*   Choose the right answer from the given options. [1 Marks Each]   **[66]**

1. The product $(a + b)(a - b)(a^2 - ab + b^2)(a^2 + ab + b^2)$ is equal to:

    (A) $a^6 + b^6$ (B) $a^6 - b^6$ (C) $a^3 - b^3$ (D) $a^3 + b^3$

2. If $x + y + z = 9$ and $xy + zx = 23$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is:

    (A) 144   (B) 108   (C) 209   (D) 180

3. If $(m^2 - 3)x^2 + 3mx + 3m + 1 = 0$ has roots which are reciprocal of each other, then the value of m equals

    (A) 4   (B) 1   (C) 2   (D) None of these.

4. The value of $\frac{0.75 \times 0.75 \times 0.75 + 0.25 \times 0.25 \times 0.25}{0.75 \times 0.75 - 0.75 \times 0.25 + 0.25 \times 0.25}$ is:

    (A) -1   (B) 2   (C) 1   (D) 0

5. If $x + \frac{1}{x} = 3$, then $x^6 + \frac{1}{x^6} =$

    (A) 927   (B) 414   (C) 364   (D) 322

6. If $(x + y)^3 - (x - y)^3 - 6y(x^2 - y^2) = ky^2$, then k =

    (A) 1   (B) 2   (C) 4   (D) 8

7. If $x + 2$ and $x - 1$ are the factor of $x^3 + 10x^2 + mx + n$, then the values of m and n are respectively.

    (A) 5 and -3   (B) 7 and -18   (C) 23 and -19   (D) 17 and -8

8. If $49a^2 - b = \left(7a + \frac{1}{2}\right)\left(7a - \frac{1}{2}\right)$, then the value of b is:

    (A) 0 (B) $\frac{1}{4}$ (C) $\frac{1}{\sqrt{2}}$ (D) $\frac{1}{2}$

9. The value of $\frac{(0.87)^3 + (0.13)^3}{(0.87)^2 - (0.87 \times 0.13) + (0.13)^2}$ is:

    (A) 0   (B) 0.13   (C) 0.87   (D) 1

10. $(a - b)^3 + (b - c)^3 + (c - a)^3 =$

    (A) $(a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$ (B) $(a - b)(b - c)(c - a)$ (C) $3(a - b)(b - c)(c - a)$ (D) None of these.

11. If $a + b + c = 0$, then $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} =$

    (A) 0   (B) 1   (C) -1   (D) 3

12. If $x + y = 8$ and $xy = 15$, than $x^2 + y^2$

    (A) 32   (B) 1   (C) 34   (D) 36

13. Write the correct answer in the following:

    The value of $249^2 - 248^2$ is.

(A) 1^2 (B) 477   (C) 487   (D) 497

14. If $p(x) = (x - 1)(x + 1)$, then the value of $p(2) + p(1) - p(0)$ is:

(A) 2   (B) 4   (C) 1   (D) 3

15. If $\frac{a}{b} + \frac{b}{a} = -1$ then $(a^3 - b^3) = ?$

(A) -3   (B) -2   (C) -1   (D) 0

16. If $x + y + z = 9$ and $xy + yz + zx = 23$, the value of $(x^3 + y^3 + z^3 - 3xyz) = ?$

(A) 108   (B) 207   (C) 669   (D) 729

17. If $x + \frac{1}{x} = 3$, then $x^6 + \frac{1}{x^6} =$

(A) 927   (B) 322   (C) 414   (D) 364

18. If $(3x - 1)^7 = a_7 x^7 + a_6 x^6 + a_5 x^5 +$ ___ $+ a_1 x + a_0$, then $a_7 + a_6 + a_5 +$ ____ $+ a_1 + a_0 =$

(A) 0   (B) 128   (C) 1   (D) 64

19. If $\frac{a}{b} + \frac{b}{a} = 1$, then $a^3 + b^3 =$

(A) 1   (B) -1   (C) 0   (D) $\frac{1}{2}$

20. The value of $\frac{(0.013)^3 + (0.007)^3}{(0.013)^2 - 0.013 \times 0.007 + (0.007)^2}$, is:

(A) 0.0091   (B) 0.006   (C) 0.00185   (D) 0.02

21. The product $(x^2 - 1)(x^4 + x^2 + 1)$ is equal to:

(A) $x^8 - 1$ (B) $x^8 + 1$ (C) $x^6 - 1$ (D) $x^6 + 1$

22. $\frac{(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3}{(a - b)^3 + (b - c)^3 + (c - a)^3} =$

(A) $3(a + b)(b + c)(c + a)$ (B) $3(a - b)(b - c)(c - a)$ (C) $(a - b)(b - c)(c - a)$ (D) None of these.

