10 TH MATHS PUBLIC EXAM QUESTIONS COLLECTIONS

10 TH PUBLIC EXAM SEPTEMBER - (2019 -2020)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. $14 \times 1 = 14$
(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. If $A = \{1,2\}$, $B = \{1,2,3,4\}$, $C = \{5,6\}$ and $D = \{5,6,7,8\}$, then state which of the following statement is true?
(a) $(A \times C) \subset (B \times D)$ (b) $(B \times D) \subset (A \times C)$
(c) $(A \times B) \subset (A \times D)$ (d) $(D \times A) \subset (B \times A)$

2. Let $f(x) = x^2 - x$, then $f(x-1) - f(x+1)$ is :
(a) $4x$ (b) $2 - 2x$ (c) $2 - 4x$ (d) $4x - 2$

3. Using Euclid's division lemma, if the cube of any positive integer is divided by 9, then the possible remainders are:
(a) 0,1,8 (b) 1, 4, 8 (c) 0,1,3 (d) 1, 3, 5

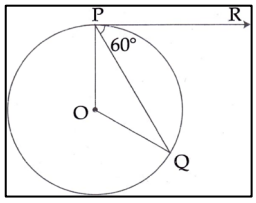
4. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \ldots + 2^0$, which of the folowing is hue?
(a) B is 2^{64} more than A (b) A and B are equal
(c) B is larger than A by 1 (d) A is larger than B by 1

5. $\frac{a^2}{a^2-b^2} + \frac{b^2}{b^2-a^2} =$
(a) a - b (b) $a + b$ (c) $a^2 - b^2$ (d) 1

6. Transpose of a column matrix is :
(a) unit matrix (b) diagonal matrix (c) column matrix (d) row matrix

7. In ΔLMN, $\angle L = 60^0, \angle M = 50^o$. If $\Delta LMN \sim \Delta PQR$, then the value of $\angle R$ is :
(a) 40^o (b) 70^o (c) 30^o (d) 110^o

8. In the figure, if PR is tangent to the circle at P and O is the centre of the circle, then $\angle POQ$ is :



(a) 120^o (b) 100^o (c) 110^o (d) 90^o

9. The straight line given by the equation $x = 11$ is
(a) Parallel to x - axis (b) Parallel to y-axis
(c) Passing through the origin (d) Passing through the point $(0,11)$

10. If $\tan\theta + \cot\theta = 2$, then the value of $\tan^2\theta + \cot^2\theta$ is :
(a) 0 (b) 1 (c) 2 (d) 4

11. A child reshapes a cone made up of clay of height 24 cm and radius 6 cm into a sphere, then the radius of sphere is :
(a) 24 cm (b) 12 cm (c) 6 cm (d) 48 cm

12. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is :
(a) 2: 1 (b) 1 : 2 (c) 4 : 1 (d) 1 : 4

13. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all deviations is:
(a) 40000 (b) 160900 (c) 160000 (d) 30000

14. If a letter is chosen at random from the English alphabets $\{a, b, c, \ldots, z\}$, then the probability that the letters chosen precedes x, is :

(a) $\frac{12}{13}$ (b) $\frac{1}{13}$ (c) $\frac{23}{26}$ (d) $\frac{3}{26}$

PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. If $A \times B = \{(3,2)(3,4)\langle 5,2), (5,4)\}$ then find A and B.

16. Show that the Function $f: N \to N$ defined by $f(m) = m^2 + m + 3$ is one-one function.

17. If m, n are natural numbers, for what values of m, does $2^n \times 5^m$ end in 5?

18. Find the 3^{rd} and 4^{th} terms of a sequence, if $a_n = \begin{cases} n^2 \ if \ n \ is \ odd \\ \frac{n^2}{2} \ if \ n \ is \ even \end{cases}$

19. Find the value of $1^2 + 2^2 + 3^2 + \cdots + 10^2$ and hence deduce $2^2 + 4^2 + 6^2 + \cdots + 20^2$.

20. Find the value of k for which the equation $9x^2 + 3kx + 4 = 0$ has real and equal roots.

21. If $A = \begin{bmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{bmatrix}$ then find the transpose of $-A$.

22. Check whether AD is bisector of $\angle A$ of ΔABC in each of the following AB $= 5\ cm$, $AC = 10\ cm$ $BD = 1.5\ cm$ and CD $= 3.5$ cm

23. Find the slope of a line joining the points $(14, 10)$ and $(14, -6)$.

24. Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + ta$

25. θd the diameter of a sphere whose surface area is 154 m^2

26. If the base area of a hemispherical solid is 1386 $sq.$ meters, then find its total surface area?

27. Find the range and coefficient of range of the following data 63, 89, 98, 125, 79, 108, 117, 68

28. Find the volume of the iron used to make a hollow cylinder of height 9 cm and whose internal and external radii are $3cm$ and $5cm$ respectively.

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Let A =The set of all natural numbers less than 8, $B = The$ set of all prime numbers less than 8, C =The set of even prime number. Verify $(A \cap B) \times C = (A \times C) \cap (B \times C)$

30. Let $A = \{1,2,3,4\}$ and $B = \{2,5,8,11,14\}$ be two sets. Let $f: A \to B$ be a function give by $f(x) = 3x - 1$. Represent this function

(i) by arrow diagram (ii) in a table form

(iii) as a set of ordered pairs (iv) in a graphical form

31. Find the sum of all natural numbers between 100 and 1000 which are divisible by 11.

32. Solve: $6x + 2y - 5z = 13$, $3x + 3y - 2z = 13$, $7x + 5y - 3z = 26$

33. Find the GCD of the given polynomials $x^4 + 3x^3 - x - 3$ and $x^3 + x^2 - 5x + 3$

34. Find the square root of the following polynomials by division method. $\frac{x^2}{y^2} - \frac{10x}{y} + 27 - \frac{10y}{x} + \frac{y^2}{x^2}$

35. If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$, and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$ then show that $(AB)^T = B^T A^T$

36. State and prove Angle Bisector Theorem.

37. Find the value of 'k' if the area of quadrilateral is 28 sq. units, whose vertices are $(-4,-2)$, $(-3,k)$, $(3,-2)$ and $(2,3)$.

38. From the top of the tower $60m$ high the angles of depression of the top and bottom of a vertical lamp post are observed to be 38° and 60° respectively. Find the height of the lamp post. $(\tan 38^\circ = 0.7813, \sqrt{3} = 1.732)$.

39. A cylindrical glass with diameter 20 cm has water to a height of $9cm$. A small cylindrical metal of radius $5cm$ and height $4cm$ is immersed it completely. Calculate the rise of the water in the glass.

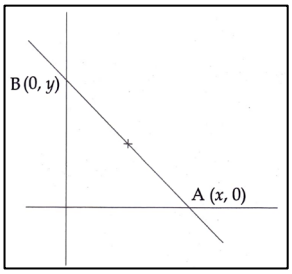
40. The scores of a cricketer in 7 matches are 70, 80, 60, 60, 40, 90, 95. Find the standard deviation.

