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Solutions

Class 10 Maths

Chapter 2

Ex 2.3

Q.1: Apply division algorithm to find the quotient q(x) and remainder r(x) on dividing f(x) by g(x) in each of the following:

(i) $f(x)=x^3-6x^2+11x-6, g(x)=x^2+x+1$

$f(x) = x^3 - 6x^2 + 11x - 6,\ g(x) = x^2 + x + 1$

(ii) f(x) = $10x^4+17x^3-62x^2+30x-105, g(x)=2x^2$

$10x^4 + 17x^3 - 62x^2 + 30x - 105,\ g(x) = 2x^2$ **+ 7x + 1**

(iii) $f(x)=4x^3+8x^2+8x+7, g(x)=2x^2-x+1$

$f(x) = 4x^3 + 8x^2 + 8x + 7,\ g(x) = 2x^2 - x + 1$

(iv) $f(x)=15x^3-20x^2+13x-12, g(x)=x^2-2x+2$

$f(x) = 15x^3 - 20x^2 + 13x - 12,\ g(x) = x^2 - 2x + 2$

Solution:

(i) $f(x)=x^3-6x^2+11x-6$

$f(x) = x^3 - 6x^2 + 11x - 6$ and $g(x)=x^2+x+1$

$g(x) = x^2 + x + 1$

	$x - 7$
$x^2 + x + 1$	$x^3 - 6x^2 + 11x - 6$
	$x^3 + x^2 + x$
	$-7x^2 + 10x - 6$
	$-7x^2 - 7x - 7$
	$17x - 1$

(ii) $f(x)=10x^4+17x^3-62x^2+30x-105, g(x)=2x^2+7x+1$

$f(x) = 10x^4 + 17x^3 - 62x^2 + 30x - 105,\ g(x) = 2x^2 + 7x + 1$

$f(x)=10x^4+17x^3-62x^2+30x-105$

$f(x) = 10x^4 + 17x^3 - 62x^2 + 30x - 105$ $g(x)=2x^2+7x+1$

$g(x) = 2x^2 + 7x + 1$

	$5x^2 - 9x - 2$
$2x^2 + 7x + 1$	$10x^4 + 17x^3 - 62x^2 + 30x - 3$
	$10x^4 + 35x^3 + 5x^2$
	$-18x^3 - 67x^2 + 30x - 3$
	$-18x^3 - 63x^2 - 9x$
	$-4x^2 + 39x - 3$
	$4x^2 - 14x - 2$
	$53x - 1$

(iii) $f(x)=4x^3+8x^2+8x+7, g(x)=2x^2-x+1$

$f(x) = 4x^3 + 8x^2 + 8x + 7,\ g(x) = 2x^2 - x + 1$

	$2x + 5$
$2x^2 - x + 1$	$4x^3 + 8x^2 + 8x + 7$
	$4x^3 - 2x^2 + 2x$
	$10x^2 + 6x + 7$
	$10x^2 - 5x + 5$
	$11x + 2$

$f(x)=4x^3+8x^2+8x+7$$f(x) = 4x^3 + 8x^2 + 8x + 7$ $g(x)=2x^2-x+1$$g(x) = 2x^2 - x + 1$

(iv) $f(x)=15x^3-20x^2+13x-12, g(x)=x^2-2x+2$

$f(x) = 15x^3 - 20x^2 + 13x - 12,\ g(x) = x^2 - 2x + 2$

$f(x)=15x^3–20x^2+13x–12$
$f(x) = 15x^3 – 20x^2 + 13x – 12$ $g(x)=x^2–2x+2$
$g(x) = x^2 – 2x + 2$

Q.2: Check whether the first polynomial is a factor of the second polynomial by applying the division algorithm:

(i) $g(t)=t^2–3;f(t)=2t^4+3t^3–2t^2–9t–12$
$g(t) = t^2 – 3 \; ; f(t) = 2t^4 + 3t^3 – 2t^2 – 9t – 12$