23. If $a + b + c = 0$ then $\left(\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} \right) = ?$

(A) 1   (B) 0   (C) -1   (D) 3

24. If the polynomial $x^3 - 6x^2 + ax + 3$ leaves a remainder 7 when divided by $(x - 1)$, than the value of a is:

(A) 9   (B) 7   (C) 8   (D) 0

25. If $3x + \frac{2}{x} = 7$, then $\left(9x^2 - \frac{4}{x^2} \right) =$

(A) 25   (B) 35   (C) 49   (D) 30

26. The value of k for which $x - 1$ is a factor of $4x^3 + 3x^2 - 4x + k$, is:

(A) 3   (B) 1   (C) -2   (D) -3

27. If $a + b + c = 9$ and $ab + bc + ca = 23$, then $a^3 + b^3 + c^3 - 3abc =$

(A) 108   (B) 207   (C) 669   (D) 729

28. The value of $(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3$ is:

(A) $3(a + b)(b + c)(c + a)(a - b)(b - c)(c - a)$ (B) $3(a - b)(b - c)(c - a)$ (C) $3(a + b)(b + c)(c + a)$ (D) None of these.

29. If $x^2 + kx - 3 = (x - 3)(x + 1)$, than the value of 'k' is:

(A) -2   (B) 2   (C) -3   (D) 3

30. If $x + \frac{1}{x} = 4$, then $x^4 + \frac{1}{x^4} =$

(A) 196   (B) 194   (C) 192   (D) 190

31. If $x^4 + \frac{1}{x^4} = 194$, then $x^3 + \frac{1}{x^3} =$

(A) 76   (B) 52   (C) 64   (D) None of these

32. If $x^2 + kx + 6 = (x + 2)(x + 3)$, for all x,then the value of k is:

(A) 3   (B) -1   (C) 1   (D) 5

33. The remainder when $x^{31} - 31$ is divided by $x + 1$ is:

(A) -32   (B) 31   (C) 30   (D) 0

34. If $a^2 + b^2 + c^2 - ab - bc - ca = 0$, then:

(A) $a + b + c$ (B) $b + c = a$ (C) $c + a = b$ (D) $a = b = c$

35. If $a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0$, than.

(A) $a^3 + b^3 + c^3 = 0$ (B) $a + b + c$ (C) $(a + b + c)^3 = 27abc$ (D) $a + b + c = 3abc$

36. The Possible expressions for the length and breadth of the rectangle whose area is given by $4a^2 + 4a - 3$ is:

(A) $(2a - 1)$ and $(2a + 3)$ (B) $(2a - 1)$ and $(2a - 3)$ (C) $(2a + 1)$ and $(2a + 3)$ (D) None of these.

37. If $a + b + c = 9$ and $ab + bc + ca = 23$, than $a^3 + b^3 + c^3 - 3abc =$

(A) 729   (B) 207   (C) 669   (D) 108

38. Write the correct answer in the following:

If $\frac{x}{y} + \frac{y}{x} = -1 \ (x, y \neq 0)$, the value of $x^3 - y^3$ is.

(A) 1   (B) -1   (C) 0   (D) $\frac{1}{2}$

39. If $a + b + c = 0$, then $\left(\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} \right) =$

(A) 1   (B) 3   (C) 0   (D) 2

40. If $49x^2 - k = \left(7x + \frac{1}{3} \right)\left(7x - \frac{1}{3} \right)$, than the value of 'k' is:

(A) $\frac{1}{9}$ (B) $\frac{-1}{9}$ (C) $\frac{1}{3}$ (D) $\frac{-1}{3}$

41. If $p(x) = x^3 - x^2 + x + 1$, than the value of $\frac{p(-1) + p(1)}{2}$ is:

(A) 2   (B) 1   (C) 3   (D) 0

42. If $x + 2$ is a factor of $x^2 + mx + 14$, then $m =$

(A) 7   (B) 2   (C) 9   (D) 14

43. If $(x^{100} + 2x^{99} + k)$ is divisible By $(x + 1)$ then the value of k is:

(A) -2   (B) 1   (C) 2   (D) -3

44. If $x^4 + \frac{1}{x^4} = 194$, than $x^3 + \frac{1}{x}^3 =$

(A) 64   (B) 52   (C) 76   (D) None of these.

