Ravi Maths Tuition

Complex Numbers and Quadratic Equations

11th Standard

Mathematics

Multiple Choice Question 35 x 1 = 35

1) Which of the following options define 'imaginary number'?

(a) Square root of any number (b) Square root of positive number (c) Square root of negative number

(d) Cube root of number

2) Two complex numbers are equal, if and only if _____.

(a) their real and imaginary parts are separately equal (b) their real parts are only equal

(c) their imaginary parts are only equal (d) None of the above

3) If 4x + i(3x - y) =3 + i(-6), where x and y are real numbers, then the values of x and y are _____.

(a) x = 3,y = 4 (b) $x = \frac{3}{4}, y = \frac{33}{4}$ (c) x = 4,y = 3 (d) x = 33,y = 4

4) Which of the following represent correct form of set of complex numbers?

(a) $C = \{x + iy : x \in R, y \in R \text{ and } i = \sqrt{-1}\}$ (b) $C = \{x + iy : x \in R, y \in I\}$

(c) $C = \{x + iy : x \in I, y \in I\}$ (d) All of these

5) If x, y∈ R, then x + iy is a non-real complex number, if _______.

(a) x = 0 (b) y = 0 (c) x ≠ 0 (d) y ≠ 0

6) If Z is a complex number and z + (-z) = 0, then _______.

(a) (-z) is called additive inverse of z (b) -z is additive identity of z (c) = z is closure of z

(d) -z is commutative of z

7) If z is non-zero complex number and z = a + ib, then inverse of z is _______.

(a) $\frac{a}{a^2+b^2} + \frac{-bi}{a^2+b^2}$ (b) $\frac{a}{a^2-b^2} + \frac{-bi}{a^2-b^2}$ (c) $\frac{a}{a^2-b^2} + \frac{ib}{a^2-b^2}$ (d) $\frac{-a}{a^2+b^2} + \frac{-bi}{a^2+b^2}$

8) If $z_1 = 6 + 3i$ and $z_2 = 2 - i$, then $\frac{z_1}{z_2}$ is equal to _______.

(a) $\frac{1}{5}(9 + 12i)$ (b) $9 + 12i$ (c) $3 + 2i$ (d) $\frac{1}{5}(12 + 9i)$

9) If z = i^{39}, then simplest form of z is equal to _______.

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

10) If $(x - iy)^{1/3} = a + ib$, where $x, y, a, b \in R$ then the value of $\frac{x}{a} + \frac{y}{b}$ is equal to _______.

(a) $4\left(a^2 - b^2\right)$ (b) $4\left(a^2 + b^2\right)$ (c) $2\left(a^2 - b^2\right)$ (d) $2\left(a^2 + b^2\right)$

11) The conjugate of a complex number z = a + ib, is _______.

(a) $\bar{z} = a + ib$ (b) $\bar{z} = a - ib$ (c) $\bar{z} = ia + b$ (d) $\bar{z} = ia - b$

12) Which of the following are correct?

I. $|3 + i| = \sqrt{10}; |2 - 5i| = \sqrt{29}$

II. $\overline{(3 + i)} = 3 - i; \overline{(2 - 5i)} = 2 + 5i$ and $\overline{(-3i - 5)} = 3i - 5$

III. $z^{-1} = \frac{\bar{z}}{|z|^2}$ or $Z\bar{z} = |z|^2, z \neq 0$

(a) I and III are correct (b) I and II are correct (c) All are correct (d) None of these

13) If $|1 - i|^n = 2^n$, then n is equal to _______.

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

14) The value of (z + 3) ($\bar{z}$ + 3) is equivalent to _______.

(a) $|z+3|^2$ (b) $|z-3|$ (c) z^2+3 (d) None of these

15) If a + ib = c + id, then _______.

(a) $a^2+c^2=0$ (b) $b^2+c^2=0$ (c) $b^2+d^2=0$ (d) $a^2+b^2=c^2+d^2$

16) Representation of z = x + iy in terms of rand e is called _______.

(a) polar form of the complex number (b) cartesian form of the complex number

(c) complex form of the complex number (d) real form of the complex number

17) If $x=r\cos\theta, y=r\sin\theta$ such that $x, y>0$ and $z=r(\cos\theta+i\sin\theta)$, then

I. $|z|=r=\sqrt{x^2-y^2}$

II. $|z|=r=\sqrt{x^2+y^2}$

III. $\arg(z)=\theta$

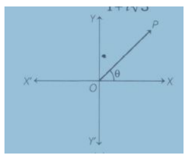
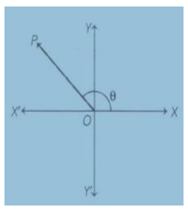
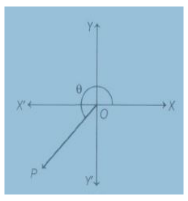
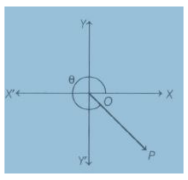
(a) I and III are correct (b) II and III are correct (c) All are correct (d) None of these

18) Polar form of the complex number z = 1+ i$\sqrt{3}$, is _______.

(a) $2\left(\cos\frac{\pi}{3}-i\sin\frac{\pi}{3}\right)$ (b) $2\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)$ (c) $2\left(\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}\right)$

(d) $2\left(\cos\frac{4\pi}{3}+i\sin\frac{4\pi}{3}\right)$

19) The geometrical representation of complex number $z=\frac{-16}{1+i\sqrt{3}}$, is _______.

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

20) The value of arg (x), when x < 0 is _______.

(a) 0 (b) $\frac{\pi}{2}$ (c) π (d) None of these

21) If P(x) is a n degree polynomial, then number of roots are _______.

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

22) Roots of x^2 + 2 = 0 are _______.

(a) $\pm\sqrt{2}i$ (b) 2 (c) 2i (d) None of these

23) If x^2 + x + 1= 0, then which of the following are correct?

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

24) If $\sqrt{5}x^2+x+\sqrt{5}=0$ then which of the following is/are correct?

