Series ωZWYX

Set-5

प्रश्न-पत्र कोड
Q.P. Code **30(B)**

रोल नं.
Roll No.

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.

गणित (मानक)
(केवल दृष्टिबाधित परीक्षार्थियों के लिए)

MATHEMATICS (STANDARD)
(FOR VISUALLY IMPAIRED CANDIDATES ONLY)

*निर्धारित समय : **3** घण्टे* | *अधिकतम अंक : **80***

*Time allowed : **3** hours* | *Maximum Marks : **80***

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **38** प्रश्न हैं ।
- **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें ।**
- 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 ।

- Please check that this question paper contains **23** printed pages.
- 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.
- Please check that this question paper contains **38** questions.
- **Please write down the serial number of the question in the answer-book before attempting it.**
- 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 students will read the question paper only and will not write any answer on the answer-book during this period.

General Instructions :

Read the following instructions very carefully and strictly follow them :

*(i) This question paper comprises **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** – Questions no. **1** to **18** are Multiple Choice (MCQ) type Questions and questions no. **19** and **20** are Assertion-Reason based questions, carrying **1** mark each.*

*(iv) **Section B** – Questions No. **21** to **25** are Very Short Answer (VSA) type questions. Each question carries **2** marks.*

*(v) **Section C** – Questions No. **26** to **31** are Short Answer (SA) type questions. Each question carries **3** marks.*

*(vi) **Section D** – Questions No. **32** to **35** are Long Answer (LA) type questions. Each question carries **5** marks.*

*(vii) **Section E** – Questions No. **36** to **38** are 3 case study based units of assessment 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. Only one of the alternatives has to be attempted.

(ix) Take $\pi = \frac{22}{7}$ *wherever required if not stated.*

*(x) Use of calculators is **not allowed**.*

SECTION A

*This section has **20** Multiple Choice Questions. Each question carries **1** mark.*

1. The greatest number which divides both 30 and 80, leaving remainder 2 and 3 respectively, is :

(a) 10 (b) 7

(c) 11 (d) 14

2. The ratio of HCF and LCM of the least prime number and the least composite number, is :

(a) 1 : 2 (b) 2 : 1

(c) 1 : 3 (d) 1 : 1

3. The value of t for which the pair of linear equations $(t + 3)\,x - 3y = t;\ tx + ty + 12 = 0$ have infinitely many solutions, is :

(a) 6 (b) 0

(c) – 6 (d) 12

4. The number of zeroes of a quadratic polynomial, whose graph intersects the y-axis at exactly one point and does not intersect the x-axis, is :

(a) 0 (b) 1

(c) 2 (d) 3

5. If $ax^2 + bx + c = 0$ has equal roots, then the value of a is :

(a) $-\frac{b}{4c}$ (b) $\frac{b^2}{4c}$

(c) $-\frac{b^2}{4c}$ (d) $\frac{b^2}{4ac}$

6. The point P on y-axis equidistant from the points (– 2, 7) and (3, 6) is :

(a) (0, 1) (b) (4, 0)

(c) (0, 4) (d) (0, –1)

7. The ratio in which the x-axis divides the line segment joining the points A(– 6, 5) and B(– 4, –1) is :

(a) 1 : 5 (b) 1 : 7

(c) 5 : 1 (d) 7 : 1

8. The point which lies on the perpendicular bisector of the line segment joining the points A(– 3, – 4) and B(3, 4) is :

(a) (0, 0) (b) (0, 3)

(c) (3, 0) (d) (– 3, 0)

