PART - I - 1 Mark Questions

1. Relations and Functions

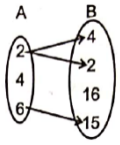
Online Test

Text Book Questions

1. If $n(A \times B) = 6$ and $A = \{1,3\}$ then $n(B)$ is SEP-21
   (A) 1 (B) 2 **(C) 3** (D) 6
2. $A = \{a, b, p\}, B = \{2,3\}, C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is APR-23, PTA-3
   (A) 8 (B) 20 **(C) 12** (D) 16
3. 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 SEP-20
   (A) $(\boldsymbol{A \times C}) \subset (\boldsymbol{B \times D})$ (B) $(B \times D) \subset (A \times C)$
   (C) $(A \times B) \subset (A \times D)$ (D) $(D \times A) \subset (B \times A)$
4. If there are 1024 relations from a set $A = \{1,2,3,4,5\}$ to a set B, then the number of element in B is
   (A) 3 **(B) 2** (C) 4 (D) 8 JUN-23, PTA-2, JUL-22
5. The range of the relations $R = \{(x, x^2) | x$ is a prime number less than 13$\}$ is PTA-4, JUL-22
   (A)$\{2,3,5,7\}$ (B) $\{2,3,5,7,11\}$ **(C) {4,9,25,49,121}** (D) $\{1,4,9,25,49,121\}$
6. If the ordered pairs $(a + 2,4)$ and $(5, 2a + b)$ are equal then (a, b) is PTA-6, MAY-22
   (A) $(2, -2)$ (B) $(5,1)$ (C) $(2,3)$ **(D)** $(\boldsymbol{3, -2})$
7. Let $n(A) = m$ and $n(B) = n$ then the total number of non-empty relations that can be defined from A to B is
   (A) m^n (B) n^m **(C)** $\boldsymbol{2^{mn} - 1}$ (D) 2^{mn}
8. If $\{(a, 8), (6, b)\}$ represents an identity function, then the value of a and b are respectively. PTA-1
   (A) (8,6) (B) (8,8) (C) (6,8) (D) (6,6)
9. Let $A = \{1,2,3,4\}$ and $B = \{4,8,9,10\}$. A function $f: A \to B$ given by $f = \{(1,4), (2,8), (3,9), (4,10)\}$ is a
   (A) Many-one function (B) Identity function PTA-4
   (C) One-to-one function (D) Into function
10. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then $f \circ g$ is
    (A) $\frac{3}{2x^2}$ (B) $\frac{2}{3x^2}$ **(C)** $\boldsymbol{\frac{2}{9x^2}}$ (D) $\frac{1}{6x^2}$
11. If $f: A \to B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to PTA-2
    (A) 7 (B) 49 (C) 1 (D) 14
12. Let f and g be two functions given by $f = \{(0,1), (2,0), (3, -4), (4,2), (5,7)\}$ and $g = \{(0,2), (1,0), (2,4), (-4,2), (7,0)\}$ then the range of $f \circ g$ is
    (A) $\{0,2,3,4,5\}$ (B) $\{-4,1,0,2,7\}$ (C) $\{1,2,3,4,5\}$ **(D)** $\{\boldsymbol{0, 1, 2}\}$
13. Let $f(x) = \sqrt{1 + x^2}$ then
    (A) $f(xy) = f(x).f(y)$ (B) $f(xy) \geq f(x).f(y)$
    (C) $\boldsymbol{f(xy) \leq f(x).f(y)}$ (D) None of these
14. If $g = \{(1,1), (2,3), (3,5), (4,7)\}$ is a function given by $g(x) = \alpha x + \beta$ then the values of α and β are
    (A) $(-1,2)$ **(B)** $(\boldsymbol{2, -1})$ (C) $(-1, -2)$ (D) $(1,2)$ PTA-6
15. $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is
    (A) linear (B) cubic (C) reciprocal **(D) quadratic** PTA-5

Creative MCQ

1. Let $f(x) = x^2 - x$, then $f(x-1) - f(x+1)$ is SEP-20
   (A) $4x$ (B) $2 - 2x$ **(C) $2 - 4x$** (D) $4x - 2$
2. If $n(A) = p, n(B) = q$ then the total number of relations that exist between A and B is APR-23 PTA-1
   (A) 2^p (B) 2^q (C) 2^{p+q} **(D) 2^{pq}**
3. Given $f(x) = (-1)^x$ is a function from $\mathbb{N}$ to $\mathbb{Z}$. Then the range of f is PTA-3
   (A) $\{1\}$ (B) $\mathbb{N}$ **(C) $\{1, -1\}$** (D) $\mathbb{Z}$
4. The given diagram represents PTA-6



