

Maths Part- I
3. Polynomial
Extra

- Write the degree of the given polynomials. (1 mark)

Q.1). $x^5 - 3x^4 - 2x + 7$

Ans:- $x^5 - 3x^4 - 2x + 7$. Degree of the polynomial is 5. In case of a polynomial in one variable, the highest power of the variable is called the degree of the polynomial.

Q.2). $5x^2y^2 - 13x^2y + 16x^3y^3 + 21y$

Ans- $5x^2y^2 - 13x^2y + 16x^3y^3 + 21y$, as sum of powers $2+2 = 4$, $2+1 = 3$, $3+3 = 6$, 1. Degree of polynomial is 6.

Q.3). $lmn - mn + n$

Ans:- Here, the sum of the powers of l , m and n in the term lmn is $1+1+1=3$, which is the highest sum of powers in the given polynomial.

Degree of the polynomial = 3.

Q.4). $\sqrt{7}$

Ans:- $\sqrt{7} = \sqrt{7}x^0$ [$\because x^0=1$] $\therefore$ Degree of polynomial = 0

- State whether the given algebraic expressions are polynomials? Justify. (1 mark)

Q.5). $y^3 + 5y^2 + 6y - 1$

Ans:- Here all the powers of y are whole numbers.

$\therefore y^3 + 5y^2 + 6y - 1$ is a polynomial.

Q.6). $6\sqrt{m} + 3$

Ans:- $6\sqrt{m} + 3$

$6m^{\frac{1}{2}} + 3$ Here the power of m is $\frac{1}{2}$, which is not a whole number.

$\therefore 6\sqrt{m} + 3$ is not a polynomial.

Q.7) $x + \frac{1}{2x}$

Ans:- $x + \frac{1}{2x} \rightarrow x + 2x^{-1}$

Here, power x in the term $2x^{-1}$ is -1 , which is not a whole number.

$\therefore x + \frac{1}{2x}$ is not a polynomial.

Q.8). 12

Ans:- $12 = 12x^0$ [$\because x^0 = 1$]

Here the power of x is a whole number.

$\therefore 12$ is a polynomial.

➤ Write the coefficient of x^7 in each of the given polynomial. (1 mark)

Q.9). $21x^7 - 15x + \frac{2}{3}$

Ans:- 21 is coefficient of x^7 .

Q.10). $4x^2 + 2x - \sqrt{5}x^7$

Ans:- $-\sqrt{5}$ is the coefficient of x^7

Q.11). x^7

Ans- $x^7 = 1 \times x^7 \therefore 1$ is the coefficient of x^7

➤ Write the following polynomials in the standard form. (1Mark)

Q.12) $x - 5x^3 + 5 + x^6$

Ans- $x - 5x^3 + 5 + x^6$

Standard form of polynomial :-

$$x^6 + 0x^5 + 0x^4 - 5x^3 + 0x^2 + x + 5$$

$$\therefore x^6 - 5x^3 + x + 5$$

Q.13) $-m^2 - \frac{1}{3} + 7m + 2m^5 + 4m^3$

Ans- $-m^2 - \frac{1}{3} + 7m + 2m^5 + 4m^3$

Standard form of polynomial:-

$$2m^5 + 0m^4 + 4m^3 - m^2 + 7m - \frac{1}{3}$$

$$\therefore 2m^5 + 4m^3 - m^2 + 7m - \frac{1}{3}$$

➤ Write the polynomial in y using the given information
(1 mark)

Q.14). Monomial with degree 9.

$$\text{Ans:- } 5y^9$$

Q.15) Binomial with degree 22.

$$\text{Ans:- } 8y^{22} + 3$$

Q.16) Trinomial with the degree 10.

$$\text{Ans:- } 4y^{10} + 2y^5 + 3y$$

➤ Write the following polynomials in coefficient form.
(2 mark)

$$\text{Q.17) } 5m^6 + 6m^3 - 4m + 8$$

$$\text{Ans:- } 5m^6 + 6m^3 - 4m + 8$$

Standard form-

$$5m^6 + 0m^5 + 0m^4 + 6m^3 + 0m^2 - 4m + 8$$

∴ Coefficient form of polynomials = (5,0,0,6,0,-4,8)