9. In two triangles PQR and LMN, if $\frac{PQ}{MN} = \frac{QR}{LN} = \frac{PR}{LM}$, then :

(a) Δ LMN ~ Δ RPQ (b) Δ LMN ~ Δ PQR

(c) Δ RQP ~ Δ LMN (d) Δ QRP ~ Δ LMN

10. If Δ ABC ~ Δ DEF, AB = 6 cm, DE = 9 cm, EF = 6 cm and FD = 12 cm, then the perimeter of Δ ABC is :

(a) 28 cm (b) 28·5 cm

(c) 18 cm (d) 23 cm

11. Quadrilateral ABCD circumscribes a circle. If BC = 7 cm, CD = 4 cm and AD = 3 cm, then the length of AB is :

(a) 3 cm (b) 4 cm

(c) 7 cm (d) 6 cm

12. If $\sqrt{3}\tan 2\theta = 3$, $0° < 2\theta < 90°$, then the value of $\sin\theta + \sqrt{3}\cos\theta$ is :

(a) 2 (b) $\sqrt{3}$

(c) $\frac{\sqrt{3}+1}{\sqrt{2}}$ (d) 1

13. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta$ equals :

(a) $\frac{1}{\sqrt{2}}\sin\theta$ (b) $\sqrt{2}\sin\theta$

(c) $2\sin\theta$ (d) $\frac{1}{2}\sin\theta$

14. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, $0° < A + B < 90°$, $A > B$, then the values of A and B respectively are :

(a) $60°, 30°$ (b) $60°, 45°$

(c) $45°, 15°$ (d) $60°, 15°$

15. The difference of the areas (in cm^2) of two segments of a circle of radius 5 cm, formed by a chord subtending an angle of $90°$ at the centre is :

(a) $\left(\frac{25\pi}{4} - \frac{25}{2}\right)$

(b) $\left(\frac{25\pi}{2} + 25\right)$

(c) $\left(\frac{15\pi}{4} - \frac{7}{2}\right)$

(d) $\left(\frac{7\pi}{4} - \frac{3}{2}\right)$

16. The area (in cm^2) of a sector of a circle of radius 21 cm cut off by an arc of length 22 cm is :

(a) 441 (b) 321

(c) 231 (d) 221

17. A 'top' is of the shape of a cone mounted over a hemisphere of same radius. The radius of hemisphere is 3·5 cm and the total height of the top is 15·5 cm. The total surface area of the 'top' (in cm^2) is :

(a) 2145 (b) 21·45

(c) 215·4 (d) 214·5

18. In the following frequency distribution :

Height (in cm)	*Number of Students*
100 – 115	15
115 – 130	13
130 – 145	11
145 – 160	10
160 – 175	11

the sum of the lower limit of the modal class and the upper limit of the median class is :

(a) 230

(b) 260

(c) 245

(d) 275

For Questions number 19 and 20, two statements are given — one labelled as Assertion (A) and the other 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 the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of the Assertion (A).

(c) Assertion (A) is true and Reason (R) is false.

(d) Assertion (A) is false and Reason (R) is true.

19. *Assertion (A) :* If the Mean and the Median of a distribution are 169 and 170 respectively, then its Mode is 172.

Reason (R) : The relation between Mean, Median and Mode is :

Mode = 3 Median – 2 Mean.

20. *Assertion (A) :* The probability of randomly drawing a card with an even number from a box containing cards numbered 1 to 100 is $\frac{1}{2}$.

Reason (R) : $\text{P (event)} = \dfrac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$

SECTION B

This section comprises Very Short Answer (VSA) type questions. Each question carries ***2*** *marks.*

21. (a) For what values of k does the pair of equations given below have a unique solution ?

$$6x + ky + 9 = 0; \quad 2x + 3y + 4 = 0$$

OR

(b) Solve the following pair of linear equations by elimination method :

$$7x - 2y = 3; \quad 11x - \frac{3}{2}y = 8$$

22. P and Q are respectively the points on the sides AB and AC of a triangle ABC such that AB = 12·5 cm, AP = 5 cm and CQ = 6 cm. If PQ || BC, then find the length of AQ.

23. If a hexagon ABCDEF circumscribes a circle, show that AB + CD + EF = BC + DE + FA.

24. (a) Evaluate :

$$\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \sin^2 60^\circ}$$

OR

(b) Prove that :

$$\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$$

25. The length of the minute-hand of a clock is 14 cm. Find the area swept by the minute-hand in 20 minutes.

SECTION C

*This section comprises Short Answer (SA) type questions. Each question carries **3** marks.*

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

27. If α and β are the zeroes of the polynomial $3x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{19}{9}$, then find the value of k.