   (A) an onto function (B) a constant function
   (C) an one-one function **(D) not a function**

2. Numbers and Sequences

Text Book Questions

1. Euclid's division lemma states that for positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where r must satisfy
   (A) $1 < r < b$ (B) $0 < r < b$ **(C) $0 \leq r < b$** (D) $0 < r \leq b$
2. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are PTA-5, SEP-20
   (A) 0, 1, 8 (B) 1, 4, 8 (C) 0, 1, 3 (D) 1, 3, 5
3. 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 MAY-22
4. The sum of the exponents of the prime factors in the prime factorization of 1729 is
   (A)1 (B) 2 **(C) 3** (D) 4 SEP-21,PTA-4,JUL-22
5. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
   (A) 2025 (B) 5220 (C) 5025 **(D) 2520**
6. $7^{4k} \equiv$ _____$(mod\ 100)$ JUN-23, PTA-1
   (A) 1 (B) 2 (C) 3 (D) 4
7. Given $F_1 = 1, F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is APR-23, SEP-21, MDL
   (A) 3 (B) 5 (C) 8 **(D) 11**
8. The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P.
   (A) 4551 (B) 10091 **(C) 7881** (D) 13531
9. If 6 times of 6th term of an A.P is equal to 7 times the 7th term, then the 13th terms of the A.P is
   (A) 0 (B) 6 (C) 7 (D) 13 PTA-4
10. An A.P consists of 31 terms. It is 16th 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 PTA-5
11. In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P must be taken for their sum to be equal to 120? MDL
    (A) 6 (B) 7 **(C) 8** (D) 9

12. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \cdots + 2^0$ which of the following is true? PTA-6, SEP-20
(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**

13. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots$ is PTA-2
(A) $\frac{1}{24}$ **(B) $\frac{1}{27}$** (C) $\frac{2}{3}$ (D) $\frac{1}{81}$

14. If the sequence $t_1, t_2, t_3, \ldots$ are in A.P then the sequence $t_6, t_{12}, t_{18}, \ldots$ is APR-23
(A) a Geometric Progression
(B) an Arithmetic Progression
(C) neither an Arithmetic Progression nor a Geometric Progression
(D) a constant sequence

15. The value of $(1^3 + 2^3 + 3^3 + \cdots + 15^3) - (1 + 2 + 3 + \cdots + 15)$ is PTA-3
(A) 14400 (B) 14200 **(C) 14280** (D) 14520

Creative MCQ

1. The next term of the sequence $\frac{1}{2}, \frac{1}{6}, \frac{1}{10}, \frac{1}{14}, \ldots$ is JUN-23
(A) $\frac{1}{15}$ (B) $\frac{1}{16}$ **(C) $\frac{1}{18}$** (D) $\frac{1}{20}$

2. If t_n is the nth term of an A.P., then $t_{8n} - t_n$ is MAY-22
(A) $(8n-1)d$ (B) $(8n-2)d$ (C) $(7n-2)d$ **(D) $(7nd)$**

3. The sequence $-3, -3, -3$ ..... is PTA-1
(A) An A.P only (B) a G.P only
(C) Neither A.P nor G.P **(D) both A.P and G.P**

4. If $2 + 4 + 6 + \cdots + 2k = 90$, then the value of k is PTA-3
(A) 8 **(B) 9** (C) 10 (D) 11

5 If a and b are two positive integers where $a > 0$ and b is a factor of a, then HCF of a and b is PTA-4
(A) b (B) a (C) $3ab$ (D) $\frac{a}{b}$

6. If a, b, c are in A.P then $\frac{a-b}{b-c}$ is equal to PTA-6
(A) $\frac{a}{b}$ (B) $\frac{b}{c}$ (C) $\frac{a}{c}$ **(D) 1**

3. Algebra

Text Book Questions

1. A system of three linear equations in three variables is inconsistent if their planes PTA-1, JUL-22
(A) intersect only at a point (B) intersect in a line
(C) coincides with each other **(D) do not intersect**

2. The solution of the system $x + y - 3z = -6$, $-7y + 7z = 7$, $3z = 9$ is JUL-22
(A) $x = 1, y = 2, z = 3$ (B) $x = -1, y = 2, z = 3$
(C) $x = -1, y = -2, z = 3$ (D) $x = 1, y = -2, z = 3$

3. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is PTA-4, MAY-22
(A) 3 **(B) 5** (C) 6 (D) 8

4. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is APR-23,PTA-5
(A) $\frac{9y}{7}$ (B) $\frac{9y^3}{21y-21}$ (C) $\frac{21y^2-42y+21}{3y^3}$ (D) $\frac{7(y^2-2y+1)}{y^2}$

5. $y^2 + \frac{1}{y^2}$ is not equal to JUN-23, JUL-22, PTA-6

(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) $\left(y + \frac{1}{y}\right)^2 - 2$

6. $\frac{x}{x^2-25} - \frac{8}{x^2+6x+5}$ 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) $\frac{x^2+10}{(x^2-25)(x+1)}$

7. The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to SEP-21

(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)** $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

8. Which of the following should be added to make $x^4 + 64$ a perfect square MAY-22

(A) $4x^2$ **(B)** $16x^2$ (C) $8x^2$ (D) $-8x^2$

9. The solution of $(2x-1)^2 = 9$ is equal to

(A) -1 (B) 2 **(C)** $-1, 2$ (D) None of these

10. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are

(A) 100,120 (B) 10,12 **(C)** $-120, 100$ (D) 12,10

11. If the roots of the equation $q^2x^2 + p^2x + r^2 = 0$ are the squares of the roots of the equation $qx^2 + px + r = 0$, then q, p, r are in _____

(A) $A.P$ **(B)** $G.P$ (C) Both $A.P$ and $G.P$ (D) None of these

12. Graph of a linear equation is a JUN-23, SEP-21, PTA-2

(A) Straight line (B) circle (C) parabola (D) hyperbola

13. 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

MAY-22

14. For the given matrix $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$ the order of the matrix A^T is

(A) 2×3 (B) 3×2 (C) 3×4 **(D)** 4×3

15. If A is 2×3 matrix and B is a 3×4 matrix, how many columns does AB have

(A) 3 **(B) 4** (C) 2 (D) 5

16. If number of columns and rows are not equal in a matrix then it is said to be a

(A) diagonal matrix **(B) rectangular matrix**

(C) square matrix (D) identity matrix

17. Transpose of a column matrix is SEP-20

(A) unit matrix (B) diagonal matrix

(C) column matrix **(D) row matrix**

18. Find the matrix X if $2X + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$ PTA-6

(A) $\begin{bmatrix} -2 & -2 \\ 2 & -1 \end{bmatrix}$ **(B)** $\begin{bmatrix} \mathbf{2} & \mathbf{2} \\ \mathbf{2} & \mathbf{-1} \end{bmatrix}$ (C) $\begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$ (D) $\begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$

19. Which of the following can be calculated from the given matrices

$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$, (i) A^2 (ii) B^2 (iii) AB (iv) BA

(A) (i) and (ii) only (B) (ii) and (iii) only **(C) (ii) and (iv) only** (D) all of these

20. If $A=\begin{bmatrix}1 & 2 & 3\\ 3 & 2 & 1\end{bmatrix}, B=\begin{bmatrix}1 & 0\\ 2 & -1\\ 0 & 2\end{bmatrix}$ and $C=\begin{bmatrix}0 & 1\\ -2 & 5\end{bmatrix}$. Which of the following statements are correct?

(i) $AB+C=\begin{bmatrix}5 & 5\\ 5 & 5\end{bmatrix}$ (ii) $BC=\begin{bmatrix}0 & 1\\ 2 & -3\\ -4 & 10\end{bmatrix}$ (iii) $BA+C=\begin{bmatrix}2 & 5\\ 3 & 0\end{bmatrix}$ (iv) $(AB)C=\begin{bmatrix}-8 & 20\\ -8 & 13\end{bmatrix}$

(A) (i) and (ii) only (B) (ii) and (iii) only (C) (ii) and (iv) only (D) all of these

Creative MCQ

1. Graph of a quadratic equation is _____ APR-23
(A) Straight line (B) Circle **(C) Parabola** (D) Hyperbola

2. The G.C.D of a^m, a^{m+1}, a^{m+2} is SEP-21
(A) a^m (B) a^{m+1} (C) a^{m+2} (D) 1

3. $\frac{a^2}{a^2-b^2}+\frac{b^2}{b^2-a^2}=$ SEP-20
(A) $a-b$ (B) $a+b$ (C) a^2-b^2 **(D) 1**

