Sri Raghavendra Tuition Center

ONE MARK UNIT - 2 & 12

12th Standard

Maths

Date : 18-May-24

Reg.No. : ☐☐☐☐☐☐

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Exam Time : 00:30:00 Hrs

Total Marks : 100

I. ANSWER ALL QUESTION 100 x 1 = 100

1) $i^n+i^{n+1}+i^{n+2}+i^{n+3}$ is

(a) 0 (b) 1 (c) -1 (d) i

2) The value of $\sum_{n=1}^{13}\left(i^n+i^{n-1}\right)$ is

(a) 1+ i (b) i (c) 1 (d) 0

3) The area of the triangle formed by the complex numbers z, iz and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

4) The conjugate of a complex number is $\frac{1}{i-2}$. Then the complex number is

(a) $\frac{1}{i+2}$ (b) $\frac{-1}{i+2}$ (c) $\frac{-1}{i-2}$ (d) $\frac{1}{i-2}$

5) If $z=\frac{\left(\sqrt{3}+i\right)^3(3i+4)^2}{(8+6i)^2}$, then $|z|$ is equal to

(a) 0 (b) 1 (c) 2 (d) 3

6) If z is a non zero complex number, such that $2iz^2=\bar{z}$ then $|z|$ is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

7) If $\left|z-\frac{3}{z}\right|=2$, then the least value $|z|$ is

(a) 1 (b) 2 (c) 3 (d) 5

8) The solution of the equation $|z| - z = 1 + 2i$ is

(a) $\frac{3}{2}-2i$ (b) $-\frac{3}{2}+2i$ (c) $2-\frac{3}{2}i$ (d) $2+\frac{3}{2}i$

9) If $|z_1| = 1$, $|z_2| = 2$, $|z_3| = 3$ and $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 12$, then the value of $|z_1+z_2+z_3|$ is

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

10) z_1, z_2 and z_3 are complex number such that $z_1 + z_2 + z_3 = 0$ and $|z_1| = |z_2| = |z_3| = 1$ then $z_1^2 + z_2^2 + z_3^3$ is

(a) 3 (b) 2 (c) 1 (d) 0

11) If $\frac{z-1}{z+1}$ is purely imaginary, then |z| is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

12) If z = x + iy is a complex number such that |z+2| = |z−2|, then the locus of z is

(a) real axis (b) imaginary axis (c) ellipse (d) circle

13) The principal argument of $\dfrac{3}{-1+i}$ is

(a) $\dfrac{-5\pi}{6}$ (b) $\dfrac{-2\pi}{3}$ (c) $\dfrac{-3\pi}{4}$ (d) $\dfrac{-\pi}{2}$

14) The principal argument of $(\sin 40°+i \cos 40°)^5$ is

(a) −110° (b) −70° (c) 70° (d) 110°

15) If (1+i)(1+2i)(1+3i)...(1+ni) = x + iy, then $2 \cdot 5 \cdot 10 ... \left(1+n^2\right)$ is

(a) 1 (b) i (c) x^2+y^2 (d) $1+n^2$

16) If $\omega \neq 1$ is a cubic root of unity and $(1+\omega)^7 = A + B\omega$, then (A, B) equals

(a) (1, 0) (b) (−1, 1) (c) (0, 1) (d) (1, 1)

17) The principal argument of the complex number $\frac{(1+i\sqrt{3})^2}{4i(1-i\sqrt{3})}$ is

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{2}$

18) If α and β are the roots of $x^2+x+1 = 0$, then $\alpha^{2020} + \beta^{2020}$ is

(a) -2 (b) -1 (c) 1 (d) 2

19) The product of all four values of $\left(cos\dfrac{\pi}{3} + isin\dfrac{\pi}{3}\right)^{\frac{3}{4}}$ is

(a) -2 (b) -1 (c) 1 (d) 2

20) If $\omega \neq 1$ is a cubic root of unity and $\begin{vmatrix} 1 & 1 & 1 \\ 1 & -\omega^2-1 & \omega^2 \\ 1 & \omega^2 & \omega^7 \end{vmatrix}$ = 3k, then k is equal to

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

21) The value of $\left(\dfrac{1+\sqrt{3}i}{1-\sqrt{3}i}\right)^{10}$ is

(a) $cis\dfrac{2\pi}{3}$ (b) $cis\dfrac{4\pi}{3}$ (c) $-cis\dfrac{2\pi}{3}$ (d) $-cis\dfrac{4\pi}{3}$

22) If $\omega = cis\dfrac{2\pi}{3}$, then the number of distinct roots of $\begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix}$=0

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

23) A binary operation on a set S is a function from

(a) S ⟶ S (b) (SxS) ⟶ S (c) S⟶ (SxS) (d) (SxS) ⟶ (SxS)

24) Subtraction is not a binary operation in

(a) R (b) Z (c) N (d) Q

25) Which one of the following is a binary operation on N?