Q.18.) $x^4 - 3x + 1$

Ans:- $x^4 - 3x + 1$

Standard form $x^4 + 0x^3 + 0x^2 - 3x + 1$

∴ Coefficient form of polynomials = (1,0,0,-3,1)

➤ Write the polynomials in index form. (2 mark)

Q.19) (5,0,-2,1,0,-7)

Ans:- Number of coefficients =6

∴ Degree = 6 – 1 = 5

[∴ Numbers of power of polynomials =
degree of polynomial + 1]

∴ Index form = $5m^5 + 0m^4 - 2m^3 + m^2 + 0m - 7$

Q.20). (6,0,0,0,-3)

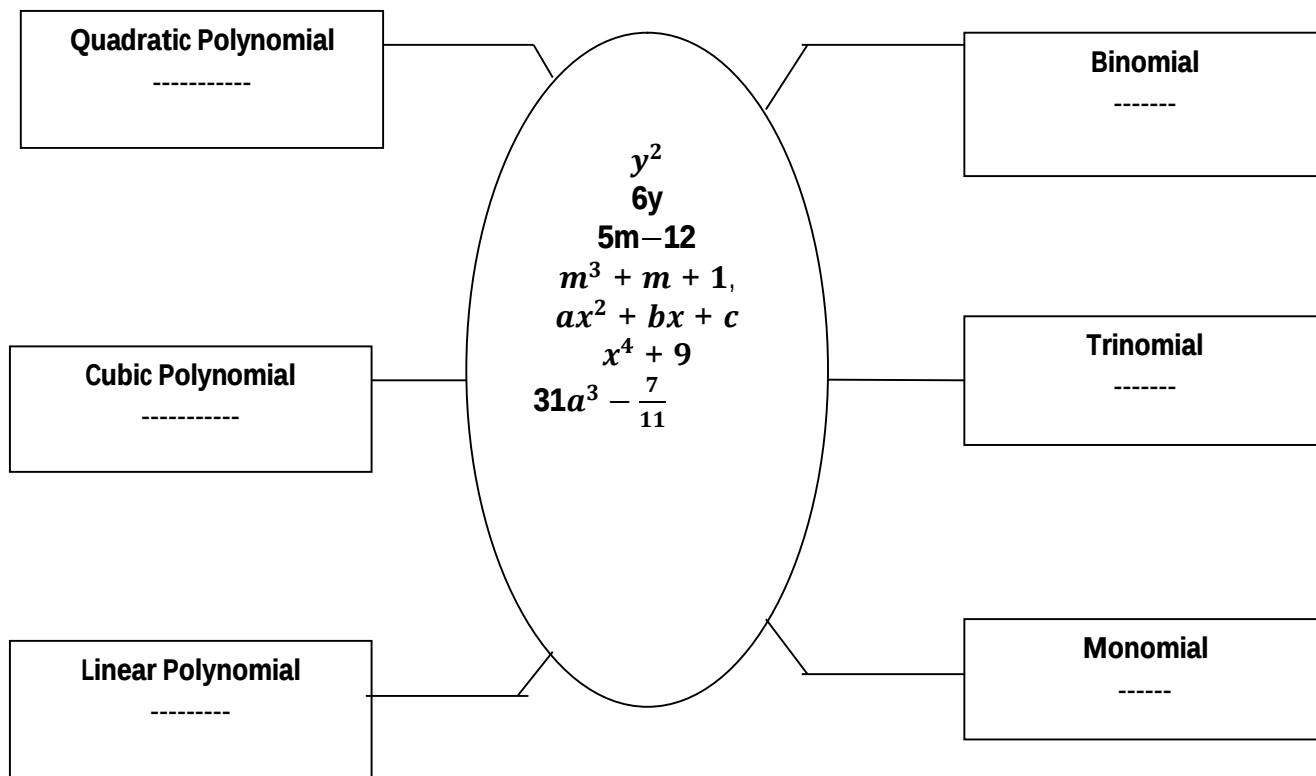
Ans:- Number of coefficient = 5

∴ Degree = 5 – 1 = 4

∴ Index form = $6m^4 + 0m^3 + 0m^2 + 0m - 3$

∴ $6m^4 - 3$

Q.21) Write the appropriate polynomials in the boxes. (4M)