41. Two unbiased dice are rolled once. Find the probability of getting

(i) a doublet (equal numbers on both dice) (ii) the product as a prime number

(iii) the sum as a prime number (iv) the sum as 1

42. A straight line AB cuts the co-ordinate axes at A and B. If the mid-point of AB is $(2,3)$, find the find the equation of AB.



PART - IV

Note : Answer the following questions.. **$2 \times 8 = 16$**

43.

(a) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ABC. (scale factor $\frac{6}{5}$)

OR

(b) Draw two tangents from a point which is 10 cm away from the center of a circle of radius 5 cm. Also measure the lengths of the tangents.

44.

(a) Graph the quadratic equation $x^2 - 8x + 16 = 0$ and state the nature of their solution.

OR

(b) Draw the graph of $y = k^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$.

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10 TH PUBLIC EXAM SEPTEMBER - (2020-2021)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. **$14 \times 1 = 14$**
(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. If $n(A \times B) = 6$ and $A = \{1,3\}$ then $n(B)$ is :
(a) 1 (b) 2 (c) 3 (d) 6

2. The sum of the exponents of the prime factors in the prime factorization of 1729 is
(a) 1 (b) 2 (c) 3 (d) 4

3. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is :
(a) 3 (b) 5 (c) 8 (d) 11

4. The square root of $\frac{256\,x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to:
(a) $\frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ (b) $16\left|\frac{y^2}{x^2z^4}\right|$ (c) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ (d) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

5. Graph of a linear equation is a
(a) Straight line (b) Circle (c) Parabola (d) Hyperbola

6. The G.C.D. of a^m, a^{m+1}, a^{m+2} is:
(a) a^m (b) a^{m+1} (c) a^{m+2} (d) 1

7. If in ΔABC, $DE \parallel BC$, $AB = 3.6$ cm, $AC = 2.4$ cm and $AD = 2.1$ cm then, the length of AE is:
(a) 1.4 cm (b) 1.8 cm (c) 1.2 cm (d) 1.05 cm

8. How many tangents can be drawn to the circle from an exterior point?.
(a) one (b) two (c) infinite (d) zero

9. The area of a triangle formed by the points $(-5,0)$, $(0,-5)$ and $(5,0)$ is
(a) 0 sq. units (b) 25 sq. units (c) 5 sq. units (d) none of these

10. The perimeter of a triangle formed by the points $(0,0)$, $(1,0)$ and $(0,1)$ is:
(a) $\sqrt{2}$ (b) 2 (c) $2+\sqrt{2}$ (d) $2-\sqrt{2}$

11. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}$: 1 then, the angle of elevation of the sun has measure :
(a) 45^o (b) 30^o (c) 90^o (d) 60^o

12. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be :
(a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm

13. The total surface area of a hemisphere is how many times the square of its radius?.
(a) π (b) 4π (c) 3π (d) 2π

14. A page is selected at random from a book. The probability that the digit at units place of the page number chosen is less than 7 is :
(a) $\frac{3}{10}$ (b) $\frac{7}{10}$ (c) $\frac{3}{9}$ (d) $\frac{7}{9}$

PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. If $A = \{1,3,5\}$ and $B = \{2,3\}$ then find. Show that $n(A \times B) = n(B \times A) = n(A) \times n(B)$.
16. Let A {1, 2,3,4, ... 45 } and R Be the relation defined as "is square of' on A". write R as a subset of A × A. AIso, find the domain and range of R.
17. Find the number of terms in the A.P. 3, 6, 9, 12, ... 111.
18. If $3+k$, $18-k$, $5k+1$ are in A.P. then find the value of 'k'.
19. Determine the quadratic equation whose sum and product of roots are-9 and 20.
20. Determine the nature of the roots for the quadratic equation $15x^2 + 11x + 2 = 0$.

21. In Δ ABC, D and E are points on the sidies AB and AC respectively such that DE || BC If $\frac{AD}{DB} = \frac{3}{4}$ and AC= $15cm$ find AE.

22. Show that the given points are collinear $(-3,-4)$, $(7,2)$ and $(12,5)$.

23. Calculate the slope and y intercept of the straight line $8x - 7y + 6 = 0$.

24. Find the intercepts made by the following lines on the coordinate axes. $3x - 2y - 6 = 0$.

25. Find the angle of elevation of the top of a tower from a point on the ground, which is $30m$ away from the foot of a tower of height $10\sqrt{3}m$.

26. Find the volume of a cylinder whose height is $2m$ and whose base area is 250 m^2.

27. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows and odd number and the coin shows a head.

28. The heights of two right circular cones are in the ratio 1: 2 and the perimeters of their bases are in the ratio 3: 4. Find the ratio of their volumes.

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Let $A = \{x \in W | x < 2\}$, $B = \{x \in N | 1 < x \leq 4\}$ and $C = \{3,5\}$. Verify that
$(i)\ A \times (B \cap C) = (A \times B) \cap (A \times C)$

30. The sum of three consecutive terms that are in A.P. is 27 and their product is 288. Find the three terms.

31. Find the HCF of 396, 504, 636.

32. Solve $x + y + z = 5, 2x - y + z = 9, x - 2y + 3z = 16$.

33. Find the square root of $64x^2 - 16x^3 + 17x^2 - 2x + 1 = 0$.

34. State and prove Pythagoras Theorem.

35. Show that in a triangle, the medians are concurrent.

36. Find the equation of the median and altitude of ΔABC through A where the vertices are $A(6,2)$, $B\ (-5,-1)$ and $C(1,9)$.

37. If the points $P(-1,-4)$, $Q(b,c)$ and $R(5,-1)$ are collinear and if $2b + c = 4$, then find the values of 'b' and 'c'.

38. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. If the lighthouse is 200 m high, find the distance between the two ships. $(\sqrt{3} = 1.732)$.

39. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and $7cm$, find the volume of the frustum.

40. A toy is in the shape of a cylinder surmounted by a hemisphere. The height of the toy is $25cm$. Find the total surface area of the toy if its common diameter is $12cm$.

41. Two dice are rolled. Find the probability that sum of outcomes is
(i) equal to 4, (ii) greater than 10, (iii) less than 13.

42. If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots, then prove that $c^2 = a^2(1 + m^2)$

PART - IV

Note : Answer the following questions.. **$2 \times 8 = 16$**

45.

(a) Construct a ΔPQR whose base $PQ = 4.5$ cm, $\angle R = 35^o$ and the median from R to RG is 6 cm.

OR

(b) Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw two tangents PA and PB to the circle and measure their lengths.

46.

(a) Draw the graph of $x^2 + x - 12 = 0$ and state the nature of their solution.

OR

(b) Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$.