45. If $\left(3x + \frac{1}{2}\right)\left(3x - \frac{1}{2}\right) = 9x^2 - p$ then the value of p is:

(A) 0 (B) $-\frac{1}{4}$ (C) $\frac{1}{4}$ (D) $\frac{1}{2}$

46. If $x^2 + \frac{1}{x^2} = 38$, then the value of $x - \frac{1}{x}$ is:

(A) 3   (B) 4   (C) 5   (D) 6

47. If $(x + y)^3 - (x - y)^3 - 6y (x^2 - y^2) = ky^2$, then k =

(A) 1   (B) 2   (C) 8   (D) 4

48. If $3x = a + b + c$, then the value of $(x - a)^3 + (x - b)^3 + (x - c)^3 - 3(x - a) (x - b) (x - c)$ is:

(A) a + b + c   (B) (a - b)(b - c)(c - a)   (C) 0   (D) None of these.

49. The value of $\dfrac{(a^2 - b^2)^3 (b^2 - c^2) + (c^2 - a^2)^3}{(a - b)^3 + (b - c)^3 + (c - a)^3}$ is:

(A) 3(a - b) (b - c) (c - a)   (B) 3(a + b) (b + c) (c + a)   (C) 3(a + b) (b + c) (c + a) (a - b) (b - c) (c - a)   (D) None of these.

50. If $x^3 - 3x^2\ 3x - 7 = (x + 1) (ax^2 + bx + c)$, then a + b + c =

(A) 4   (B) -10   (C) 12   (D) 3

51. Write the correct answer in the following:

If $49x^2 - b = \left(7x + \frac{1}{2}\right)\left(7x - \frac{1}{2}\right)$, the value of b is.

     a. 0

     b. $\frac{1}{\sqrt{2}}$

     c. $\frac{1}{4}$

     d. $\frac{1}{2}$

52. Write the correct answer in the following:

Degree of the polynomial $4x^4 + 0x^3 + 0x^5 + 5x + 7$ is.

     a.   4

     b.   5

     c.   3

     d.   7

53. If $x^4 + \frac{1}{x^4} = 623$, then $x + \frac{1}{x} =$

     a.   27

     b.   25

     c. $3\sqrt{3}$

     d. $-3\sqrt{3}$

54. The product $(a + b)(a - b)(a^2 - ab + b^2)(a^2 + ab + b^2)$ is equal to:

     a. $a^6 + b^6$

     b. $a^6 - b^6$

     c. $a^3 - b^3$

     d. $a^3 + b^3$

55. If $a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0$, then:

a. $a + b + c = 0$

b. $(a + b + c)^3 = 27abc$

c. $a + b + c = 3abc$

d. $a^3 + b^3 + c^3 = 0$

56. If $\frac{a}{b} + \frac{b}{a} = -1$, then $a^3 - b^3 =$

   a. 1

   b. -1

   c. $\frac{1}{2}$

   d. 0

57. $\dfrac{(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3}{(a-b)^3+(b-c)^3+(c-a)^3} =$

   a. $3(a + b)(b + c)(c + a)$

   b. $3(a - b)(b - c)(c - a)$

   c. $(a - b)(b - c)(c - a)$

   d. None of these.