- Ans-1. Quadratic Polynomial – $y^2, ax^2, bx + c$
2. Cubic Polynomial - $m^3 + m + 1, 31a^3 - \frac{7}{11}$
3. Linear Polynomial – $6y, 5m - 12, x^4 + 9, y^2$
4. Binomial – $5m - 12, 31a^3 - \frac{7}{11}, x^4 + 9$
5. Trinomial - $m^3 + m + 1, ax^2 + bx + c$
6. Monomial - $y^2, 6y, 5m - 12$

Add the given polynomials (3 mark)

Q.22) $5m + 11n + 35; 4m + 5n - 30$

Ans- $(5m + 11n + 35) + (4m + 5n - 30)$

$$= 5m + 11n + 35 + 4m + 5n - 30$$

$$= \underline{5m + 4m} + \underline{11n + 5n} + \underline{35 - 30}$$

.....(Like terms are arranged)

$$= 9m + 16n + 5 \text{ -----(Like terms are added)}$$

$$\text{Q.23) } xyz^2 - 2x^2yz - 4y^2zx; -6xyz^2 + 2x^2yz + 4y^2zx$$

$$\text{Ans- } (xyz^2 - 2x^2yz - 4y^2zx) + (6xyz^2 + 2x^2yz + 4y^2zx)$$

$$= xyz^2 - 2x^2yz - 4y^2zx - 6xyz^2 + 2x^2yz + 4y^2zx$$

$$= \underline{xyz^2 - 6xyz^2} - \underline{2x^2yz + 2x^2yz} - \underline{4y^2zx + 4y^2zx}$$

---- (like terms arranged)

$$= -5xyz^2 - 0 - 0 \text{ ----(like terms are added)}$$

$$= -5xyz^2$$

$$\text{Q.24). } \sqrt{3x} - \sqrt{2y} + 3; 3\sqrt{3x} + 2\sqrt{2y} + 4$$

$$\text{Ans- } (\sqrt{3x} - \sqrt{2y} + 3) + (3\sqrt{3x} + 2\sqrt{2y} + 4)$$

$$\sqrt{3x} - \sqrt{2y} + 3 + 3\sqrt{3x} + 2\sqrt{2y} + 4$$

$$= \underline{\sqrt{3x} + 3\sqrt{3x}} - \underline{\sqrt{2y} + 2\sqrt{2y}} + \underline{3 + 4}$$

----- (like terms are arranged)

$$= 4\sqrt{3x} - \sqrt{2y} + 7 \text{(like terms are added)}$$

➤ Subtract the second polynomial from the first . (3M)

$$\text{Q.25). } x^3 - 3x^2 + x + 1; 3x + 5$$

$$\text{Ans- } (x^3 - 3x^2 + x + 1) - (3x + 5)$$

$$= x^3 - 3x^2 + x + 1 - 3x - 5$$

$$= x^3 - 3x^2 + \underline{x - 3x} + \underline{1 - 5}$$

----- (like terms are arranged)

$$= x^3 - 3x^2 - 2x - 4$$

OR

$$x^3 + 3x^2 + 2x + 4 \dots \text{(Multiply by ' - ve ' sign)}$$

$$\text{Q.26) } 4xy + 5yz + 6zx; 6xy - 4yz + 5zx$$

$$\text{Ans- } (4xy + 5yz + 6zx) - (6xy - 4yz + 5zx)$$

$$= 4xy + 5yz + 6zx - 6xy + 4yz - 5zx$$

$$= \underline{4xy - 6xy} + \underline{5yz + 4yz} + \underline{6zx - 5zx}$$

----- (like terms are arranged)

$$= -2xy + 9yz + zx$$

➤ Multiply the given polynomials. (3 mark)

$$\text{Q.27) } (5a - 3) \times (6a^2 + a - 7)$$

$$\text{Ans- } (5a - 3) \times (6a^2 + a - 7)$$

$$= 5a(6a^2 + a - 7) - 3(6a^2 + a - 7)$$

(∵ Each term of the polynomials is multiplied by each term of the first polynomial)