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10 TH PUBLIC EXAM MAY - (2021-2022)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. **$14 \times 1 = 14$**
(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. If the ordered pairs $(a+2,4)$ and $(5,2a+b)$ are equal then (a,b) is :
(a) $(2,-2)$ (b) $(5,1)$ (c) $(2,3)$ (d) $(3,-2)$

2. If the HCF of 65 and 117 is expressible in the form of $65m-117$, then the value of 'm' is :
(a) 4 (b) 2 (c) 1 (d) 3

3. If t_n is the n^{th} term of a A.P., then $t_{8n}-t_n$ is :
(a) $(8n-1)d$ (b) $(8n-2)d$ (c) $(7n-2)d$ (d) $(7nd)$

4. If $(x-6)$ is the HCF of $\beta-2x-24$ and $\beta-kx-6$, then the value of k is
(a) 3 (b) 5 (c) 6 (d) 8

5. Which of the following should be added to make x^4+64 a perfect square?
(a) $4x^2$ (b) $16x^2$ (c) $8x^2$ (d) $-8x^2$

6. The number of points of intersection of the quadratic polynomial x^2+4x+4 with the X-axis is:
(a) 0 (b) 1 (c) 0 or 1 (d) 2

7. If ΔABC is an isosceles triangle with $\angle C = 90^o$ and $AC = 5$ cm, then AB is :
(a) 2.5 cm (b) 5 cm (c) 10 cm (d) $5\sqrt{2}$ cm

8. In a ΔABC, AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm and $DC = 3$ cm, length of the side AC is :
(a) 6 cm (b) 4 cm (c) 3 cm (d) 8 cm

9. If $(5,7),(3,p)$ and $(6,6)$ are collinear, then the value of 'p' is :
(a) 3 (b) 6 (c) 9 (d) 12

10. The slope of the line which is perpendicular to a line joining the points $(0,0)$ and $(-8,8)$ is:
(a) -1 (b) 1 (c) $\frac{1}{3}$ (d) -8

11. A tower is 60 m high. Its shadow is x metres shorter when the sun's altitude is 45^o than when it had been 30°, then 'x' is equal to :
(a) 41.92 m (b) 43.92 m (c) $43m$ (d) 45.6 m

12. If two solid hemispheres of same base radius 'r' units are joined together along their bases, then curved surface area of this new solid is :
(a) $4\pi r^2$ sq. units (b) $6\pi r^2$ sq. units (c) $3\pi r^2$ sq. units (d) $8\pi r^2$ sq.units

13. If the radius of the cylinder is doubled, the new volume of the cylinder will be times the original volume.
(a) same (b) 3 (c) 4 (d) 2

14. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$, then the value of x is :
(a) 2 (b) 1 (c) 3 (d) 1.5

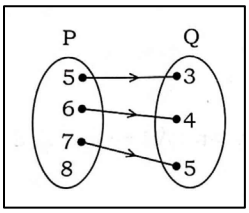
PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. Let $A = \{1,2,3\}$ and $B = \{x | x$ is a prime number less than $10\}$. Find A $\times B$ and $B \times A$.

16. The arrow diagram shows in figure a relationship between the sets P and Q. Write the relation in

(i) Set builder form (ii) Roster form (iii) What is the domain and range of R.

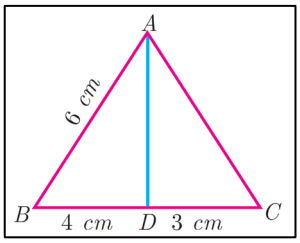


17. If $13824 = 2^a \times 3^b$ then find 'a' and 'b'.

18. Which term of an A.P. 16, 11, 6, 1,... is -54?.

19. Find the excluded values of the following expression $\frac{7p+2}{8p^2+13p+5}$.

20. In the figure AD is the bisector of $\angle A$. If $BD = 4cm$, DC $= 3\ cm$ and AB $= 6$ cm, find AC



21. Show that the points $P(-1.5,3)$, $Q(6,-2)$, $R\ (-3,4)$ are collinear.

22. The line p passes through the points $(3,-2)$, $(12,4)$ and the line q passses throught the points $(6,-2)$ and $(12,2)$. Is p parallel to q?

23. Find the equation of a straight line which has slope $\frac{-5}{4}$ and passing through the point $(-1,2)$.

24. From the top of a rock $50\sqrt{3}m$ height, the angle of depression of a car on the ground is observed to be 30°. Find the distance of the car from the rock.

25. The radius of a spherical balloon increases from $12cm$ to $16cm$ as air being pumped into it. Find the ratio of the surface area of the balloons in the two cases.

26. The volumes of two cones of same base radius are 3600 cm^3 and 5040 cm^3. Find the ratio of heights.

27. Two coins are tossed together. What is the probability of getting different faces of the coins?

28. If $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$ then find $\frac{1}{(P^2-Q^2)}$.

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Let A =The set of all natural numbers less than 8, B = The set of all prime numbers less than 8, C = The set of even prime number. Verify A × (B−C) = $(A \times B) - (A \times C)$.

30. If l^{th}, m^{th} and n^{th} terms of an A.P. are, x, y, z respectively, then show that

(i) $x(m-n) + y(n-l) + z(l-m) = 0$ (ii) $(x-y)n + (y-z)l + (z-x)m = 0$

31. The ratio of 6^{th} and 8^{th} term of an A.P. is 7: 9. Find the ratio 9^{th} term to 13^{th} term.

32. If $36x^4 - 60x^3 + 61x^2 - mx + n$ is a perfect square, find the values of 'm' and 'n'.

33. Solve $pqx^2 - (p+q)^2x + (p+q)^2 = 0$.

34. If α and β are the roots of $7x^2 + ax + 2 = 0$ and $\beta - \alpha = \frac{-13}{7}$. Find the values of a.

35. State and Prove Basic Proportionality Theorem (BPT) or Thales theorem.

36. An Aeroplane leaves an airport and flies due north at a speed of 1000 km/hr. At the same time, another Aeroplane leaves the same airport and flies due west at the speed of 1200 km/hr. How far apart will be the two planes after $1\frac{1}{2}$ hours?.

37. A quadrilateral has vertices $A\ (-4,-2)$, $B(5,-1)$, $C(6,5)$ and $D\ (-7,6)$. Show that the mid-points of its sides form a parallelogram.

38. From a point on the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a 30 m high building are $45°$ and $60°$ respectively. Find the height of the tower. $(\sqrt{3} = 1.732)$.

39. A container open at the top is in the form of a frustum of a cone of height $16cm$ with radii of its lower and upper ends are $8cm$ and $20cm$ respectively. Find the cost of milk which can completely fill a container at the rate of 540 per liter.

40. Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is $3cm$ and its length $12cm$. lf each cone has height $2cm$, find the volume of the model that Nathan made.

41. In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that

(i) The student opted for NCC but not NSS. (ii) The student opted for NSS but not NCC.

(iii) The student opted for exactly one of them.

42. Find the equation of the line passing through $(22,-6)$ and having intercept on X- axis exceeds the intercept on Y-axis by 5 units.