58. The expression $x^4 + 4$ can be factorized as:

   a. $(x^2 + 2x + 2)(x^2 - 2x + 2)$

   b. $(x^2 + 2x + 2)(x^2 + 2x - 2)$

   c. $(x^2 - 2x - 2)(x^2 - 2x + 2)$

   d. $(x^2 + 2)(x^2 - 2)$

59. The factors of $8a^3 + b^3 - 6ab + 1$ are:

   a. $(2a + b - 1)(4a^2 + b^2 + 1 - 3ab - 2a)$

   b. $(2a - b + 1)(4a^2 + b^2 - 4ab + 1 - 2a + b)$

   c. $(2a + b + 1)(4a^2 + b^2 + 1 - 2ab - b - 2a)$

   d. $(2a - 1 + b)(4a^2 + 1 - 4a - b - 2ab)$

60. If $x - a$ is a factor of $x^3 - 3x^2a + 2a^2x + b$, then the value of b is:

   a. 0

   b. 2

   c. 1

   d. 3

61. If $x + 2$ and $x - 1$ are the factors of $x^3 + 10x^2 + mx + n$, then the values of m and n are respectively

   a. 5 and -3

   b. 17 and -8

   c. 7 and -18

   d. 23 and -19

62. If $(x^{100} + 2x^{99} + k)$ is divisible by $(x + 1)$ then the value of k is:

   a. 1

   b. 2

   c. -2

   d. -3

63. If $(x + 1)$ is a factor of the polynomial $(2x^2 + kx)$ then k = ?

   a. 4

   b. -3

c. 2

d. -2

64. If (x + 2) and (x - 1) are factors of the polynomial $p(x) = x^3 + 10x^2 + mx + n$ then:
   a. m = 5, n = -3
   b. m = 7, n = -18
   c. m = 17, n = -8
   d. m = 23, n = -19

65. For what value of k is the polynomial $p(x) = 2x^3 - kx^2 + 3x + 10$ exactly divisible by (x + 2)?
   a. $-\frac{1}{3}$
   b. $\frac{1}{3}$
   c. 3
   d. -3

66. If (x + 5) is a factor of $= x^3 - 20x + 5k$ then k = ?
   a. -5
   b. 5
   c. 3
   d. -3

* A statement of Assertion (A) is followed by a statement of Reason (R). [5] Choose the correct option.

67. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

   Assertion: The LCM of $(x^2 + x - 6)$ and $4 (4 - x)^2$ is 4 (x + 3) (x + 2) (x - 2)

   Reason: $x^{100} + 2x^{99} + k$ is divisible by (x + 1) then the value of k is 2.
   a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
   b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
   c. Assertion is true but the reason is false.
   d. Both assertion and reason are false.

68. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

   Assertion: If (x + 2) is a factor of $x^3 - 2ax^2 + 16$ the value of a is 7.

   Reason: If one of the factor of $x^2 + x - 20$ is (x + 5) and other is (x + 4).
   a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
   b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.
   c. Assertion is true but the reason is false.
   d. Both assertion and reason are false.

69. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: $y^2 - 5$ is a quadratic polynomial.

Reason: Degree of polynomial 2 is called quadratic polynomial.

    a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

    b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

    c. Assertion is true but the reason is false.

    d. Both assertion and reason are false.

70. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: If one zero of polynomial $p(x) = (k^2 + 4) x^2 + 13x + 4k$ is reciprocal of the other, then k = 2.

Reason: Lrrational zeros always occurs in pairs.

    a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

    b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

    c. Assertion is true but the reason is false.

    d. Both assertion and reason are false.

71. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: A quadratic polynomial can have at most two zero.

Reason: $x^2 + 7x + 9$ has two zero.

    a. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

    b. Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

    c. Assertion is true but the reason is false.

    d. Both assertion and reason are false.

* Answer the following questions in one sentence. [1 Marks Each]   **[7]**

72. Factorise: $\frac{25}{4}x^2 - \frac{y^2}{9}$.

73. If x + y + z = 0 then show that $x^3 + y^3 + z^3 = 3xyz$.

74. Factorise : $64m^3 - 343n^3$

75. Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divided by x + 1

76. Write the coefficient of x^2 in $\frac{\pi}{2}x^2 + x$

77. Verify whether the following are True or False:

$\frac{-4}{5}$ is a zero of 4 - 5y

78. Which of the following expression are polynomials?

$\frac{1}{7}a^3 - \frac{2}{\sqrt{3}}a^2 + 4a - 7$

* Answer the following short questions. [2 Marks Each]   **[50]**

79. Find the value of k, if x − 1 is a factor of $4x^3 + 3x^2 - 4x + k$.

80. Verify : $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

81. Verify : $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

82. Factorise : $27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$.

83. Verify $x = -\frac{m}{l}$ are zeroes of the polynomial $p(x) = lx + m$

84. Expand the following:
$$\left(4 - \frac{1}{3x}\right)^3$$

85. Without actually calculating the cubes, find the value of:
$(0.2)^3 - (0.3)^3 + (0.1)^3$

86. By Remainder Theorem find the remainder, when p(x) is divided by g(x), where:
$p(x) = x^3 - 2x^2 - 4x - 1$, $g(x) = x + 1$

87. By Remainder Theorem find the remainder, when p(x) is divided by g(x), where:
$p(x) = 4x^3 - 12x^2 + 14x - 3$, $g(x) = 2x - 1$

88. For what value of m is $x^3 - 2mx^2 + 16$ divisible by x + 2 ?

89. Factorise:
$$2\sqrt{2}a^3 + 8b^3 - 27c^3 + 18\sqrt{2}abc.$$

90. If a, b, c are all non-zero and a + b + c = 0, prove that $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = 3$.

