

**Question 1:** If  $x + \frac{1}{x} = 4$ , then the value of  $x^3 + \frac{1}{x^3}$  is

- a) 52
- b) 54
- c) 34
- d) 64

**Question 2:** A rectangle is inscribed in a right triangle with legs 15 cm and 20 cm such that one side of rectangle lies along the hypotenuse. The maximum possible area of such a rectangle is

- a)  $100 \text{ cm}^2$
- b)  $96 \text{ cm}^2$
- c)  $80 \text{ cm}^2$
- d)  $75 \text{ cm}^2$

**Question 3:** If HCF of 306, 657 is 9, then using Euclid's division algorithm. The relation between 306 and 657 can be written as

- a)  $657 = 2(306) + 45$
- b)  $657 = 3(306) + 45$
- c)  $657 = 2(306) + 55$
- d)  $657 = 1(306) + 9$

**Question 4:** A data set has mean 50 and standard deviation 5. If each observation is increased by 7, the new mean and standard deviation are

- a) mean 57, standard deviation 12
- b) mean 43, standard deviation 5
- c) mean 57, standard deviation 5
- d) mean 50, standard deviation 12

**Question 5:** If the points A(3, 2), B(-2, x), and C(8, 4) are collinear, then the value of x is

- a) 3
- b) 0
- c) 1
- d) 2

**Question 6:** A chord of a circle is 16 cm long and is 6 cm away from the center. The radius of the circle is

- a) 10 cm
- b) 12 cm
- c) 14 cm
- d) 15 cm

**Question 7:** The quadratic equation  $x^2 - (2k + 1)x + k^2 = 0$  has equal roots when k equals

- a) 1
- b) -1
- c) 0
- d)  $\frac{-1}{4}$

**Question 8:** Diagonals of a kite are 16 cm and 30 cm. The area of the kite is

- a)  $240 \text{ cm}^2$
- b)  $480 \text{ cm}^2$
- c)  $120 \text{ cm}^2$
- d)  $256 \text{ cm}^2$

**Question 9:** The zeros of the polynomial  $p(x) = 4x^2 + kx + 16$  are equal to each other. The value of k is

- a) 8
- b) 16
- c) 4
- d) 2

**Question 10:** The median of 7 numbers is 18. If the largest number is changed so it becomes 50 (old largest was 40), the median will

- a) become 20
- b) remain 18
- c) increase to 19
- d) decrease to 17

**Question 11:** The coordinates of the point that divides the line joining A(-8, 6) and B(4, -3) in the ratio 3:5 internally are

- a)  $(\frac{-7}{8}, \frac{21}{8})$
- b)  $(\frac{-7}{2}, \frac{21}{8})$
- c)  $(\frac{1}{2}, \frac{1}{4})$
- d) (3, -1)

**Question 12:** Two tangents are drawn from a point P outside a circle. The distance from P to the center is 13 cm and the radius of the circle is 5 cm. The length of each tangent is

- a) 12 cm
- b) 10 cm
- c) 11 cm
- d) 9 cm

**Question 13:** A number when divided by 7 leaves remainder 3 and when divided by 11 leaves remainder 5. The smallest positive such number is

- a) 52
- b) 26
- c) 89
- d) 38

**Question 14:** The locus of points inside a rectangle equidistant from two opposite vertices is

- a) perpendicular bisector of diagonal segment inside
- b) diagonal
- c) pair of arcs
- d) no such locus

**Question 15:** The sum of the squares of the zeros of  $x^2 - 4x + 5$  is

- a) 16
- b) 13
- c) 10
- d) 6

**Question 16:** If mean = median in a distribution, it's usually

- a) Symmetric
- b) Skewed right
- c) Bimodal
- d) Uniform

**Question 17:** The area of the triangle formed by A(2, 3), B(4, 7), and C(6, 3) is

- a) 8
- b) 5
- c) 10
- d) 6

**Question 18:** The angle between two tangents drawn from an external point to a circle is  $(60^\circ)$ . The angle subtended at the center by the line joining the external point to the center is

- a)  $120^\circ$
- b)  $60^\circ$
- c)  $90^\circ$
- d)  $150^\circ$

**Question 19:** One root twice the other in  $kx^2 - 3x + 2 = 0$ . Find k.

- a) 2
- b) 1
- c)  $\frac{3}{2}$
- d)  $\frac{4}{3}$

**Question 20:** A square is inscribed in a circle of radius  $r$  cm. Side length of square is

- a)  $2r$
- b)  $r\sqrt{3}$
- c)  $r\sqrt{2}$
- d)  $r$

**Question 21:** If the polynomial  $p(x) = x^3 - 3x^2 + x + 2$  is divided by  $(x - 2)$ , the remainder is

- a)  $-2$
- b)  $4$
- c)  $2$
- d)  $0$

**Question 22:** A fair die is rolled twice. Probability of sum 7 is

- a)  $\frac{7}{12}$
- b)  $\frac{1}{3}$
- c)  $\frac{5}{36}$
- d)  $\frac{1}{6}$

