2019 MATHEMATICS SSC-I
(Science Group)

Time allowed: 2:40 Hours   **Total Marks Sections B and C: 60**

NOTE: Attempt any twelve parts from Section 'B' and any three questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly. Logbook and graph paper will be provided on demand.

SECTION – B (Marks 36)

Q. 2   Attempt any TWELVE parts. All parts carry equal marks.   **(12 x 3 = 36)**

(i)   Let $A = \begin{bmatrix} -1 & 3 \\ 2 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -3 & -5 \end{bmatrix}$, $C = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ verify that $A(B-C) = AB - AC$

(ii)   If $B = \begin{bmatrix} 3 & -1 \\ 2 & -2 \end{bmatrix}$ then show that $BB^{-1} = I$

(iii)   Solve the system of linear equations using matrix inverse method, $x + y = 75$, $x - 4y = 0$

(iv)   Simplify $\left(\dfrac{a^p}{a^q}\right)^{p+q} \left(\dfrac{a^q}{a^r}\right)^{q+r} \div 5 \, (a^p . a^r)^{p-r}$

(v)   Solve the following equation for real x and y $(3-2i)(x+yi) = 2(x-2yi) + 2i - 1$

(vi)   Prove that $\log_a \left(\dfrac{m}{n}\right) = \log_a m - \log_a n$

(vii)   Use log to find the value of $\dfrac{83 \times \sqrt[3]{92}}{127 \times \sqrt[5]{246}}$

(viii)   Perform the indicated operation and simplify $\dfrac{x-2}{x^2+6x+9} - \dfrac{x+2}{2x^2-18}$

(ix)   If $5x - 6y = 13$ and $xy = 6$, then find the value of $125x^3 - 216y^3$

(x)   Factorize $4x^4 + 81$

(xi)   The polynomial $x^3 + lx^2 + mx + 24$ has a factor $x+4$ and it leaves a remainder of 36 when divided by $(x-2)$. Find the values of l and m.

(xii)   Factorize the polynomial by factor theorem $x^3 - 6x^2 + 3x + 10$

(xiii)   Find H.C.F by division method $2x^5 - 4x^4 - 6x$, $x^5 + x^4 - 3x^3 - 5x^2$

(xiv)   Find the value of k for which the following expression will become a perfect square. $4x^4 - 12x^3 + 37x^2 - 42x + k$

(xv)   Solve the equation $\dfrac{2}{x^2-1} = \dfrac{1}{x+1} - \dfrac{1}{x+1}$; $x \neq \pm 1$

(xvi)   Solve the double inequality $-2 \langle \dfrac{1-2x}{3} \langle 1$ where $x \in R$

(xvii)   Solve the following pair of equations $x = 3y$, $2x - 3y = -6$ using table of value of x and y.

(xviii)   Find the length of the diameter of the circle having centre at $(-3, 6)$ and passing through $P(1, 3)$.

SECTION – C (Marks 24)

Note: Attempt any THREE questions. All questions carry equal marks.   **(3 x 8 = 24)**

Q. 3   Prove the midpoint of the hypotenuse of a right triangle is equidistant from its three vertices $P(-2, 5)$, $Q(1, 3)$ and $R(-1, 0)$.

Q. 4   Prove that the line segment, joining the midpoints of two sides of a triangle is parallel to the third side and is equal to one half of its length.

Q. 5   Prove that if two sides of a triangle are unequal in length, the longer side has an angle of greater measure opposite to it.

Q. 6   Prove that the internal bisector of an angle of a triangle divides the side opposite to it in the ratio of the lengths of the sides containing the angle.

Q. 7   Construct the triangle ABC. Draw the perpendicular bisectors of its sides and show that they are concurrent. $m\overline{AB} = 5.3 cm$, $m\angle A = 45°$, $m\angle B = 30°$

—— 1SA 1909 (L) ——