I. Discriminant, D = -19.

II. $x=\frac{-1\pm\sqrt{19}i}{2\sqrt{5}}$.

(a) Only I is correct (b) Only II is correct (c) Both are correct (d) Both are incorrect

25) If difference in roots of the equation x^2 - px +8 = 0 is 2, thenp is equal to _______.

(a) ±6 (b) ±2 (c) ±1 (d) ±5

26) If $x=\sqrt{-16}$, then _______.

(a) x = 4i (b) x = 4 (c) x = -4 (d) All of these

27) Which of the following is true?

(a) 1- i < 1+ i (b) 2i + 1 > - 2i + 1 . (c) 2i > 1 (d) None of these

28) If z + 0 = z, where Z = x + i y and 0 = 0 + i 0, then 0 is called _______.

(a) additive identity (b) additive inverse (c) closure (d) None of these

29) If $Z_1 = 2 + 3i$ and $Z_2 = = 3 - 2i$, then $Z_1 - Z_2$ is equal to _______.

(a) -1 + 5 i (b) 5 - i (c) i + 5 (d) None of these

30) If $z = 5i\left(-\frac{3}{5}i\right)$, then z is equal to _______.

(a) 0 + 3i (b) 3 + 0i (c) 0-3i (d) -3+0i

31) If $Z = i^9 + i^{19}$, then Z is equal to _______.

(a) 0 + 0i (b) 1+ 0i (c) 0 + i (d) 1+ 2i

32) If $x^2 + 1 = 0$, then solution is _______.

(a) i,-i (b) 1,-i (c) -1, i (d) None of these

33) If $Z \neq 0$ is a complex number, then _______.

(a) $Re(z) = 0 \Rightarrow Im(Z^2) = 0$ (b) $Re(z2) = 0 \Rightarrow Im(Z^2) = 0$ (c) $Re(z) = 0 \Rightarrow Re(z^2) = 0$

(d) None of the above

34) A polynomial equation has _______.

(a) atleast two roots (b) atleast one root (c) atmost three roots (d) atmost two roots

35) Number of solutions of the equation $Z^2 + |Z|^2 = 0$ and $Z \neq 0$ _______.

(a) 1 (b) 2 (c) 3 (d) infinite many

2 Marks 222 x 2 = 444

36) Evaluate $\left[i^{18} + \left(\frac{1}{i}\right)^{25}\right]^3$.

37) Find the multiplicative inverse of each of the complex numbers given in the Exercises: 4-3i

38) Find the multiplicative inverse of each of the complex numbers given in the Exercises : $\sqrt{5}$ +3i

39) Find the multiplicative inverse of each of the complex numbers given in the Exercises : -i

40) If $z_1 = 2-i$, $z_2 = 1+i$ find $\left|\frac{z_1+z_2+1}{z_1-z_2+1}\right|$

41) If 4x + i (3x – y) = 3 + i (– 6), where x and y are real numbers, then find the values of x and y.

42) Express $(-\sqrt{3} + \sqrt{-2})(2\sqrt{3} - i)$ in the form of a + ib.

43) Express $(5 - 3i)^3$ in the form a + ib.

44) Find the real and imaginary parts of the following complex numbers: 7

45) Express the following in the form of a + ib. $\left[\left(\frac{1}{3} + \frac{7}{3}i\right) + \left(4 + \frac{1}{3}i\right)\right] - \left(-\frac{4}{3} + i\right)$

46) Write the real and imaginary parts of the complex number $\sqrt{37} + \sqrt{-19}$
Write the number $\sqrt{37} + \sqrt{-19}$ in the form z = a + ib and compare, we get Re(z) = a and Im(z) = b

47) Express the following in the form of a + ib.
$\left(\frac{1}{2} + \frac{5}{2}i\right) - \frac{3}{2}i + \left(-\frac{5}{2} - i\right)$

48) Find the conjugate of complex 3+i.

49) Express $(-2 - 5i) \div (3 - 6i)$ in the form a+ib

50) If z_1 and z_2 are complex numbers, then prove that $Re(z_1 z_2) = Re(z_1) Re(z_2) - Im(z_1) Im(z_2)$.

51) Find the value of i^{37}

52) Express $\frac{(3+\sqrt{5}i)(3-\sqrt{5}i)}{(\sqrt{3}+\sqrt{2}i)-(\sqrt{3}-\sqrt{2}i)}$ in the form of a+ib

53) Find the conjugate of the complex numbers: -i $\sqrt{5}$

54) Find the conjugate of the complex numbers: $\sqrt{3}$

55) Find the complex conjugates of : 2 + i5

56) Find the complex conjugates of : - 6 - i7

57) Express the following in the form of a + ib, where a, b $\in$ R.
i^{103}

58) Find the complex conjugates of : $\sqrt{3}$

59) Find the multiplicative inverse of the complex number $\sqrt{5}$ +3 i.

60) If (1 + i)z = (1 - i)$\overline{z}$, then show that z = $-i\overline{z}$.

61) Find the modulus of the conjugate of the complex number - 3i.

62) Find the principle argument of the complex numbers.-1-i$\sqrt{3}$

63) Find the principle argument of the complex numbers -$\sqrt{3}$ +i

64) Express $(1-i)^4$ in the form a + ib.

65) Find the conjugate of the complex number $\frac{1-i}{1+i}$

66) Find the principle argument of the complex numbers.

67) Find the conjugate of (6 + 5i)^2

68) Find the principle argument of the complex numbers.$\frac{1+2i}{1-3i}$

69) Find the conjugate and modulus of the complex number (3 - 2i) (3 + 2i) (1 + i).

70) A person is represented by a complex number z=x+iy. If a person is represented only by x, then he is not sensitive towards environment and if a person is represented only by y, then he is sensitive towards environment. If a person is related by the relation $\left|\frac{z-5i}{z+5i}\right|=1$ do you think that the person is eco-friendly?

71) Find the argument of the complex number$\frac{1+3i}{1-2i}$

72) Find the conjugate and modules of the complex number $\frac{3+5i}{2-5i}+\frac{3-2i}{2+5i}$

73) Evaluate $(1+i)^6+(1-i)^3$.