(ii) $g(x)=x^2–3x+1;f(x)=x^5–4x^3+x^2+3x+1$
$g(x) = x^2 – 3x + 1 \; ; f(x) = x^5 – 4x^3 + x^2 + 3x + 1$

(iii) $g(x)=2x^2–x+3;f(x)=6x^5−x^4+4x^3–5x^2–x–15$
$g(x) = 2x^2 – x + 3 \; ; f(x) = 6x^5 − x^4 + 4x^3 – 5x^2 – x – 15$

Solution:

(i) $g(t)=t^2–3;f(t)=2t^4+3t^3–2t^2–9t–12$
$g(t) = t^2 – 3 \; ; f(t) = 2t^4 + 3t^3 – 2t^2 – 9t – 12$

	$2t^2 + 3t + 4$
$t^2 – 3$	$2t^4 + 3t^3 – 2t^2 – 9t - 12$
	$2t^4 \quad - 6t^2$
	$3t^3 + 4t^2 – 9t$
	$3t^3 \quad – 9t$
	$4t^2 – 12$
	$4t^2 – 12$
	0

$g(t)=t^2–3$ $g(t) = t^2 – 3$ $f(t)=2t^4+3t^3–2t^2–9t$
$f(t) = 2t^4 + 3t^3 – 2t^2 – 9t$

Therefore, g(t) is the factor of f(t).

(ii) $g(x)=x^2–3x+1;f(x)=x^5–4x^3+x^2+3x+1$
$g(x) = x^2 – 3x + 1 \; ; f(x) = x^5 – 4x^3 + x^2 + 3x + 1$

	$x^2 - 1$
$x^3 - 3x + 1$	$x^5 - 4x^3 + x^2 + 3x + 1$
	$x^5 - 3x^3 + x^2$
	$-x^3 \quad + 3x + 1$
	$-x^3 \quad + 3x - 1$
	2

$g(x)=x^2–3x+1$ $g(x) = x^2 - 3x + 1$ $f(x)=x^5–4x^3+x^2+3x+1$ $f(x) = x^5 - 4x^3 + x^2 + 3x + 1$

Therefore, g(x) is not the factor of f(x).

(iii) $g(x)=2x^2–x+3;f(x)=6x^5−x^4+4x^3–5x^2–x–15$
$g(x) = 2x^2 - x + 3 \; ; f(x) = 6x^5 - x^4 + 4x^3 - 5x^2 - x - 15$

	$3x^3 + x^2 - 2x - 5$
$2x^2 - x + 3$	$6x^5 - x^4 + 4x^3 - 5x^2 - x - 15$
	$6x^5 - 3x^4 + 9x^3$
	$2x^4 - 5x^3 - 5x^2$
	$2x^4 - x^3 + 3x^2$
	$-4x^3 - 8x^2 - x$
	$-4x^3 + 2x^2 - 6x$
	$-10x^2 + 5x - 15$
	$-10x^2 + 5x - 15$
	0

$g(x)=2x^2–x+3$ $g(x) = 2x^2 - x + 3$ $f(x)=6x^5−x^4+4x^3–5x^2–x–15$ $f(x) = 6x^5 - x^4 + 4x^3 - 5x^2 - x - 15$

Q.3: Obtain all zeroes of the polynomial f(x) = $\mathbf{f(x)=2x^4+x^3–14x^2–19x–6}$ $f(x) = 2x^4 + x^3 - 14x^2 - 19x - 6$ **, if two of its**

zeroes are -2 and -1.