(a) Subtraction (b) Multiplication (c) Division (d) All the above

26) In the set R of real numbers '*' is defined as follows. Which one of the following is not a binary operation on R?

(a) a*b = min (a.b) (b) a*b = max (a, b) (c) a*b = a (d) a*b = a^b

27) The operation * defined by $a * b = \frac{ab}{7}$ is not a binary operation on

(a) Q^+ (b) Z (c) R (d) C

28) In the set Q define a⊙b = a+b+ab. For what value of y, 3⊙(y⊙5) = 7?

(a) $y = \frac{2}{3}$ (b) $y = \frac{-2}{3}$ (c) $y = \frac{-3}{2}$ (d) y = 4

29) If a * b=$\sqrt{a^2 + b^2}$ on the real numbers then * is

(a) commutative but not associative (b) associative but not commutative

(c) both commutative and associative (d) neither commutative nor associative

30) Which one of the following statements has the truth value T?

(a) sin x is an even function (b) Every square matrix is non-singular

(c) The product of complex number and its conjugate is purely imaginary

(d) $\sqrt{5}$ is an irrational number

31) Which one of the following statements has truth value F?

(a) Chennai is in India or $\sqrt{2}$ is an integer

(b) Chennai is in India or $\sqrt{2}$ is an irrational number

(c) Chennai is in China or $\sqrt{2}$ is an integer

(d) Chennai is in China or $\sqrt{2}$ is an irrational number

32) If a compound statement involves 3 simple statements, then the number of rows in the truth table is

(a) 9 (b) 8 (c) 6 (d) 3

33) Which one is the inverse of the statement $(p \vee q) \to (p \wedge q)$?

(a) $(p \wedge q) \to (p \vee q)$ (b) $\neg(p \vee q) \to (p \wedge q)$ (c) $(\neg p \vee \neg q) \to (\neg p \wedge \neg q)$ (d) $(\neg p \wedge \neg q) \to (\neg p \vee \neg q)$

34) Which one is the contrapositive of the statement $(p \vee q) \to r$?

(a) $\neg r \to (\neg p \wedge \neg q)$ (b) $\neg r \to (p \vee q)$ (c) $r \to (p \wedge q)$ (d) $p \to (q \vee r)$

35) The truth table for $(p \wedge q) \vee \neg q$ is given below

p	q	$(p \wedge q) \vee (\neg q)$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is true?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	T

(c)

(a)	(b)	(c)	(d)
T	T	F	T

(d)

(a)	(b)	(c)	(d)
T	F	F	F

36) In the last column of the truth table for $\neg(p \vee \neg q)$ the number of final outcomes of the truth value 'F' are

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

37) Which one of the following is incorrect? For any two propositions p and q, we have

(a) ¬ (p∨q) ≡ ¬ p ∧ ¬q (b) ¬ (p∧ q)≡¬p ∨ ¬q (c) ¬ (p ∨ q)≡¬p∨¬q (d) ¬(¬p)≡ p

38)

p	q	(p ∧ q) ⟶ ¬q
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of (p ∧ q)⟶ ¬p?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
F	T	T	T

(c)

(a)	(b)	(c)	(d)
F	F	T	T

(d)

(a)	(b)	(c)	(d)
T	T	T	F

39) The dual of ¬(p V q) V [p V (p ∧ ¬r)] is

(a) ¬(p ∧ q) ∧ [p V (p ∧ ¬r)] (b) (p ∧ q) ∧ [p ∧ (p V ¬r)] (c) ¬(p ∧ q) ∧ [p ∧ (p ∧ r)]

(d) ¬(p ∧ q) ∧ [p ∧ (pV ¬r)]

