

Unit 4

Ex: 4.4

Q1

i) $H.C.F = x^2 + 2x$

ii) $H.C.F = x^2 + 2x$

iii) $H.C.F = x^2 + 2x$

iv) $H.C.F = \cancel{2x} 5(x^2 + 2x)$

v) $x(x^3 + 5x^2 + 6x)$ and $x(x^3 + 9x^2 + 14x)$

$H.C.F = (x^2 + 2x)$ so Taking x common

so $H.C.F = x(x^2 + 2x)$ Ans.

Find the LCM of the following monomials by completing the table.

Monomials	LCM of numerical coefficients	LCM of 'x'	LCM of 'y'	LCM of 'z'	Required LCM
(i) $8x^6y, 4x^2yz$	8	x^6	y	z	$8x^6yz$
(ii) $12x^2y^4z, 24x^3z$	24	x^3	y^4	z	$24x^3y^4z$
(iii) $18x^3z, 9xy^2z, 6x^6yz^3$	18	x^6	y^2	z^3	$18x^6y^2z^3$
(iv) $xyz^3, z^5y^3x, 28x^3y^5z$	28	x^3	y^5	z^5	$28x^3y^5z^5$

the HCF of the following by division method.

$a^2 + a - 2, a^3 + 2a^2 + a + 2$

$2x^3 + x^2 - x - 2, 3x^3 - x^2 + x - 3$

$24x^4 - 2x^3 - 60x^2 - 32x, 18x^4 - 6x^3 - 39x^2 - 18x$

$2x^3 + 6x^2 + x + 3, 3x^3 + 9x^2 - 2x - 6, x^3 + 3x^2 + 2x + 6$

the LCM of the following expressions.

$9a^2b - b, 6a^2 + 2a$

$4x^2v - y, 2x^2 + x$

4. $x^3 + 2x^2 - 4x - 8, 2x^3 + 7x^2 + 4x - 4$

6. $3 + 2p^4 + 5p^2, 5p + 5p^3 + 3 + 3p^2$

10. $p^3q - pq^3, p^5q^2 - p^2q^5$

12. $x^2 - x - 6, x^2 + x - 2, x^2 - 4x + 3$

14. $x^3 + 2x^2 - x - 2, x^2 - x - 2, x^2 - 4$

$$\begin{array}{r} 210 \quad 24 \\ 2 \overline{) 420} \\ 420 \\ \hline 0 \end{array}$$

Q3

$$a^2+a-2, a^3+2a^2+a+2$$

$$a^2+a-2 \sqrt{a^3+2a^2+a+2}$$

$$\begin{array}{r} a+1 \\ a^2+a-2 \sqrt{a^3+2a^2+a+2} \\ \underline{+a^3+a^2-2a} \\ \end{array}$$

$$\begin{array}{r} a^2+3a+2 \\ \underline{+a^2+a-2} \\ \end{array}$$

$$2a+4$$

$$2(a+2)$$

$$\begin{array}{r} a+1 \\ a+2 \sqrt{a^2+a-2} \\ \underline{+a^2+2a} \end{array}$$

$$\begin{array}{r} -a-2 \\ \underline{+a+2} \\ \end{array}$$

$$a+2$$

$$H.C.F = a+2$$

iv) $x^3 + 2x^2 - 4x - 8, 2x^3 + 7x^2 + 4x - 4$

$$\begin{array}{r} x^3 + 2x^2 - 4x - 8 \sqrt{2x^3 + 7x^2 + 4x - 4} \\ - 2x^3 + 4x^2 - 8x + 16 \\ \hline \end{array}$$

$$\begin{array}{r} 3x^2 + 12x + 12 \\ 3(x^2 + 4x + 4) \sqrt{x^3 + 2x^2 - 4x - 8} \\ x^3 + 4x^2 + 4x \\ \hline \end{array}$$

$$\begin{array}{r} -2x^2 - 8x - 8 \\ -2x^2 - 8x - 8 \\ \hline \end{array}$$

H.C.F. = $x^2 + 4x + 4$

v) $2x^3 + x^2 - x - 2, 3x^3 - x^2 + x - 3$

$$\begin{array}{r} 2x^3 + x^2 - x - 2 \sqrt{3x^3 - x^2 + x - 3} \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ 6x^3 - 2x^2 + x - 6 \\ + 6x^3 + 3x^2 - 3x + 6 \\ \hline \end{array}$$

$$\begin{array}{r} -5x^2 + 5x \\ -5x(x - 1) \end{array}$$

$$\begin{array}{r} 2x^2 + 3x + 2 \\ x - 1 \sqrt{2x^3 + x^2 - x - 2} \\ \hline \end{array}$$