PART - IV

Note : Answer the following questions.. **$2 \times 8 = 16$**

43.

(a) Construct a ΔABC such that $AB = 5.5$ cm, $\angle C = 25^o$ and the altitude from C to AB is 4 cm.

OR

(b) Draw the two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also, measure the lengths of the tangents.

44.

(a) Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$.

OR

(b) Draw the graph of $x^2 - 4x + 4 = 0$ and state the nature of their solution.

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10 TH PUBLIC EXAM AUGUST - (2021-2022)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. $14 \times 1 = 14$

(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. If there are 1024 relations from a set $A = \{1,2,3,.4,5\}$ to set B, then the number of elements in B is:

(a) 3 (b) 2 (c) 4 (d) 8

2. The range of the Relation R= $\{\{x \mid x^2)$,x is a Prime number less than 13$\}$

(a) $\{2,3,5,7\}$ (b) $\{2,3,5,7,11\}$ (c) $\{4, 9, 25, 49, 121\}$ (c) $\{1,4, 9, 25, 49, 121\}$

3. The sum of the exponents of the prime factors in the prime factorization 1729 is:

(a) 1 (b) 2 (c) 3 (d) 4

4. A system of three linear equations in the three variables is inconsistent of their planes:

(a) Intersect only at a point (b) Intersect in a line

(c) Coincide with each other (d) Do not intersect

5. The solution of the system $x + y - 3z = -6, -7y + 7z = 7, 3z = 9$ is

(a) $x = 1, y = 2, z = 3$ (b) $x = -1, y = 2, z = 3$

(c) $x = -1, y = -2, z = 3$ (d) $x = 1, y = -2, z = 3$

6. $y^2 + \frac{1}{y^2}$ is not equal to ::

(a) $\frac{y^4+1}{y^2}$ (b) $\left(y + \frac{1}{y}\right)^2$ (c) $\left(y - \frac{1}{y}\right)^2 + 2$ (d) $(y + \frac{1}{y})^2 - 2$

7. If in ΔABC, $DE||BC$, $AB = 3.6cm$, $AC = 2.4$ cm and $AD = 2.1$ cm then, the length of AE is :

(a) 1.4 cm (b) 1.8 cm (c) 1.2 cm (d) 1.05 cm

8. How many tangents can be drawn to the circle from an Exterior Point

(a) one (b) two (c) infinite (d) zero

9. The point of intersection of $3x - y = 4$ and $x + y = 8$ is :

(a) $(5, 3)$ (b) $(2, 4)$ (c) $(3, 5)$ (d) $(4, 4)$

10. If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then, slope of the perpendicular bisector of PQ is

(a) $\sqrt{3}$ (b) $-\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) 0

11. The angle of elevation of a cloud from a point h metre above a lake is S. The angle of depression of its reflection in the lake is 45^0. The height of location of the cloud from the lake (in meters) is :

(a) $\frac{h(1+\tan\beta)}{1-\tan\beta}$ (b) $\frac{h(1-\tan\beta)}{1+\tan\beta}$ (c) $h\tan(45^o - \beta)$ (d) None of these

12. If the radius of the base of a right circular cylinder is halved keeping the same Height then, the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is :

(a) 1 : 2 (b) 1 : 4 (c) 1 : 6 (d) 1 : 8

13. The total surface area of hemi-sphere is how much times the square of its radius :

(a) π (b) 4π (c) 3π (d) 2π

14. A page is selected at random from a book. The probability that the digit at units place of the page number chosen is less than 7 is :

(a) $\frac{3}{10}$ (b) $\frac{7}{10}$ (c) $\frac{3}{9}$ (d) $\frac{7}{9}$

PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. If $A \times B = \{(3,2), (3,4), (5,2), (5,4)\}$ then find A and B.
16. If $A = \{5,6\}$, $B = \{4,5,6\}$, $C = \{5,6,7\}$. Show that $A \times A = (B \times B) \cap (C \times C)$.
17. Find the least number that is divisible by the first ten natural numbers.
18. Find the 19^{th} term of an A.P. $-11, -15, -19, \ldots$.
19. Find the square root of the following rational expressions. $\frac{400x^4y^{12}z^{16}}{100x^8y^4z^4}$.
20. ABCD is a trapezium in which AB || DC and P, Q are points on AD and BC respectively, such that PQ || DC if PD $= 18cm$, $BQ = 35cm$ and $QC = 15$ cm, find AD.
21. If area of triangle formed by vertices $A(-1,2)$, $B(k,-2)$ and $C(7,4)$ is 22 sq. units. find the value of 'k'.
22. The line p passes through the points $(3,-2)$, $(12,4)$ and the line q passes through the points $(6,-2)$ and $(12,2)$. Is p parallel to q?.
23. Find the slope of a line joining the given points $(5,\sqrt{5})$with the origin.
24. Find the angle of elevation of the top of a tower from a point on the ground, which is $30m$ away from the foot of a tower of height $10\sqrt{3}m$.
25. Find its radius and height. radius $7cm$ is $704cm^2$, then find its slant height.
26. If the total surface area of a cone of The radius and height of a cylinder are in the ratio 5: 7 and its curved surface area is 5500 $sq.$ cm.
27. A bag contains 5 red balls, 6 white balls, 7 green balls, 8 black balls. One ball is drawn at random from the bag. Find the probability that the ball drawn is (i) white ball (ii) black or red ball.
28. Find the value of 'x', in $x^2 - 4x - 12 = 0$.

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster from, wherever possible. $\{(x,y) | y = x + 3, x, y$ are natural numbers $< 10\}$.
30. Find the largest number which divides 1230 and 1926 leaving remainder 12 in each case.

31. In an A.P nine times ninth term is equal to the fifteen times fifteenth term, show that six times twenty fourth term is zero.

32. Simplify: $\frac{b^2+3b-28}{b^2+4b+4} \div \frac{b^2-49}{b^2-5b-14}$.

33. Find the square root of $x^4 - 12x^3 + 42x^2 - 36x + 9$.

34. Solve $x^2 + 2x - 2 = 0$ by Formula method.

35. State and prove Angle Bisector Theorem.

36. A man goes 18 m due east and then 24 m due north. Find the distance of his current position from the starting point?.

37. Find the area of the quadrilateral formed by the points $(8, 6)$, $(5, 11)$, $(-5,12)$ and $(-4,3)$.

38. To a man standing outside his house, the angles of elevation of the top and bottom of a window are 60° and 45° respectively. lf the height of the man is 180 cm and if he is $5m$ away from the wall, what is the height of the window ?. $(\sqrt{3} = 1.732)$.

39. A cylindrical drum has height of $20cm$ and base radius of $14cm$. Find its curved surface area and the total surface area.

