7. PARTIAL FRACTIONS

1 x 4 = 4 Marks

IMP FORMULAS, KEY CONCEPTS

1) **Proper Rational fraction:** If the degree of f(x) is less than the degree of g(x) then $\frac{f(x)}{g(x)}$ is called a proper Rational fraction.

2) **Improper Rational Fraction:** If the degree of f(x) is greater than or equal to the degree of g(x) then $\frac{f(x)}{g(x)}$ is called an improper rational fraction.

3) **Type-1.1:** Rational fraction of the form $\frac{f(x)}{g(x)}$ where g(x) contains non repeated linear factors. Here, with respect to every factor of g(x) of the form (ax+b), there will be one partial fraction of the form $\frac{A}{ax+b}$

4) **Type 1.2:** Rational fraction of the form $\frac{f(x)}{g(x)}$ where g(x) contains repeated and non-repeated linear factors.Here with respect to every repeated factor of g(x) of the form $(ax+b)^n$, $n>1 \in N$, there are n partial fractions of the form $\frac{A_1}{ax+b}+\frac{A_2}{(ax+b)^2}+......+\frac{A_n}{(ax+b)^n}$

5) **Type-1.3:** Improper Rational fractions of the form $\frac{f(x)}{g(x)}$ with linear factors in the denominator (or) repeated linear factors in the denominator. Here express the improper rational fraction $\frac{f(x)}{g(x)}$ as $\frac{f(x)}{g(x)}=q(x)+\frac{r(x)}{g(x)}$ and resolve $\frac{r(x)}{g(x)}$ into its partial fractions accordingly.

6) **Type 1.4:** Rational fraction of the form $\frac{f(x)}{g(x)}$ where g(x) is a single repeated linear factor. Here take g(x)=y and find x interms of y. Then change $\frac{f(x)}{g(x)}$ into a rational function of y and simplify accordingly.

7) **Type 2.1:** Rational fraction of the form $\frac{f(x)}{g(x)}$, where g(x) contains a non repeated irreducible factor of the form ax^2+bx+c. Here corresponding to (ax^2+bx+c), there will be one partial fraction of the form $\frac{Ax+B}{ax^2+bx+c}$ where A,B are real constants.

8) **Type-2.2:** Rational fraction of the form $\frac{f(x)}{g(x)}$, where g(x) contains a repeated irreducible factor of the form $(ax^2+bx+c)^2$. Here corresponding to $(ax^2+bx+c)^2$ there will be partial fractions of the form $\frac{Ax+B}{ax^2+bx+c}+\frac{Cx+D}{(ax^2+bx+c)^2}$