74) Write the following as complex numbers
$\sqrt{-27}$

75) Write the following as complex numbers
$\sqrt{-16}$

76) Write the following as complex numbers
$4-\sqrt{-5}$

77) Write the following as complex numbers
$-1-1\sqrt{-5}$

78) Write the following as complex numbers
$1+\sqrt{-1}$

79) Write the real and imaginary parts of the complex number
$z=\frac{\sqrt{17}}{2}+\frac{2}{\sqrt{70}}i$

80) Find the value of x and y, if (3x - 2iy) (2 + i)^2 = 10(1 + i).

81) Write the real and imaginary parts of the complex number $\sqrt{37}+\sqrt{-19}$

82) If honesty is represented by complex number α and punctuality by complex number β, such that $|\beta|$ =1, then show that $\left|\frac{\beta-\alpha}{1-\alpha\beta}\right|$ is a perfect one.Do you want score perfect one?

83) Write the real and imaginary parts of the following complex numbers
$2 - i\sqrt{2}$

84) Write the real and imaginary parts of the following complex numbers
$-\frac{1}{5} + \frac{i}{5}$

85) Write the real and imaginary parts of the following complex numbers
$\frac{\sqrt{5}}{7}i$

86) Write the real and imaginary parts of the following complex numbers
$\sqrt{37} + \sqrt{-19}$

87) Write the real and imaginary parts of the following complex numbers
$\sqrt{\frac{37}{3}} + \frac{3}{\sqrt{70}}i$

88) Find a and b such that 2a +4bi and 2i represent the same complex number

89) Find the value of x and y, if x + 4iy = ix + y + 3.

90) Show that $1+i^{10}+i^{20}+i^{30}$ is a real number.

91) Find the value of $1+i^2+i^4+i^6+....+i^{20}$.

92) Write the following as complex numbers
$5 - 7\sqrt{-21}$

93) If $(x+iy)^{1/3}$ = a + ib, where x, y, a, b ϵ R, then show that $\frac{x}{a} - \frac{y}{b} = -2\left(a^2 + b^2\right)$ .Firstly, use identity $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ and then equate the coefficients of real and imaginary parts.

94) Write the following as complex numbers
$\sqrt{x}; x > 0$

95) Write the following as complex numbers
$\frac{\sqrt{3}}{2} - \frac{\sqrt{-2}}{\sqrt{7}}$

96) Write the following as complex numbers
$-b + \sqrt{-4ac}; a, c > 0$

97) Find the value of i^{-1097}

98) Express the following in the form of a + ib
i^{-35}

99) Express the following in the form of a + ib
i^{998}

100) Find the square root of 1+i.

101) Express the following in the form of a + ib
$(\sqrt{-1})^{90}$

102) Express the following in the form of a + ib
$(i^{37} x \frac{1}{i^{67}})$

103) Evaluate $[i^{29} + (\frac{1}{i})^{50}]$

104) Express the following in the form of a+ib. $\left(\frac{1}{5} + \frac{2}{5}i\right) - \left(4 + i\frac{5}{2}\right)$

105) Express the following in the form of a+ib :$3(1-2i) - (-4-5i) + (-8+3i)$

106) Evaluate the following
i^{80}

107) Evaluate the following
$\frac{1}{i}$

108) Evaluate the following
$(-\sqrt{-1})^{31}$

109) Find the square root of -15-8i.

110) Evaluate the following
$\frac{i^2+i^4+i^6+i^7}{1+i^2+i^3}$

111) Find the real values of x and y for which $(1+i)\,y^2+(6+i)=(2+i)\,x$

112) Find the sum of the complex numbers $-\sqrt{3}+\sqrt{2}$ and $2\sqrt{3}-i$.

113) Express $\left(-\sqrt{3}+\sqrt{-2}\right)\left(2\sqrt{3}-i\right)$ in the form of a+ib.

114) Find the real values of x and y for which $(x+iy)\,(2-3i)=4+i$

115) Express $\left(\sqrt{6}+5i\right)\left(\sqrt{6}-\frac{1}{5}i\right)$ in the form of a+ib

116) Express $(7+5i)\,(7-5i)$ in the form of a+ib

117) Express the equation in the form of a+ib $(7-i2)-(4+i)+(-3+i5)$

118) Express the equation in the form of a+ib $\left[\left(\frac{1}{3}+i\frac{7}{3}\right)+\left(4+i\frac{1}{3}\right)\right]-\left(-\frac{4}{3}+i\right)$

119) Express the equation in the form of a+ib $i^3+(6+3i)-(20+5i)+(14+3i)$

120) Express the equation in the form of a+ib $(7+i5)\,(7-i5)$

121) Express the equation in the form of $3i^3\left(15i^6\right)$

122) Express the equation in the form of $\sqrt{3}+\left(\sqrt{3}-i2\right)-(3-2i)$

123) Simplify the following $2i^2 + 6i^3 + 3i^{16} - 6i^{19} + 4i^{25}$

124) Prove that $(\frac{2+3i}{3+4i})(\frac{2-3i}{3-4i})$ is purely real.

125) Express $\left(-2-\frac{1}{3}i\right)^3$ in the form a+ib.

126) Express $\frac{1}{-2+\sqrt{-3}}$ in the form a+ib.

127) Express $\frac{2-\sqrt{-25}}{1-\sqrt{-16}}$ in the form a+ib.

128) Solve $2x^2-2\sqrt{3x}+\frac{21}{8}=0$ .Compare the given equation with $ax^2+bx+c=0$ and use the formula $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

129) Simplify the following
$1+ i^{10} + i^{110} + i^{1000}$

130) Simplify the following
$i^n + i^{n+1} + i^{n+2} + i^{n+3}$

131) Express $\frac{1}{1-cos\theta+2isin\theta}$ in the form a+ib.