Solution:

$f(x)=2x^4+x^3–14x^2–19x–6$ $f(x) = 2x^4 + x^3 – 14x^2 – 19x – 6$

If the two zeroes of the polynomial are -2 and -1, then its factors are (x + 2) and (x + 1)

$(x+2)(x+1)=x^2+x+2x+2=x^2+3x+2$
$(x + 2)(x + 1) = x^2 + x + 2x + 2 = x^2 + 3x + 2$

Quotient: $2x^2 – 5x – 3$

Divisor: $x^2 + 3x + 2$) Dividend: $2x^4 + x^3 – 14x^2 – 19x – 6$

$2x^4 + 6x^3 + 4x^2$

$- 5x^3 – 18x^2 – 19x$

$- 5x^3 – 15x^2 – 10x$

$- 3x^2 – 9x – 6$

$- 3x^2 – 9x – 6$

0

$f(x)=2x^4+x^3–14x^2–19x–6$
$f(x) = 2x^4 + x^3 – 14x^2 – 19x – 6$ $= (2x^2–5x–3)(x^2+3x+2)$
$(2x^2 – 5x – 3)(x^2 + 3x + 2)$

= (2x + 1)(x – 3)(x + 2)(x + 1)

Therefore, zeroes of the polynomial = −12 $\frac{-1}{2}$, 3, -2 , -1

Q-4: Obtain all zeroes of f(x) = $f(x)=x^3+13x^2+32x+20$
$f(x) = x^3 + 13x^2 + 32x + 20$ **, if one of its zeroes is -2.**

Solution:

f(x) = $f(x)=x^3+13x^2+32x+20$ $f(x) = x^3 + 13x^2 + 32x + 20$

Since, the zero of the polynomial is -2 so, it means its factor is (x + 2).

	$x^2 + 11x + 10$
$x + 2$	$x^3 + 13x^2 + 32x + 20$
	$x^3 + 2x^2$
	$11x^2 + 32x + 20$
	$11x^2 + 22x$
	$10x + 20$
	$10x + 20$
	0

So, $f(x)=x^3+13x^2+32x+20$
$f(x) = x^3 + 13x^2 + 32x + 20$ $= (x^2+11x+10)(x+2)$
$(x^2 + 11x + 10)(x + 2)$

$= (x^2+10x+x+10)(x+2)(x^2 + 10x + x + 10)(x + 2)$

$= (x+10)(x+1)(x+2)(x + 10)(x + 1)(x + 2)$

Therefore, the zeroes of the polynomial are -1, -10, -2.

Q-5: Obtain all zeroes of the polynomial $f(x)=x^4-3x^3-x^2+9x-6$ $f(x) = x^4-3x^3-x^2+9x-6$, if the two of its zeroes are $-\sqrt{3}$ and $\sqrt{3}$ $-\sqrt{3}$ and $\sqrt{3}$.

Solution:

$f(x)=x^4-3x^3-x^2+9x-6$ $f(x) = x^4-3x^3-x^2+9x-6$

Since, two of the zeroes of polynomial are $-\sqrt{3}$ and $\sqrt{3}$ $-\sqrt{3}$ and $\sqrt{3}$ so, $(x+\sqrt{3})(x-\sqrt{3})(x + \sqrt{3})(x-\sqrt{3})$ $= x^2-3$
x^2-3

$$
\begin{array}{r|l}
 & x^2 - 3x + 2 \\
\hline
x^2 - 3 & x^4 - 3x^3 - x^2 + 9x - 6 \\
 & x^4 \quad - 3x^2 \\
\hline
 & -3x^3 + 2x^2 + 9x \\
 & -3x^3 \quad + 9x \\
\hline
 & 2x^2 - 6 \\
 & 2x^2 - 6 \\
\hline
 & 0
\end{array}
$$

So, $f(x)=x^4–3x^2–x^2+9x–6$ $f(x) = x^4 – 3x^2 – x^2 + 9x – 6$ $= (x^2–3)(x^2–3x+2)$ $(x^2–3)(x^2–3x+2)$

$= (x+\sqrt{3})(x–\sqrt{3})$ $(x+\sqrt{3})(x–\sqrt{3})$ $(x^2–2x–2+2)$ $(x^2–2x–2+2)$

$= (x+\sqrt{3})(x–\sqrt{3})$ $(x+\sqrt{3})(x–\sqrt{3})$ $(x–1)(x–2)$ $(x–1)(x–2)$

Therefore, the zeroes of the polynomial are $-\sqrt{3}, \sqrt{3}$ $–\sqrt{3}, \sqrt{3}$, 1, 2.