40. If the circumference of base of a conical wooden piece is 484 cm then find its volume when its height is 105 cm.

41. Two unbiased dice are rolled once. Find the probability of getting

(i) a doublet (equal numbers on both dice) (ii) the product as a prime number

(iii) the sum as a prime number (iv) the sum as 1

42. A cat is located at the point $(-6, -4)$ in xy plane. A bottle of milk is kept at $(5, 11)$. The cat wishes to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk.

PART - IV

Note : Answer the following questions.. **$2 \times 8 = 16$**

43.

(a) Construct a triangle similar to a triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR. (Scale factor $\frac{7}{3} > 1$)

OR

(b) Draw a circle of diameter 6 cm. From a point P, which is 8 cm away from its centre, draw the two tangents PA and PB to the circle and measure their lengths.

44.

(a) Draw the graph of $x^2 - 9x + 20 = 0$ and state the nature of their solution.

OR

(b) Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$.

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10 TH PUBLIC EXAM APRIL - (2022-2023)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. **$14 \times 1 = 14$**
(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. $A = \{a, b, p\} B = \{2,3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is:
(a) 8 b) 20 (c) 12 (d) 16

2. If $n(A) = p, n(B\} = q$. then the total number of relations that exist from A to B is
(a) 0 (b) 1 (c) $2^{pq} - 1$ (d) 2^{pq}

3. Given $F_1 = 1, F_2 = 3$ *and* $F_n = F_{n-1} + F_{n-2}$ then F_5 is :
(a) 3 (b) 5 (c) 8 (d) 11

4. If the sequence t_1, t_2, t_3 are in A.P., then be sequence t_6, t_{12}, t_{18}...
(a) a Geometric progression (b) an Arithmetic Progression
(c) neither an Arithmetic Progression nor a Geometric progression
(d) a constant sequence

5. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is :
(a) $\frac{9y}{7}$ (b) $\frac{9y^3}{(21y-21)}$ (c) $\frac{21y^2-42y+21}{3y^3}$ (d) $\frac{7(y^2-2y+1)}{y^2}$

6. Graph of a Quadratic Equation is a
(a) straight line (b) circle (c) parabola (d) hyperbola

7. If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar when :
(a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle F$

8. A tangent of a circle is perpendicular to the radius at the
(a) centre (b) point of contact (c) infinity (d) Chord

9. The slope of the straight line perpendicular to x-axis is :
(a) 1 (b) 0 (c) ∞ (d) -1

10. If $\sin\theta = \cos\theta$ then the value of $2\tan^2\theta + sin^2\theta - 1$ is :
(a) $\frac{3}{2}$ (b) $\frac{-3}{2}$ (c) $\frac{2}{3}$ (d) $\frac{-2}{3}$

11. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be :
(a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm

12. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is :
(a) 1:2:3 (b) 2:1:3 (c) 1:3:2 (d) 3:1:2

13. If the sum and mean of a data are 407 and 11 respectively, then the number of observations in the data are:
(a) 37 (b) 4477 (c) 396 (d) 418

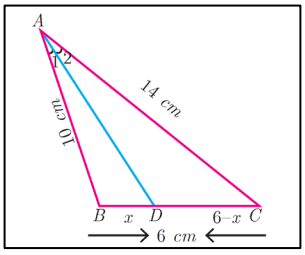
14. If a letter is chosen at random from the English alphabets $\{a, b, c, \ldots, z\}$ then the probability that the letter chosen precedes x:
(a) $\frac{12}{13}$ (b) $\frac{1}{13}$ (c) $\frac{23}{26}$ (d) $\frac{3}{26}$

PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. If $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$ find A and B.

16. Find 'k' if $fof(k) = 5$ where $f(k) = 2k - 1$.
17. Find $'x'$ so that $x + 6, x + 12$ and $x + 15$ are consecutive terms of a Geometric Progression.
18. Simplify: $\frac{x+2}{4y} \div \frac{x^2-x-6}{12y^2}$.
19. Determine the nature of roots for the following quadratic equation. $2x^2 - x - 1 = 0$.
20. In the figure AD is the bisector of $\angle BAC$, if AB $= 10cm$, AC $= 14cm$ and $BC = 6cm$. Find BD and DC.



21. A cat is located at the point $(-6, -4)$ in xy plane. A bottle of milk is kept at $(5, 11)$. The cat wishes to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk.
22. If the straight lines $12y = -(p + 3)x + 12, 12x - 7y = 16$ are perpendicular then find 'p'.
23. Prove that $\frac{\sec\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta} = \cot\theta$.
24. The radius of a conical tent is 7 m and height is 24 m. Calculate the length of the canvas used to make the tent if the width of the rectangular canvas is 4 m?
25. If the ratio of radii of two spheres is 4: 7, find the ratio of their volumes.
26. Find the range and coefficient of range of the following data 63, 89, 98, 125, 79, 108, 117, 68.
27. A and B are two candidates seeking admission to IIT. The probability that A getting selected is 0.5 and the probability that both A and B getting selected is 0.3. Prove that the probability of B being selected is atmost 0.8.
28. If $p^2 \times q^1 \times r^4 \times s^3 = 3{,}15{,}000$ then find the values of 'p', 'q', 'r' and 's'

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Let $f: A \to B$ be a function defined by $f(x) = \frac{x}{2} - 1$, wehre $A = \{2,4,6,10,12\}$, $B = \{0,1,2,4,5,9\}$. Represent f by
    (i) Set of ordered pairs, (ii) a table (iii) a graph (iv) an arrow diagram
30. The houses of a street are numbered from 1 to 49. Senthil's house is numbered Such that the sum of numbers of the houses prior to Senthil's house is equal to the sum of numbers of the houses following Senthil's house. Find Senthil's house number?.
31. Find the sum to n terms of the series $5+55+555+\cdots$
32. Solve: $x + 20 = \frac{3y}{2} + 10 = 2z + 5 = 110 - (y + z)$.
33. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, and $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ then show that $(AB)^T = B^T A^T$.
34. Two poles of height 'a' meters and 'b' meters are $'p'$ meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ meters.
35. State and prove Angle Bisector Theorem.
36. Find the area of the quadrilateral formed by the points $(8, 6)$, $(5, 11)$, $(-5,12)$ and $(-4,3)$.

37. Find the equation of a straight line parallel to X- axis and passing through the point of intersection of the lines $7x - 3y = -12$ and $2y = x + 3$.

38. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be 30° and 60°. lf the height of the lighthouse is h meters and the linejoining the ships passes through the foot of the lighthouse, show that the distance between the ships is $\frac{4h}{\sqrt{3}}\ m$.

39. The radius and height of a cylinder are in the ratio 5: 7 and its curved surface area is 5500 sq. cm. Find its radius and height.

40. Arul has to make arrangements for the accommodation of150 persons for his family function. For this purpose, he plans to build a tent which is in the shape of cylinder surmounted by cone. Each person occupies 4 sq. m of the space on ground and 40 cu. Meter of air to breathe. What should be the height of the conical part of the tent if the height of cylindrical part is 8 m?