132) Simplify the following
$\{i^{17}-(\frac{1}{i})^{34}\}^2$

133) Simplify the following
$(-i)^{4n+3}$, where n is a positive integer

134) Simplify the following
$(2i)^3$

135) Simplify the following
i^{-35}

136) Simplify the following
i^{-39}

137) Simplify the following
i^9+i^{19}

138) Solve $\sqrt{3}x^2-\sqrt{2}x+3\sqrt{3}=0$

139) Simplify the following
$[i^{18}+(\frac{1}{i})^{25}]^3$

140) Simplify the following
i^6+i^8

141) Find the smallest positive integral value of n for which $\frac{(1+i)^n}{(1-i)^{n-2}}$ is a real number.

142) Simplify the following $i + i^2 + i^3 + i^4$

143) Simplify the following $i^{12} + i^{13} + i^{14} + i^{15}$

144) Simplify the following $i^4+i^8+i^{12}+i^{16}$

145) Find the real value of θ for which the expression $\frac{1+icos\theta}{1-2icos\theta}$ is a real number.

146) Prove that $i^{107} + i^{112} + i^{117} +i^{122} = 0$

147) Simplify $i^{n+100} + i^{n+50} + i^{n+48} + i^{n+46}$

148) What is the reciprocal of $3+\sqrt{7}i$?

149) Find the multiplicative inverse of 1+i.

150) Explain the fallacy in the following
$-1=i.i=\sqrt{-1}.\sqrt{-1}=\sqrt{(-1)(-1)}=\sqrt{1}=1$

151) Solve $9x^2+16=0$

152) Find the quadrant in which conjugate of $\frac{1+2i}{1-i}$ lies.

153) Find the real and imaginary parts of the following complex numbers: 3i

154) Express the equation in the form of a+ib $(1+i)^4$

155) Express the equation in the form of a+ib $\left(\frac{1}{2}+i2\right)^3$

156) Express the equation in the form of a+ib $\left(-2-i\frac{1}{3}\right)^3$

157) Express the equation in the form of a+ib $\left(\frac{1}{3}+3i\right)^3$

158) Express the equation in the form of a+ib $(5-3i)^3$

159) Express the equation in the form of a+ib $(1-i)^4$

160) What is the smallest positive integer n, for which $(1+i)^{2n}=(1-i)^{2n}$?

161) Express $\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$ in the form a+ib

162) Find the value of i^{-30}

163) Find the value of $\frac{1}{i^7}$

164) Change the following complex numbers in cartesian form.
$2(\cos 0^0+i\sin 0^0)$

165) Change the following complex numbers in cartesian form.
$3(\cos 201^0+i\sin 210^0)$

166) Express the following in the form of a + ib, where a, b ∈ R.
$(-\sqrt{-1})^{4x+3}$

167) Express the following in the form of a + ib, where a, b ∈ R
$(i^{29} + \frac{1}{i^{29}})$

168) Find the modulus and argument of the complex number $z = -3 - i3\sqrt{3}$.

169) Solve the equation $25x^2 - 30x + 11 = 0$ by using the general expression for the roots of a quadratic equation and show that the roots are complex conjugate.

170) If $|z| = 1$, then find the value of $|z| = 1$, Use the result $z\bar{z}$ =$|z|^2$ =1

171) Solve the quadratic equation $2x^2 - 3ix + 2 = 0$ .Compare the equation $2x^2 - 3ix + 2 = 0$ with $ax^2 + bx + c = 0, a \neq 0$ and the calculate $\alpha = \frac{-b+\sqrt{b^2-4ac}}{2a}$ and $\beta = \frac{-b-\sqrt{b^2-4ac}}{2a}$

172) Solve $x^2 - 5ix - 6 = 0$

173) Simplify the following complex number.
$\overline{9-i} + \overline{6+i^3} - \overline{9+i^2}$

174) Evaluate $\frac{(1-i)^3}{1-i^3}$

175) If $\frac{(1+i)^2}{2-i} = x + iy$, then find the value of x+y

176) Express $\left[\left(\sqrt{5} + \frac{i}{2}\right)\left(\sqrt{5} - 2i\right)\right] \div (6 + 5i)$ in the form of a+ib.

177) If $x + iy = \frac{a+i}{a-i}$, then prove that ay - 1 = x

178) Express $(5 - 3i)^3$ in the form a+ib

179) If $z_1, z_2 \in C,$ prove that $Im\,(z_1 . z_2) = Re\,(z_1) . Im\,(z_2) + Im\,(z_1) . Re\,(z_2)$

180) Find the real values of x and y, if $\frac{x-1}{3+i} + \frac{y-1}{3-i} = i$

181) If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$, then find (a,b)

182) Find the equation $\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+i\sqrt{2})-(\sqrt{3}-i\sqrt{2})}$ as a single complex number x+iy

183) Find the equation $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ as a single complex number

184) Find the real and imaginary parts of the conjugate of the complex number $-5i^{-15}-6i^{-8}$.

185) Find the modulus of the complex number $4 + 3i^7$ .Write the complex number in the form z =a+ib, then modulus of z is $|z| = \sqrt{a^2 + b^2}$

186) If Z_1=2-i and Z_2=1+i, then find $\left|\frac{z_1+z_2+1}{z_1+z_2-1}\right|$

187) Express the complex number in the form a+ib: $(5i)\left(-\frac{3}{5}i\right)$

188) Express the complex number in the form a+ib: i^9+i^{19}

189) Express the complex number in the form a+ib: i^{-39}

190) Express the complex number in the form a+ib: 3(7+i7)+i(7+i7)

191) Express the complex number in the form a+ib: $\left(\frac{1}{5} + \frac{2}{5}i\right) - \left(4 + \frac{5}{2}i\right)$

192) Express the complex number in the form a+ib: $\left[\left(\frac{1}{3} + \frac{7}{3}i\right) + \left(4 + \frac{1}{3}i\right)\right] - \left[\frac{-4}{3} + i\right]$

193) Express the complex number in the form a+ib: $(1-i)^4$

194) Express the complex number in the form a+ib: $\left(\frac{1}{3} + 3i\right)^3$

195) Express the complex number in the form a+ib $\left(-2 - \frac{1}{3}i\right)^3$

196) Express each of these complex numbers in the form a + ib: $\frac{5+4i}{4+5i}$

