SEISMIC BEHAVIOUR OF PILE SUPPORTED MULTISTOREY BUILDINGS

A Thesis Submitted to the Indian Institute of Technology, Delhi, for the Award of the Degree of

DOCTOR OF PHILOSOPHY

In

CIVIL ENGINEERING

by

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TO MY PARENTS

SRIKANTH

INDRANI

WHO ARE NO MORE

CERTIFICATE

This is to certify that the thesis entitled, "**Seismic Behaviour of Pile Supported Multistorey Buildings**", being submitted by Mr. A K Chaku to the Indian Institute of Technology, Delhi, for the award of the degree of Doctor of Philosophy in Civil Engineering is a record of bonafide research work carried out by him. Mr. A K Chaku has worked under my guidance and supervision and has fulfilled the requirements for the submission of this thesis, which to the best of my knowledge has reached the requisite standard.

The material contained in this thesis has not been submitted, in part or in full to any other University or Institute for the award of any degree or diploma.

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ABSTRACT

The seismic response of multistorey buildings supported on piles passing through a soil of homogeneous layer and resting on base rock is studied. The buildings considered are frame-wall systems and coupled shear wall systems. Continuum technique is used to model the superstructure. The continuum model is then discretised to obtain the dynamic characteristics of the superstructure. For soil pile system also continuum model is employed. For dynamic soil-pile interaction plane strain behaviour for soil is assumed. Material and radiation damping in the soil are considered.

Analysis is carried out in frequency domain as well as in time domain for the motion applied at the base rock level as well as at the pile cap level. The nature of response in frequency domain is studied in terms of the characteristics of soil layer and of the compliant or fixed base superstructure.

Seismic analysis is carried out for simulated earthquakes. Comparison between results of structures with compliant foundation and with fixed base is made for the earthquakes applied at the pile cap level as well as at the base rock level. The effect of characteristics of soil

layer and of superstructure on the response of structures is studied. The effect of resonance between soil layer and compliant superstructure or fixed base superstructure and of the nature of earthquakes is demonstrated.

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