4. The non- diagonal elements in any unit matrix are _____ MDL
(A) 0 (B) 1 (C) m (D) n

5. The LCM of x^3-a^3 and $(x-a)^2$ is PTA-1
(A) $(x^3-a^3)(x+a)$ (B) $(x^3-a^3)(x-a)^2$
(C) $(x-a)^2(x^2+ax+a^2)$ (D) $(x+a)^2(x^2+ax+a^2)$

6. The excluded value of the rational expression $\frac{x^3+8}{x^2-2x-8}$ is PTA-2
(A) 8 (B) 2 **(C) 4** (D) 1

7. If a polynomial is a perfect square then its factors will be repeated _____ number of times PTA-4
(A) Odd (B) zero **(C) even** (D) none of the above

8. $\frac{3y-3}{y}\div\frac{7y-7}{3y^2}$ is PTA-5
(A) $\frac{9y}{7}$ (B) $\frac{9y^3}{21y-21}$ (C) $\frac{21y^2-42y+21}{3y^3}$ (D) $\frac{7(y^2-2y+1)}{y^2}$

9. The solution of $x^2-25=0$ is PTA-5
(A) No real roots (B) real and equal roots
(C) Real and unequal roots (D) imaginary roots

10. For the given matrix $A=\begin{bmatrix}1 & 3 & 5\\ 2 & 4 & 6\end{bmatrix}$ the order of the matrix $(A^T)^T$ is PTA-5
(A) 2×3 (B) 3×2 (C) 3×4 (D) 4×3

11. On dividing $\frac{x^2-25}{x+3}$ by $\frac{x+5}{x^2-9}$ PTA-6
(A) $(x-5)(x-3)$ (B) $(x-5)(x+3)$ (C) $(x+5)(x-3)$ (D) $(x+5)(x+3)$

4. Geometry

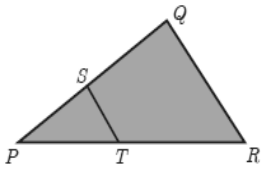
Text Book Questions

1. If in triangles ABC and EDF, $\frac{AB}{DE}=\frac{BC}{FD}$ then they will be similar, when APR-23
(A) $\angle B=\angle E$ (B) $\angle A=\angle D$ **(C) $\angle B=\angle D$** (D) $\angle A=\angle F$

2. In ΔLMN, $\angle L=60^\circ$, $\angle M=50^\circ$. If $\Delta LMN\sim\Delta PQR$ then the value of $\angle R$ is SEP-20
(A) 40° **(B) 70°** (C) 30° (D) 110°

3. If ΔABC is an isosceles triangle with $\angle C=90^\circ$ and $AC=5\ cm$, then AB is PTA-4, MAY-22
(A) 2.5 cm (B) 5 cm (C) 10 cm **(D) $5\sqrt{2}\ cm$**

4. In a given figure $ST \parallel QR$, $PS = 2\ cm$ and $SQ = 3\ cm$. Then the ratio of the area of ΔPQR to the area of ΔPST is



(A) 25 : 4 (B) 25 : 7
(C) 25 : 11 (D) 25 : 13

5. The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If $PQ = 10\ cm$, then the length of AB is

PTA-5

(A) $6\frac{2}{3}cm$ (B) $\frac{10\sqrt{6}}{3}cm$ (C) $66\frac{2}{3}cm$ **(D) 15 *cm***

6. 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

JUN-23, JUL-22, SEP-21, PTA-3

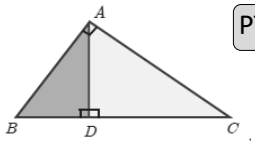
7. In a $\Delta\ ABC$, AD is the bisector of $\angle BAC$. If $AB = 8\ cm$, $BD = 6\ cm$ and $DC = 3\ cm$. The length of the side AC is

PTA-6, MAY-22

(A) 6 cm **(B) 4 *cm*** (C) 3 cm (D) 8 cm

8. In the adjacent figure $\angle BAC = 90^\circ$ and $AD \perp BC$ then

PTA-1



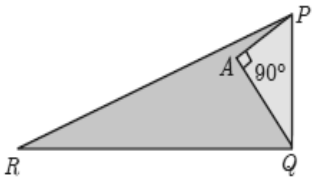
(A) $BD \cdot CD = BC^2$ (B) $AB \cdot AC = BC^2$
(C) $BD \cdot CD = AD^2$ (D) $AB \cdot AC = AD^2$

9. 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

10. In the given figure, $PR = 26\ cm$, $QR = 24\ cm$, $\angle PAQ = 90^\circ$, $PA = 6\ cm$ and $QA = 8\ cm$. Find $\angle PQR$

