



GravIIty Academy Talent Hut Award Scholarship cum Entrance Exam (GATHA) JEE - Sample Paper

Duration: 1.30 min

Total Marks: 200

Instructions to Candidates:

- 1) This booklet is your question paper. Answer is to be marked on the OMR sheet provided.
- 2) Blank sheet is provided for rough work along with the question paper.
- 3) Log table, Slide rule, Calculator, Cellular phones and other electronic devices in any form are NOT allowed in the examination hall.
- 4) USE ONLY BLACK OR BLUE BALL PEN TO DARKEN YOUR ANSWERS.
- 5) This question booklet contain 50 objective type questions. 50 Questions (Q. No. 1 to 50) Mathematics.
- 6) Only one choice is correct.
- 7) Each question with correct response shall be awarded 4 Marks.
- 8) There is No Negative Marking.

MATHEMATICS

1. One of the factors of the expression $x^4 + 8x$ is -
(A) $x + 2$ (B) $x - 2$ (C) $x^2 + 8$ (D) $x^2 + 2x + 2$
2. One of the factor of the expression $(a + b)^3 - (a - b)^3$ is -
(A) a (B) $3a^2 - b$ (C) $2b$ (D) $(a + b)(a - b)$
3. If $p(x) = 2x^3 + 5x^2 - 3x - 2$ is divided by $(x - 1)$ then remainder is -
(A) 2 (B) -1 (C) 0 (D) -2
4. Zero of the polynomials $2x^4 + 9x^3 + 11x^2 + 4x - 26$ is -
(A) 1 (B) -1 (C) 3 (D) -3
5. How many prime number are there between 0 and 30:-
(A) 9 (B) 10 (C) 8 (D) 11
6. Two irrational numbers between 2 and 2.5 are:-
(A) $\sqrt{5}$ and $\sqrt{2} + \sqrt{5}$ (B) $\sqrt{5}$ and $\sqrt{2} + \sqrt{5}$ (C) $\sqrt{5}$ and $\sqrt{2} + \sqrt{7}$ (D) None of these
7. The exponential form of $\sqrt{\sqrt{2}\sqrt{3}}$ is:-
(A) $6^{1/2}$ (B) $6^{1/3}$ (C) $6^{1/4}$ (D) 6
8. The rational form of -25.6875 is:-
(A) $\frac{411}{16}$ (B) $\frac{421}{16}$ (C) $\frac{431}{16}$ (D) $\frac{441}{16}$
9. The rational form of $2.\overline{7435}$ is:-
(A) $\frac{27161}{999}$ (B) $\frac{27}{99}$ (C) $\frac{27161}{9900}$ (D) $\frac{27191}{9000}$

