## Section A (Marks :50)
### Multiple Choice Questions (MCQs)

**Q1:** *Choose the correct answer.*

(i)   Set of rational numbers is subset of set of ------------ . . .
   (a) natural numbers     (b) real numbers   (c) whole numbers     (d) integers

(ii)   One and only one line can pass through ---------- distinct points. .
   (a) two          (b) three          (c) four          (d) five

(iii) $\pi$ is ------------- number.
   (a) natural          (b) even          (c) rational          (d) irrational

(iv) $\cot^2\theta + 1 =$ _____
   (a) $\sin^2\theta$          (b) $\cos^2\theta$          (c) $\cosec^2\theta$          (d) $\sec^2\theta$

(v) $\sqrt{x^3 + 2}$ is ------------- expression. .
   (a) polynomial          (b) rational          (c) irrational          (d) none of these

(vi) $(x - y)(x^2 + xy + y^2) =$ ----------- .
   (a) $x^3 + y^3$          (b) $(x - y)^3$          (c) $(x + y)^3$          (d) $x^3 - y^3$

(vii) $\sin 20^\circ =$ _____
   (a) $\cos 70^\circ$          (b) $\cosec 70^\circ$          (c) $\cos 20^\circ$          (d) $\cosec 20^\circ$

(viii) Complement of $50^\circ$ is --------------- .
   (a) $130^\circ$          (b) $40^\circ$          (c) $-50^\circ$          (d) $90^\circ$

(ix)   Which of the following is a convex set.
   (a) square          (b) triangle          (c) line          (d)  circle

(x)   An isosceles triangle has ------ sides congruent..
   (a) three          (b) two          (c) no          (d) none of these

(xi)   Exterior angle of a triangle is --------- than each of opposite interior angles..
   (a) greater          (b) less          (c) equal or greater          (d) equal or less.

(xii)  Sum of all angles of quadrilateral is --------------. .
   (a) $360^\circ$          (b) $180^\circ$          (c) $90^\circ$          (d) $40^\circ$

(xiii) $(2x - 1)(2x + 1) =$ ----------------
   (a) $4x^2 - 2$          (b) $4x^2 + 2$          (c) $4x^2 - 1$          (d) $4x^2 + 1$

(xiv) Mantissa of logarithm can not be----------------
   (a) positive          (b) negative          (c) fraction          (d) real

(xv) If $\log_2 x = 3$   then $\log_2 x^2 =$
   (a) 9          (b) 5          (c) 4          (d) 6

(xvi) $(x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx) =$ --------------
   (a) $x^2 + y^2 + z^2 + xy - yz - zx$          (b) $x^2 + y^2 + z^2 - xy - yz - zx$
   (c) $x^3 + y^3 + z^3 - 3xyz$          (d) $x^3 - y^3 - 3xy(x - y)$

(xvii)   A trapezium is a type of -------------- .
   (a) rhombus          (b) rectangle          (c) parallelogram          (d) quadrilateral

(xviii) A circle which passes through all the vertices of a triangle is called --------
   (a) circumcircle          (b) incircle          (c) excircle          (d) none of these

(xix) If $(x - 2, 1 + y) = (-7, -2)$ then values of x and y are ------------ respectively.
   (a) 5 and 3          (b) 3 and 5          (c) -5 and -3          (d) 1 and 0

(xx)   The point $(-3, -5)$ is located in _____ quadrant.
   (a) first          (b) second          (c) third          (d) fourth

(xxi)   The absicssa of any point on y-axis is always -----------
   (a) non-zero          (b) zero          (c) negative          (d) positive

(xxii) ---------------- is additve identity in set of real numbers.

(a) 1           (b) 0           (c) -1           (d) none of these

(xxiii) The expression $y^2 \times 3x \div 8$ is ------------------

     (a) monomial           (b) trinomial           (c) binomial           (d) all of these

(xxiv) The L.C.M of $2x^2y$ and $4x\,y^3$ is -----------

     (a) $6x^3y^3$           (b) $6x^2y^2$           (c) $2x^2y^2$           (d) $4x^3y^3$

(xxv) $\begin{bmatrix} 6 & 0 \\ 0 & 8 \end{bmatrix}$ is --------- matrix.

     (a) diagonal           (b) scalar           (c) unit           (d) all of these

(xxvi) The determinant of singular matrix is ---------

     (a) positve           (b) negative           (c) zero           (d) non-zero

(xxvii) $(x+y)^2 + (x-y)^2 = $ ------------

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

(xxviii) The solution set of $|x-4| = 8$ is-----------

     (a) $\{-4, 12\}$           (b) $\{4, -12\}$           (c) $\{-16, 2\}$           (d) none of these

(xxix) The solution set of $\sqrt{x} = -8$ is-----------

     (a) $\{8\}$           (b) $\{16\}$           (c) $\{64\}$           (d) $\{\ \}$

(xxx) The sum of two supplementary angles is equal to ------- degrees

     (a) 90           (b) 180           (c) 360           (d) 100

(xxxi) A line which cuts cirlce at two distinct points is called ----------

     (a) diameter           (b) tangent           (c) secant           (d) chord

(xxxii) $\dfrac{\sqrt{169} - \sqrt{121}}{\sqrt{16}} = $ ---------

     (a) 2           (b) $\dfrac{1}{2}$           (c) 1           (d) none of these

(xxxiii) A chord which passes through the centre of a circle is called ----------