Q-6: Obtain all zeroes of the polynomial $f(x)=2x^4–2x^3–7x^2+x–1$ $f(x) = 2x^4 – 2x^3 – 7x^2 + x – 1$, if the two of its zeroes are $-\sqrt{32}$ and $\sqrt{32}$ $–\sqrt{\frac{3}{2}}$ and $\sqrt{\frac{3}{2}}$.

Solution:

$f(x)=2x^4–2x^3–7x^2+x–1$ $f(x) = 2x^4 – 2x^3 – 7x^2 + x – 1$

Since, $-\sqrt{32}$ and $\sqrt{32}$ $–\sqrt{\frac{3}{2}}$ and $\sqrt{\frac{3}{2}}$ are the zeroes of the polynomial, so the factors are

$(x–\sqrt{32})$ and $(x+\sqrt{32})$ $(x–\sqrt{\frac{3}{2}})$ and $(x+\sqrt{\frac{3}{2}})$

	$2x^2 - 2x - 4$
$x^2 - 3/2$	$2x^4 - 2x^3 - 7x^2 + 3x + 6$
	$2x^4 \quad - 3x^2$
	$- 2x^3 - 4x^2 + 3x + 6$
	$- 2x^3 \quad + 3x$
	$- 4x^2 + 6$
	$- 4x^2 + 6$
	0

So, $f(x)=2x^4-2x^3-7x^2+x-1$
$f(x) = 2x^4-2x^3-7x^2+x-1$ = $(x-\sqrt{32})(x+\sqrt{32})$
$(x-\sqrt{\frac{3}{2}})\ (x+\sqrt{\frac{3}{2}})$ $(2x^2-2x-4)(2x^2-2x-4)$

= $(x-\sqrt{32})(x+\sqrt{32})(x-\sqrt{\frac{3}{2}})\ (x+\sqrt{\frac{3}{2}})$ $(2x^2-4x+2x-4)$
$(2x^2-4x+2x-4)$

= $(x-\sqrt{32})(x+\sqrt{32})(x-\sqrt{\frac{3}{2}})\ (x+\sqrt{\frac{3}{2}})$ $(x+2)(x-2)$
$(x+2)(x-2)$

Therefore, the zeroes of the polynomial = x = -1, 2, $-\sqrt{32}$ and $\sqrt{32}$
$-\sqrt{\frac{3}{2}}$ and $\sqrt{\frac{3}{2}}$.

Q.7: Find all the zeroes of the polynomial $x^4+x^3-34x^2-4x+120$ $x^4+x^3-34x^2-4x+120$, if the two of its zeroes are 2 and -2.

Solution:

$x^4+x^3-34x^2-4x+120$ $x^4+x^3-34x^2-4x+120$

Since, the two zeroes of the polynomial given is 2 and -2

So, factors are (x + 2)(x – 2) = $x^2+2x-2x-4$
$x^2+2x-2x-4$ = x^2-4 x^2-4

$$
\begin{array}{r|l}
 & x^2 + x - 30 \\
\hline
x^2 - 4 & x^4 + x^3 - 34x^2 - 4x + 120 \\
 & x^4 \qquad - 4x^2 \\
\hline
 & \quad x^3 - 30x^2 - 4x + 120 \\
 & \quad x^3 \qquad - 4x \\
\hline
 & \qquad -30x^2 + 120 \\
 & \qquad -30x^2 + 120 \\
\hline
 & \qquad\qquad 0
\end{array}
$$

So, $x^4+x^3-34x^2-4x+120$ $x^4+x^3-34x^2-4x+120$ $= (x^2-4)(x^2+x-30)$ $(x^2-4)(x^2+x-30)$

$=(x-2)(x+2)(x^2+6x-5x-30)$ $(x-2)(x+2)(x^2+6x-5x-30)$

$= (x-2)(x+2)(x+6)(x-5)$ $(x-2)(x+2)(x+6)(x-5)$

Therefore, the zeroes of the polynomial = x = 2, -2, -6, 5

Q-8: Find all the zeroes of the polynomial $2x^4+7x^3-19x^2$ $2x^4+7x^3-19x^2$ – 14x + 30, if the two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$ $\sqrt{2}$ and $-\sqrt{2}$.