197) Express each of these complex numbers in the form a + ib: $\frac{(1+i)^2}{3-i}$

198) Express each of these complex numbers in the form a + ib: $\left[\frac{1}{1-2i}+\frac{3}{1+i}\right]\left[\frac{3+4i}{2-4i}\right]$

199) Express each of these complex numbers in the form a + ib: $\frac{(3-2i(2+3i)}{(1+2i)(2-i)}$

200) Express each of these complex numbers in the form a + ib: $\frac{1}{1-cos\theta+2i \quad sin \quad \theta}$

201) Find the multiplicative inverse of the following complex number 3+2i

202) Find the multiplicative inverse of the following complex number $(2+\sqrt{3}i)^2$

203) Find the multiplicative inverse of the following complex number: $\frac{(2+3i)(3+2i)}{5+i}$

204) Find the multiplicative inverse of the following complex number cos θ+i sin θ

205) Simplify: $\frac{(1+i)^2}{1-i^3}$

206) Simplify $\frac{i^{4n+1}-i^{4n-1}}{2}$

207) Simplify: $\left[i^{19}+\left(\frac{1}{i}\right)^{25}\right]^2$

208) Find the modulus and argument of the following complex number $\sqrt{3}+i$

209) Find the modulus and argument of the following complex number $\frac{1}{1+i}$

210) Find the modulus and argument of the following complex number $\frac{-16}{1+\sqrt{3}i}$

211) Find the modulus and argument of the following complex number $\frac{i-1}{cos\frac{\pi}{3}+isin\frac{\pi}{3}}$

212) Solve the equation $9x^2 + 49 = 0$ by factorisation method.

213) Solve the quadratic equation $2x^2 - 4x +3 =0$.

214) Convert the complex number in polar form $\frac{1}{2}-\frac{\sqrt{3}}{2}i$

215) Convert the complex number in polar form $3\sqrt{3}$ +3i

216) Convert the complex number in polar form 1+i tan∝

217) Express $(-\sqrt{3}+\sqrt{-2}) \quad (2\sqrt{3}-4i)$ in the form a + ib.

218) Express $(2 - 3i)^{-3}$ in the standard form a + ib.

219) Solve $x^2+3 =0$

220) Solve $2x^2+x+1 = 0$

221) Solve $x^2+3x+9=0$

222) Solve $-x^2+x-2=0$

223) If $(x+iy)^{\frac{1}{3}}$ = a + ib, x, y, a, b ∈ R. Show that $\frac{x}{a}+\frac{y}{b}=4(a^2-b^2)$.

224) Find real θ such that $\frac{3+2isin\theta}{1-2isin\theta}$ is purely real.

225) Find the modulus and argument of the complex number$2\sqrt{3}-2i$.

226) Find the modulus and argument of the complex number $\frac{1+3i}{1-2i}$ and convert them In polar form.

227) Solve the quadratic equation $5x^2 - 6x + 2 = 0$.

228) Solve the quadratic equation $8x^2 - 9x + 3 = 0$.

229) Solve the quadratic equation $13x^2+ 7x + 1 = 0$.

230) Solve the quadratic equation $\sqrt{5}x^2+x+\sqrt{5}=0$.

231) Solve $x^2+3x+5=0$

232) Solve $x^2-x+2=0$

233) Solve $\sqrt{2}x^2+x+\sqrt{2}=0$

234) Solve $\sqrt{3}x^2-\sqrt{2}x+3\sqrt{3}=0$

235) Solve $x^2+x+\frac{1}{\sqrt{2}}=0$

236) Solve $x^2+\frac{x}{\sqrt{2}}+1=0$

237) Solve the equation $2x^2-4x+3=0$

238) Solve the equation $25x^2-30x+11=0$

239) Solve the equation $17x^2-8x+1=0$

240) Solve the equation $x^2+x+1=0$

241) Solve the equation $2x^2+3ix+2=0$

242) Solve the equation $2x^2-(3+7i)-(3-9i)=0$

243) Solve $3x^2-4x+\frac{20}{3}=0$

244) Solve $27x^2-10x+1=0$

245) Solve $21x^2-28x+10=0$

246) Find the square root of the following complex numbers.
$4+3\sqrt{-20}$

247) Find the square root of the following complex numbers.
7-24i

248) Find the square root of the following complex numbers.
-2i

249) Find the square root of the following complex numbers.
$\frac{1+i}{1-i}$

250) Find the square root of the following complex numbers.
16+30i

251) Find the square root of the following complex numbers.
$-11-60\sqrt{-1}$

252) Find the number of non-zero integral solutions of the equation $|1-i|^x = 2^x$.

253) Express $(-3i)(i)\left(-\frac{1}{4}i\right)^3$ in the form a+ib

254) Prove that the following complex number is purely real: $\left[\frac{3+2i}{2-3i}\right]+\left[\frac{3-2i}{2+3i}\right]$

255) Solve $x^2+2=0$

256) Solve $x^2+x+1=0$

257) Solve $\sqrt{5}\,x^2+x+\sqrt{5}=0$

3 Marks 113 x 3 = 339

258) Find the number of non-zero integral solutions of the equation $|1-i|^x = 2^x$.

259) Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$

260) If $x+iy=\frac{a+ib}{a-ib}$ prove that $x^2+y^2=1$.

261) Find the modulus of $\frac{1+i}{1-i} - \frac{1-i}{1+i}$

262) Express the following expression in the form of a + ib : $\frac{(3+\sqrt{5}i)(3-\sqrt{5}i)}{(\sqrt{3}+\sqrt{2}i)-(\sqrt{3}-\sqrt{2}i)}$

263) For any two complex numbers Z_1 and Z_2 , prove that $Re(z_1z_2)$ =Re z_1 Re z_2 - Imz_1 Imz_2

264) If$\left[\frac{1+i}{1-i}\right]^m$ = 1, then find the least positive integral value of m.

265) Express the following in the form of a + bi

(i) $(-5i)\left(\frac{1}{8}i\right)$

(ii) $(-i)(2i)\left(-\frac{1}{8}i\right)^3$

266) Find the multiplicative inverse of 2 – 3i.