PTA-6



(A) 80° (B) 85°
(C) 75° **(D) 90°**

11. A tangent is perpendicular to the radius at the

APR-23,PTA-2

(A) centre **(B) point of contact** (C) infinity (D) chord

12. How many tangents can be drawn to the circle from an exterior point?

JUN-23, SEP-21, JUL-22

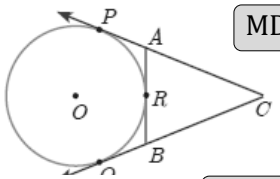
(A) one **(B) two** (C) infinite (D) zero

13. The two tangents from an external points P to a circle with centre at O are PA and PB. If $\angle APB = 70^\circ$ then the value of $\angle AOB$ is

(A) 100° **(B) 110°** (C) 120° (D) 130°

14. If figure CP amd CQ are tangents to a circle with centre at O. ARB is another tangent touching the circle at R. If $CP = 11\ cm$ and $BC = 7\ cm$, then the length of BR is

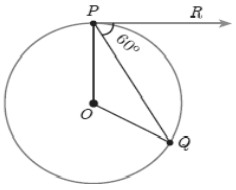
MDL



(A) 6 cm (B) 5 cm (C) 8 cm **(D) 4 *cm***

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

SEP-20



(A) 120° (B) 100°
(C) 110° (D) 90°

Creative MCQ

1. The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If $PQ = 10cm$, then the length of AB is PTA-5
(A) $6\frac{2}{3}\ cm$ (B) $\frac{10\sqrt{6}}{3}\ cm$ (C) $66\frac{2}{3}\ cm$ **(D) 15 cm**

5. Coordinate Geometry

Text Book Questions

1. The area of triangle formed by the points $(-5,0)$, $(0,-5)$ and $(5,0)$ is SEP-21,PTA-2
(A) 0 sq. units **(B) 25 sq. units** (C) 5 sq. units (D) none of these
2. A man walks near a wall, such that the distance between him and the wall is 10 units. consider the wall to be the Y axis. The path travelled by the man is
(A) $x = 10$ (B) $y = 10$ (C) $x = 0$ (D) $y = 0$
3. The straight line given by the equation $x = 11$ is JUN-23, PTA-1, SEP-20
(A) Parallel to X axis **(B) parallel to Y axis**
(C) passing through the origin (D) passing through the point $(0,11)$
4. If $(5,7)$, $(3,p)$ and $(6,6)$ are collinear then the value of p is PTA-5, MAY-22
(A) 3 (B) 6 **(C) 9** (D) 12
5. The point of intersection $3x - y = 4$ and $x + y = 8$ is PTA-2, JUL-22
(A) $(5,3)$ (B) $(2,4)$ **(C) $(3,5)$** (D) $(4,4)$
6. The slope of the line joining $(12,3)$ and $(4,a)$ is $\frac{1}{8}$ the value of $'a'$ is PTA-3
(A) 1 (B) 4 (C) -5 **(D) 2**
7. The slope of the line which is perpendicular to line joining the points $(0,0)$ and $(-8,8)$ is
(A) -1 **(B) 1** (C) $\frac{1}{3}$ (D) -8 MAY-22
8. If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then the slope of the perpendicular bisector of PQ is JUN-23 JUL-22,PTA-6
(A) $\sqrt{3}$ **(B) $-\sqrt{3}$** (C) $\frac{1}{\sqrt{3}}$ (D) 0
9. If A is a point on the Y axis whose ordinate is 8 and B is a point on the X axis whose abscissae is 5 then the equation of the line AB is
(A) $8x + 5y = 40$ (B) $8x - 5y = 40$ (C) $x = 8$ (D) $y = 5$
10. The equation of the line passing through the origin and perpendicular to the line $7x - 3y + 4 = 0$ is PTA-4
(A) $7x - 3y + 4 = 0$ (B) $3x - 7y + 4 = 0$ **(C) $3x + 7y = 0$** (D) $7x - 3y = 0$
11. Consider four straight lines
(i) $l_1;\ 3y = 4x + 5$ (ii) $l_2;\ 4y = 3x - 1$ (iii) $l_3;\ 4y + 3x = 7$ (iv) $l_4;\ 4x + 3y = 2$
Which of the following statement is true
(A) l_1 and l_2 are perpendicular (B) l_1 and l_4 are parallel
(C) l_2 and l_4 are perpendicular (D) l_2 and l_3 are parallel
12. A straight line has equation $8y = 4x + 21$ which of the following is true. PTA-3
(A) The slope is 0.5 and the y intercept is 2.6 (B) The slope is 5 and the y intercept is 1.6
(C) The slope is 0.5 and the y intercept is 1.6 (D) The slope is 5 and the y intercept is 2.6
13. When proving that a quadrilateral is a trapezium it is necessary to show PTA-4
(A) Two sides are parallel. **(B) Two parallel and two non- parallel sides.**
(C) Opposite sides are parallel. (D) All sides are of equal length.

