Date: 28/9/2021

Q1. Answer the following and justify.
If on division of a polynomial $p(x)$ by a polynomial $g(x)$, the quotient is zero, what is the relation between the degree of $p(x)$ and $g(x)$?

Q2. Answer the following and justify.
If on division of a non-zero polynomial $p(x)$ by a polynomial $g(x)$, the remainder is zero, what is the relation between the degrees of $p(x)$ and $g(x)$?

Q3. Answer the following and justify.
Can $x^2 - 1$ be the quotient on division of $x^6 + 2x^3 + x - 1$ by a polynomial in x of degree 5?

Q4. Answer the following and justify.
Can the quadratic polynomial $x^2 + kx + k$ have equal zeroes for some odd integer $k > 1$?

Q5. Are the following statements 'True' or 'False'? Justify your answer.

(i) If the zeroes of a quadratic polynomial $ax^2 + bx + c$ are both positive, then a, b and c all have the same sign.

(ii) If the graph of a polynomial intersects the X-axis at only one point, it cannot be a quadratic polynomial.

Q6. Are the following statements 'True' or 'False'? Justify your answer.

(i) If the graph of a polynomial intersects the X-axis at exactly two points, it need not be a quadratic polyomial.

(ii) If two of the zeroes of a cubic polynomial are zero, then it does not have limear and constant terms.

Q7. Are the following statements 'True' or 'False'? Justify your answer.

(i) If all the zeroes of a cubic polynomial are negative, then all the coefficients and the constant term of the polynomial have the same sign.

(ii) If all three zeroes of a cubic polynomial $x^3 + ax^2 - bx + c$ are positive, then atleast one of a, b and c is non-negative.

Q8. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$3x^2 + 4x - 4$$

Q9. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$5t^2 + 12t + 7$$

Q10. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$t^3 - 2t^2 - 15t$$

Q11. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

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

Q12. If the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form a, $a + b$ and $a + 2b$ for some real numbers a and b, find the values of a and b as well as the zeroes of the given polyomial.

Q13. Answer the following and justify.
What will the quotient and remainder be on division of $ax^2 + bx + c$ by $px^3 + qx^2 + rx + s$, $p \neq 0$?

Q14. If $\sqrt{2}$ is a zero of the cubic polynomial $6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$, the find its other two zeroes.

Q15. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$2x^2 + \frac{7}{2}x + \frac{3}{4}$$

Q16. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$y^2 + \frac{3}{2}\sqrt{5}y - 5$$

Q17. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$v^2 + 4\sqrt{3}v - 15$$

Q18. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$2s^2 - (1 + 2\sqrt{2})s + \sqrt{2}$$

Q19. Find the zeroes of the polynomial by factorisation method and verify the relations between the zeroes and the coefficients of the polynomial.

$$4x^2 + 5\sqrt{2}x - 3$$

Q20. Find a quadratic polynomial whose sum and product respectively of the zeroes are as given. Also, find the zeroes of polynomial by factorisation.

$$\frac{-3}{2\sqrt{5}}, \quad -\frac{1}{2}$$

Q21. Find a quadratic polynomial whose sum and product respectively of the zeroes are as given. Also, find the zeroes of polynomial by factorisation.

$$-2\sqrt{3}, \quad -9$$

Q22. Find a quadratic polynomial whose sum and product respectively of the zeroes are as given. Also, find the zeroes of polynomial by factorisation.

$$\frac{21}{8}, \quad \frac{5}{16}$$

Q23. Find k, so that $x^2 + 2x + k$ is a factor of $2x^4 + x^3 - 14x^2 + 5x + 6$. Also, find all the zeroes of the two polynomials.

Q24. If $x - \sqrt{5}$ is a factor of the cubic polynomial $x^3 - 3\sqrt{5}x^2 + 13x - 3\sqrt{5}$, then find all the zeroes of the polynomial.

Q25. For which values of a and b, the zeroes of $q(x) = x^3 + 2x^2 + a$ are also the zeroes of the polynomial $p(x) = x^5 - x^4 - 4x^3 + 3x^2 + 3x + b$? Which zeroes of $p(x)$ are not the zeroes of $q(x)$?

Date: 28/9/2021

S1. Theory.

S2. Theory.

S3. Theory.

S4. Theory.

S5. (i) F (ii) T

S6. (i) T (ii) T

S7. (i) T (ii) F

S8. -2 and $\frac{2}{3}$

S9. $\frac{-7}{5}$ and -1

S10. -3, 0 and 5

S11. $x = 1$ and $x = \frac{-1}{4}$

S12. When $a = -1$, then $b = 3$ and when $a = 5$, then $b = -3$ and the zeroes are -1, 2 and 5.

S13. Theory.

S14. Its other zeroes are $\frac{-1}{\sqrt{2}}$ and $\frac{-4}{3\sqrt{2}}$.

S15. $\frac{-3}{2}$ and $\frac{-1}{4}$

S16. $-2\sqrt{5}$ and $\frac{\sqrt{5}}{2}$

S17. $-5\sqrt{3}$ and $\sqrt{3}$

S18. $\frac{1}{2}$ and $\sqrt{2}$

S19. $\frac{-3}{\sqrt{2}}$ and $\frac{1}{2\sqrt{2}}$

S20. Theory.

S21. Theory.

S22. Theory.

S23. $k = -1$ or -3.

The zeroes of $x^2 + 2x - 3$ are $1, -3$ and the zeroes of $2x^4 + x^3 - 14x^2 + 5x + 6$ are $1, -3, 2, \frac{-1}{2}$.

S24. All the zeroes of polynomial are $\sqrt{5}$, $(\sqrt{5} + \sqrt{2})$ and $(\sqrt{5} - \sqrt{2})$

S25. For $a = -1$ and $b = -2$, the zeroes of $q(x)$ are also the zeroes of the polynomial $p(x)$.
The zeroes of $p(x)$ are 1 and 2 which are not the zeroes of $q(x)$.