267) Express the following in the form a + ib.

(i) $\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$

(ii) i^{-35}

268) Express each of the complex number given in the Exercises in the form a + ib:

$(5i)\left(-\frac{3}{5}i\right)$

269) Express each of the complex number given in the Exercises in the form a + ib:

$i^9 + i^{19}$

270) Express each of the complex number given in the Exercises in the form a + ib:

i^{-39}

271) Express each of the complex number given in the Exercises in the form a + ib:

3(7 + i7) + i (7 + i7)

272) Express each of the complex number given in the Exercises in the form a + ib:

(1 – i) – (–1 + i6)

273) Express each of the complex number given in the Exercises in the form a + ib:

$\left(\frac{1}{5}+i\frac{2}{5}\right)-\left(4+i\frac{5}{2}\right)$

274) Express each of the complex number given in the Exercises in the form a + ib:

$\left[\left(\frac{1}{3}+i\frac{7}{3}\right)+\left(4+i\frac{1}{3}\right)\right]-\left(-\frac{4}{3}+i\right)$

275) Express each of the complex number given in the Exercises in the form a + ib:

$(1 - i)^4$

276) Express each of the complex number given in the Exercises in the form a + ib:

$\left(\frac{1}{3}+3i\right)^3$

277) Express each of the complex number given in the Exercises in the form a + ib:

$\left(-2-\frac{1}{3}i\right)^3$

278) If a + ib = $\frac{(x+i)^2}{2x^2+1}$ prove that $a^2+b^2=\frac{\left(x^2+1\right)^2}{\left(2x^2+1\right)^2}$

279) Reduce $\left(\frac{1}{1-4i}-\frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ to the standard form.

280) Find the value of $\sqrt{-25}+3\sqrt{-4}+2\sqrt{-9}$

281) Find the real values of x and y, if $(x^4 + 2xi) - (3x^2 + iy) = (3 - 5i) + (1 + 2iy)$.

(i) Firstly, separate real and imaginary parts of both sides.

(ii) Second, equate the real and imaginary parts of both sides and get equations in terms of x and y.

(iii) Further, solve these equations to get the values of x and y.

282) Express the following in the form a + ib.

$(-i)\,(3i)\left(-\frac{1}{6}i\right)^3$

283) Express the following in the form a + ib.
$\left(-\sqrt{3}+\sqrt{-2}\right)\left(-2+\sqrt{-3}\right)$

284) Find the real values of x and y, if (1 + i)(x + iy) = 2 - 5i.

285) Simplify each of the following and put it in the from a + ib.
$\left(2+\sqrt{-3}\right)^{-2}$

286) Reduce to $\left(\frac{1}{1-4i}-\frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ the standard form.

287) Simplify each of the following and put it in the form a + ib.
$\left(\frac{1}{3}+3i\right)^3$

288) Simplify each of the following and put it in the form a + ib. $\left(3+\sqrt{-5}\right)\left(3-\sqrt{-5}\right)$

289) Find the value of $[i^{19}+(\frac{1}{i})^{25}]^2$

290) Show that $i^n + i^{n+1} + i^{n+2} + i^{n+3} = 0$, $\forall n \in N$

291) Express $\left(\frac{4i^3-1}{2i+1}\right)^2$ in the form of a+ib, where $a, b \in R$.

292) Find the modulus of the complex number $4 + 3i^7$

293) Find the conjugate and modulus of the complex number $\frac{2+3i}{3+2i}$

294) What is the value of $\frac{i^{4x+1}-i^{4x-1}}{2}$?

295) Find the real value of 'a' for which $3i^3 - 2ai^2 + (1-a)i + 5$ is real.

296) Find real values of x and y for which the complex numbers $-3 + ix^2y$ and $x^2 + y + 4i$ are conjugate of each other.

297) Convert the complex numbers in polar form 1 - i

298) If a + ib = $\frac{(x^2+1)}{2x^2+1}$, prove that $a^2+b^2=\frac{(x^2+1)^2}{(2x+1)^2}$

299) Convert the complex numbers in polar form -1 + i.

300) Convert the complex numbers in polar form -3.

301) Convert the complex numbers in polar form. $\frac{1-1}{1+i}$

302) If $z_1 = 3 + i$ and $z_2 = 1 + 4i$, then verify that $|z_1 - z_2| \geq |z_2| - |z_1|$.

303) If f(z) = $\frac{7-z}{1-z^2}$ where z= 1 + 2i , then find $|f(z)|$

304) Write the complex number $\sqrt{3}$ +i into polar form and determine the modulus and the principal value of the argument.

305) Change the complex number -4+i4$\sqrt{3}$ in polar form

306) Convert the complex number into $\frac{-16}{1+i\sqrt{3}}$ polar form

307) Express the complex number $\frac{2+6\sqrt{3}i}{5+\sqrt{3}i}$ into polar form.

308) If $\frac{z-1}{z+1}$ is a purely imaginary number $(z \neq -1)$ then find the value of $|z|$

309) If $|z+1| = z+2(1+i)$ then find z.

310) If z = x + iy, w = $\frac{1-iz}{z-i}$ and $|w|=1$ then show that z is purely real.

311) If z is a complex number such that $|z-1|=|z+1|$ then show that Re(z) = 0.

312) If x = 3+2i, then find the value of $x^4-4x^3+4x^2+8x+39$

313) If $x=-5+2\sqrt{-4}$, find the value of $x^4+9x^3+35x^2-x+4$

314) Evaluate,$2x^3 + 2x^2 - 7x + 72$ when $x = \frac{3-5i}{2}$

315) Find the argument of the complex number 1 - i.

316) Find z, if $|r|$ = 2 and arg(z) = $\frac{\pi}{4}$

317) If z_1 ,z_2 are complex numbers such that $\frac{4z_1}{5z_2}$ is purely imaginary number , then find $\left|\frac{z_1-z_2}{z_1+z_2}\right|$.