Solution:

$2x^4+7x^3-19x^2-14x+30$ $2x^4+7x^3-19x^2-14x+30$

Since, $\sqrt{2}$ and $-\sqrt{2}$ $\sqrt{2}$ and $-\sqrt{2}$ are the zeroes of the polynomial given.

So, factors are $(x+\sqrt{2})$ and $(x-\sqrt{2})$ $(x+\sqrt{2})$ and $(x-\sqrt{2})$ $= x^2+\sqrt{2}x-\sqrt{2}x-2$ $x^2+\sqrt{2}x-\sqrt{2}x-2$ $= x^2-2$ x^2-2

$$
\begin{array}{r|l}
 & 2x^2 + 7x - 15 \\
\hline
x^2 - 2 & 2x^4 + 7x^3 - 19x^2 - 14x + 30 \\
 & 2x^4 \quad\quad - 4x^2 \\
\hline
 & \quad 7x^3 - 15x^2 - 14x + 30 \\
 & \quad 7x^3 \quad\quad - 14x \\
\hline
 & \quad\quad - 15x^2 + 30 \\
 & \quad\quad - 15x^2 + 30 \\
\hline
 & \quad\quad\quad 0
\end{array}
$$

So, $2x^4+7x^3-19x^2-14x+30$ $2x^4 + 7x^3 - 19x^2 - 14x + 30$ $= (x^2-2)(2x^2+7x-15)$ $(x^2-2)(2x^2+7x-15)$

$= (2x^2+10x-3x-15)(x+\sqrt{2})(x-\sqrt{2})$
$(2x^2+10x-3x-15)(x+\sqrt{2})(x-\sqrt{2})$

$= (2x-3)(x+5)(x+\sqrt{2})(x-\sqrt{2})$
$(2x-3)(x+5)(x+\sqrt{2})(x-\sqrt{2})$

Therefore, the zeroes of the polynomial is $\sqrt{2}, -\sqrt{2}, -5,$ 32 $\sqrt{2}, -\sqrt{2}, -5, \frac{3}{2}$.

Q-9: Find all the zeroes of the polynomial $f(x)=2x^3+x^2-6x-3$ $f(x) = 2x^3 + x^2 - 6x - 3$ ***, if two of its zeroes are*** $-\sqrt{3}$ ***and*** $\sqrt{3}$ $-\sqrt{3}$ and $\sqrt{3}$ ***.***

Solution:

$f(x)=2x^3+x^2-6x-3$ $f(x) = 2x^3 + x^2 - 6x - 3$

Since, $-\sqrt{3}$ and $\sqrt{3}$ $-\sqrt{3}$ and $\sqrt{3}$ are the zeroes of the given polynomial

So, factors are $(x-\sqrt{3})$ and $(x+\sqrt{3})$ $(x-\sqrt{3})$ and $(x+\sqrt{3})$ $= (x^2-\sqrt{3}x+\sqrt{3}x-3)$ $(x^2-\sqrt{3}x+\sqrt{3}x-3)$ $= (x^2-3)$$(x^2-3)$

So, $f(x)=2x^3+x^2–6x–3$ $f(x) = 2x^3 + x^2 – 6x – 3$ $= (x^2–3)(2x+1)$ $(x^2 – 3)(2x + 1)$

$= (x–\sqrt{3})(x+\sqrt{3})(2x+1)$ $(x – \sqrt{3})(x + \sqrt{3})(2x + 1)$

Therefore, set of zeroes for the given polynomial = $\sqrt{3}, –\sqrt{3}, –12$ $\sqrt{3}, –\sqrt{3}, \frac{–1}{2}$

Q-10: Find all the zeroes of the polynomial $f(x)=x^3+3x^2–2x–6$ $f(x) = x^3 + 3x^2 – 2x – 6$, if the two of its zeroes are $\sqrt{2}$ and $–\sqrt{2}$ $\sqrt{2}$ and $–\sqrt{2}$.