$$\begin{array}{r} + 2x^3 - 2x^2 \\ \hline \end{array}$$

$$3x^2 - x - 2$$

$$\begin{array}{r} + 3x^2 - 3x \\ \hline \end{array}$$

$$2x - 7$$

$$\begin{array}{r} + 2x - 2 \\ \hline \end{array}$$

$$x$$

H.C.F. = $x - 1$ Ans

vi) $3+2p^4+5p^2, 5p+5p^3+3+3p^2$

$3+2p^4+5p^2+3, 5p^3+3p^2+5p+3$

$2p^4+5p^2+3 \sqrt{5p^3+3p^2+5p+3}$

$$\begin{array}{r} 2p \\ 5p^3+3p^2+5p+3 \sqrt{2p^4+5p^2+3} \\ \times 5 \end{array}$$

$$\begin{array}{r} 10p^4+25p^2+15 \\ -10p^4+10p^2+6p^3+6p \\ -6p^3+15p^2-6p+15 \\ -3(2p^3-5p^2+2p-5) \end{array}$$

$$\begin{array}{r} 5 \\ 2p^3-5p^2+2p-5 \sqrt{5p^3+3p^2+5p+3} \end{array}$$

$$\begin{array}{r} \times 2 \\ 10p^3+6p^2+10p+6 \\ -10p^3-25p^2+10p-25 \end{array}$$

$$31p^2+31$$

$$\begin{array}{r} 2p+2p-5 \quad 31(p^2+1) \\ p^2+1 \sqrt{2p^3-5p^2+2p-5} \end{array}$$

$$\begin{array}{r} +2p^3+2p \\ -2p^3-5p^2-5p-5 \end{array}$$

$$-5p^2-5$$

~~$$5(p^2+1)$$~~

$$-5p^2-5$$

$$H.C.F = p^2+1$$

x

vii)

$$24x^4 - 2x^3 - 60x^2 - 32x, 18x^4 - 6x^3 - 39x^2 - 18x, 2x(12x^3 - x^2 - 30x - 16), 3x(6x^3 - 2x^2 - 13x - 6)$$

$$\begin{array}{r} 2 \\ 6x^3 - 2x^2 - 13x - 6 \sqrt{12x^3 - x^2 - 30x - 16} \\ \underline{+ 12x^3 - 4x^2 - 26x - 12} \\ 3x^2 - 4x - 4 \end{array}$$

$$\begin{array}{r} 2x+2 \\ 3x^2 - 4x - 4 \sqrt{6x^3 - 2x^2 - 13x - 6} \\ \underline{+ 6x^3 - 8x^2 - 8x - 6} \\ 6x^2 - 5x - 6 \\ \underline{+ 6x^2 - 8x - 8} \\ 13x + 2 \end{array}$$

$$\begin{array}{r} x-2 \\ 3x+2 \sqrt{3x^2 - 4x - 4} \\ \underline{+ 3x^2 + 2x - 6} \\ -6x - 4 \\ \underline{+ 6x + 4} \\ 0 \end{array}$$

X

$$\text{H.C.F} = x(3x+2) \text{ or } 3x^2 + 2x$$

viii)

$$2x^3 + 6x^2 + x + 3, 3x^3 + 9x^2 - 2x - 6, x^3 + 3x^2 + 2x + 6$$

$$\begin{array}{r} x^3 + 3x^2 + 2x + 6 \sqrt{3x^3 + 9x^2 - 2x - 6} \\ \underline{+ 3x^3 + 9x^2 + 6x + 18} \end{array}$$

$$-8x - 24$$

$$-8(x+3)$$

$$\begin{array}{r} x^2 + 2x + 6 \sqrt{x^3 + 3x^2 + 2x + 6} \\ \underline{+ x^3 + 3x^2} \end{array}$$

$$2x + 6$$

$$\underline{+ 2x + 6}$$

$$X$$

Now

$$\begin{array}{r} x^3 + 3x^2 + 2x + 6 \sqrt{2x^3 + 6x^2 + x + 3} \\ \underline{+ 2x^3 + 6x^2} \\ + x + 3 \\ \underline{+ x + 3} \\ X \end{array}$$

$$H.C.F = (x+3) \text{ Ans.}$$

Find the "LCM" of the following expression.

$$\begin{aligned} \text{9) } & 9a^2b - b, 6a^2 + 2a \\ & = b(9a^2 - 1), 2a(3a + 1) \\ & = b[(3a)^2 - (1)^2], \\ & = b[(3a - 1)(3a + 1)], \end{aligned}$$

$$\text{LCM} = 2ab(3a + 1)(3a - 1)$$

$$\text{LCM} = 2ab(3a^2 - 1^2)$$

$$\text{LCM} = 2ab(9a^2 - 1) \text{ Ans.}$$

$$\text{10) } p^3q - pq^3, p^5q^2 - p^2q^5$$

$$pq(p^2 - q^2), p^2q^2(p^3 - q^3)$$

$$pq[(p)^2 - (q)^2], p^2q^2(p - q)(p^2 + pq + q^2)$$

$$pq[(p + q)(p - q)],$$

$$\text{L.C.M} = p^2q^2(p - q)(p + q)(p^2 + pq + q^2)$$

$$\text{L.C.M} = p^2q^2(p + q)(p^3 - q^3) \text{ Ans.}$$

11

$$\begin{aligned}
 &4x^2y - y, 2x^2 + x \\
 &y(4x^2 - 1), x(2x + 1) \\
 &y[(2x)^2 - (1)^2], x(2x + 1) \\
 &y[(2x + 1)(2x - 1)], \\
 &\text{L.C.M} = xy(2x + 1)(2x - 1) \\
 &\text{L.C.M} = xy[(2x)^2 - (1)^2] \\
 &\text{L.C.M} = xy(4x^2 - 1) \text{ Ans.}
 \end{aligned}$$