10. The perimeter of an isosceles triangle is equal to 14 cm, the lateral side is to the base in the ratio 5: 4. The area of the triangle is
 (A) $\frac{1}{2}\sqrt{21}\text{ cm}^2$ (B) $\frac{3}{2}\sqrt{21}\text{ cm}^2$ (C) $\sqrt{21}\text{ cm}^2$ (D) $2\sqrt{21}\text{ cm}^2$
11. If the area of an equilateral triangle is $24\sqrt{3}$ sq. m, then its perimeter is:
 (A) 96 m (B) $12\sqrt{6}$ m (C) $4\sqrt{6}$ m (D) $2\sqrt{6}$ m
12. The ratio of the area of square of side a and equilateral triangle of side a, is :
 (A) 2: 1 (B) 2: $\sqrt{3}$ (C) 4: 3 (D) 4: $\sqrt{3}$
13. If every side of a triangle is doubled, then increase in the area of the triangle is:
 (A) $(\sqrt{2} \times 100)\%$ (B) 200 % (C) 300 % (D) 400 %
14. If two angles are complementary of each other, then each angle is:
 (A) An Obtuse angle (B) A Right angle (C) An Acute angle (D) A supplementary angle.
15. X lies in the interior of $\angle BAC$. If $\angle BAC = 70^\circ$ and $\angle BAX = 42^\circ$ then $\angle XAC = ?$
 (A) 28° (B) 29° (C) 27° (D) 30°
16. If the volume of a cube is 1728 cm^3 , the length of its edge is equal to
 (a) 12 cm (b) 14 cm (c) 16 cm (d) 24 cm
17. Two cubes each of 10 cm edge are joined end to end. The surface area of the resulting cuboid is
 (a) 1200 cm^2 (b) 1000 cm^2 (c) 800 cm^2 (d) 1400 cm^2
18. A rectangular sheet of paper $44\text{ cm} \times 18\text{ cm}$ is rolled along its length and a cylinder is formed.
 The volume the cylinder so formed is equal to (Take $\pi = \frac{22}{7}$)
 (a) 2772 cm^3 (b) 2505 cm^3 (c) 2460 cm^3 (d) 2672 cm^3
19. If the radius and height of a cylinder are in ratio 5: 7 and its volume is 550 cm^3 , then its radius is
 equal to (Take $\pi = \frac{22}{7}$)
 (a) 6 cm (b) 7 cm (c) 5 cm (d) 10 cm
20. If the curved surface area of a solid right circular cylinder of height h and radius r is one-third of its total surface area, then
 (a) $h = \frac{1}{3}r$ (b) $h = r/2$ (c) $h = r$ (d) $h = 2r$
21. If the sum of first n terms of an AP be $3n^2 - n$ and it's common difference is 6, then its first term is:
 (A) 2 (B) 3 (C) 1 (D) 4
22. If 7th and 13th terms of an A.P. be 34 and 64, respectively, then it's 18th term is:
 (A) 87 (B) 88 (C) 89 (D) 90
23. The sum of all 2-digit odd numbers is:
 (A) 2475 (B) 2530 (C) 4905 (D) 5049
24. The fourth term of an A.P. is 4. Then the sum of the first 7 terms is:
 (A) 4 (B) 28 (C) 16 (D) 40
25. In an A.P. $s_1 = 6$, $s_7 = 105$, then $s_n : s_{n-3}$ is same as:
 (A) $(n+3):(n-3)$ (B) $(n+3):n$ (C) $n:(n-3)$ (D) None of these

An unbiased die is thrown (Q. NO. 26 to 30)

26. The probability of getting a prime number is
 (a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$
27. The probability of getting a multiple of 3 is
 (a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{3}{6}$ (d) $\frac{4}{6}$
28. The probability of getting a number greater than 1 is
 (a) $\frac{1}{6}$ (b) $\frac{2}{6}$ (c) $\frac{4}{6}$ (d) $\frac{5}{6}$
29. The probability of getting a number between 1 and 6 is
 (a) $\frac{1}{6}$ (b) $\frac{2}{6}$ (c) $\frac{4}{3}$ (d) $\frac{2}{3}$
30. The probability of getting an odd number is
 (a) $\frac{1}{6}$ (b) $\frac{2}{6}$ (c) $\frac{4}{6}$ (d) None of these
31. Simplify $\frac{1.12 - (0.0104 - 0.002) + 0.36 - 0.002}{0.12 - 0.12}$
 (A) 11.2 (B) 1.2 (C) 0.02 (D) 0.12
32. How many natural numbers between 200 and 400 are there which are divisible by
 I. Both 4 and 5 ? II. 4 or 5 or 8 or 10 ?
 (A) 9, 79 (B) 10, 80 (C) 9, 81 (D) 10, 81
33. What is the remainder when 7^{63} is divided by 344 ?
 (A) 1 (B) 343 (C) 338 (D) None of these
34. Which of following numbers $\sqrt{p^2}, \sqrt[3]{0.8}, \sqrt[4]{0.00016}, \sqrt{-1}, \sqrt{0.001}$ is/are rational ?
 (A) $\sqrt{-1}$ (B) $\sqrt{\pi^2}$ (C) $\sqrt{0.001}$ (D) All of these
35. What will be the unit digit of $1^{781} + 2^{781} + 3^{781} + \dots + 9^{781}$?
 (A) 1 (B) 3 (C) 5 (D) 7
36. A leak in the bottom of a tank can empty it in 6 hr. A pipe fills the tank at 4 L/min. When the tank is full, the inlet is opened, but due to the leak the tank is emptied in 8 hr. What is the capacity of the tank ?
 (A) 5,260 L (B) 5,760 L (C) 5,846 L (D) 6,970 L
37. A man rows 13 km upstream and 28 km downstream in 5 hrs each. Find the velocity of the stream.
 (A) 2 kmph (B) 1.5 kmph (C) 2.5 kmph (D) 3 kmph
38. A dog at point A goes in pursuit of a fox 40 m away. The dog takes leap of 2 against 1 m long leaps of the fox. If the dog makes two leaps to the fox's three, at what distance from A will the dog catch up with the fox ?
 (A) 150 m (B) 160 m (C) 105 m (D) 120 m
39. A, B and C are moving on a circular track. A who is the only one moving in anticlockwise direction and moves at a speed twice that of B and thrice that of C, takes 10s to cover the entire track. If all the three start simultaneously, when would they meet for the second time after the start ?
 (A) 120 s (B) 240 s (C) 300 s (D) None of these