28. (a) A 2-digit number is 4 times the sum of its digits and twice the product of the digits. Find the number.

OR

(b) Solve for x and y :

$$\frac{ax}{b} + \frac{by}{a} = a - b$$

$$ax - by = 2ab$$

29. (a) Two tangents PA and PB are drawn to a circle with centre O from an external point P. Prove that $\angle$ APB = 2 $\angle$ OAB.

OR

(b) If AP and DQ are medians of triangles ABC and DEF respectively, where Δ ABC ~ Δ DEF, then prove that $\frac{AB}{DE} = \frac{AP}{DQ}$.

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

31. 20 cards, numbered 1 to 20 are mixed thoroughly and then a card is drawn at random. Find the probability that the number on the drawn card is a multiple of 3 or 5.

SECTION D

This section comprises Long Answer (LA) type questions. Each question carries ***5*** *marks.*

32. (a) If -3 is a root of the quadratic equation $3x^2 + 14x + p = 0$, find p and hence find k so that the roots of the quadratic equation $x^2 + k(4x + k - 4) + p = 0$ are equal.

OR

(b) Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the numbers.

33. Prove that the lengths of the tangents drawn from an external point to a circle are equal. Using this result, find the radius of a circle inscribed in a right-angled triangle ABC with $\angle B = 90^\circ$, AB = 8 cm and BC = 6 cm.

34. (a) From a solid cone, whose height is 16 cm and radius of base is 12 cm, a right circular cylindrical cavity of height 3 cm and radius 4 cm is hollowed out such that bases of cone and cylinder form concentric circles. Find the volume of the remaining solid.

OR

(b) A hemispherical depression is cut off from one face of a cubical wooden block such that the diameter 14 cm of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

35. The table below shows the daily expenditure on food of 25 households in a locality.

Daily Expenditure (in ₹)	*Number of Households*
100 – 150	4
150 – 200	5
200 – 250	12
250 – 300	2
300 – 350	2

Find the mean daily expenditure on food.

SECTION E

*In this section, there are 3 case study based units of assessment of **4** marks each.*

Case Study – 1

36. Ravindra took a loan of ₹ 3,45,000 from a bank to buy a car, and decided to pay back by ₹ 2,000 at the end of the first month and then increased the instalment amount by ₹ 200 each month.

Based on the above, answer the following questions :

(a) Find the amount paid by him in 10^{th} instalment. *1*

(b) Find the total amount paid by him in first 10 instalments. *1*

(c) In how many instalments would he clear his total loan ? *2*

OR

(c) What amount will he be able to clear in his first 45 instalments ? *2*

Case Study – 2

37. In a classroom, 4 friends Ravi, Vinod, Raghav and Vithal are seated at the points A(2, 3), B(7, 8), C(10, 5) and D(5, 0) respectively.

Based on the above, answer the following questions :

(a) Find the distance between Ravi and Raghav. *1*

(b) Find the distance between Vinod and Vithal. *1*

(c) Show that ABCD is a rectangle. *2*

OR

(c) Find the perimeter of rectangle ABCD. *2*

Case Study – 3

38. Two lamp posts are of equal heights. A boy measured the elevation of the top of each lamp post from the mid-point of the line segment joining the feet of the lamp post, as 30°. After walking 15 m towards one of them, he measured the elevation of the top of the nearest lamp post at the point where he stands as 60°.

Based on the above, answer the following questions :

(a) Taking h (metres) as the height of each lamp post and x (metres) as the distance between the feet of two lamp posts, find a relation between x and h. *1*

(b) After moving 15 m towards one lamp post, what is the relation between x and h ? *1*

(c) Find the height of each lamp post. *2*

OR

(c) Find the distance between the two lamp posts. *2*