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Sec : B

Subject : Numerical Analysis

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Assignment : 1

Q.2) Review of Integration. Concept.

Ans: It contains some major
concept of integration,

- Substitution method.
- Integration by Parts.
- Integration Rational Functions.

* SUBSTITUTION Method:

$$\Rightarrow \int f(g(x) g'(x)) dx = \int f(u) du$$

If the function $f(u)$ has
an easily identification anti
derivates then all is
well. If not another
substitution method may be
needed.

* Integration by Parts:

$$\Rightarrow [u(x)v(x)]' = u'(x)v(x) + u(x)v'(x)$$

$$= u(x)v'(x) = [u(x)v(x)]' - u'(x)v(x)$$

$$= \int u(x)v'(x) dx = u(x)v(x) - \int u'(x)v(x) dx$$

$$= \int u \, dv = uv - \int v \, du$$

In case of definite integral we have

$$\int_a^b u(x)v'(x) \, dx = \left[u(x)v(x) \right]_{x=a}^{x=b} - \int_a^b u'(x)v(x) \, dx$$

• Integrating Rational Functions:-

$$\Rightarrow \frac{3x+2}{2x^2+x-3} = \frac{3x+2}{(2x+3)(x-1)}$$

To integrate such a function we use the method of partial fractions to split the fraction into easily integrable pieces

$$\frac{3x+2}{(2x+3)(x-1)} = \frac{1}{2x+3} + \frac{1}{x-1}$$

$$\text{Now } \int \frac{3x+2}{2x^2+x-3} \, dx = \frac{1}{2} \log(2x+3) + \log|x-1| + C$$

Q2

Ans.

Application of Trapezoidal Rule:-

The trapezoidal rule is one of the family member of numerical integration formula.

- The trapezoidal rule has faster convergence.
- Moreover the trapezoidal rule tends to become extremely accurate than periodic functions.

Application of Simpson's Rule:-

Simpson's rule is a numerical method for approximating the integral of a function b/w two limits, a & b . It's based on knowing the area under a parabola, or a plane curve area under a parabola or a plane curve.

- It include the calculation of a vessels displacement, total wetted surface area and the calculation of the longitudinal center of buoyancy of the hull.