40) The proposition p ∧ (¬p ∨ q) is

(a) a tautology (b) a contradiction (c) logically equivalent to p ∧ q

(d) logically equivalent to p ∨ q

41) Determine the truth value of each of the following statements:

(a) 4 + 2 = 5 and 6 + 3 = 9

(b) 3 + 2 = 5 and 6 + 1 = 7

(c) 4 + 5 = 9 and 1 + 2 = 4

(d) 3 + 2 = 5 and 4 + 7 = 11

(a)

(a)	(b)	(c)	(d)
F	T	F	T

(b)

(a)	(b)	(c)	(d)
T	F	T	F

(c)

(a)	(b)	(c)	(d)
T	T	F	F

(d)

(a)	(b)	(c)	(d)
F	F	T	T

42) Which one of the following is not true?

(a) Negation of a negation of a statement is the statement itself

(b) If the last column of the truth table contains only T then it is a tautology.

(c) If the last column of its truth table contains only F then it is a contradiction

(d) If p and q are any two statements then p↔q is a tautology.

43) If $\sqrt{a+ib}$ = x + iy, then possible value of $\sqrt{a-ib}$ is ___________

(a) x^2+y^2 (b) $\sqrt{x^2+y^2}$ (c) x+iy (d) x-iy

44) If z = cos$\frac{\pi}{4}$ + i sin$\frac{\pi}{6}$, then ______

(a) |z| = 1, arg(z) = $\frac{\pi}{4}$ (b) |z| = 1, arg(z) = $\frac{\pi}{6}$ (c) |z| = $\frac{\sqrt{3}}{2}$, arg(z) = $\frac{5\pi}{24}$

(d) |z| = $\frac{\sqrt{3}}{2}$, arg (z) = $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

45) .If a = 3+i and z = 2-3i, then the points on the Argand diagram representing az, 3az and - az are _________

(a) Vertices of a right angled triangle (b) Vertices of an equilateral triangle

(c) Vertices of an isosceles (d) Collinear

46) If a = 3 + i and z = 2 - 3i, then the points on the Argand diagram representing az, 3az and - az are ___________

(a) Vertices of a right angled triangle (b) Vertices of an equilateral triangle

(c) Vertices of an isosceles (d) Collinear

47) If z = 1-cos θ + i sin θ, then |z| = ____________

(a) $2\sin\frac{1}{3}$ (b) $2\cos\frac{\theta}{2}$ (c) $2|\sin\frac{\theta}{2}|$ (d) $2|\cos\frac{\theta}{2}|$

48) If x + iy = $\frac{3+5i}{7-6i}$, they y = __________

(a) $\frac{9}{85}$ (b) $-\frac{9}{85}$ (c) $\frac{53}{85}$ (d) none of these

49) The amplitude of $\frac{1}{i}$ is equal to ______

(a) 0 (b) $\frac{\pi}{2}$ (c) $-\frac{\pi}{2}$ (d) π

50) The value of $(1+i)^4 + (1-i)^4$ is _________

(a) 8 (b) 4 (c) -8 (d) -4

51) The complex number z which satisfies the condition $\left|\frac{1+z}{1-z}\right|$ = 1 lies on ________

(a) circle $x^2 + y^2 = 1$ (b) x-axis (c) y-axis (d) the lines x+y = 1

52) If z = a + ib lies in quadrant then $\frac{\bar{z}}{z}$ also lies in the III quadrant if ________

(a) a > b > 0 (b) a < b < 0 (c) b < a < 0 (d) b > a > 0

53) If $z^n = cos\frac{n\pi}{3} + isin\frac{n\pi}{3}$, then $z_1, z_2 ..... z_6$ is ________

(a) 1 (b) -1 (c) i (d) -i

54) If ω is the cube root of unity, then the value of $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8)$ is ________

(a) 9 (b) -9 (c) 16 (d) 32

55) $(1+i)^3$ = _____

(a) 3 + 3i (b) 1 + 3i (c) 3 - 3i (d) 2i - 2

56) If a = cos α + i sin α, b = -cos β + i sin β then $\left(ab - \frac{1}{ab}\right)$ is ________

(a) -2i sin(α - β) (b) 2i sin(α - β) (c) 2 cos(α - β) (d) -2 cos(α - β)

