 0$
 (C) $2x^2 - 7x + 6 = 0$ (D) $3x^2 - 6x - 2 = 0$



7. If $P(A)$ denotes the probability of an event A , then 1
(A) $P(A) < 0$ (B) $P(A) > 1$
(C) $0 \leq P(A) \leq 1$ (D) $-1 \leq P(A) \leq 1$
8. A line intersecting a circle in two distinct points is called a 1
(A) secant (B) chord
(C) diameter (D) tangent
9. If n is any natural number, then which of the following numbers ends with digit 0 ? 1
(A) $(3 \times 2)^n$ (B) $(5 \times 2)^n$
(C) $(6 \times 2)^n$ (D) $(4 \times 2)^n$
10. If $5 \cos A - 4 = 0$, then the value of $\tan A$ is 1
(A) $\frac{3}{4}$ (B) $\frac{4}{3}$
(C) $\frac{3}{5}$ (D) $\frac{4}{5}$
11. In the given figure, tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80° . $\angle ABO$ is equal to 1



- (A) 40° (B) 80°
(C) 100° (D) 50°
12. Which of the following equations has 2 as a root ? 1
(A) $x^2 - 4x + 5 = 0$ (B) $x^2 + 3x - 12 = 0$
(C) $2x^2 - 7x + 6 = 0$ (D) $3x^2 - 6x - 2 = 0$



13. द्विघात बहुपद जिसके शून्यकों का योग -5 और गुणनफल 6 है, है : 1

- (A) $x^2 + 5x + 6$ (B) $x^2 - 5x + 6$
(C) $x^2 - 5x - 6$ (D) $-x^2 + 5x + 6$

14. 'p' का मान जिसके लिए समीकरण युग्म $-2x + 3y - 9 = 0$ और $4x + py + 7 = 0$ का केवल एक हल (अद्वितीय) है, है : 1

- (A) $p \neq 6$ (B) $p = 6$
(C) $p = -6$ (D) $p \neq -6$

15. $\frac{\operatorname{cosec}^2 A - \cot^2 A}{1 - \sin^2 A}$ बराबर है : 1

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

16. एक शहर का पिछले 66 दिनों का बारिश का वार्षिक रिकार्ड नीचे तालिका में दिया है : 1

बारिश (cm में) :	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
दिनों की संख्या :	22	10	8	15	5	6

बहुलक वर्ग तथा माध्यक वर्ग की ऊपरी सीमाओं का अन्तर है :

- (A) 10 (B) 15
(C) 20 (D) 30

17. 21 cm त्रिज्या के एक वृत्त के 120° के कोण के लघु त्रिज्यखंड और संगत दीर्घ त्रिज्यखंड के क्षेत्रफलों का अन्तर है : 1

- (A) 231 cm^2 (B) 462 cm^2
(C) 346.5 cm^2 (D) 693 cm^2

18. एक समांतर श्रेणी में, यदि $d = -4$ और $a_7 = 4$ है, तो इसका पहला पद 'a' बराबर है : 1

- (A) 6 के (B) 7 के
(C) 20 के (D) 28 के



13. A quadratic polynomial, the sum of whose zeroes is -5 and their product is 6 , is 1
 (A) $x^2 + 5x + 6$ (B) $x^2 - 5x + 6$
 (C) $x^2 - 5x - 6$ (D) $-x^2 + 5x + 6$
14. The value of 'p' for which the pair of equations $-2x + 3y - 9 = 0$ and $4x + py + 7 = 0$ has a unique solution is 1
 (A) $p \neq 6$ (B) $p = 6$
 (C) $p = -6$ (D) $p \neq -6$
15. $\frac{\operatorname{cosec}^2 A - \cot^2 A}{1 - \sin^2 A}$ is equal to 1
 (A) $\sin^2 A$ (B) $\cos^2 A$
 (C) $\sec^2 A$ (D) $\tan^2 A$
16. The annual rainfall record of a city for 66 days is given in the following table : 1
- | | | | | | | |
|---------------------------|--------|---------|---------|---------|---------|---------|
| Rainfall (in cm) : | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 |
| Number of days : | 22 | 10 | 8 | 15 | 5 | 6 |
- The difference of upper limits of modal and median classes is :
 (A) 10 (B) 15
 (C) 20 (D) 30
17. The difference of the areas of a minor sector of angle 120° and its corresponding major sector of a circle of radius 21 cm, is 1
 (A) 231 cm^2 (B) 462 cm^2
 (C) 346.5 cm^2 (D) 693 cm^2
18. In an A.P., if $d = -4$ and $a_7 = 4$, then the first term 'a' is equal to 1
 (A) 6 (B) 7
 (C) 20 (D) 28



(Assertion – Reason based questions)

Directions : In question numbers **19** and **20**, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option :

- (A) Both Assertion (A) and Reason (R) are correct and Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are correct 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) :** A line drawn parallel to any one side of a triangle intersects the other two sides in the same ratio. 1

Reason (R) : Parallel lines cannot be drawn to any side of a triangle.