41. Two unbiased dice are rolled once. Find the probability of getting

(i) a doublet (equal numbers on both dice) (ii) the product as a prime number

(iii) the sum as a prime number (iv) the sum as 1

42. Let $A = \{x \in W \mid x < 3\}$, $B = \{x \in N | 1 < x \leq 5\}$ and $C = \{3,5,7\}$.

Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$

PART - IV

Note : Answer the following questions.. **$2 \times 8 = 16$**

43.

(a) Take a point which is 11 cm away kom the centre of a circle of radius 4 cm and draw two tangents to the circle from that point.

OR

(b) Draw a triangle ABC of base $BC = 8$ cm. $\angle A = 60^{o}$ and the bisector of $\angle A$ meets BC at D such that $BO = 6$ cm.

44.

(a) Varshika drew 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference (approximately related) of each circle as shown in the table and use it to find the circumference of a circle when its diameter is 6 cm.

Diameter (x) cm	1	2	3	4	5
Circumference (y) cm	3.1	6.2	9.3	12.4	15.5

OR

(b) Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$.

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10 TH PUBLIC EXAM JULY - (2022-2023)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. **$14 \times 1 = 14$**
(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. If there are 1024 relations from a set $A = \{1_1 2,3,4,5\}$ to a set B, then the number of elements in B is:
(a) 3 (b) 2 (c) 4 (d) 8

2. $7^{4k} \equiv$ _____ $(mod\ 100)$
(a) 1 (b) 2 (c) 3 (d) 4

3. The next term of the sequence $\frac{1}{2}, \frac{1}{6}, \frac{1}{10}, \frac{1}{14}, \ldots$. is :
(a) $\frac{1}{15}$ (b) $\frac{1}{16}$ (c) $\frac{1}{18}$ (d) $\frac{1}{20}$

4. $y^2 + \frac{1}{y^2}$ is not equal to ::
(a) $\frac{y^4+1}{y^2}$ (b) $\left(y+\frac{1}{y}\right)^2$ (c) $\left(y-\frac{1}{y}\right)^2 + 2$ (d) $(y+\frac{1}{y})^2 - 2$

5. Graph of a Linear Equation is a
(a) straight line (b) circle (c) parabola (d) hyperbola

6. If in ΔABC, $DE||BC$, $AB = 3.6\ cm$, $AC = 2.4$ cm and $AD = 2.1$ cm then, the length of AE is :
(a) 1.4 cm (b) 1.8 cm (c) 1.2 cm (d) 1.05 cm

7. How many tangents can be drawn to the circle from an exterior point ?
(a) one (b) two (c) infinite (d) zero

8. The straight line given by the equation $x = 11$ is :
(a) parallel to X-axis (b) parallel to y-axis
(c) passing through the origin (d) passing through the point $(0,11)$

9. If the slope of the line PQ is $\frac{1}{\sqrt{3}}$, then the slope of the perpendicular bisector of PQ is:
(a) $\sqrt{3}$ (b) $-\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) 0

10. $\tan\theta\ cosec^2\theta - \tan\theta$ is equal to
(a) $\sec\theta$ (b) $\cot^2\theta$ (c) $\sin\theta$ (d) $\cot\theta$

11. The total surface area of hemi-sphere is how much times the square of its radius :
(a) π (b) 4π (c) 3π (d) 2π

12. The curved surface area of the right circular cone of height 15 cm and base diameter is 16 cm:
(a) $60\ \pi$ cm^2 (b) $68\ \pi$ cm^2 (c) $120\ \pi$ cm^2 (d) $136\ \pi$ cm^2

13. The range of the data 8,8,8,….8 is
(a) 0 (b) 1 (c) 8 (d) 3

14. The probability of a red marble selected at random from a jar containing p red, q blue and r green marbles is:
(a) $\frac{q}{p+q+r}$ (b) $\frac{p}{p+q+r}$ (c) $\frac{p+q}{p+q+r}$ (d) $\frac{p+r}{p+q+r}$

PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. A Relation R is given by the set $\{(x,y)/y = x+3, x \in \{0,1,2,3,4,5$ Detrmine it is domain and the range.

16. Check whether $(f \circ g) = (g \circ f)$ if $f(x) = x - 6$ and $g(x) = x^2$.

17. Find the least number that is divisible by the first ten natural numbers.

18. Find the 8^{th} term of the G.P. $9, 3, 1, \ldots$.

19. Determine the nature of the roots for the quadratic equation $15x^2 + 11x + 2 = 0$.

20. If $A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$ then verify $(A^T)^T = A$.

21. Check whether AD is bisector of $\angle A$ of ΔABC in each of the following $AB = 4\ cm$, AC $= 6\ cm$ $BD = 1.6\ cm$ and CD $=2.4$ cm .

22. Find the slope of a line joining he given points $(5, \sqrt{5})$ with the origin.

23. Prove that $\tan^2\theta - \sin^2\theta = \tan^2\theta \sin^2\theta$.

24. The curved surface area of a right circular cylinder of height $14\ cm$ is $88\ cm^2$ Find the diameter of the cylinder.

25. The volume of a solid right circular cone is $11088\ cm^3$. If its height is $24\ cm$ then find the radius of the cone.

26. Find the standard deviation of first 21 natural numbers.

27. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows and odd number and the coin shows a head.

28. Find the equation of a straight line which is parallel to the line $3x - 7y = 12$ and passing through the point $(6, 4)$.

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Let $A = \{x \in W | x < 2\}$, $B = \{x \in N | 1 < x \leq 4\}$ and $C = \{3,5\}$.

Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$

30. Find the sum to n terms of the series $3 + 33 + 333 + \cdots$

31. Rekha has 15 square Colour papers of sizes $10\ cm$, 11 cm, $12\ cm$, ... $24\ cm$. How much area can be decorated with these Colour papers.

32. Solve $3x - 2y + z = 2$, $2x + 3y - z = 5$, $x + y + z = 6$.

33. Find the square root of the following polynomials by division method.

$$121x^4 - 198x^3 - 183x^2 + 216x + 144.$$

34. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$.

35. State and prove Pythagoras Theorem.

36. Find the area of the quadrilateral whose vertices are at $(-9, -2)$, $(-8, -4)$, $(2,2)$ and $(1, -3)$

37. Find the equation of the perpendicular bisector of the line joining the points $A\ (-4,2)$ and $B(6, -4)$.

38. Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}+\sqrt{\frac{1-\sin\theta}{1+\sin\theta}}=2\sec\theta$.

39. A metallic sphere of radius 16 cm is melted and recast into small spheres each of radius 2 cm. How many small spheres can be obtained ?.

40. Find the coefficient of variation 24, 26, 33,37, 29, 31.

41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

42. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. lf the lighthouse is 200 m high, find the distance between the two ships. $(\sqrt{3}=1.732)$.

PART - IV

Note : Answer the following questions.. $2\times 8=16$

43.