318) Find the modulus and argument of $z = \frac{(1+i)^{13}}{(1+i)^7}$

319) Solve $(y+1)(y-3)+7=0$

320) Find $\left|(1+i)\frac{(2+i)}{(3+i)}\right|$

321) Convert the complex number i in the polar form.

322) If z_1 = 3+i and z_2 = 1+4i, then verify that $|z_1 + z_2| < |z_1| + |z_2|$

323) If z=2-3i, show that z^2-4z+13=0 and hence find the value of $4z^3$-$3z^2$+169.

324) Change the complex number 2 - 2i into polar form.

325) What is the conjugate of $\frac{2-i}{(1-2i)^2}$?

326) If (1+i)(1+2i)(1+3i)...(1+ni)=(x+iy), then show that 2.5.10....(1+n^2)=x^2+y^2

327) Solve that equation $|z| = z + 1 + 2i$.

328) If $|z_1| = |z_2| = \ldots = |z_n| = 1$ then show that $|z_1 + z_2 + \ldots + z_n| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \ldots + \frac{1}{z_n}\right|$

329) Find x and y, if $(3x - 2iy)\,(2+i)^2 = 10\,(1+i)$

330) Find the principal argument of $(1 + i\sqrt{3})^2$.

331) Find the modulus and argument of the complex number $\frac{1}{1+i}$.

332) If z_1 = 3+2i and z_2 = 2-i, then verify that: $\overline{z_1 + z_2} = \bar{z_1} + \bar{z_2}$

333) Solve $5x^2 - 4ix + 9 = 0$

334) What is the polar form of the complex number $(i^{25})^3$?

335) Express $-3\sqrt{2} + 3\sqrt{2}i$ in the polar form.

336) Find the square root of the 16-30i

337) If z_1 = 3+2i and z_2 = 2-i, then verify that $\overline{z_1 z_2} = \bar{z_1}\bar{z_2}$

338) Find the conjugate and modulus of the complex number $(1-i)^{-2} + (1+i)^{-2}$

339) Find the value of x and y, if $\frac{(1+i)x-2i}{3+i} + \frac{(2-3i)y+i}{3-i} = i$

340) Find the modulus of the complex number $\frac{\sqrt{3}-i\sqrt{2}}{2\sqrt{3}-i\sqrt{2}}$

341) Find the square root of 1-i.

342) Solve $27x^2$-10x+1=0.

343) Solve $10x^2$+5ix-3=0.

344) If z_1 = 3+2i and z_2 = 2-4i, then verify that $|z_1 + z_2|^2 + |z_1 - z_2|^2 = 2(|z_1|^2 + |z_2|^2)$

345) If z_1 = 3+2i and z_2 = 1-3i, then find the modulus of z_1 and z_2. Also verify that $|z_1 z_2| = |z_1|\,|z_2|$.

346) If x+iy = $\frac{(a^2+1)^2}{2a-i}$, what is the value of x^2+y^2 ?

347) If x + iy = $\sqrt{\frac{1+i}{1-i}}$, then prove that x^2+y^2 = 1.

348) If $|z| = 1$, then prove that $\frac{z-1}{z+1}; (z \neq 1)$ is a purely imaginary number. What will you conclude, if z=1?

349) If (2+i) (2+2i) (2+3i)....(2+ni) = x+iy, then prove that 5.8.13 .....($4+n^2$) = $x^2 + y^2$

350) Find the value of $2x^4 + 5x^3 + 7x^2 - x + 41, when\ x = -2 - \sqrt{3i}$

351) Represent the complex number z =1+ i$\sqrt{3}$ in the polar form.

352) Convert the given complex number in polar form: i

353) Find the modulus and argument of the complex numbers:
$\frac{1+i}{1-i}$

354) Convert the complex number $z = \frac{i-1}{\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}}$ in the polar form.

355) Find the square roots of the following.
1+ 4$\sqrt{-3}$

356) Find the square roots of the following.
$-8 - 6i$

357) Find the square roots of the following.
$7 - 24i$

358) Find the square roots of the following.
$1 - i$

359) Find the square roots of the following.
$-11 - 60i$

360) Find the square roots of the following.
$-8 - 6i$

361) Find the square roots of the following.
$-5 + 12i$

362) Find the square roots of the following.
$4 - 6\sqrt{5}i$

363) Find the square roots of the following.
$6\sqrt{2}i - 7$

364) Find the square roots of the following.
- i

365) Solve the following equations.
$x^2 + 4 = 0$

366) Solve the following equations.
$x^2 + 2 = 0$

367) Solve the following equations.
$\sqrt{2}x^2 + x + \sqrt{2} = 0$

368) Solve the following equations.
$x^2 + 5x + \frac{25}{2} = 0$

369) Solve the following equations.
$x^2 + x + \frac{1}{\sqrt{2}} = 0$

370) Solve the following equations.$21x^2 - 28x + 10 = 0$

Case Study Questions 2 x 4 = 8

371) A complex number z is purely real if and only if $\bar{z} = z$ and is purely imaginary if and only if $\bar{z} = -z$.
Based on the above information, anwer the following qustions.
(i) If $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely real, then θ is equal to
(a) $n\pi$ **(b)** $\frac{n\pi}{2}$ **(c)** $n\pi \pm \frac{\pi}{3}$ **(d)** $2n\pi \pm \frac{\pi}{4}$
(ii) If x and y are rol numbers and the complex number $\frac{(2+6)x-1}{4+1} + \frac{(1-6)y+21}{4}$ is purely teal, the relation between x and y is
(a) 8x+7 y=15 (b) 8x-17 y=16 (c) 17x-8 y=15 (d) 17x+8 y=15
(iii) If z be a complex number satisfying $|\mathrm{Re}(z)| + |m(z)| = 4$, then |z| cannot be
(a) $\sqrt{7}$ **(b)** $\sqrt{\frac{17}{2}}$ **(c)** $\sqrt{10}$ **(d)** $\sqrt{8}$
(iv) The smallest positive integer (n) for which $(1+i)^{2n} = (1-i)^{2n}$ is
(a) 2 (b) 3 (c) 1 (d) 4
(v) If z_1 and z_2 are complex numbers such that $\left|\frac{z_1-z_2}{z_1+z_2}\right| = 1$, then
(a) $\frac{z_1}{z_2}$ **is purely real**
(b) $\frac{z_1}{z_2}$ **is purely imaginary**
(c) z_1 **is purely real**
(d) z_1 **and** z_2 **are purely imaginary**