**Question 23:** The slope of the line passing through A ( 2, 3 ) and B ( -4, -5 ) is

- a)  $2$
- b)  $\frac{4}{3}$
- c)  $\frac{-3}{4}$
- d)  $\frac{3}{2}$

**Question 24:** A triangle with sides 13 cm, 14 cm, and 15 cm has an inscribed circle. The radius of the in circle is

- a) 5 cm
- b) 4 cm
- c) 6 cm
- d) 3 cm

**Question 25:** If the  $n$ th term of a sequence is  $3n + 2$ , find the 10th term.

- a) 30
- b) 32
- c) 35
- d) 38

**Question 26:** The sum of areas of two non-overlapping squares with side lengths  $a$  and  $b$  equals area of a square with side  $c$ . Then  $c$  equals.

- a)  $\sqrt{a^2 + b^2}$
- b)  $a + b$
- c)  $\sqrt{a + b}$
- d)  $(a^2 + b^2)$

**Question 27:** The HCF of two numbers is 18 and their LCM is 1296. If one number is 54, then the other number is

- a) 432
- b) 288
- c) 648
- d) 452

**Question 28:** Probability that a continuous random variable equals exactly a given value is

- a) Equal to density
- b) Depends on distribution
- c) Zero
- d) Nonzero

**Question 29:** The coordinates of the centroid of the triangle with vertices A ( 1 , 2 ) , B ( 3 , 8 ) , and C ( 5 , 4 ) are

- a) ( 2 , 4 )
- b) ( 3 , 5 )
- c)  $( 3 , \frac{14}{3} )$
- d) ( 3 , 6 )

**Question 30:** A triangle is formed whose side lengths are equal to the radii  $r_1, r_2, r_3$  of three given circles. If  $r_1, r_2, r_3$  are all distinct positive numbers that satisfy the triangle inequalities, the triangle is necessarily

- a) Equilateral
- b) Isosceles
- c) Right-angled
- d) Scalene

**Question 31:** A and B can do a job in 12 and 18 days respectively. Working together but A leaves after 4 days, remaining job is done by B in how many additional days?

- a) 4 days
- b) 5 days
- c) 6 days
- d) 8 days

**Question 32:** In cyclic quadrilateral, opposite angles are supplementary. If  $\angle A = 110^\circ$ ,  $\angle C$  equals

- a)  $60^\circ$
- b)  $70^\circ$
- c)  $90^\circ$
- d)  $110^\circ$

**Question 33:** If  $\alpha$  and  $\beta$  are the zeros of  $6x^2 - 5x - 6$ , find the value of  $(1/\alpha + 1/\beta)$

- a)  $\frac{-6}{5}$
- b)  $\frac{5}{6}$
- c)  $\frac{-5}{6}$
- d)  $\frac{6}{5}$

**Question 34:** An event has odds of 3:2 in favor. Probability of event equals

- a)  $\frac{3}{2}$
- b)  $\frac{3}{5}$
- c)  $\frac{2}{3}$
- d) 3

**Question 35:** If  $\sin \theta = \frac{3}{5}$ , then the value of  $\tan \theta + \cot \theta$  is

- a)  $\frac{34}{15}$
- b)  $\frac{15}{34}$
- c)  $\frac{25}{12}$
- d)  $\frac{24}{25}$

**Question 36:** A tangent to a circle at a point A makes an angle of  $(30^\circ)$  with a chord AB of the circle. The angle subtended by the chord at the center is

- a)  $60^\circ$
- b)  $120^\circ$
- c)  $150^\circ$
- d)  $90^\circ$

**Question 37:** If  $\text{LCM}(12, x) = 180$  and  $\text{GCD}(12, x) = 6$ ,  $x$  equals

- a) 15
- b) 30
- c) 60
- d) 90

**Question 38:** The area of triangle with vertices  $(0, 0), (x, 0), (0, y)$  is

- a)  $\frac{xy}{2}$
- b)  $xy$
- c)  $x + y$
- d)  $\frac{x+y}{2}$

**Question 39:** A rational number in its lowest form has a terminating decimal expansion only if the denominator has prime factors of the form

- a)  $2^m 3^n$
- b)  $2^m 7^n$
- c)  $2^m 5^n$
- d)  $3^m 5^n$

**Question 40:** If a probability distribution is skewed right, which is largest?

- a) mode > median > mean
- b) mean < median < mode
- c) mean > median > mode
- d) mean = median = mode

**Question 41:** If  $\tan A = 2$ , then the value of  $\frac{2\sin A - \cos A}{\sin A + 2\cos A}$  is

- a)  $\frac{3}{5}$
- b)  $\frac{1}{3}$
- c)  $\frac{3}{4}$
- d)  $-1$

**Question 42:** In quadrilateral ABCD,  $AB = CD = 10$  cm and  $BC = DA = 24$  cm. If  $AC = 26$  cm, area of ABCD equals