57) The conjugate of $\frac{1+2i}{1-(1-i)^2}$ is ______

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

58) The modular of $\frac{(-1+i)(1-i)}{1+i\sqrt{3}}$ is _____

(a) $\sqrt{2}$ (b) 2 (c) 1 (d) $\frac{1}{2}$

59) The value of $\frac{(cos45^0 + isin45^0)^2(cos30^0 - isin30^0)}{cos30^0 + isin30^0}$ is __________

(a) $\frac{1}{2} + i\frac{\sqrt{3}}{2}$ (b) $\frac{1}{2} - i\frac{\sqrt{3}}{2}$ (c) $-\frac{\sqrt{3}}{2} + \frac{1}{2}$ (d) $\frac{\sqrt{3}}{2} + \frac{1}{2}$

60) If x = cos θ + i sin θ, then $x^n + \frac{1}{x^n}$ is _____

(a) 2 cos nθ (b) 2 i sin nθ (c) 2^n cosθ (d) 2^n i sinθ

61) If $x_r = cos\left(\frac{\pi}{2^r}\right) + isin\left(\frac{\pi}{2^r}\right)$ then $x_1, x_2, x_3 ... x_\infty$ is ________

(a) -∞ (b) -2 (c) -1 (d) 0

62) The value of $\left[i^{19} + \left(\frac{1}{i}\right)^{25}\right]^2$ is __________

(a) 4 (b) -4 (c) 5 (d) -5

63) If the cube roots of unity are 1, ω, ω^2 then $1+\omega+\omega^2 =$ ____________

(a) 1 (b) 0 (c) -1 (d) ω

64) If z = x + iy and |3z| = |z - 4| then $x^2 + y^2 + x =$ _________

(a) 1 (b) -1 (c) 2 (d) -2

65) Let z, w be complex numbers such that $\bar{z} + i\bar{w} = 0$ and arg $(\mathbf{zw}) = \pi$ then arg z = ___________

(a) $\frac{3\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{5\pi}{4}$

66) Let z be complex number with modulus 2 and argument $\frac{-2\pi}{3}$ then $z =$ _________

(a) $-1+i\sqrt{3}$ (b) $\frac{-1+i\sqrt{3}}{2}$ (c) $-1-i\sqrt{3}$ (d) $\frac{-1-i\sqrt{3}}{2}$

67) If z_1, z_2 are complex numbers and $|z_1+z_2| = |z_1| + |z_2|$ then ________

(a) $\arg(z_1)+\arg(z_2)=0$ (b) $\arg(z_1 z_2)=0$ (c) $\arg(z_1)=\arg(z_2)$ (d) None of these

68) If a, b, c are integers, not all equal and ω is a cube root of unity $(\omega \neq 1)$ then the minimum value of $|a+b\omega+c\omega^2|$ is ________

(a) 0 (b) 1 (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{2}$

69) If $x = a+b, y = a\alpha + b\beta$ and $z = a\beta + b\alpha,$ where $\alpha, \beta \neq 1$ are cube roots of unity, then x, y, z =____________

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

70) The equation | z - i | + | z + i | = k represents an ellipse if k = ____________

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

71) If $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix} = x +$ iy then __________

(a) x = 3, y = 1 (b) x = 1, y = 3 (c) x = 0, y = 3 (d) x = 0, y = 0

72) If z_1, z_2 and z_3, are complex numbers such that $|z_1| = |z_2| = |z_3| = \left|\frac{1}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}\right| = 1$ then $|z_1+z_2+z_3|$ is _______

(a) = 1 (b) < 1 (c) > 1 (d) 3

73) arg(0) is _______

(a) ∞ (b) 0 (c) π (d) undefined

74) All complex numbers z which satisfy the equation $\left|\frac{z-6i}{z+6i}\right| = 1$ lie on the _________

(a) real axis (b) imaginary axis (c) circle (d) ellipse

75) If $x = \frac{-1+i\sqrt{3}}{2}$ then the value of x^2+x+1 _________

(a) 2 (b) 1/2 (c) 0 (d) 1

76) The value of $\mathbf{i}^{201} + \mathbf{i}^{202} + \mathbf{i}^{203}$ is __________

(a) 1 (b) i (c) -i (d) -1

77) If a = 3 +i and z =2-3i, then the points on the Argand diagram representing az, 3az and - az are

