SYNOPSIS.

The results of experimental and analytical investigations on the moment-rotation characteristics of composite beams, consisting of steel joists of variable moment of inertia, encased in concrete, are presented in this thesis. Encased simple and continuous beams (rectangular section) and continuous T-beams, loaded to failure for various arrangements of loads on the spans were investigated.

The theory of inelastic design of statically indeterminate structures is based on the phenomenon of 'redistribution of moments'. The degree of redistribution of moments essentially depends on the rotation-capacity of the control hinges. The hinge rotations used in the compatibility conditions, are deduced on the basis of a theoretical moment-curvature relationship with a limiting concrete strain of 0.0035.

In the present investigation, an attempt has been made to assess the rotations at the critical hinges by plotting the curvature distributions over the plastic lengths. The plastic length corresponding to a particular load on a structure has been assumed as the length of the structure over which the moment is greater than 30% of the ultimate moment, 30% being the average value of the experimentally observed $\frac{\text{first cracking load}}{\text{failure load}}$ for different beams.

SYNOPSIS.
(contd.)

It has been possible to obtain a reasonably close agreement between measured rotations and those obtained on the basis of an appropriate moment-curvature relationship, derived theoretically. The theoretical curve has been obtained for three stages corresponding to the concrete compressive strains of 0.001, 0.002 and 0.0035 and the theoretical stress-strain curve for concrete used.

It has also been possible to predict in terms of a cubic equation, a relationship between the hinge rotation and the cross-sectional properties at a hinge for various load-distributions on the encased beams. The design charts derived from the cubic equation can be used for the computation of the plastic-hinge rotations.

The results presented in this thesis cover investigations on the following:

1.	Simply supported beams	24 Nos.
2.	Continuous beams of rectangular section ..	5 Nos.
3.	Continuous beams of T-section	6 Nos.