$$= 5a \times 6a^2 + 5a \times a - 5a \times 7 - 3 \times 6a^2 - 3 \times a - 3 \times 7$$

$$= 30a^3 + 5a^2 - 35a - 18a^2 - 3a + 21$$

$$= 30a^3 + \underline{5a^2 - 18a^2} - \underline{35a - 3a} + 21$$

-- like terms taken together

$$= 30a^3 - 13a^2 - 38a + 21$$

$$\text{Q.28) } (2a^2 - 3a)(4a + 1)$$

$$\text{Ans- } (2a^2 - 3a) \times (4a + 1)$$

$$= 2a^2(4a + 1) - 3a(4a + 1)$$

$$= \underline{2a^2 \times 4a} + \underline{2a^2 \times 1} - \underline{3a \times 4a} - 3a \times 1$$

.... (Each term of the second polynomial is multiplied by each term of first polynomial)

$$= 8a^3 + \underline{2a^2 - 12a^2} - 3a = 8a^3 - 10a^2 - 3a$$

➤ Divide the first polynomial by second polynomial and write the answer in the form. (3 mark)

‘Dividend = Divisor $\times$ Quotient + Remainder

$$\text{Q.29) } y^3 - 2y^2 + 3y - 18 \div y - 3$$

Ans-

$$\begin{array}{r}
 y^2 + y - 6 \\
 y - 3 \overline{) y^3 - 2y^2 + 3y - 18} \\
 \underline{y^3 - 3y^2} \\
 + \\
 y^2 + 3y \\
 \underline{y - 3y} \\
 - \\
 6y - 18 \\
 \underline{6y - 18} \\
 - \\
 0
 \end{array}$$

$$P(y) = \text{Dividend} = y^3 - 2y^2 + 3y - 18$$

$$s(y) = \text{Quotient} = y^2 + y - 6$$

$$q(y) = \text{divisor} = y - 3$$

$$\text{Remainder} = 0 = r(y)$$

‘Dividend = Divisor $\times$ Quotient + Remainder

$$y^3 - 2y^2 + 3y - 18 = (y - 3)(y^2 + y - 6) + 0$$

$$P(y) = q(y) \times s(y) + r(y)$$

Q.30.) $4x + 2x^2 - 3 \div x + 1$

Ans- $4x + 2x^2 - 3 \rightarrow 2x^2 + 4x - 3$

$$\begin{array}{r}
 2x + 2 \\
 x + 1 \overline{) 2x^2 + 4x - 3} \\
 \underline{2x^2 + 2x} \\
 - x - 3 \\
 \underline{- x - 2} \\
 \phantom{- } - 1 \\
 \phantom{- } - 5
 \end{array}$$

$p(x) = \text{dividend} = 2x^2 + 4x - 3$

$s(x) = \text{quotient} = 2x + 2$

$q(x) = \text{divisor} = x + 1$

$r(x) = \text{remainder} = -5$

$\therefore \text{dividend} = \text{divisor} \times \text{quotient} + \text{remainder}$

$\therefore p(x) = q(x) \times s(x) + r(x)$

$\therefore 2x^2 + 4x - 3 = (x + 1) \times (2x + 2) + (-5)$

Q.31) If the sides of a triangle are $b - 3a + 2c$, $a + 3b - 3c$ and $2a - b + c$, then find its perimeter. (3 mark)

Ans- Perimeter of triangle = sum of three sides of triangles.

$\therefore \text{Perimeter of triangle} = (b - 3a + 2c) + (a + 3b - 3c) + (2a - b + c)$

$$\begin{aligned}
&= b - 3a + 2c + a + 3b - 3c + 2a - b + c \\
&= \underline{b + 3b - b} - \underline{3a + 2a + a} + \underline{2c - 3c + c} \\
&\quad \dots\dots \text{(like terms are arranged)} \\
&= 4b - b - a + a - c + c \\
&= 3b - 0 - 0 \\
&= 3b
\end{aligned}$$