     (a) secant           (b) diameter           (c) tangent           (d) radius

(xxxiv) Factors of $x^3 - 8y^3$ are -----------

     (a) $(x-y)(x^2 + xy + y^2)$           (b) $(x+2y)(x^2 - 2xy + 4y^2)$

     (c) $(x-2y)(x^2 + 2xy + 4y^2)$           (d) $(x-2y)(x^2 + 2xy + 2y^2)$

(xxxv) If $\log_x 64 = 3$ then $x$ is equal to ------

     (a) 4           (b) 8           (c) 6           (d) 16

(xxxvi) The side opposite to right angle in a triangle is called ---------

     (a) perpendicular           (b) hypotenuse           (c) base           (d)altitude

(xxxvii) Fundamental agreements related to numbers are called ----------

     (a) theorems           (b) corollaries           (c) postulates           (d) axioms

(xxxviii) $\tan^2 \theta + 1 = $ .--------

     (a) $\cot^2 \theta$           (b) $\cos^2 \theta$           (c) $\sec^2 \theta$           (d) $\sin^2 \theta$

(xxxix) If two non-parallel lines of different planes , fail to intersect are -------

     (a) parallel lines           (b)intersecting lines           (c) skew lines           (d) none of these

(xl) $\dfrac{\sqrt{3}}{2}$ is the value of ----------

     (a) $\sin 60^\circ$           (b) $\cos 30^\circ$           (c) $\tan 45^\circ$           (d) both a & b

(xli) $x + 2 = 0$ is -------------- equation.

     (a) quadratic           (b) linear           (c)non-linear           (d) irrational

(xlii) If $R = \{(2,5),(3,6),(4,7)\}$ then domain of R is -------

     (a) $\{5, 6, 7\}$           (b) $\{1, 2, 3\}$           (c) $\{2, 3, 4\}$           (d) none of these

(xliii) Tabular form of $\{x \mid x \in Z \wedge -2 < x < 2\}$ is .

     (a) $\{-1, 0, 1\}$           (b) $\{-2, -1, 0, 1, 2\}$           (c) $\{0, 1, 2\}$           (d) none of these

(xliv) $\sqrt{2} + 3$ is a binomial -------

(a) expression      (b) polynomial      (c)equation      (d) surd

(xlv)   $(x-2)(x+3) =$ ---------

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

(xlvi)   The H.C.F of $a^3 - b^3$ and $a^6 - b^6$ is ---------

     (a) $a - b$      (b) $a^2 - b^2$      (c) $a^3 - b^3$      (d) $a^6 - b^6$

(xlvii)   If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then $A^{-1} =$ --------

     (a) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$      (b) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$      (c) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$      (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

(xlviii) A perpendicular from the vertex of a triangle to the opposite side is called--------.

     (a) median      (b) right bisector    (c) altitude      (d) transversal

(xlix)   The common logarithm has the base _____

     (a) $\pi$      (b) e      (c)10      (d) 0

(L)   If $x + \dfrac{1}{x} = 2$ then $x^2 + \dfrac{1}{x^2} =$ -------------

     (a) 0      (b) 2      (c) 4      (d)6

## Section B (Marks :30)

**Note: Attempt any FIVE from the following .Each question carries 6 marks**.

Q.2   If $A = \{a,b,c\}$ and $B = \{x,y\}$ .then find:

   (i) a function from A to B which is onto.

   (ii) three relations in $B \times A$

Q.3   Simplify : $\sqrt{\dfrac{(216)^{\frac{2}{3}}(25)^{\frac{1}{2}}}{\left(\dfrac{1}{25}\right)^{\frac{-3}{2}}}}$

Q.4   Find the value of $\dfrac{57.26}{\sqrt[3]{0.382}}$ using logarithms.

Q.5   For what value of k ,the expression $x^3 + x^2 - 14x - k$ is exactly divisible by $x + 2$ ?

Q.6   If $a + \dfrac{1}{a} = 2$ .then prove that $a^2 + \dfrac{1}{a^2} = a^4 + \dfrac{1}{a^4} = a^3 + \dfrac{1}{a^3}$

Q.7   Factorize any two :  (i) $a^4 + a^2 + 1$   (ii) $12x^2 - 13x + 3$   (iii) $x^{12} - y^{12}$

Q.8   For what values of p and q , $4x^4 + 12x^3 + 25x^2 + px + q$ will be a perfect square?

Q.9   Solve : $\dfrac{1}{y+4} - \dfrac{1}{y-4} = 4$

Q.10  Apply Cramer's rule to solve the system :

$$2x + 3y = -3$$
$$4x + 3y = 5$$

Q.11 Eliminate x from the given equations : $x + \dfrac{1}{x} = 2p$ ; $x - \dfrac{1}{x} = 2q + 1$

## Section C (Marks :20)

**Note: Attempt any TWO from the following. Each question carries 10 marks**.

Q.12 The sum of the measures of the angles of a triangle is $180^{\circ}$.Prove it.

Q.13 Prove that $\dfrac{\cos\theta}{1+\sin\theta} = \dfrac{1-\sin\theta}{\cos\theta}$ .Also verify that $\dfrac{1-\tan^2 30^{\circ}}{1+\tan^2 30^{\circ}} = 1 - 2\sin^2 30^{\circ}$

Q.14 Find the values of the trigonometric ratios of $30^{\circ}$

Q.15 Construct a $\triangle ABC$ in which $m\overline{BC} = 3.7\,cm, m\overline{AB} = 5.3\,cm$ and $m\angle A = 40^{\circ}$

   Also define inscribed circle with the help of figure.