(a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle PQR. [Scale factor $\frac{3}{5}<1$]

OR

(b) Draw two tangents from a point which is 10 cm away from the centre of a Circle of radius 5 cm. Also, measure the lengths of the tangents.

44.

(a) Graph the following linear function $y=\frac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also (i) find y when $x=9$ (ii) find x when $y=7.5$.

OR

(b) Draw the graph of $y=x^2-4$ and henoe solve $x^2-x-12=0$.

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10 TH PUBLIC EXAM APRIL - (2023-2024)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. **$14 \times 1 = 14$**
(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. If $n(A \times B) = 6$ and $A = \{1,3\}$, then $n(B)$ is:
(a) 1 (b) 2 (c) 3 (d) 6

2. If $f: A \to B$ is a bijective function and if $n(B) = 7$ then $n(A)$ is equal to.
(a) 7 (b) 49 (c) 1 (d) 14

3. The least number that is divisible by all the numbers from 1 to 10 (inclusive) is:
(a) 2025 (b) 5220 (c) 5025 (d) 2520

4. An $A.P$, consists of 31 terms. If its 16^{th} term is m, then the sum of all the terms of this A.P. is
(a) $16\ m$ (b) $62\ m$ (c) $31\ m$ (d) $\frac{31}{2}m$

5. Which of the following should be added to make $x^4 + 64$ a perfect square ?.
(a) $4x^2$ (b) $16x^2$ (c) $8x^2$ (d) $-8x^2$

6. Graph of a Linear Equation is a
(a) straight line (b) circle (c) parabola (d) hyperbola

7. If in ΔABC, $DE||BC$, $AB = 3.6\ cm$, $AC = 2.4$ cm and $AD = 2.1$ cm then, the length of AE is :
(a) 1.4 cm (b) 1.8 cm (c) 1.2 cm (d) 1.05 cm

8. How many tangents can be drawn to the circle from an exterior point?
(a) One (b) Two (c) Infinite (d) Zero

9. The area of triangle formed by the points $(-5,0)$, $(0,-5)$ and $(5,0)$ is
(a) 0 sq. units (b) 25 sq. units (c) 5 sq. units (d) 10 sq. units

10. If $x = a\tan\theta$ and $y = b\sec\theta$, then:
(a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ (b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (c) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (d) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

11. The curved surface area of a right circular cylinder of height 4 cm and base diameter 10 cm is
(a) 40 π sq. units (b) 20 π sq. units (c) 14 π sq. units (d) 80 π sq. units

12. The ratio of the volumes of a cylinder, a cone and a sphere , if each has the same diameter and same height is :
(a) 1:2:3 (b) 2: 1: 3 (c) 1:3:2 (d) 3:1:2

13. Which of the following values cannot be a probability of an event?
(a) 0 (b) 0.5 (c) 1.05 (d) 1

14. The probability of getting a job for a person is $\frac{x}{3}$. If the probability of not getting the job is $\frac{2}{3}$, then the value of x is :
(a) 2 (b) 1 (c) 3 (d) 1.5

PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. If $A \times B = \{(3,2), (3,4), (5,2), (5,4)\}$ then find A and B.

16. If $f(x) = 3x - 2, g(x) = 2x + k$ and $f \circ g = g \circ f$, then find value of k.

17. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'

18. Simplify- $\frac{4x^2y}{2z^2} \times \frac{6xz^3}{20y^4}$.

19. Find the sum and product of the roots for following quadratic equation $x^2 + 8x - 65 = 0$.

20. A man goes to 18 m due east and then 24 m due North. Find the distance of his current position from the starting point.

21. If the points $A(-3,9), B(a,b)$ and $C(4,-5)$ are collinear and if $a + b = 1$, then find a and b.

22. Find the equation of a straight line which has slope $\frac{-5}{4}$ and passing through the points $(-1,2)$.

23. Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta + \cot\theta$.

24. If the base area of a hemispherical solid is 1386 sq. meters, then find its total surface area?

25. Find the volume of a cylinder whose height is $2m$ and whose base area is 250 sq.m.

26. Find the Range and Co-efficient of range of the following data : 25,67,48,53,18,39,44.

27. What is the Probability that a leap year selected at random will contain 53 Saturdays?.

28. Find the HCF of 23 and 12.

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Let $A = \{x \in N | 1 < x < 4\}, B = \{x \in W | 0 \leq x < 2\}$ and $C = \{x \in W | x < 3\}$.

Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$.

30. Let $A = \{0,1,2,3\}$ and $B = \{1,3,5,7,9\}$ be two sets. Let $f: A \to B$ be a function give by $f(x) = 2x - 1$. Represent this function

(i) by arrow diagram (ii) in a table form

(iii) as a set of ordered pairs (iv) in a graphical form

31. Find the Sum of $9^3 + 10^3 + \cdots + 21^3$.

32. Find the square root of $64x^2 - 16x^3 + 17x^2 - 2x + 1 = 0$.

33. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$.

34. State and Prove Thales Theorem.

35. Find the area of the quadrilateral whose vertices are at $(-9,-2)$, $(-8,-4)$, $(2,2)$ and $(1,-3)$.

36. Find the equation of the perpendicular bisector of the line joining the points $A\ (-4,2)$ and $B(6,-4)$.

37. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. lf the lighthouse is 200 m high, find the distance between the two ships. $(\sqrt{3} = 1.732)$.

38. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum.

39. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice-cream. The ice-cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container.

40. Find the coefficient of variation 24, 26, 33,37, 29, 31.

41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

42. Find the sum to n terms of the series $7 + 77 + 777 + \cdots$

PART - IV

Note : Answer the following questions.. $2 \times 8 = 16$

43.

(a) Construct a ΔPQR which ffie base $PQ = 4.5$ cm, $\angle R = 35^0$ and the median RG from R to PQ is 6 cm

OR

(b) Draw a circle of diameter 6 cm, from a point P, which is 8 cm away from its centre. Draw a two tangents PA and PB to the circle and measure their lengths.

44.

(a) Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$.

OR

(b) Draw the graph of $xy = 24, x, y > 0$. Using the graph find

(i) y when $x = 3$ and

(ii) x when $y = 6$.

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10 TH PUBLIC EXAM JULY - (2023-2024)

Time Allowed: 3.00 Hours **Maximum Marks: 100**

PART - I

Note : (i) Answer all the questions. **$14 \times 1 = 14$**
(ii) Choose the most appropriate answer from the given four alternative and write the option code and the corresponding answer.

1. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then fog is :
(a) $\frac{3}{2x^2}$ (b) $\frac{2}{3x^2}$ (c) $\frac{2}{9x^2}$ (d) $\frac{1}{6x^2}$

2. If $\{(a, 8), (6, b)\}$ represents an identity function, then the value of a and b are respectively
(a) $(8, 6)$ (b) $(8, 8)$ (c) $(6, 8)$ (d) $(6, 6)$

3. $7^{4k} \equiv$ _____$(mod\ 100)$
(a) 1 (b) 2 (c) 3 (d) 4

4. $\frac{x}{x^2-25} - \frac{8}{x^2+6x+5}$ gives :
(a) $\frac{x^2-7x+40}{(x-5)(x+5)}$ (b) $\frac{x^2+7x+40}{(x-5)(x+5)(x+1)}$ (c) $\frac{x^2-7x+40}{(x^2-25)(x+1)}$ (d) $\frac{x^2+10}{(x^2-25)(x+1)}$

5. Transpose of a column matrix is:
(a) unit matrix (b) diagonal matrix (c) column matrix (d) row matrix

6. Two poles of heights 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m , what is the distance between their tops?
(a) 13 m (b) 14 m (c) 15 m (d) 12.8 m

7. A tangent is perpendicular to the radius at the:
(a) centre (b) point of contact (c) infinity (d) Chord

8. The straight line given by the equation $x = 11$ is
(a) Parallel to X - axis (b) Parallel to Y-axis
(c) Passing through the origin (d) Passing through the point $(0, 11)$

9. The equation of a line passing through the origin and perpendicular to the line $7x - 3y + 4 = 0$ is:
(a) $7x - 3y + 4 = 0$ (b) $3x - 7y + 4 = 0$ (c) $3x + 7y = 0$ (d) $7x - 3y = 0$

10. $\tan\theta\ cosec^2\theta - \tan\theta$ is equal to
(a) $\sec\theta$ (b) $\cot^2\theta$ (c) $\sin\theta$ (d) $\cot\theta$

11. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}$: 1, then the angle of elevation of the sun has measure :
(a) 45^o (b) 30^o (c) 90^o (d) 60^o

12. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be
(a) 12 cm (b) 10 cm (c) 13 cm (d) 5 cm

13. Which of the following is incorrect ?.
(a) $P(A) > 1$ (b) $0 \leq P(A) \leq 1$ (c) $P(\emptyset) = 0$ (d) $P(A) + P(\overline{A}) = 1$

14. The range of the data 8, 8, 8, 8, ...8, is :
(a) 0 (b) 1 (c) 8 (d) 3

PART - II

Note : Answer **any 10** questions. Question **No. 28** is compulsory. **$10 \times 2 = 20$**

15. If $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$ find A and B.

16. Given $f(x) = 2x - x^2$. Find (i) $f(1)$ (ii) $f(x+1)$.

17. Find the 8^{th} term of the G.P. 9, 3, 1,....

18. Find the LCM of $9a^3b^2, 12a^2b^2c$.

19. Determine the nature of the roots for the following quadratic equation $15x^2 + 11x + 2 = 0$.

20. In figure QA and PB are perpendicular to Ab. If $AO = 10\ cm,\ BO = 6\ cm$ and $PB = 9\ cm$. Find AQ.

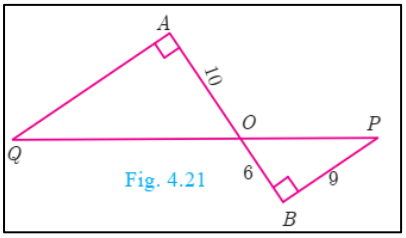

Fig. 4.21

21. The line p passes through the points $(3, -2)$, $(12,4)$ and the line q passses throught the points $(6, -2)$ and $(12, 2)$. ls p parallel to q?

22. Find the slope of the straight line $6x + 8y + 7 = 0$.

23. Prove the following identity $\frac{1-\tan^2\theta}{\cot^2\theta - 1} = \tan^2\theta$.

24. A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its curved surface Area?.

25. The volumes of two cones of same base radius are 3600 cm^3 and 5040 cm^3. Find the ratio of heights.

26. Find the standard deviation of first 21 natural numbers.

27. A Coin is tossed thrice. What is the Probability of getting two Consecutive tails?.

28. Which term of an A.P. 16, 11, 6, 1,... is -54?.

PART - III

Note : Answer **any 10** questions. Question **No. 42** is compulsory. **$10 \times 5 = 50$**

29. Let A =The set of all natural numbers less than 8, B =The set of all prime numbers less than 8, C =The set of even prime number. Verify $(A \cap B) \times C = (A \times C) \cap (B \times C)$.

30. A function $f: [-5,9] \to \mathbb{R}$ is defined as follows:

$$f(x) = \begin{cases} 6x + 1; & -5 \le x < 2 \\ 5x^2 - 1; & 2 \le x < 6 \\ 3x - 4; & 6 \le x \le 9 \end{cases}$$

Find (i) $f(-3) + f(2)$ (ii) $f(7) - f(1)$ (iii) $2f(4) + f(8)$ (iv) $\frac{2f(-2) - f(6)}{f(4) + f(-2)}$

31. Find the sum to n terms of the series $3 + 33 + 333 + \cdots$

32. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the values of 'a' and 'b'

33. Rekha has 15 square Colour papers of sizes 10 cm, 11 cm, 12 cm, ... 24 cm. How much area can be decorated with these Colour papers.

34. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, and $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ then show that $(AB)^T = B^T A^T$.

35. State and prove Pythagoras Theorem.

36. Find the area of the quadrilateral whose vertices are at $(-9, 0)$, $(-8,6)$, $(-1, -2)$ and $(-6, -3)$.

37. Find the equation of a straight line through the intersection of lines $7x + 3y = 10,\ 5x - 4y = 1$ and parallel to the line $13x + 5y + 12 = 0$.

38. A pole 5 m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point 'A' on the ground is 60° and the angle of depression to the point 'A' from the top of the tower is 45°. Find the height of the tower. $(\sqrt{3} = 1.732)$.

39. A metallic sphere of radius $16cm$ is melted and recast into small spheres each of radius $2cm$. How many small spheres can be obtained ?.

40. A teacher asked the students to complete 60 pages of a record note book. Eight students have completed only 32, 35, 37, 30, 33, 36, 35 and 37 pages. Find the standard deviation of the pages completed by them.

41. Two dice are rolled. Find the probability that the sum of outcomes is
(i) equal to 4 (ii) greater than 10 (iii) less than 13.

42. The internal and external diameters of a hollow hemispherical vessel are 20 cm and 28 cm respectively. Find the cost to paint the vessel all over at ₹0.14 per . cm^2 .

PART - IV

Note : Answer the following questions.. $2 \times 8 = 16$

43.

(a) Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also, measure the lengths of the tangents.

OR

(b) Construct a Δ PQR in which QR $= 5$ cm, $\angle P = 40^o$ and the median PG from P to, QR is 4.4 cm Find the length of the altitude from P to QR.

44.

(a) The following table shows the data about the number of pipes and the time taken to fill the same tank.

No. of Pipes (x)	2	3	6	9
Time Taken (y) (in in)	45	30	15	10

Draw the graph for the above data and hence:

(i) Find the time taken to fill the tank when five pipes are used.

(ii) Find the number of pipes when the time is 9 minutes.

OR

(b) Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.

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