$\therefore$ Perimeter of triangle = $3b$

Q.32) Factorize the following polynomial. (3 mark)

$$(x^2-x) - 8(x^2-x) + 12$$

Ans:

$$(x^2-x) - 8(x^2-x) + 12$$

$$\text{Let } x^2-x = m$$

$$\begin{aligned}
\therefore (x^2-x) - 8(x^2-x) + 12 &= m^2 - 8m + 12 \\
&= m^2 - 6m - 2m + 12 \\
&= m(m-6) - 2(m-6) \\
&= (m-6)(m-2)
\end{aligned}$$

Resubstituting the value of m we get

$$\begin{aligned}
(x^2-x) - 8(x^2-x) + 12 &= (x^2-x-6)(x^2-x-2) \\
&= (x^2-3x+2x-6)(x^2-2x+x-2) \\
&= [x(x-3)+2(x-3)][(x(x-2)+1(x-2))] \\
&= (x-3)(x+2)(x-2)(x+1)
\end{aligned}$$

➤ Divide each of the following polynomials by synthetic division method and also by linear division method.

Write the quotient and the remainder. (4 mark)

Q.33) $y^3 - 125 \div (y - 5)$

Ans- Synthetic division method-

Dividend = $y^3 - 125$

Divisor = $(y - 5) \therefore y = 5$ [$\because$ Comparing with $y - a \therefore a = 5$]

$y^3 - 125$

Standard form - $y^3 + 0y^2 + 0y - 125$

$\therefore$ Coefficient of this polynomial = $(1, 0, 0, -125)$

5	1	0	0	- 125
		5	25	125
	1	5	25	0

Coefficient form of quotient $(1, 5, 25)$

$\therefore$ Quotient = $y^2 + 5y + 25$, Remainder = 0

$\therefore y^3 - 125 = (y - 5)(y^2 + 5y + 25) + 0$

Linear division method –

$\therefore y^3 - 125$

$= y^2(y - 5) + 5y^2 - 125$

$$= y^2(y - 5) + 5y(y - 5) + 25y - 125$$

$$= y^2(y - 5) + 5y(y - 5) + 25(y - 5) + 125 - 125$$

$$= (y - 5) - y^2 + 5y + 25 + 0$$

$$\therefore \text{Quotient} = y^2 + 5y + 25, \text{Remainder} = 0$$

Q.34) Find the value of polynomials. (4 mark)

$$p(y) = y^3 - 5y - 2y^2 + 3 \text{ when, } y = 2, y = -2 \text{ and}$$

$$p(2) - p(-2) = ?$$

$$\text{Ans- Polynomial } p(y) = y^3 - 5y - 2y^2 + 3$$

Put $y=2$ in polynomial

$$\therefore p(2) = 2^3 - 5(2) - 2(2)^2 + 3$$

$$= 8 - 10 - 2 \times 4 + 3$$

$$= 8 - 10 - 8 + 3$$

$$= -10 + 3$$

$$\therefore p(2) = -7$$

Similarly, $y = -2$ in polynomial

$$\therefore p(-2) = (-2)^3 - 5(-2) - 2(-2)^2 + 3$$

$$= -8 + 10 - 2 \times 4 + 3$$

$$= -8 + 10 - 8 + 3$$

$$= -16 + 13$$

$$\therefore p(-2) = -3$$

$$\therefore p(2) = -7 \text{ and } p(-2) = -3$$

$$\text{Now, } p(2) - p(-2) = -7 - (-3) = -7 + 3 = -4$$

$$\therefore p(2) - p(-2) = -4$$

Q. 35) Find the value of the polynomials $2x^4 - x^3 + 3x^2 - 5$

When $x = 0, x = 1, x = -1$ and $x = -2$. Complete the following activity. (4 mark)