91. Find the following:
$(x^2 - 1)(x^4 + x^2 + 1)$

92. Write the following in the expanded form:
$$\left(\frac{x}{y} + \frac{y}{z} + \frac{z}{x}\right)^2$$

93. Evaluate the following using identities:
$$\left(1.5x^2 - 0.3y^2\right)\left(1.5x + 0.3y^2\right)$$

94. Simplify the following:
$$\frac{7.83 \times 7.83 - 1.17 \times 1.17}{6.66}$$

95. Write the following in the expanded form:
$$\left(\frac{a}{bc} + \frac{b}{ca} + \frac{c}{ab}\right)^2$$

96. Factorize the following expressions:
$(2x - 3y)^3 + (4z - 2x)^3 + (3y - 4z)^3$

97. Factorize the following expressions:
$$2\sqrt{2}a^3 + 3\sqrt{3}b^3 + c^3 - 3\sqrt{6}abc$$

98. Factorize:
$$\frac{8}{27}x^3 + 1 + \frac{4}{3}x^2 + 2x$$

99. Multiply:

$(x^2 + y^2 + z^2 - xy + xz + yz)$ by $(x + y - z)$

100. If $a^2 + b^2 + c^2 = 250$ and $ab + bc + ca = 3$, find $a + b + c$.

101. In the following, use factor theorem to find whether polynomial g(x) is a factor of polynomial f(x) or, not:

$f(x) = 3x^4 + 17x^3 + 9x^2 - 7x - 10$; $g(x) = x + 5$

102. What must be subtracted from $x^3 - 6x^2 - 15x + 80$ so that the result is exactly divisible by $x^2 + x - 12$?

103. Factorise:

$$\sqrt{2}x^2 + 3x + \sqrt{2}$$

* Answer the following questions. [3 Marks Each] **[57]**

104. If $a + b + c = 5$ and $ab + bc + ca = 10$, then prove that $a^3 + b^3 + c^3 - 3abc = -25$.

105. If $a + b + c = 9$ and $ab + bc + ca = 26$, find $a^2 + b^2 + c^2$.

106. For the polynomial $\frac{x^3+2x+1}{5} - \frac{7}{2}x^2 - x^6$, write.

   i.   The degree of the polynomial.
   ii.   The coefficient of x^3.
   iii. The coefficient of x^6.
   iv. The constant term.

107. If $x = 3$ and $y = -1$, find the values of the following using in identity:

$$\left(\frac{x}{4} - \frac{y}{3}\right)\left(\frac{x^2}{16} + \frac{xy}{12} + \frac{y^2}{9}\right)$$

108. Find the following products:

$(2a - 3b - 2c)(4a^2 + 9b^2 + 4c^2 + 6ab - 6bc + 4ca)$

109. If $a^2 + b^2 + c^2 = 16$ and $ab + bc + ca = 10$, find the value of $a + b + c$.

110. If $x = 3$ and $y = -1$, find the values of the following using in identity:

$$\left(\frac{x}{7} + \frac{y}{3}\right)\left(\frac{x^2}{49} + \frac{y^2}{9} - \frac{xy}{21}\right)$$

111. If $x = -2$ and $y = 1$, by using an identity find the value of the following:

$$\left(5y + \frac{15}{y}\right)\left(25y^2 - 75 + \frac{225}{y^2}\right)$$

112. Simplify:

$$\frac{173\times173\times173+127\times127\times127}{173\times173-173\times127+127\times127}$$

