15E & 16E

Total No. of Printed Pages : 7

Question Booklet Sl. No.
3520150

MATHEMATICS

(English Version)

Time : 3 Hours 15 Minutes | Max. Marks : 100

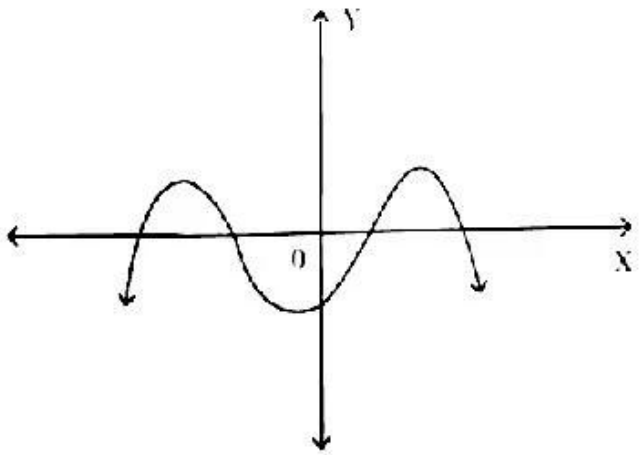
Instructions :

1) In the duration of **3** hours **15** minutes, **15** minutes of time is allotted to read the question paper.
2) **All** the answers shall be written in the answer booklet **only**.
3) Question paper consists of **4** Sections and **33** Questions.
4) Internal choice is available in Section – **IV only**.
5) Answers shall be written **neatly** and **legibly**.

SECTION – I (12×1=12)

Note : 1) Answer **all** the questions in **one** word or **a** phrase.
2) **Each** question carries **1** mark.

1. What is the HCF of 37 and 49 ?
2. $\mathbb{N} = \{1, 2, 3, \ldots\}$. This set is a/an __ set. (Finite Infinite)
3. Find the number of zeroes of the polynomial p(x), whose graph is given.



4. Which of the following equations is not a linear equation ?

(A) $5 + 4x = y + 3$

(B) $x + 2y = y - x$

(C) $3 - x = y^2 + 4$

(D) $x + y = 0$

5. **Statement – I** : $2x^2 - x = 5$ is a quadratic equation.

Statement – II : General form of the quadratic equation is $ax^2 + bx + c = 0$, where $a \neq 0$.

Now, choose the correct answer.

(A) Both statements are true

(B) Statement I is true and Statement II is false

(C) Statement I is false and Statement II is true

(D) Both statements are false

6. Match the following :

i. $\tan\theta$	p.	$\frac{1}{\cos\theta}$
ii. $\sec\theta$	q.	$\frac{1}{\sin\theta}$
iii. $\operatorname{cosec}\theta$	r.	$\frac{\sin\theta}{\cos\theta}$

Choose the correct answer

(A) i → r, ii → p, iii → q

(B) i → r, ii → q, iii → p

(C) i → p, ii → q, iii → r

(D) i → q, ii → r, iii → p

7. Distance between the two points (2, 0) and (6, 0) is _____ units.

8. The n^{th} term of G.P. is $a_n = a.r^{n-1}$. Here, 'r' represents _____.

9. Two _____ are not always similar.

(A) Line segments

(B) Triangles

(C) Circles

(D) Squares

10. Number of tangents drawn from the external point to the circle is _____.

11. What is the length of the edge of the cube whose volume is 64 cm^3 ?

(A) 4 cm

(B) 16 cm

(C) 5 cm

(D) 6 cm

12. Which of the following cannot be the probability of an event ?

(A) 0.3

(B) – 1.5

(C) 15%

(D) $\frac{2}{7}$

(8×2=16

SECTION – II

Note : 1) Answer all the questions.

2) Each question carries 2 marks.

13. Check whether 3 and – 2 are the zeroes of the polynomial $p(x) = x^2 - x - 6$.

14. 5 pencils and 7 pens together cost ₹ 50, whereas 7 pencils and 5 pens together cost ₹ 46. Represent this information in the form of pair of linear equations in variables x and y.

15. Check whether $(x - 2)^2 + 1 = 2x - 3$ is a quadratic equation.

16. Find the centroid of the triangle whose vertices are (3, – 2), (– 2, 8) and (0, 4).

17. A flag pole 4 m tall casts 6 m shadow. At the same time, a nearby building casts a shadow of 24 m. How tall is the building ?

18. Calculate the length of the tangent drawn from a point 15 cm away from the centre of a circle of radius 9 cm.

19. A solid toy is in the form of right circular cylinder with hemispherical shape at one end and a cone at the other end. Draw a rough diagram of this solid toy.

20. Express $\sin 81° + \tan 81°$ in terms of trigonometric ratios of angles between 0° and 45°.

SECTION – III

(8×4=32

Note : 1) Answer all the questions.

2) Each question carries 4 marks.

21. If $x^2 + y^2 = 25xy$, then prove that $2\log(x + y) = 3\log 3 + \log x + \log y$.

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22. Draw the Venn diagrams of A∪B, A∩B, A − B and B − A (Here A, B are non-empty sets)

23. Solve the pair of linear equations 3x + 2y = 11 and 2x + 3y = 4.

24. Find the roots of the quadratic equation $2x^2 + x - 1 = 0$.

25. Find the volume and surface area of a sphere of radius 2.1 cm. $\left(\text{Take } \pi = \frac{22}{7}\right)$.

26. Simplify $(1 - \cos\theta)(1 + \cos\theta)(1 + \cot^2\theta)$.

27. A die is thrown once. Find the probability of getting

    i) a prime number

    ii) an odd number.

28. Write the formula to find the median of a grouped data and explain the terms involved in it

SECTION – IV

(5×8=40)

Note : 1) Answer **all** the questions.

2) Each question carries **8** marks.

3) There is an **internal** choice for **each** question.

29. a) Prove that $\sqrt{7}$ is irrational.

OR

b) ABC is a right triangle right angled at C. Let BC = a, CA = b, AB = c and let p be the length of perpendicular from C on AB. Prove that

i) pc = ab

ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

P.T.O.

30. a) If A = {1, 3, 4, 5, 7}, B = {2, 4, 5, 6}, C = {4, 5, 8, 9}, D = {1, 3, 7, 8}, then find

i) $A \cup B$

ii) $B \cap D$

iii) $A \cap D$

iv) $C - D$

OR

b) A sum of ₹ 700 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is ₹ 20 less than its preceding prize, find the value of each of the prizes.

31. a) Find the co-ordinates of the points of trisection of the line segment joining (4, – 1) and (– 2, – 3).

OR

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

Daily Expenditure (in Rupees)	100 – 150	150 – 200	200 – 250	250 – 300	300 – 350
No. of Households	4	5	12	2	2

Find the mean daily expenditure on food by a suitable method.

32. a) Two poles of equal heights are standing opposite to each other on either side of the road, which is 120 feet wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distance of the point from the poles.

OR

b) One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting :

i) a face card

ii) a spade

iii) the queen of diamonds

iv) the king of hearts.

13. a) Draw the graph of the polynomial $p(x) = x^2 - x - 12$ and find its zeroes.

OR

b) Construct a triangle of sides 4 cm, 5 cm and 6 cm. Then, construct a triangle similar to it, whose sides are $\frac{3}{4}$ of the corresponding sides of the first triangle.