$$\therefore p(x) = 2x^4 - x^3 + 3x^2 - 5$$

Put $x = 0$

$$P(0) = \boxed{}$$

$$P(0) = -5,$$

Put $x=1$,

$$\therefore p(1) = 2(1)^4 - (1)^3 + 3(1)^2 - 5$$

$$= \boxed{}$$

$$= 1+3-5$$

$$= \boxed{}$$

$$\text{Put } x = \boxed{}$$

$$\therefore p(-1) = 2(-1)^4 - (-1)^3 + 3(-1)^2 - 5$$

$$= 2(1) - (-1) + 3(1) - 5$$

$$= \boxed{}$$

$$= 6 - 5$$

$$= \boxed{}$$

Put $x=-2$

$$P(\boxed{}) = \boxed{}$$

$$= 2 \times 16 - (-8) + 3 \times 4 - 5$$

$$= 32 + 8 + 12 - 5$$

$$= \boxed{}$$

$$= \boxed{}$$

$$\text{Ans- } \therefore p(x) = 2x^4 - x^3 + 3x^2 - 5$$

Put $x = 0$,

$$P(0) = \boxed{2(0)^4 - (0)^3 + 3(0)^3 - 5}$$

$$P(0) = -5,$$

Put $x=1$,

$$\therefore p(1) = 2(1)^4 - (1)^3 + 3(1)^2 - 5$$

$$= \boxed{2-1+3-5}$$

$$= 1+3-5$$

$$= \boxed{4-5}$$

$$\text{Put } x = \boxed{-1}$$

$$\therefore p(-1) = 2(-1)^4 - (-1)^3 + 3(-1)^2 - 5$$

$$= 2 \times 1 - (-1) + 3 - 5$$

$$= \boxed{2+1+3-5}$$

$$= 6 - 5$$

$$= \boxed{1}$$

Put $x=-2$

$$P(\boxed{-2}) = \boxed{2(-2)^4 - (-2)^3 + 3(-2)^2 - 5}$$

$$= 2 \times 16 - (-8) + 3 \times 4 - 5$$

$$= 32 + 8 + 12 - 5$$

52-5

$$= 47$$

Q.36) The value of polynomial $ax^2 + 5x + 6$ for $x = 1$ is 13, find a. Complete the following activity. (3 mark)

$$p(x) = ax^2 + 5x + 6$$

$x =$

$$a(1)^2 + 5(1) + 6$$

$$a + 11 = 13$$

$$\therefore a = 2$$

$$\text{Ans- } p(x) = ax^2 + 5x + 6 = 13$$

$x = 1$

$$a(1)^2 + 5(1) + 6 = 13$$

$$a + 5 + 6 = 13$$

$$a + 11 = 13$$

a = 13 -11

$$\therefore a = 2$$

➤ Find the remainder using Remainder theorem. (3 mark)

Q.37) when $x^3 - 3x^2 + x + 1$, divided by $x - 1$ put $x=1$,

Ans- $p(x) = x^3 - 3x^2 + x + 1$

$$\text{put } x=1$$

$$\therefore p(1) = (1)^3 - 3(1)^2 + (1) + 1$$

$$= 1 - 3 + 1 + 1$$

$$= -2 + 2$$

$$\therefore p(1) = 0$$

$$\text{Remainder} = 0$$

Q.38) When $3x^3 - 4x^2 + 4x - 2$ is divided by $x+2$

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

$$\text{Divisor} = x+2$$

By remainder theorem, remainder = $P(-2)$

Put $x = -2$, in $P(x)$

$$\therefore P(-2) = 3(-2)^3 - 4(-2)^2 + 4(-2) - 2$$

$$= 3 \times -8 - 4 \times 4 - 8 - 2$$

$$= -24 - 16 - 8 - 2$$

$$= -24 - 26$$

$$\text{Remainder} = -50$$

Q.39). Determine whether $(x-3)$ is a factor of

$x^3 - 3x^2 + 4x - 4$, by using factor theorem. (3 mark)

$$\text{Ans- } p(x) = x^3 - 3x^2 + 4x - 4$$

$$\text{Divisor} = x - 3$$

$$\therefore x = 3$$

$$\begin{aligned}\therefore p(3) &= 3^3 - 3(3)^2 + 4(3) - 4 \\ &= 27 - 3 \times 9 + 12 - 4 \\ &= 27 - 27 + 12 - 4 \\ &= 8\end{aligned}$$

$$\text{Remainder} = p(3) = 8 \neq 0$$

$\therefore$ By factor theorem, $x - 3$ is not factor of

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

Q.40). Use the factor theorem to determine whether $(x+1)$ is a factor of $2x^3 + 4x + 6$ or not. (3 mark)

$$\text{Ans- } P(x) = 2x^3 + 4x + 6$$

$$\text{Divisor} = x + 1 \quad \therefore x = -1$$

$$\begin{aligned}P(-1) &= 2(-1)^3 + 4(-1) + 6 \\ &= -2 - 4 + 6 \\ &= -6 + 6 \\ &= 0\end{aligned}$$

$\therefore$ Remainder = 0, By factor theorem, $x+1$ is a factor of $2x^3 + 4x + 6$.

