Use of Nuclear shell Model:-

This model has been used successfully to a variety of problems in nuclear physics —

(1) This model makes it possible to predict the total angular momenta of nuclei and the results are in good agreement with experiments. The assignment of this ang. momentum is very useful in the study of β-decay.

The subject of nuclear isomerism has been studied from the view-point of the nuclear shell model (47, 48, 49). and a correlation has been formed betⁿ the distribution of isomers and magic numbers. It is clear that there are groupings (or islands) of isomers just below the magic numbers 50, 84, 126; There is a sharp break at each of these numbers isomerism disappears when a shell is filled and does not appear again until the next shell is about half full.

The experimental data on mag. moment and electric quadropol moments have been also interpreted with some success in terms of the

Nuclear shell model. As an example, at the proton nos. 2, 8, 20, 50 and 82, the quadrupole moment is zero or small. When a new shell begins to from the quadrupole moment is -ve as the no. of proton in the unfilled shell is increased. The quadrupole moment is the measure of the deviation of the charge distribution in a nucleus from the spherical form.

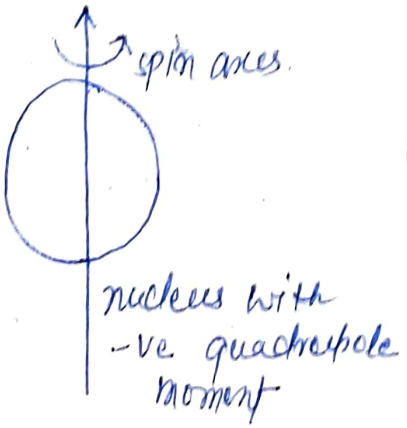

Fig - I.

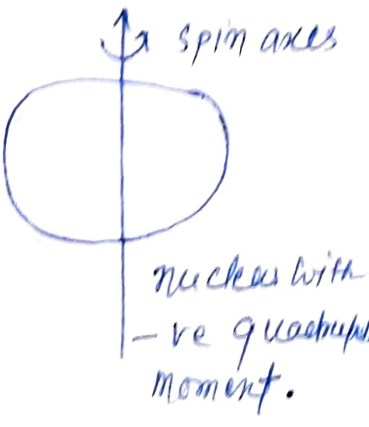

Fig - II.

For spherically symmetric distribution of charge quadrupole moment is zero. For nuclei beyond the closed shells; the quadrupole moment is -ve. With increasing number of nucleons outside closed shells the negative value of the quadrupole moment increases at first and then decreases. Ultimately the moment

becomes +ve and reaches a maxm.
Evidently the charge distribution in the
nucleus changes its shape and becomes
like that (shown in fig. II.) in betn
closed shells nucleon number.