40. The time in a clock is 20 minute past 2. Find the angle between the hands of the clock.
 (A) 60 degrees (B) 120 degrees (C) 45 degrees (D) 50 degrees
41. The sum of the series $5 + 13 + 21 + \dots + 181$
 (A) 2139 (B) 6500 (C) 7500 (D) 3750
42. What must be added to $\frac{1}{x}$ to make it equal to x ?
 (A) $\frac{x-1}{x+1}$ (B) $\frac{x+1}{x-1}$ (C) $\frac{x^2+1}{x}$ (D) $\frac{x^2-1}{x}$
43. The value of $(a^{1/8} + a^{-1/8})(a^{1/8} - a^{-1/8})(a^{1/4} + a^{-1/4})(a^{1/2} + a^{-1/2})$ is
 (A) $(a + a^{-1})$ (B) $(a - a^{-1})$ (C) $(a^2 - a^{-2})$ (D) $(a^{1/2} - a^{-1/2})$
44. If $(x - 2)$ is a factor of $(x^2 + 3qx - 2q)$ then the value of q is
 (A) 2 (B) -2 (C) 1 (D) -1
45. The arithmetic mean of two numbers is 34 and their geometric mean is 16. Find the numbers.
 (A) 60,8 (B) 64,4 (C) 56,12 (D) 52,16
46. If the p^{th} , q^{th} and r^{th} terms of an AP are equal to corresponding terms of a GP and these are respectively x, y, z then $x^{y-z}y^{z-x}z^{x-y}$ equals
 (A) 0 (B) 1 (C) 2 (D) None of these
47. If $\log 2, \log(2^x - 1)$ and $\log(2^x + 3)$ are in AP then the value of x is
 (A) $\frac{5}{2}$ (B) $\log_2 5$ (C) $\log_3 5$ (D) $\log_5 2$
48. Sum of first 24 terms of the AP a_1, a_2, a_3, \dots if it is known that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$ is:
 (A) 450 (B) 900 (C) 1350 (D) None of these
49. Value of x when $1 + 6 + 11 + 16 + \dots + x = 148$ is
 (A) 8 (B) 16 (C) 36 (D) None of these
50. A square is drawn by joining the mid points of the sides of a square. A third square is drawn inside the second square in the same way and the process is continued indefinitely. If the side of the square is 10 cm, then the sum of areas of all the squares so formed is
 A) 100 B) 200 C) 250 D) None of these

| ANSWER KEY | Q.NO | ANS |
|------------|------|-----|------|-----|------|-----|------|-----|------|-----|
| | 1 | A | 11 | B | 21 | A | 31 | C | 41 | A |
| | 2 | C | 12 | D | 22 | C | 32 | D | 42 | D |
| | 3 | A | 13 | C | 23 | A | 33 | B | 43 | B |
| | 4 | A | 14 | C | 24 | B | 34 | D | 44 | D |
| | 5 | B | 15 | A | 25 | A | 35 | C | 45 | B |
| | 6 | A | 16 | A | 26 | C | 36 | B | 46 | B |
| | 7 | C | 17 | B | 27 | B | 37 | D | 47 | B |
| | 8 | A | 18 | A | 28 | D | 38 | D | 48 | B |
| | 9 | C | 19 | C | 29 | D | 39 | A | 49 | C |
| | 10 | D | 20 | B | 30 | D | 40 | B | 50 | B |