Q.41) When $mx^2 + 7x + 12$ is divided by $x - 3$ the remainder is 51. Find m. Complete the following activity.

(3 mark)

$$P(x) = mx^2 + 7x + 12, \text{ divisor} = x-3.$$

$\therefore$ Put $x =$ in p(x)

By remainder theorem,

$$\text{$$

$$51 = 9m + 21 + 12$$

$$\text{$$

$$18 = 9m$$

$$m = \text{$$

$$\therefore m = 2$$

$$\text{Ans- } P(x) = mx^2 + 7x + 12, \text{ divisor} = x-3.$$

$\therefore$ Put $x =$ in p(x)

By remainder theorem,

$$\text{Remainder } p(3) = m(3)^2 + 7(3) + 12$$

$$51 = 9m + 21 + 12$$

$$\text{51= 9m + 33}$$

$$51 - 33 = 9m$$

$$18 = 9m$$

$$m = \text{$$

$$\therefore m = 2$$

Q.42) If the value of the polynomial $x^4 + 2x^3 - 3x^2 + ax - 1$ is 21 when $x = -3$. Then find a. (3 mark)

$$\text{Ans- } P(x) = x^4 + 2x^3 - 3x^2 + ax - 1$$

$$x = -3 \dots \dots (\text{given})$$

$$P(-3) = (-3)^4 + 2(-3)^3 - 3(-3)^2 + (-3)a - 1$$

$$21 = 81 + 2(-27) - 3(9) - 3a - 1$$

$$21 = 81 - 54 - 27 - 3a - 1$$

$$21 = 81 - 81 - 3a - 1$$

$$21 = -3a - 1$$

$$21 + 1 = -3a$$

$$22 = -3a$$

$$\therefore a = \frac{-22}{3}$$

Find the factors of the polynomials given below.

Q.43) Find the factor of polynomial (3 mark)

$$(x^2 + x)(x^3 + x - 3) - 28$$

Ans- Let $x^2 + x = m$ in the given polynomial.

$$\therefore (x^2 + x)(x^2 + x - 3) - 28$$

$$= m(m - 3) - 28$$

$$= m^2 - 3m - 28$$

$$= m^2 - 7m + 4m - 28$$

$$= m(m - 7) + 4(m - 7)$$

$$= (m - 7)(m + 4) \text{ ----- (Replace m with } x^2 + x)$$

$$= (x^2 + x - 7)(x^2 + x + 4)$$

$$\text{Q.44) } (x + 4)(x - 2)^2(x - 8) - 37$$

$$\text{Ans- } (x + 4)(x - 8)(x - 2)^2 - 37$$

$$(x^2 - 8x + 4x - 32)(x^2 - 4x + 4) - 37.$$

$$[\because (a - b)^2 = a^2 - 2ab + b^2]$$

$$(x^2 - 4x - 32)(x^2 - 4x + 4) - 37$$

$$\text{Let } x^2 - 4x = m$$

$$\therefore (m - 32)(m + 4) - 37$$

$$\therefore m^2 + 4m - 32m - 128 - 37$$

$$\therefore m^2 - 28m - 165$$

$$\therefore m^2 - 33m + 5m - 165$$

$$\therefore m(m - 33) + 5(m - 33)$$

$$\therefore (m - 33)(m + 5)$$

$$\therefore (x^2 - 4x - 33)(x^2 - 4x + 5)$$

$$\text{----- (replace m with } x^2 - 4x)$$

$$\text{Q.45) } (n^2 - 4n)(n^2 - 4n - 1) - 20$$

$$\text{Ans- Let } n^2 - 4n = x \text{ in given polynomial.}$$

$$\therefore x(x - 1) - 20$$

$$\therefore x^2 - x - 20$$

$$\therefore x^2 - 5x + 4x - 20$$

$$\therefore x(x - 5) + 4(x - 5)$$

$$\therefore (x + 4)(x - 5)$$

$$\therefore (n^2 - 4n + 4)(n^2 - 4n - 5) \text{-----[Replace n with } (n^2 - 2n)\text{]}$$