20. **Assertion (A) :** The point (0, 4) lies on y – axis. 1

Reason (R) : The x-coordinate of a point, lying on y – axis, is zero.

Section – B

(Very Short Answer Type Questions)

Q. Nos. **21** to **25** are Very Short Answer type questions of **2** marks each.

21. 15 defective pens are accidentally mixed with 145 good ones. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one. 2

22. Prove that the tangents drawn at the ends of a diameter of a circle are parallel to each other. 2

23. Find the LCM of 231 and 396 by prime factorisation method. 2

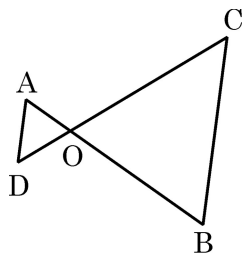
24. (a) The sum of two natural numbers is 70 and their difference is 10. Find the natural numbers. 2

OR

- (b) Solve for x and y : 2
- $$x - 3y = 7$$
- $$3x - 3y = 5$$

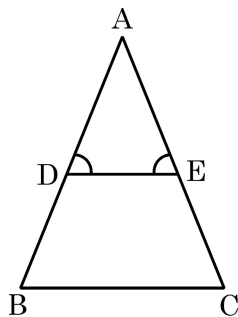


25. (a) In the given figure, $OA \cdot OB = OC \cdot OD$. Prove that $\triangle AOD \sim \triangle COB$. 2



OR

- (b) In the given figure, $\angle D = \angle E$ and $\frac{AD}{DB} = \frac{AE}{EC}$. Prove that $\triangle ABC$ is isosceles. 2



Section – C

(Short Answer Type Questions)

Q. Nos. 26 to 31 are Short Answer type questions of 3 marks each.

26. (a) Zeroes of the quadratic polynomial $x^2 - 3x + 2$ are α and β . Construct a quadratic polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$. 3

OR

- (b) Find the zeroes of the polynomial $4x^2 - 4x + 1$ and verify the relationship between the zeroes and the coefficients. 3

27. A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120° . Find the area cleaned at each sweep of the blades. 3



28. All the kings and queens are removed from a deck of 52 playing cards. Remaining cards are well shuffled and then a card is drawn at random. Find the probability that the drawn card is 1+1+1
- (a) an ace of hearts
(b) a black card
(c) a jack of spades

29. (a) In two concentric circles, a chord of length 24 cm of larger circle touches the smaller circle, whose radius is 5 cm. Find the radius of the larger circle. 3

OR

- (b) 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. 3

30. Prove that $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$ 3

31. Prove that $5\sqrt{2} - 3$ is an irrational number, given that $\sqrt{2}$ is an irrational number. 3

Section – D

(Long Answer Type Questions)

Q. Nos. 32 to 35 are Long Answer type questions of 5 marks each.

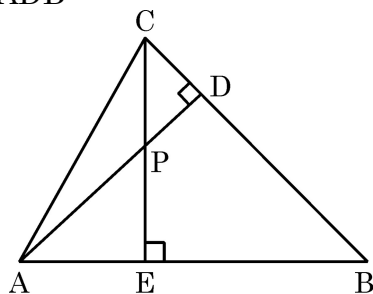
32. As observed from the top of a 75 m light house from the sea-level, the angles of depression of two ships are 30° and 45° . If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships. [Use $\sqrt{3} = 1.732$] 5



33. (a) In the given figure, altitudes CE and AD of $\triangle ABC$ intersect each other at the point P . 1+2+2

Show that

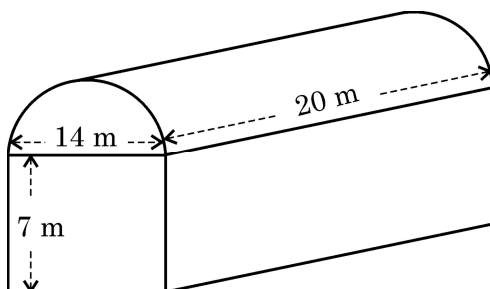
- (i) $\triangle AEP \sim \triangle CDP$
- (ii) $\triangle ABD \sim \triangle CBE$
- (iii) $\triangle AEP \sim \triangle ADB$



OR

- (b) AD and PM are medians of triangles ABC and PQR , respectively, where $\triangle ABC \sim \triangle PQR$. Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$. 5

34. (a) 5



A textile industry runs in a shed. This shed is in the shape of a cuboid surmounted by a half cylinder. If the base of the industry is of dimensions $14 \text{ m} \times 20 \text{ m}$ and the height of the cuboidal portion is 7 m , find the volume of air that the industry can hold. Further, suppose the machinery in the industry occupies a total space of 400 m^3 . Then, how much space is left in the industry ?

