

5-9-2024

Unit 4

Ex 4.5

Q1

i) $16-4x^2, x^2+x-6$

$$\begin{array}{l|l} = 4(4-x^2) & x^2+3x-2x-6 \\ = 4[(2)^2-(x)^2] & x(x+3)-2(x+3) \\ = 4(2+x)(2-x) & (x+3)(x-2) \end{array}$$

H.C.F = $(x-2)$

L.C.M = $4(2+x)(2-x)(x+3)$

L.C.M = $4[(2)^2-(x)^2](x+3)$

L.C.M = $4(4-x^2)(x+3)$ Ans.

ii) a^4-a^3-a+1, a^4+a^2+1

$$\begin{array}{l|l} a^3(a-1)-1(a-1) & a^4+a^2+1 \\ (a-1)(a^3-1) & (a^2)^2+(1)^2+2(a^2)(1)-2(a^2)(1)+a^2 \\ (a-1)(a^3-1)^3 & (a^2+1)^2-a^2 \\ (a-1)(a-1)(a^2+a)(1)+(1)^2 & (a^2+1)^2-(a^2) \\ (a-1)(a-1)(a^2+a+1) & (a^2+1-a)(a^2+1+a) \end{array}$$

H.C.F = (a^2+a+1)

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

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

L.C.M = $(a^3-1)(a+1)(a-1)(a^2+1-a)$ Ans.

iii) $x^3+2x^2-3x, 2x^3+5x^2-3x$

$$\begin{array}{l|l} x(x^2+2x-3) & x(2x^2+5x-3) \\ x(x^2+3x-4x-3) & x(2x^2+6x-4x-3) \\ x[x(x+3)-1(x+3)] & x[2x(x+3)-1(x+3)] \\ x[(x+3)(x-1)] & x[(x+3)(2x-1)] \\ x(x+3)(x-1) & x(x+3)(2x-1) \end{array}$$

H.C.F = $x(x+3)$

L.C.M = $x(x+3)(2x-1)(x+1)$ Ans.

Q2 $HCF = x-7$, $LCM = x^3 - 10x^2 + 11x + 70$

Product of two polynomials = $HCF \times LCM$
 $= (x-7)(x^3 - 10x^2 + 11x + 70)$
 $= x^4 - 10x^3 + 11x^2 + 70x - 7x^3 + 70x^2 - 77x + 490$
 $= x^4 - 17x^3 + 81x^2 - 7x + 490$ Ans

Q3 Product of two polynomials is $x^4 + 3x^3 - 12x^2 - 20x + 48$

Let $P \times Q = x^4 + 3x^3 - 12x^2 - 20x + 48$

$H.C.F = x-2$ and $L.C.M = 7$

∴ $HCF \times LCM = P \times Q \rightarrow$ formula

$LCM = \frac{P \times Q}{HCF}$

$L.C.M = \frac{x^4 + 3x^3 - 12x^2 - 20x + 48}{x-2}$

$$\begin{array}{r} x^3 + 5x^2 - 2x - 24 \\ x-2 \overline{) x^4 + 3x^3 - 12x^2 - 20x + 48} \\ \underline{+x^4 - 2x^3} \\ 5x^3 - 12x^2 - 20x + 48 \end{array}$$

$$\begin{array}{r} 5x^3 - 12x^2 - 20x + 48 \\ \underline{+5x^3 - 10x^2} \\ -2x^2 - 20x + 48 \end{array}$$

$$\begin{array}{r} -2x^2 - 20x + 48 \\ \underline{+2x^2 + 4x} \\ -16x + 48 \end{array}$$

$$\begin{array}{r} -16x + 48 \\ \underline{+16x + 32} \\ 80 \end{array}$$

X

$L.C.M = x^3 + 5x^2 - 2x - 24$ Ans.

Q4 The product of two polynomials is $y^4 + 6y^3 - 3y^2 - 56y - 48$ and their LCM is $y^3 + 2y^2 - 11y - 12$. Find the HCF.

Let $= y^4 + 6y^3 - 3y^2 - 56y - 48$ HCF = ? LCM = $y^3 + 2y^2 - 11y - 12$

$$\text{HCF} \times \text{LCM} = \text{P} \times \text{Q}$$

$$\text{HCF} = \frac{\text{P} \times \text{Q}}{\text{LCM}}$$

$$\text{HCF} = \frac{y^4 + 6y^3 - 3y^2 - 56y - 48}{y^3 + 2y^2 - 11y - 12}$$

$$\begin{array}{r} \text{HCF} \quad y^3 + 2y^2 - 11y - 12 \quad \overline{) \quad y^4 + 6y^3 - 3y^2 - 56y - 48} \\ \underline{y^4 + 2y^3 + 11y^2 - 12y} \\ 4y^3 + 8y^2 - 44y - 48 \\ \underline{+ 4y^3 + 8y^2 - 44y - 48} \\ 0 \end{array}$$

HCF = $y + 4$ Ans

Q5 First polynomial = $x^4 + x^3 + x + 1$, HCF = $x + 1$ LCM = $(x^3 + 1)(x^4 + x^3 - x - 1)$
Second polynomial = ?

$$\text{P} \times \text{Q} = \text{LCM} \times \text{HCF}$$

$$\text{Q} = \frac{\text{LCM} \times \text{HCF}}{\text{P} \times \text{Q}}$$

R.W
$x^4 + x^3 + x + 1$
$x^3(x+1) \cancel{1}(x+1)$
$(x+1)(x^3+1)$

$$\text{Q} = \frac{(x^3+1)(x^4+x^3-x-1)(x+1)}{(x^4+x^3+x+1)}$$

$$\text{Q} = (x^4 + x^3 - x - 1) \text{ Ans.}$$

$$\text{Q} = \frac{(x^3+1)(x^4+x^3-x-1)(x+1)}{(x+1)(x^3+1)}$$

Q6 LCM = ?

$P = 4x^3 - 10x^2 + 4x + 2$, $Q = 3x^4 - 2x^3 - 3x + 2$, $HCF = x - 1$

$HCF \times LCM = P \times Q$

$LCM = \frac{P \times Q}{HCF}$

HCF

$LCM = \frac{(4x^3 - 10x^2 + 4x + 2)(3x^4 - 2x^3 - 3x + 2)}{(x - 1)}$

$$= x - 1 \overline{) \begin{array}{r} 3x^3 + x^2 + x - 2 \\ 3x^4 - 2x^3 - 3x + 2 \\ \hline 3x^4 - 3x^3 \end{array}}$$

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

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

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

$LCM = (4x^3 - 10x^2 + 4x + 2)(3x^4 - 2x^3 - 3x + 2)$ Ans =