$$\therefore (n^2 - 2n - 2n + 4) (n^2 - 5n + n - 5)$$

$$\therefore [n(n-2) - 2(n-2)] [n(n-5) + 1(n-5)]$$

$$\therefore (n-2)(n-2)(n+1)(n-5)$$

Q.46) Complete the following activity. (3 marks)

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

$$\sqrt{2x} \quad \boxed{} \quad + 1(x + \sqrt{2})$$

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

$$\sqrt{2x^2 + 2x + 1x + \sqrt{2}}$$

$$\sqrt{2x} \quad \boxed{(x + \sqrt{2})} \quad +1 (x + \sqrt{2})$$

$$(\sqrt{2x+1})(x+\sqrt{2})$$

Q.47) Which polynomial is to be subtracted from $x^2+13x+7$ to get the polynomial $3x^2 +5x -4$? (3 marks)

Ans : Let the polynomial $p(x)$ be subtracted.

$$\text{Then } (x^2+13x+7) - p(x) = 3x^2 + 5x - 4$$

$$\therefore (x^2+13x+7) - (3x^2 + 5x - 4) = p(x)$$

$$= x^2 + 13x + 7 - 3x^2 - 5x + 4 \dots\dots (\text{Removing brackets})$$

$$= x^2 - 3x^2 + 13x - 5x + 7 + 4 \dots\dots (\text{collecting like terms})$$

$$= -2x^2 + 8x + 11$$

The required polynomial is $-2x^2 + 8x + 11$.

Q.48) Let A and B be the remainders when polynomials $x^3 + 2x^2 - 5ax - 7$ and $x^3 + ax^2 - 12x + 6$ are divided by $x+1$ and $x-2$ respectively and $2A + B = 6$. Find the value of a. (4 marks)

Ans- $f(x) = x^3 + 2x^2 - 5ax - 7$ is divided by $x + 1$,

Put $x = -1$

$$\therefore f(-1) = (-1)^3 + 2(-1)^2 - 5a(-1) - 7$$

$$= -1 + 2 + 5a - 7$$

$$\therefore A = 5a - 6$$

Similarly,

$p(x) = x^3 + ax^2 - 12x + 6$ is divided by $x - 2$

Put $x=2$,

$$\therefore p(2) = 2^3 + a(2)^2 - 12(2) + 6$$

$$= 8 + 4a - 24 + 6$$

$$\therefore B = 4a - 10$$

Now, $2A+B=6$

$$2(5a - 6) + (4a - 10) = 6$$

($\because$ Putting the values of A and B)

$$\therefore 10a - 12 + 4a - 10 = 6$$

$$\therefore 14a - 22 = 6$$

$$\therefore 14a = 6 + 22$$

$$\therefore 14a = 28$$

$$\therefore a = \frac{28}{14}$$

$$\therefore a = 2$$

Q.49) $x^3 - 2x^2 - x + 2$ (3marks)

$$\therefore x^3 - x - 2x^2 + 2$$

$$\therefore x(x^2 - 1) - 2(x^2 - 1)$$

$$\therefore (x^2 - 1)(x - 2)$$

$$\therefore [x^2 - (1)^2](x - 2)$$

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

$$[\because a^2 - b^2 = (a - b)(a + b)]$$

Q.50) Find the value of k , if $x - 1$ is a factor of $kx^2 - 3x + k$ (3 marks)

$$\text{Ans- } p(x) = kx^2 - 3x + k$$

$x - 1$ is factor of $p(x)$

$$\therefore x = 1$$

$$\therefore p(1) = k(1)^2 - 3(1) + k = 0$$

$$\therefore k - 3 + k = 0$$

$$\therefore 2k - 3 = 0$$

$$\therefore k = \frac{3}{2}$$