OR

- (b) From a solid cylinder of height 8 cm and radius 6 cm , a conical cavity of the same height and same radius is carved out. Find the total surface area of the remaining solid. (Take $\pi = 3.14$) 5

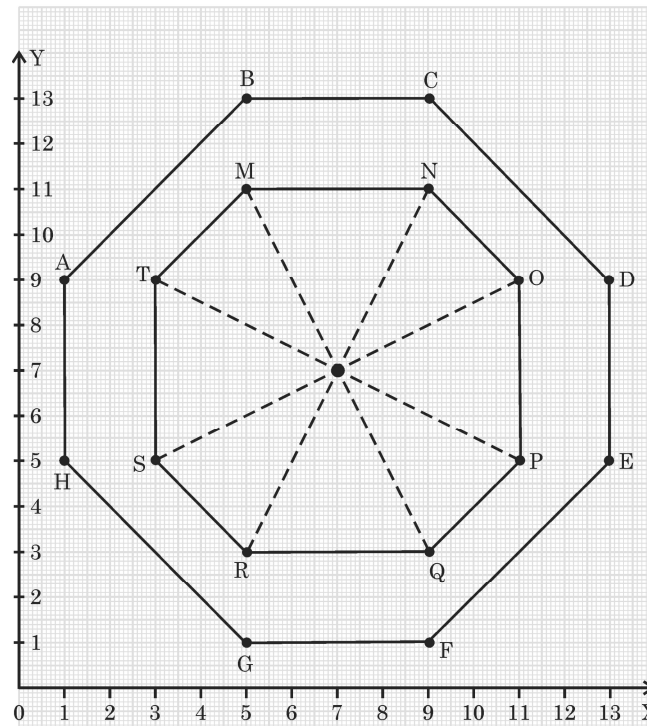
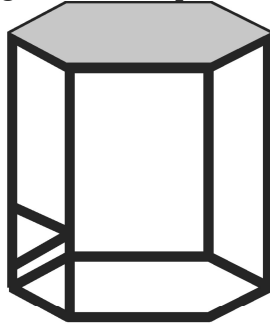
35. The area of a rectangular plot is 528 m^2 . The length of the plot (in metres) is one more than twice the breadth. Find the length and breadth of the plot. Also, find the cost of levelling the plot at the rate of ₹ 80 per square metre. 5



Section – E
(Case Study based Questions)

Q. Nos. 36 to 38 are Case Study based Questions of 4 marks each.

36. The top of a table is hexagonal in shape.



On the basis of the information given above, answer the following questions :

- | | |
|---|---|
| (i) Write the coordinates of A and B. | 1 |
| (ii) Write the coordinates of the mid-point of line segment joining C and D. | 1 |
| (iii) (a) Find the distance between M and Q. | 2 |
| OR | |
| (iii) (b) Find the coordinates of the point which divides the line segment joining M and N in the ratio 1:3 internally. | 2 |



37. Saving money is a good habit and it should be inculcated in children right from the beginning. Rehan's mother brought a piggy bank for Rehan and puts one ₹ 5 coin of her savings in the piggy bank on the first day. She increases his savings by one ₹ 5 coin daily.



Based on the above information, answer the following questions :

- (i) How many coins were added to the piggy bank on 8th day ? 1
- (ii) How much money will be there in the piggy bank after 8 days ? 1
- (iii) (a) If the piggy bank can hold one hundred twenty ₹ 5 coins in all, find the number of days she can contribute to put ₹ 5 coins into it. 2

OR

- (iii) (b) Find the total money saved, when the piggy bank is full. 2



38. Heart Rate : The heart rate is one of the 'vital signs' of health in the human body. It measures the number of times per minute that the heart contracts or beats. While a normal heart rate does not guarantee that a person is free of health problems, it is a useful benchmark for identifying a range of health issues.



Thirty women were examined by doctors of AIIMS and the number of heart beats per minute were recorded and summarized as follows :

Number of heart beats per minute	Number of Women
65 – 68	2
68 – 71	4
71 – 74	3
74 – 77	8
77 – 80	7
80 – 83	4
83 – 86	2

Based on the above information, answer the following questions :

- (i) How many women are having heart beat in the range 68 – 77 ? 1
- (ii) What is the median class of heart beats per minute for these women ? 1
- (iii) (a) Find the modal value of heart beats per minute for these women. 2
- OR**
- (iii) (b) Find the median value of heart beats per minute for these women. 2