113. Factorize the following expressions:

$a^3 + 3a^2b + 3ab^2 + b^3 - 8$

114. Factorize:

$xy^9 - yx^9$

115. Factorize:

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

116. Multiply:

$(9x^2 + 25y^2 + 15xy + 12x - 20y + 16)$ by $(3x - 5y + 4)$

117. If $x = 2$ is a root of the polynomial $f(x) = 2x^2 - 3x + 7a$, Find the value of a.

118. What must be added to $3x^3 + x^2 - 22x + 9$ so that the result is exactly divisible by $3x^2 + 7x - 6$?

119. Find the value k if $x - 3$ is a factor of $k^2x^3 - kx^2 + 3kx - k$.

120. If $x - 2$ is a factor of the following two polynomials, find the values of a in case:

    $x^3 - 2ax^2 + ax - 1$

121. Find the value of a such that $(x - 4)$ is a factors of $5x^3 - 7x^2 - ax - 28$.

122. Factorise:

    $(5a - 7b)^3 + (7b - 9c)^3 + (9c - 5a)^3$

* **Questions with calculation. [4 Marks Each]** **[52]**

123. The polynomial $p(x) = x^4 - 2x^3 + 3x^2 - ax + 3a - 7$ when divided by $x + 1$ leaves the remainder 19. Find the values of a. Also find the remainder when p(x) is divided by $x + 2$.

124. Prove that $(a + b + c)^3 - a^3 - b^3 - c^3 = 3(a + b)(b + c)(c + a)$.

125. Find the value of $27x^3 + 8y^3$, if:

    $3x + 2y = 20$ and $xy = \frac{14}{9}$

126. If $x^4 + \frac{1}{x^4} = 194$, find $x^3 + \frac{1}{x^3}$, $x^2 + \frac{1}{x^2}$ and $x + \frac{1}{x}$.

127. Factorize the following expressions:

    $\left[\frac{x}{2} + y + \frac{z}{3}\right]^3 + \left[\frac{x}{3} - \frac{2y}{3} + z\right]^3 + \left[-\frac{5x}{6} - \frac{y}{3} - \frac{4z}{3}\right]^3$

128. Factorize the following expressions:

    $(a + b)^3 - 8(a - b)^3$

129. If the polynomials $ax^3 + 3x^2 - 13$ and $2x^3 - 5x + a$, when divided by $(x - 2)$ leave the same remainder, Find the value of a.

130. If both $x + 1$ and $x - 1$ are factors of $ax^3 + x^2 - 2x + b$, find the values of a and b.

131. If the polynomial $2x^3 + ax^2 + 3x - 5$ and $x^3 + x^2 - 4x + a$ leave the same remainder when divided by $x - 2$, Find the value of a.

132. In the following, using the remainder theorem, find the remainder when f(x) is divided by g(x) and verify the by actual division:

    $f(x) = 4x^4 - 3x^3 - 2x^2 + x - 7$, $g(x) = x - 1$

133. If $x = 0$ and $x = -1$ are the roots of the polynomial $f(x) = 2x^3 - 3x^2 + ax + b$, Find the of a and b.

134. Evaluate:

    $(28)^3 + (-15)^3 + (-13)^3$

135. Factorise:

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

* **Answer the following questions. [5 Marks Each]** **[65]**

136. If $x + \frac{1}{x} = 3$, then find the value of $x^6 + \frac{1}{x^6}$.

137. If $x + \frac{1}{x} = 3$, calculate $x^2 + \frac{1}{x^2}$, $x^3 + \frac{1}{x^3}$ and $x^4 + \frac{1}{x^4}$.

138. If $x^4 + \frac{1}{x^4} = 119$, find the valu of $x^3 - \frac{1}{x^3}$.

139. Simplify the following expressions:

$$\left(x + y + z\right)^2 + \left(x + \frac{y}{2} + \frac{z}{3}\right)^2 - \left(\frac{x}{2} + \frac{y}{3} + \frac{z}{4}\right)^2$$

140. Simplify the following:

$$\left(x + \frac{2}{x}\right)^3 + \left(x - \frac{2}{x}\right)^3$$

141. If $3x = a + b + c$, then the value of $(x - a)^3 + (x - b)^3 + (x - c)^3 - 3(x - a)(x - b)(x - c)$ is:
    a. $a + b + c$
    b. $(a - b)(b - c)(c - a)$
    c. 0
    d. None of these.