Solution:

$f(x)=x^3+3x^2–2x–6$ $f(x) = x^3 + 3x^2 – 2x – 6$

Since, $\sqrt{2}$ and $–\sqrt{2}$ $\sqrt{2}$ and $–\sqrt{2}$ are the two zeroes of the given polynomial.

So, factors are $(x+\sqrt{2})$ and $(x–\sqrt{2})$ $(x + \sqrt{2})$ and $(x – \sqrt{2})$ $= x^2+\sqrt{2}x–\sqrt{2}x–2$ $x^2 + \sqrt{2}x – \sqrt{2}x – 2$ $= x^2–2$ $x^2 – 2$

	$x + 3$
$x^2 – 2$	$x^3 + 3x^2 – 2x – 6$
	$x^3 \quad – 2x$
	$3x^2 \quad – 6$
	$3x^2 \quad – 6$
	0

By division algorithm, we have:

$f(x)=x^3+3x^2–2x–6$ $f(x) = x^3 + 3x^2 – 2x – 6$ $= (x^2–2)(x+3)$ $(x^2 – 2)(x + 3)$

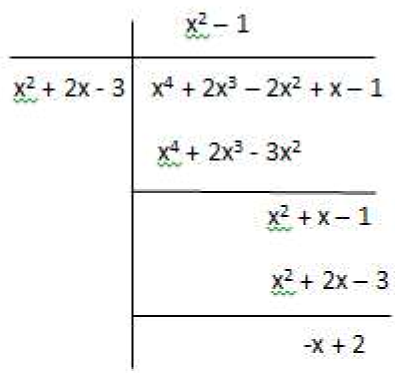
$= (x–\sqrt{2})(x+\sqrt{2})(x+3)$ $(x – \sqrt{2})(x + \sqrt{2})(x + 3)$

Therefore, the zeroes of the given polynomial is $-\sqrt{2}, \sqrt{2}$ and -3 $-\sqrt{2}, \sqrt{2}$ and -3 .

Q-11: What must be added to the polynomial $f(x)=x^4+2x^3–2x^2+x-1$ $f(x) = x^4 + 2x^3 – 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $g(x)=x^2+2x-3$ $g(x) = x^2 + 2x - 3$.

Sol:

$f(x)=x^4+2x^3–2x^2+x-1$ $f(x) = x^4 + 2x^3 – 2x^2 + x - 1$



We must add (x – 2) in order to get the resulting polynomial exactly divisible by $g(x)=x^2+2x-3$ $g(x) = x^2 + 2x - 3$.

Q-12: What must be subtracted from the polynomial $f(x)=x^4+2x^3–13x^2–12x+21$ $f(x) = x^4 + 2x^3 – 13x^2 – 12x + 21$ so that the resulting polynomial is exactly divisible by $g(x)=x^2–4x+3$ $g(x) = x^2 – 4x + 3$.

Sol:

$f(x)=x^4+2x^3-13x^2-12x+21$

$f(x) = x^4 + 2x^3 - 13x^2 - 12x + 21$

$$
\begin{array}{r|l}
 & x^2 - 6x + 8 \\
\hline
x^2 - 4x + 3 & x^4 + 2x^3 - 13x^2 - 12x + 21 \\
 & x^4 - 4x^3 + 3x^2 \\
\hline
 & +6x^3 - 16x^2 - 12x + 21 \\
 & 2x^3 - 24x^2 - 18x \\
\hline
 & 8x^2 - 30x + 21 \\
 & 8x^2 - 32x + 24 \\
\hline
 & 2x - 3
\end{array}
$$

We must subtract (2x – 3) in order to get the resulting polynomial exactly divisible by $g(x)=x^2-4x+3$ $g(x) = x^2 - 4x + 3$.

