**METHODOLOGY**

There are quite a number of methods, approaches and technics that can be used to classify the quantum systems which include:

1. **Nonperturbative renormalization group transformation (NRG),**

which give some guidelines for calculating physical quantities, and various applications which include variants of the original Kondo problem such as the non-Fermi-liquid behavior in the two-channel Kondo model, dissipative quantum systems such as the spin-boson model, and lattice systems in the framework of the dynamical mean-field theory.

1. **Quantum Spectral Transform Method (QSTM**,

Developed as a result of a synthesis of two major directions in the modern theory of exactly soluble systems. The first of them is based on the tradition of studying the exactly soluble models of solid states. This method integrates to many others like the Classical Spectral Transform Method (CSTM), having yielded a lot of important results. The QSTM yields benefits giving solutions to:

* + 1. The sine—Gordon model 13, 20, 26 i.e. finding its mass spectrum and S—matrix.
    2. The solution of the quantum inverse problem for the nonlinear.

1. **Matrix product states and projected entangled pair states (MPS).**

This method analyses systems with unique as well as degenerate ground states and in both the absence and the presence of symmetries. These symmetries consist of two parts, one of which acts by permuting the ground states, while the other acts on individual ground states, and phases are labeled by both the permutation action of the former and the cohomology class of the latter.