14. When proving that a quadrilateral is a parallelogram by using slopes you must find
(A) The slopes of two sides **(B) The slopes of two pair of opposite sides**
(C) The length of all sides (D) Both the lengths and slopes of two sides

15. (2,1) is the point of intersection of two lines
(A) $x-y-3=0, 3x-y-7=0$ **(B) $x+y=3,\ 3x+y=7$**
(C) $3x+y=3,\ x+y=7$ (D) $x+3y-3=0, x-y-7=0$

Creative MCQ

1. The slope of the straight line perpendicular to x −axis is APR-23
(A) 1 (B) 0 **(C) ∞** (D) -1

2. The perimeter of a triangle formed by the points $(0,0), (1,0)$ and $(0,1)$ is SEP-21
(A) $\sqrt{2}$ (B) 2 **(C) $2+\sqrt{2}$** (D) $2-\sqrt{2}$

3. If the points $A(6,1), B(8,2), C(9,4)$ and $D(p,3)$ are the vertices of a parallelogram, taken in order then the value of p is PTA-5
(A) -7 **(B) 7** (C) 6 (D) -6

6. Trigonometry

Text Book Questions

1. The value of $\sin^2\theta + \frac{1}{1+\tan^2\theta}$ is equal to
(A) $\tan^2\theta$ **(B) 1** (C) $\cot^2\theta$ (D) 0

2. $\tan\theta \operatorname{cosec}^2\theta - \tan\theta$ is equal to JUN-23,PTA-3
(A) $\sec\theta$ (B) $\cot^2\theta$ (C) $\sin\theta$ **(D) $\cot\theta$**

3. If $(\sin\alpha + \operatorname{cosec}\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$, then the value of k is equal to
(A) 9 **(B) 7** (C) 5 (D) 3 PTA-1

4. If $\sin\theta + \cos\theta = a$ and $\sec\theta + \operatorname{cosec}\theta = b$, then the value of $b(a^2-1)$ is equal to
(A) $2a$ (B) $3a$ (C) 0 (D) $2ab$

5. If $5x = \sec\theta$ and $\frac{5}{y} = \tan\theta$, then $x^2 - \frac{1}{y^2}$ is equal to PTA-2
(A) 25 **(B) $\frac{1}{25}$** (C) 5 (D) 1

6. If $\sin\theta = \cos\theta$, then $2\tan^2\theta + \sin^2\theta - 1$ is equal to APR-23, PTA-1, 4
(A) $\frac{-3}{2}$ **(B) $\frac{3}{2}$** (C) $\frac{2}{3}$ (D) $\frac{-2}{3}$

7. 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) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$

8. $(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta)$ is equal to
(A) 0 (B) 1 **(C) 2** (D) -1

9. $a\cot\theta + b\operatorname{cosec}\theta = p$ and $b\cot\theta + a\operatorname{cosec}\theta = q$ then $p^2 - q^2$ is equal to
(A) $a^2 - b^2$ **(B) $b^2 - a^2$** (C) $a^2 + b^2$ (D) $b - a$ PTA-5

10. 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 PTA-6, SEP-21
(A) 45° (B) 30° (C) 90° **(D) 60°**

11. The electric pole subtends an angle of 30° at a point on the same level as its foot. At a second point 'b' metres above the first, the depression of the foot of the pole is 60°. The height of the pole (in metres) is equal to
(A) $\sqrt{3}\,b$ **(B) $\frac{b}{3}$** (C) $\frac{b}{2}$ (D) $\frac{b}{\sqrt{3}}$

12. A tower is 60 m height. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30°, then x is equal to MAY-22
(A) 41.92 m **(B) 43.92 m** (C) 43 m (D) 45.6 m

13. The angle of depression of the top and bottom of 20 m tall building from the top of a multistoried building are 30° and 60° respectively. The height of the multistoried building and the distance between two buildings (in meters) is
(A) $20, 10\sqrt{3}$ (B) $30, 5\sqrt{3}$ (C) 20, 10 **(D) $30, 10\sqrt{3}$**