$$1 \times 6 = 6$$

$$3 \times 2 = 6$$

$$7 - 2 = 5$$

$$1 \times 2 = 2$$

$$2 - 1 = 1$$

$$1 \times 3 = 3$$

$$3 \times 1 = 3$$

12

$$\begin{aligned}
 &x^2 - x - 6, x^2 + x - 2, x^2 - 4x + 3 \\
 &x^2 - 3x + 2x - 6, x^2 + 2x - 1x - 2, x^2 - 3x - 1x + 3 \\
 &x(x - 3) + 2(x - 3), x(x + 2) - 1(x + 2), x(x - 3) - 1(x - 3) \\
 &(x - 3)(x + 2), (x + 2)(x - 1), (x - 3)(x - 1) \\
 &\text{L.C.M} = (x - 3)(x + 2)(x - 1) \text{ Ans.}
 \end{aligned}$$

13

$$\begin{aligned}
 &m^6 - 1, m^4 - 1, m^2 - 1 \\
 &= (m^3)^2 - (1^2) \\
 &= (m^3 + 1)(m^3 - 1) \\
 &= [(m)^3 + (1)^3][(m)^3 - (1)^3] \\
 &= (a^3 + b^3)(a^3 - b^3) \\
 &= (m + 1)[(m)^2 - (m)(1) + (1)^2](m - 1)[(m)^2 + (m)(1) + (1)^2] \\
 &= (m + 1)(m^2 - m + 1)(m - 1)(m^2 + m + 1) \text{ --- eq (i)} \\
 &m^4 - 1
 \end{aligned}$$

$$(m^2)^2 - (1)^2$$

$$(m^2 + 1)(m^2 - 1)$$

$$(m^2 + 1)(m^2 - 1)$$

$$(m^2 + 1)[(m)^2 - (1)^2]$$

$$(m^2 + 1)(m + 1)(m - 1) \text{ --- eq ii}$$

$$m^6 - 1$$

$$(m^3)^2 - (1)^2$$

$$m^3 - 1$$

$$(m)^3 - (1)^3$$

$$(m^3 + 1)(m^3 - 1) \quad (m-1)[(m)^2 + (m)(1) + (1)^2]$$

$$(m-1)[m^2 + m + 1]$$

$$L.C.M = (m+1)(m-1)(m^2+m+1)(m^2+m+1)(m^2+1)$$

$$L.C.M = [(m)^3 + (1)^3] [(m)^3 - (1)^3] (m^2+1)$$

$$L.C.M = (m^3+1)(m^3-1)(m^2+1) \quad \therefore (a+b)(a-b) = a^2 - b^2$$

$$L.C.M = [(m^3)^2 - (1)^2] (m^2+1)$$

$$L.C.M = (m^6 - 1)(m^2+1) \text{ Ans}$$

$$\begin{array}{l} 2 \times 1 = 2 \\ 2 - 2 = 0 \end{array}$$

①4 $x^3 + 2x^2 - x - 2, x^2 - x - 2, x^2 - 4$

$$= x^2(x+2) - 1(x+2), x^2 - x - 2, x^2 - 4$$

$$= (x+2)(x^2-1), x^2 - 2x + 1x - 2, (x)^2 - (2)^2$$

$$(x+2)[(x)^2 - (1)^2], x(x-2) + 1(x-2), (x+2)(x-2)$$

$$(x+2)(x+1)(x-1), (x-2)(x+1),$$

$$L.C.M = (x+2)(x-2)(x+1)(x-1)$$

$$L.C.M = [(x)^2 - (2)^2] [(x)^2 - (1)^2]$$

$$L.C.M = [x^2 - 4] [x^2 - 1]$$

$$L.C.M = [x^4 - 5x^2 + 4] \text{ Ans}$$

5

$$x^2 + x - 20, x^2 - 10x + 24, x^2 - x - 30$$

$$1 \times 20 = 20$$

$$1 \times 24 = 24$$

$$x^2 + 5x - 4x - 20 \quad | \quad x^2 - 6x - 4x + 24 \quad | \quad x^2 - 6x + 5x - 30$$

$$x(x+5) - 4(x+5) \quad | \quad x(x-6) - 4(x-6) \quad | \quad x(x-6) + 5(x-6)$$

$$(x+5)(x-4) \quad | \quad (x-6)(x-4) \quad | \quad (x-6)(x+5)$$

$$L. [M = (x-6)(x+5)(x-4) \text{ Ans.}]$$