Assignment For Class X

Subject : Mathematics

Topic :Factorisation (Remainder and factor Theorem)

- **Polynomial:** An algebraic expression of the form $a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \ldots\ldots\ldots a_{n-1}x + a_n$, where n is a positive integer and $a_1, a_2, a_3 \ldots\ldots a_n \in R$, the set of real numbers is called a polynomial in a variable x. It is denoted by f(x).
- If a polynomial is divided by a non zero polynomial , say g(x), there exist unique polynomial q(x) such that f(x) = g(x)q(x) + r(x).
- A non zero polynomial g(x) is called factor of any polynomial f(x), if there exist some polynomial q(x) such that f(x) = g(x)q(x) .
- **Remainder Theorem : If** a polynomial f(x), over a set of real numbers R, is divided by (x-a), where $\boldsymbol{a} \in R$, the remainder is equal to f(**a)**.

  f(x)= (x-a)Q+r , Where Q = quotient and r is remainder or f(a) =r

- **Factor theorem: If** f(x) is a polynomial and **a** is any real number , (x-a) is a factor of f(x) if and only if f(**a**) =0 (remainder =0)

Exercise 6. Q1.ii) Find the remainder (without division) on dividing $f(x)= 2x^3 -7x^2 +3$ by (x-2)

Steps for finding remainder

Step 1 *: Equate the divisor to zero and solve the equation so obtained to get the value of variable .*

Here (x-2) is the divisor. Equating x-2=0, we get x=2

Step 2: *substitute the value of the variable obtained in step 1, in the given polynomial f(x)and simplify it to get required remainder.*

Here Remainder $=f(2) =2(2)^3 - 7(2)^2 +3= 2(8) -7(4) +3= 16 -28 +3=-9$ Ans

Using Exercise 6. Q.4 Using remaider theorem, , find the value of k if on dividing $2x^3 +3x^2 -kx+5$ by x-2, leaves remainder 7. (ICSE 2016)

Here (x-2) is divisor so x-2 =0 $\Rightarrow$ x=2

Given f(2) =7 ,

$\Rightarrow 2(2)^3 + 3(2)^2 - k(2) + 5=7$

$\Rightarrow 2(8) +12-2k +5 =7$

$\Rightarrow 33 -2k =7$

$\Rightarrow 2k =26$

$\Rightarrow k=13$ Ans

Factor Theorem :

When a polynomial f(x) is divided by(x-a), the remainder is equal to f(a). If the remainder f(a) is equal to zero (0), then (x-a) is a factor of polynomial f(x)

Exercise 6,Q.11, Show that (x-2) is a factor of $3x^2$- x -10.Hence factorise $3x^2$- x -10 .

Here (x-2) is divisor so x-2=0 $\Rightarrow$ x=2 & f(x) =$3x^2$- x -10

$\Rightarrow$ f(2) = $3(2)^2$ -(2) -10 =12 -12= 0

$\because$ f(2) =0 , (x-2) is factor of $3x^2$ -x -10 . (Factor theorem)

Dividing $3x^2$ -x -10 by x-2, we get 3x+5 as quotient and remainder = 0

$\Rightarrow$
$$(x-2)\overline{)\,3x^2-x-10}\;\;3x+5$$
$$\underline{3x^2-6x}$$
$$5x-10$$
$$\underline{5x-10}$$
$$0+0$$

$\Rightarrow$ $\therefore$ $3x^2$ -x-10 =(x-2)(3x+5)

Homework Q3. ii) Q.6i), Q.7ii)Q8,Q. 13,Q.15ii), iii, Q18,Q.24,Chapter test Q10

Note: Solutions of following questions are there in the video link provided to you by the school.

Q6ii),Q7iii),Q.12,Q.15 i),iv)Q.20i)Q23 & one question from outside