142. If $x^3 - 3x^2 + 3x - 7 = (x + 1)(ax^2 + bx + c)$, then $a + b + c =$
    a. 4
    b. 12
    c. -10
    d. 3

143. If $(x + y)^3 - (x - y)^3 - 6y(x^2 - y^2) = ky^2$, then $k =$
    a. 1
    b. 2
    c. 4
    d. 8

144. If 2 and 0 are the zeros of the polynomial $f(x) = 2x^3 - 5x^2 + ax + b$ then find the values of a and b.
    Hint: $f(x) = 0$ and $f(0) = 0$.

145. The polynomial $p(x) = x^4 - 2x^3 + 3x^2 - ax + b$ when divided by $(x - 1)$ and $(x + 1)$ leaves the remainders 5 and 19 respectively. Find the values of a and b. Hence, find the remainder when $p(x)$ is divided by $(x - 2)$.

146. Find the values of a and b so that the polynomial $(x^4 + ax^3 - 7x^2 - 8x + b)$ is exactly divisible by $(x + 2)$ as well as $(x + 3)$.

147. If $(x^3 + ax^2 + bx + 6)$ has $(x - 2)$ as a factor and leaves a remainder 3 when divided by $(x - 3)$, find the values of a and b.

148. What must be subtracted from $(x^4 + 2x^3 - 2x^2 + 4x + 6)$ so that the result is exactly divisible by $(x^2 + 2x - 3)$?

* **Case study based questions.** [8]

149. Hard plastic square shaped sheets are available in the.
     The side length of sheets is as per requirement.
     The price of a sheet is z per square meter.
     Anuj requires two sheets – a smaller sheet with side length x m and a larger sheet with

side length ym. He has two choices:

Choice 1 – buy two separate sheets of side lengths x m and y m

Choice 2 – buy a single sheet with side length (x+ y) m

4. What is the height of each container?

5. What is the difference in price between the two choices?

6. The area of a rectangle is $\left(3x^2 + x - 2\right)$ square units. Its width is $\left(1 + x\right)$ units. What is the length of the rectangle?

7. A polynomial is expressed as $x^3 + bx^2 + cx + d = 0$. The same polynomial can be written in factor form as $x + px + qx + r = 0$.

How is the constant term in the polynomial related to its factors p, q, and r?

  A. $d = p + q + r$

  B. $d = (p + q) \times r$

  C. $d = p \times q \times r$

  D. $d = pq + qr + pr$

8. A polynomial is divided by $\left(x - 1\right)$. The quotient obtained is $3x^3 - x^2 - x - 4$, and the remainder is -5 . Which polynomial meets these conditions?

  A. $3x^3 - x^2 - x - 9$

  B. $3x^3 - x^2 - x - 4$

  C. $3x^4 - 4x^3 - 3x + 4$

  D. $3x^4 - 4x^2 - 3x - 1$

9. What is the common factor of $x^3 - x^2$ and $-22x^2 + 142x - 120$?
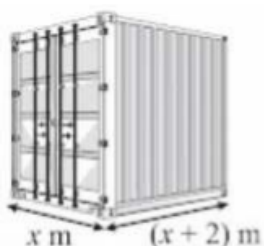
  A. x

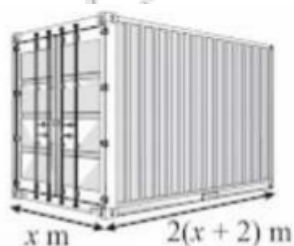 B. (x – 1)

  C. x^2

  D. 1

10. A polynomial is expressed as: $p(x) = x^3 + x^2 - x - 1$

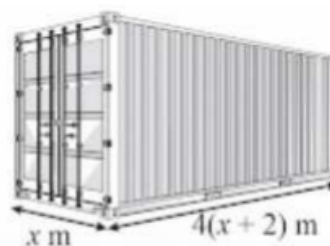At what values of x is the polynomial $p(x) = 0$?

150. A shipment service provider uses three types of containers for shipping materials. The height and

width of the three containers are the same. The containers' height is 0.15 m more than their width, and the volume of the smallest container is 652 m³

Container 1   Container 2   Container 3

1. Write a polynomial relating Container 1's length, breadth and height with its volume.

2. Which of the following statements is true?

  A. The volume of the three containers is the same.

  B. The length of the three containers is the same.

  C. The volume of Container 3 is 2,608 m³.

D. The length of Container 3 is 4 times the length of Container 2.

3. What is the height of each container?

----- "अगर किसी चीज को शिद्दत से चाहो तो पूरी कायनात तुम्हें उससे मिलाने में लग जाती है", -----