372) Consider z=a+i b and $\bar{z}$ =a-i b, where a and b are real numbers are conjugate of each other.
Based on the above information, answer the following questions.
(i) If the complex numbers $-3 + i\left(x^2 y\right)$ and $x^2 + y + 4i$, where x and y are real, are conjugate to each other, then the number of ordered pairs (x, y) is
(a) 1 (b) 2 (c) 3 (d) 4
(ii) The conjugate of $(6+5i)^2$ is
(a) $11 - 60\mathrm{i}$ **(b)** $11 + 60i$ **(c)** $-11 - 60i$ **(d)** $-11 + 60i$
(iii) Let $z = x^2 - 7x - 9yi$ such that $\bar{z} = y^2 i + 20i - 12$, then the number of ordered pairs (x, y) is
(a) 1 (b) 2 (c) 3 (d) 4
(iv) If $z_1 = 3 + 2i$ and $z_2 = 2 - i$, then $\overline{z_1 + z_2}$ is equal to
(a) $\overline{z_1 z_2}$ **(b)** $\frac{z_1}{z_2}$ **(c)** $\overline{z_1} z_2$ **(d)** $\overline{z_1} + \overline{z_2}$
(v) The number of real values of x such that $\sin x + i\cos 2x$ and $\cos x - i\sin 2x$ are conjugate to each other is
(a) 0 (b) 3 (c) 1 (d) 2

5 Marks 39 x 5 = 195

373) Find the real numbers x and y, if (x-iy) (3+5i) is the conjugate of -6 -24i.

374) If x-iy =$\sqrt{\frac{a-ib}{c-id}}$ prove that $(x^2+y^2)^2 = \frac{a^2+b^2}{c^2+d^2}$

375) Let z_1= 2-i ,z_2=-2+i Find
(i) $Re\left(\frac{z_1 z_2}{\bar{Z}_1}\right)$ (ii) $Im\left(\frac{1}{z_1 \bar{z}_1}\right)$

376) If $(x+iy)^3$ = u + iv, then show that $\frac{u}{x} + \frac{u}{y}$ = 4 (x^2-y^2).

377) If α and β are different complex numbers with $|\beta|$ =1then find $\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$.

378) If (a+ib) (c+id) (e+if) (g+ih) = A+ iB then show that $(a^2+b^2)(c^2+d^2)(e^2+f^2)(g^2+h^2) = A^2+B^2$.

379) Find the real values of a and b, if (3a - 6) + 2ib = - 6b + (6 + a)i.

380) Evaluate $\frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{576}+i^{574}}$

381) If $a + ib = \frac{x+i}{x-i'}$, where x is real, then prove that $a^2 + b^2 = 1$ and $\frac{b}{a} = \frac{2x}{x^2-1}$

382) If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x + iy$, then find (x,y).

383) If z_1 =$\sqrt{3} + i\sqrt{3}$ and $z_2 = \sqrt{3} + i$ then find the quadrant in which $\left(\frac{z_1}{z_2}\right)$ lies.

384) Find the real values of a and b, if, (2a + 2b) + i(b - a) = - 4i

385) Let z_1 = 2-i and z_2 = -2+i, then find Re $\left(\frac{z_1 z_2}{z_1}\right)$

386) Convert the complex number $-\sqrt{3}-i$ into polar form and determine the modulus and the principal value of the argument of given complex number.

387) Solve the equation $z^2 = \bar{z}$, where z = x + iy.

388) If z_1 = 3+5i and z_2 = -3i, then verify that $\overline{\left(\frac{z_1}{z_2}\right)} = \frac{\bar{z}_1}{\bar{z}_2}$

389) Find the complex number satisfying the equation $z+\sqrt{2}\,|(z+1)|+i=0$

390) Find the modulus and the arguments of complex number z= - 1 - i$\sqrt{3}$

391) Find the modulus and the arguments of complex number $z=-\sqrt{3}+i$

392) Convert the complex numbers in polar form -1 - i.

393) Convert the complex numbers in polar form $\sqrt{3}+i$

394) If $x+iy=\frac{(a+i)^2}{2a-i}$ show that $x^2+y^2=\frac{(a^2+1^2)}{4a^2+1}$.

395) Show that a real value of x will satisfy the equation $\frac{1-ix}{1+ix}=a-ib$ if a + b^2 = 1where a and b are real.

396) Find the modulus and argument of the complex number $-2+2\sqrt{3i}$.

397) Find the modulus and argument of the complex number $\frac{1+2i}{1-3i}$ and convert it into polar form.

398) Solve the equation x^2-(7-i)x+(18-i)=0

399) Convert the following in the polar form $\frac{1+7i}{(2-i)^2}$

400) Convert the following in the polar form $\frac{1+3i}{1-2i}$

401) Solve x^2- 2x +$\frac{3}{2}$ = 0

402) Find the square root of 3-4i.

403) Find the square root of -5+12i.

404) If a+i=$\frac{(x^2+i)^2}{2x^2+1}$,prove that $a^2+b^2=\frac{(x^2+i)^2}{(2x^2+1)^2}$

405) Let z_1 = 2-i ,z_2 = -2+i. Find $Im\left(\frac{1}{z_1\bar{z}_1}\right)$

406) Find the modulus and argument of the complex number $\frac{1+2i}{1-3i}$

407) Find the square root of -8i.

408) Find the square root of $-2+2\sqrt{3}i$.

409) Find the square root of $3-4\sqrt{7}i$.

410) Find the values of x and y if (x+iy) (4+5i) =6-2i.

411) If a+ib =$\frac{x+i}{x-i}$ where x is real,prove that $a^2+b^2=1$ and $\frac{b}{a}=\frac{2x}{x^2-1}$

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