- a)  $312 \text{ cm}^2$
- b)  $260 \text{ cm}^2$
- c)  $520 \text{ cm}^2$
- d)  $240 \text{ cm}^2$

**Question 43:** A chord of a circle has length 7 cm. The perpendicular distance from the center of the circle to the chord is 5 cm. The radius of the circle is

- a) 13.25 cm
- b) 12.5 cm
- c) 6.10 cm
- d) 8 cm

**Question 44:** If arithmetic mean of 4 numbers is 10 and three of them are 8, 12, 15, the fourth is

- a) 5
- b) 7
- c) 9
- d) 10

**Question 45:** If the zeros of  $3x^2 - 2x + k$  are in the ratio 3:2, find the value of k

- a)  $\frac{4}{45}$
- b)  $\frac{8}{15}$
- c)  $\frac{14}{35}$
- d)  $\frac{8}{25}$

**Question 46:** The mean of 10 numbers is 20. If one number is removed, the new mean becomes 18. Find the number removed.

- a) 30
- b) 40
- c) 25
- d) 38

**Question 47:** The value of  $(\sin^4 30^\circ + \cos^4 30^\circ)$  is

- a)  $\frac{3}{8}$
- b)  $\frac{7}{16}$
- c)  $\frac{7}{8}$
- d)  $\frac{10}{16}$

**Question 48:** The diagonals of a parallelogram intersect at right angle. If their lengths are 12 cm and 16 cm. find the area.

- a)  $96 \text{ cm}^2$
- b)  $120 \text{ cm}^2$
- c)  $48 \text{ cm}^2$
- d)  $144 \text{ cm}^2$

**Question 49:** The radius of a circle is 13 cm. A chord of the circle subtends a right angle at the center. The length of the chord is

- a) 13 cm
- b)  $13\sqrt{2}$  cm
- c) 26 cm
- d)  $26\sqrt{2}$  cm

**Question 50:** The sum of squares of roots of  $x^2 - 10x + 21 = 0$  equals

- a) 1
- b) 58
- c) 79
- d) 100

**Question 51:** Which of the following is a correct factorization of  $x^3 - 8$ ?

- a)  $(x - 2)(x^2 + 2x + 4)$
- b)  $(x - 2)(x^2 - 4)$
- c)  $(x - 2)(2x^2 + x + 4)$
- d)  $(x - 2)(x^2 - 2x + 4)$

**Question 52:** The mean of first  $n$  natural numbers is 10. Find  $n$ .

- a) 18
- b) 19
- c) 20
- d) 21

**Question 53:** The angle of elevation of the top of a tower from a point on the ground is  $30^\circ$ . On moving 20 m closer, the angle becomes  $60^\circ$ . The height of the tower is

- a) 10 m
- b) 15 m
- c) 17.32 m
- d) 20 m

**Question 54:** The perimeter of a square is equal to that of a rectangle of sides 8 cm and 6 cm. Find the area of the square.

- a)  $64 \text{ cm}^2$
- b)  $81 \text{ cm}^2$
- c)  $49 \text{ cm}^2$
- d)  $100 \text{ cm}^2$

**Question 55:** To divide a line segment AB in the ratio 3:4, first, a ray AX is drawn so that  $\angle BAX$  is an acute angle and then at equal distances points are marked on the ray AX such that the minimum number of these points is

- a) 5
- b) 7
- c) 9
- d) 11

**Question 56:** The sum of first 50 even natural numbers is \_\_\_\_

- a) 2450
- b) 2500
- c) 2550
- d) 2600

**Question 57:** The sum of the cubes of two consecutive natural numbers is 855. The numbers are

- a) 6 and 7
- b) 7 and 8
- c) 8 and 9
- d) 5 and 6

**Question 58:** To divide a line segment AB of length 7.6 cm in the ratio 5 : 8, a ray AX is drawn first such that  $\angle BAX$  forms an acute angle and then points  $A_1, A_2, A_3, \dots$  are located at equal distances on the ray AX and the point B is joined to

- a)  $A_5$
- b)  $A_6$
- c)  $A_{10}$
- d)  $A_{13}$

**Question 59:** If  $\sin A = \frac{3}{4}$ , find the value of  $2\tan^2 A - \sec^2 A$

- a)  $\frac{5}{13}$
- b)  $\frac{2}{7}$
- c)  $\frac{1}{2}$
- d)  $\frac{2}{3}$

**Question 60:** Zeros of  $x^2 - 5x + 6$  are  $\alpha, \beta$ . Find polynomial with roots  $\frac{1}{\alpha}, \frac{1}{\beta}$ .

- a)  $x^2 - 6x + 5$
- b)  $6x^2 - 5x + 1$
- c)  $5x^2 - 6x + 1$
- d)  $x^2 - 5x + 6$

**ROUGH WORK**  
(NOT TO BE EVALUATED)

DATE