14. Two persons are standing 'x' metres apart from each other and the height of the first person is double that of the other. If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complementary, then the height of the shorter person (in metres) is
(A) $\sqrt{2}\,x$ **(B) $\frac{x}{2\sqrt{2}}$** (C) $\frac{x}{\sqrt{2}}$ (D) $2\,x$

15. The angle of elevation of a cloud from a point h metres above a lake is β. The angle of depression of its reflection in the lake is 45°. The height of location of the cloud from the lake is JUL-22
(A) $\frac{h(1+\tan\beta)}{1-\tan\beta}$ (B) $\frac{h(1-\tan\beta)}{1+\tan\beta}$ (C) $h\tan(45^\circ-\beta)$ (D) none of these

Creative MCQ

1. If $\tan\theta+\cot\theta=2$ then $\tan^2\theta+\cot^2\theta$ is equal to SEP-20
(A) 0 (B) 1 **(C) 2** (D) 4

2. The angle of elevation and depression are usually measured by a device called PTA-1
(A) Clinometer (B) kaleidoscope (C) Periscope (D) Telescope

3. $\frac{\sin(90^\circ-\theta)\sin\theta}{\tan\theta}+\frac{\cos(90^\circ-\theta)\cos\theta}{\cot\theta}=$ PTA-2
(A) $\tan\theta$ **(B) 1** (C) -1 (D) $\sin\theta$

7. Mensuration

Text Book Questions

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
(A) $60\pi\ cm^2$ (B) $68\pi\ cm^2$ (C) $120\pi\ cm^2$ **(D) $136\pi\ cm^2$**

2. 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 MAY-22
(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

3. 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 APR-23,SEP-21

4. 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 JUL-22
(A) 1 : 2 **(B) 1 : 4** (C) 1 : 6 (D) 1 : 8

5. The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is PTA-1
(A) $\frac{9\pi h^2}{8}$ sq. units (B) $24\pi h^2$ sq. units **(C) $\frac{8\pi h^2}{9}$ sq. units** (D) $\frac{56\pi h^2}{9}$ sq. units

6. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is PTA-4
(A) $5600\pi\ cm^3$ **(B) $1120\pi\ cm^3$** (C) $56\pi\ cm^3$ (D) $3600\pi\ cm^3$

7. If the radius of the base of a cone is tripled and the height is doubled then the volume is
(A) made 6 times **(B) made 18 times** (C) made 12 times (D) unchanged

8. The total surface area of a hemi-sphere is how much times the square of its radius.
(A) π (B) 4π **(C) 3π** (D) 2π JUN-23, PTA-3, SEP-21, JUL-22

9. A solid sphere of radius x cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is
(A) $3x\ cm$ (B) $x\ cm$ **(C) $4x\ cm$** (D) $2x\ cm$
10. A frustum of a right circular cone is of height $16\ cm$ with radii of its ends as $8\ cm$ and $20\ cm$. Then, the volume of the frustum is
(A) $3328\pi\ cm^3$ (B) $3228\pi\ cm^3$ (C) $3240\pi\ cm^3$ (D) $3340\pi\ cm^3$
11. A shuttle cock used for playing badminton has the shape of the combination of
(A) a cylinder and a sphere (B) a hemisphere and a cone
(C) a sphere and a cone **(D) frustum of a cone and a hemisphere**
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 PTA-6, SEP-20
(A) 2: 1 (B) 1: 2 (C) 4: 1 (D) 1: 4
13. The volume (in cm^3) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius $1\ cm$ and height $5\ cm$ is
(A) $\frac{4}{3}\pi$ (B) $\frac{10}{3}\pi$ (C) 5π (D) $\frac{20}{3}\pi$
14. The height and radius of the cone of which the frustum is a part are h_1 units and r_1 units respectively. Height of the frustum is h_2 units and radius of the smaller base is r_2 units. If $h_2 : h_1 = 1:2$ then $r_2 : r_1$ is PTA-2
(A) 1: 3 **(B) 1: 2** (C) 2: 1 (D) 3: 1
15. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is APR- 23,PTA-5
(A) 1: 2: 3 (B) 2: 1: 3 (C) 1: 3: 2 **(D) 3: 1: 2**