(a) Vertices of a right angled triangle (b) Vertices of an equilateral triangle
(c) Vertices of an isosceles (d) Collinear

78) The value of $\sum_{n=1}^{12} i^n$

(a) 0 (b) 1 (c) -1 (d) -2

79) The value of $\left(\frac{1+i}{\sqrt{2}}\right)^8 + \left(\frac{1-i}{\sqrt{2}}\right)^8$ is

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

80) arg $\left(\frac{3}{-1-i}\right)$=

(a) $\frac{-5\pi}{6}$ (b) $\frac{-2\pi}{3}$ (c) $\frac{3\pi}{4}$ (d) $\frac{-\pi}{2}$

81) If * is defined by a * b = $a^2 + b^2$ + ab + 1, then (2 * 3) * 2 is ____________

(a) 20 (b) 40 (c) 400 (d) 445

82) The identity element of $\left\{\begin{pmatrix} x & x \\ x & x \end{pmatrix}\right\}$ |x ∈ R, x ≠ 0} under matrix multiplication is __________

(a) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (b) $\begin{pmatrix} \frac{1}{4x} & \frac{1}{4x} \\ \frac{1}{4x} & \frac{1}{4x} \end{pmatrix}$ (c) $\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$ (d) $\begin{pmatrix} \frac{1}{2x} & \frac{1}{2x} \\ \frac{1}{2x} & \frac{1}{2x} \end{pmatrix}$

83) Which of the following is a tautology?

(a) p v q (b) p ∧ q (c) q v ~ q (d) q ∧ ~ q

84) The identity element in the group {R - {1},x} where a * b = a + b - ab is __________

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

85) Define * on Z by a * b = a + b + 1 ∀ a,b ∈ Z. Then the identity element of z is ________

(a) 1 (b) 0 (c) 1 (d) -1

86) A binary operation * is defined on the set of positive rational numbers Q^+ by a*b = $\frac{ab}{4}$. Then 3 * $\left(\frac{1}{5} * \frac{1}{2}\right)$ is ____________

(a) $\frac{3}{160}$ (b) $\frac{5}{160}$ (c) $\frac{3}{10}$ (d) $\frac{3}{40}$

87) The number whose multiplication universe does not exist in C.

(a) 0 (b) 1 (c) 0 (d) 1

88) Let p: Kamala is going to school
q: There are 20 students in the class. Then Kamala is not going to school or there are 20 students in the class is represented by

(a) p v q (b) p ∧ q (c) ~ p (d) ~ p v q

89) If p is true and q is unknown, then _________

(a) ~ p is true (b) p v (~p) is false (c) p ∧ (~p) is true (d) p v q is true

90) '-' is a binary operation on ___________

(a) ~ (b) Q-{0} (c) R-{0} (d) Z

91) Which of the following is a statement?

(a) 7+2< 10 (b) Wish you all success (c) All the best (d) How old are you?

92) In (N, *), x * y = max(x, y), x, y ∈ N then 7 * (-7)

(a) 7 (b) -7 (c) 0 (d) -49

93) The number of commutative binary operations which can be defined on a set containing n elements is ________

(a) $n^{\frac{n(n+1)}{2}}$ (b) n^{n^2} (c) $n^{\frac{n}{2}}$ (d) n^2

94) On the set R of real numbers, the operation * is defined by a * b = a^2 - b^2 Then (3 * 5) * 4 is ____________

(a) -240 (b) 240 (c) -72 (d) 72

95) ln Z, we define a * b = a + b + 1. The identity element with respect to * is __________

(a) 1 (b) 0 (c) -1 (d) 2

96) Which of the following are logically equivalent?

(a) $p \to q, q \to p$ (b) $q \to p, \neg q \vee p$ (c) $p \to q, \neg p \wedge q$ (d) $q \to p,\ q \vee \neg p$

97) The number of rows and columns for (p V q) V r will be _________

(a) 3, 8 (b) 8, 4 (c) 8, 5 (d) 5, 8

98) If P V q is false (F), then __________

(a) p is false (b) q is false (c) p and q are false (d) p or q is false

99) The value of [3] $+_8$ [7] is

(a) a) [10] (b) a) [8] (c) a) [5] (d) a) [2]

100) In the set Q define a × b = a + b + ab. For what values of y, 3×(y×5) = 7

(a) a)

ALL THE BEST

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