Q-13: Given that $\sqrt{2}$ $\sqrt{2}$ ***is a zero of the cubic polynomial*** $f(x)=6x^3+\sqrt{2}x^2-10x-4\sqrt{2}$ $f(x) = 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$ ***, find its other two zeroes.***

Solution:

$f(x)=6x^3+\sqrt{2}x^2-10x-4\sqrt{2}$ $f(x) = 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$

Since, $\sqrt{2}$ $\sqrt{2}$ is a zero of the cubic polynomial

So, factor is $(x-\sqrt{2})$ $(x-\sqrt{2})$

$$
\begin{array}{r|l}
 & 6x^2 + 7\sqrt{2}x + 4 \\
\hline
x - \sqrt{2} & 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2} \\
 & 6x^3 - 6\sqrt{2}x^2 \\
\hline
 & 7\sqrt{2}x^2 - 10x - 4\sqrt{2} \\
 & 7\sqrt{2}x^2 - 14x \\
\hline
 & 4x - 4\sqrt{2} \\
 & 4x - 4\sqrt{2} \\
\hline
 & 0
\end{array}
$$

Since, $f(x)=6x^3+\sqrt{2}x^2-10x-4\sqrt{2}$
$f(x) = 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$ $= (x-\sqrt{2})(6x^2+7\sqrt{2}x+4)$
$(x-\sqrt{2})(6x^2 + 7\sqrt{2}x + 4)$

$= (x-\sqrt{2})(6x^2+4\sqrt{2}x+3\sqrt{2}x+4)$
$(x-\sqrt{2})(6x^2 + 4\sqrt{2}x + 3\sqrt{2}x + 4)$

$= (x-\sqrt{2})(3x+2\sqrt{2})(2x+\sqrt{2})$$(x-\sqrt{2})(3x + 2\sqrt{2})(2x + \sqrt{2})$

So, the zeroes of the polynomial is $-2\sqrt{2}3, -\sqrt{2}2, \sqrt{2}$
$-\frac{2\sqrt{2}}{3}, -\frac{\sqrt{2}}{2}, \sqrt{2}$

Q-14: Given that $x-\sqrt{5}$$x-\sqrt{5}$ is a factor of the cubic polynomial $x^3-3\sqrt{5}x^2+13x-3\sqrt{5}$$x^3-3\sqrt{5}x^2+13x-3\sqrt{5}$, find all the zeroes of the polynomial.

Solution:

$x^3-3\sqrt{5}x^2+13x-3\sqrt{5}$$x^3-3\sqrt{5}x^2+13x-3\sqrt{5}$

In the question, it's given that $x-\sqrt{5}$$x-\sqrt{5}$ is a factor of the cubic polynomial.

Since, $x^3-3\sqrt{5}x^2+13x-3\sqrt{5}$ $x^3-3\sqrt{5}x^2+13x-3\sqrt{5}$ $=(x-\sqrt{5})(x^2-2\sqrt{5}x+3)$ $(x-\sqrt{5})(x^2-2\sqrt{5}x+3)$

$=(x-\sqrt{5})(x-(\sqrt{5}+\sqrt{2}))(x-(\sqrt{5}-\sqrt{2}))$

$(x-\sqrt{5})(x-(\sqrt{5}+\sqrt{2}))(x-(\sqrt{5}-\sqrt{2}))$

So, the zeroes of the polynomial = $\sqrt{5},(\sqrt{5}-\sqrt{2}),(\sqrt{5}+\sqrt{2})$

$\sqrt{5},\ (\sqrt{5}-\sqrt{2}),\ (\sqrt{5}+\sqrt{2})$.