Total No. of printed pages = 8

RETEST EXAMINATION – 2019

Semester – 1st (New)

Subject Code : Sc-102

MATHEMATICS–I

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. *All* questions of PART–A are compulsory.
2. Answer *all* questions from PART–B.

PART – A

Marks – 25

1. Choose the correct answer : 1×5=5

   (a) The value of i^9 is

   (i) i (ii) –i

   (iii) 1 (iv) –1

[Turn over

(b) The modulus of $a + ib$ is

(i) $a - ib$ (ii) $\sqrt{a^2 + b^2}$

(iii) $\sqrt{a - ib}$ (iv) None of these

(c) The number of terms in $\left(x + \frac{1}{x}\right)^4$ is

(i) 4 (ii) 5

(iii) 6 (iv) 7

(d) The value of $\log_{10} 100$ is

(i) 4 (ii) 1

(iii) 2 (iv) 5

(e) If $A = \begin{bmatrix} 1 & 2 \\ 4 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 0 \\ 0 & 6 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 4 \\ 8 & 2 \end{bmatrix}$ then

(i) $A = B$ (ii) $B = C$

(iii) $A = C$ (iv) $A = B \neq C$

2. Fill in the blanks : $1 \times 5 = 5$

(a) The value of $\tan 135^\circ$ is ——.

(b) $\cos 0^\circ + i \sin 0^\circ =$ ——.

(c) $(\cos\theta + i \sin\theta)^2 =$ ——.

(d) If $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$ then A+B = ——.

(e) $\log_{10} mn$ = ——.

3. Choose the correct answer : 1×10=10

(a) The co-ordinate of the mid point of the line joining (–2, 8) and (4, 5) is

(i) (–2, 3) (ii) 6, 5)

(iii) $\left(2, \frac{13}{2}\right)$ (iv) (10, 5)

(b) The slope of the line joining (3, 2) and (4, 5) is

(i) 2 (ii) 3

(iii) –3 (iv) –7

(c) If m_1 and m_2 are slopes of two perpendicular lines, then

(i) $m_1 > m_2$ (ii) $m_1 < m_2$

(iii) $m_1 = m_2$ (iv) $m_1 m_2 = -1$

(d) Value of $\log_2 \log_2 \log_3 81$ is

(i) 2 (ii) 3

(iii) 1 (iv) 4

(e) Sin^{-1} $(\sin \frac{\pi}{4})$ is equal to

(i) 0 (ii) $\pi/2$

(iii) $\pi/4$ (iv) 1

(f) If $\cos\theta = 3/5$ then $\tan\theta$ is

(i) 5/3 (ii) 3/4

(iii) 4/3 (iv) 4/5

(g) 10th term of 1, –2, 4, –8, ... is

(i) -512 (ii) 19

(iii) 512 (iv) -17

(h) Value of w^{105} is

(i) 2 (ii) 3

(iii) 1 (iv) None of these

(i) The determinant of order three contains

(i) 2 rows 3 columns

(ii) 3 rows 2 columns

(iii) 3 rows 3 columns

(iv) 2 rows 2 columns

(j) The modulus of $3 - i4$ is

(i) 10 (ii) 5

(iii) –5 (iv) –10

4. Match the following : 1×5=5

(i)	Volume of pyramid	(a)	½×perimeter of base ×slant height
(ii)	Volume of a sphere	(b)	$\frac{\pi r^2 h}{3}$
(iii)	Volume of cone	(c)	perimeter × height
(iv)	Area of the prism	(d)	$\frac{4\pi r^3}{3}$
(v)	Area of the pyramid	(e)	1/3 × area of the base × height

PART – B

Marks – 45

5. Answer any *five* questions : 2×5=10

(a) Find the value of tan 1125^0.

(b) Prove that $\frac{1+i}{1-i}+\frac{1-i}{1+i}=0$.

(c) Evaluate $\log_2 \log_3 \log_2 512$.

(d) If ${}^nP_3 : {}^{n+2}P_3 = 5 : 12$, find n.

(e) Apply Binomial theorem to find the value of $(1 + i)^4$.

(f) Find the value of $1^2 + 2^2 + 3^2 + ... + (100)^2$

(g) Transform $\frac{2+i}{2-i}$ into A + iB form.

6. Answer any *three* questions : 3×3=9

(i) If a,b,c be in A.P. and x, y, z are in G.P. prove that $x^{b-c}\ y^{c-a}\ z^{a-b} = 1$

(ii) Find the value of $(\sqrt{2}+1)^5 - (\sqrt{2}-1)^5$

(iii) Using Cramer's rule, solve

$$x + y + z = 3$$

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

$$x + 2y - z = 2$$

(iv) Solve : $\begin{bmatrix} y+z & x & x \\ y & z+x & y \\ z & z & x+y \end{bmatrix} = 4xyz$

(v) Resolve in partial fraction $\frac{7x-25}{(x-3)(x-4)}$.

7. Answer any *three* questions : $3\times3=9$

(a) Show that the points (2, 5), (4, 6) and (8, 8) lie on a straight line.

(b) Find the angle between the lines $7x - y = 1$ and $6x - y = 11$.

(c) Find the equation of straight line which passes through the points (1, 2) and which is parallel to the straight line $2x + 3y + 6 = 0$

(d) Find the equation of the line that cuts off equal intercepts on the co-ordinate axes and passes through the point (2, 3).

(e) Find the co-ordinate of the foot of the perpendicular from the points (–1, 3) to the line $3x - 4y - 16 = 0$.

8. Prove (any *four*) : $3\times4=12$

(i) $\sin^2 18^\circ + \sin^2 72^\circ = 1$

(ii) $\cos 2\theta = 2\cos^2\theta - 1$

(iii) $\dfrac{\sin\theta}{1+\cos\theta} = \dfrac{1-\cos\theta}{\sin\theta}$

(iv) $\dfrac{\sin\ (A+B) + \sin\ (A-B)}{\cos\ (A+B) + \cos\ (A-B)} = \tan A$

(v) $\dfrac{\cos\alpha + \cos 3\alpha + \cos 5\alpha + \cos 7\alpha}{\sin\alpha + \sin 3\alpha + \sin 5\alpha + \sin 7\alpha} = \cot 4\alpha$

(vi) $\dfrac{\sin\ (B-C)}{\cos B \cos C} = \tan B - \tan C$

(vii) $\dfrac{\sin A + \sin B}{\cos A + \cos B} = \tan\left(\dfrac{A+B}{2}\right)$

9. (a) An irregular plot has the following offsets measured from one end at equal distance. 3

x	0	12	24	36	48	60	72	84	96	108	120
d	53	52	47	49	53	63	58	61	52	49	48

Find the area of the plot.

(b) The section of a right circular cone by a plane through its vertex perpendicular to the base is an equilateral triangle each side of which is 12m. Find the volume of the cone. 2