Creative MCQ

1. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
(A) $60\ \pi\ cm^2$ (B) $66\pi\ cm^2$ (C) $120\pi\ cm^2$ **(D) $136\pi\ cm^2$** JUN-23
2. If the radius of the cylinder is doubled, the new volume of the cylinder will be _____ times the original volume MAY-22
(A) Same (B) 3 **(C) 4** (D) 2
3. 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 SEP-20
(A) 24 cm (B) 12 cm **(C) 6 cm** (D) 48 cm
4. If the volume of sphere is $36\pi cm^3$, then its radius is equal to PTA-3
(A) 3 cm (B) 2 cm (C) 5 cm (D) 10 cm
5. C.S.A of solid sphere is equal to PTA-5
(A) T.S.A of solid sphere (B) T.S.A of hemisphere
(C) C.S.A of hemisphere (D) none of these

8. Statistics and Probability

Text Book Questions

1. Which of the following is not a measure of dispersion? PTA-6
(A) Range (B) Standard deviation **(C) Arithmetic mean** (D) Variance
2. The range of the data 8,8,8,8,8,…8 is JUN-23
(A) 0 (B) 1 (C) 8 (D) 3
3. The sum of all deviations of the data from its mean is
(A) Always positive (B) Always negative **(C) zero** (D) non- zero integer

4. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all observations is SEP-20
(A) 40000 **(B) 160900** (C) 160000 (D) 30000
5. Variance of first 20 natural numbers is PTA-5
(A) 32.25 (B) 44.25 **(C) 33.25** (D) 30
6. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is
(A) 3 (B) 15 (C) 5 **(D) 225**
7. If the standard deviation of x, y, z is p then the standard deviation of $3x+5, 3y+5, 3z+5$ is
(A) $3p+5$ **(B) $3p$** (C) $p+5$ (D) $9p+15$
8. If the mean and coefficient of variation of a data are 4 *and* 87.5% then the standard deviation is
(A) 3.5 (B) 3 (C) 4.5 (D) 2.5
9. Which of the following is incorrect? PTA-1, 4, 5
(A) $P(A) > 1$ (B) $0 \le P(A) \le 1$ (C) $P(\emptyset) = 0$ (D) $P(A) + P(\bar{A}) = 1$
10. The probability a red marble selected at random from a jar containing p red, q blue and r green marbles is JUN-23
(A) $\frac{q}{p+q+r}$ **(B) $\frac{p}{p+q+r}$** (C) $\frac{p+q}{p+q+r}$ (D) $\frac{p+r}{p+q+r}$
11. 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 SEP-21, JUL-22
(A) $\frac{3}{10}$ **(B) $\frac{7}{10}$** (C) $\frac{3}{9}$ (D) $\frac{7}{9}$
12. 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 MAY-22
(A) 2 **(B) 1** (C) 3 (D) 1.5
13. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of kamalam winning is $\frac{1}{9}$, then the number of tickets bought by kamalam is
(A) 5 (B) 10 **(C) 15** (D) 20
14. If a letter is chosen at random from the English alphabets $\{a, b, \ldots, z\}$, then the probability that the letter chosen precedes x. APR-23,SEP-20
(A) $\frac{12}{13}$ (B) $\frac{1}{13}$ **(C) $\frac{23}{26}$** (D) $\frac{3}{26}$
15. A purse contains 10 notes of ₹ 2000, 15 notes of ₹ 500, and 25 notes of ₹ 200. One note is drawn at random. What is the probability that the note is either a ₹ 500 note or ₹ 200 note?
(A) $\frac{1}{5}$ (B) $\frac{3}{10}$ (C) $\frac{2}{3}$ **(D) $\frac{4}{5}$**

Creative MCQ

1. If the sum and mean of a data are 407 and 11 respectively, then the number of observations in the data are : APR-23
(A) 37 (B) 4477 (C) 396 (D) 418
2. The range of first 10 prime numbers is PTA-2
(A) 9 (B) 20 **(C) 27** (D) 5
3. A letter is selected at random from the word 'PROBABILITY'. The Probability that it is not a vowel is
(A) $\frac{4}{11}$ **(B) $\frac{7}{11}$** (C) $\frac{3}{11}$ (D) $\frac{6}{11}$ MDL
4. Probability of getting 3 heads or 3 tails in tossing a coin 3 times is PTA-4
(A) $\frac{1}{8}$ **(B) $\frac{1}{4}$** (C) $\frac{3}{8}$ (D) $\frac{1}{3}$
5. A fair die is thrown once. The probability of getting a prime (or) composite number is PTA-6
(A) 1 (B) 0 **(C) $\frac{5}{6}$** (D) $\frac{1}{6}$