"EARTHQUAKE RESPONSE OF LUMPED SDOF SYSTEMS"

Project submitted to

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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In

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Synopsis

Understanding the response of linear-elastic lumped parameter systems is a vital step in analysis and design of structures subjected to earthquake ground motions. The response quantities which are of primary importance are deformation of the spring elements, inertial forces experienced by the mass, internal forces and stresses. Since earthquakes themselves are random in nature it is rather convenient to seek solutions by numerical techniques, which can be easily programmed on a computer using spread sheets.

In this project work an attempt has been made to comprehensively understand the dynamic response of lumped parameter systems that are subjected to earthquake inputs. Initially the response of linear SDOF system has been studied by developing a user friendly numerical integration scheme on MS-Excel spread sheet. The numerical integration scheme adopted here is non iterative Newmark`s β scheme on MS-Excel spread sheet. This work sheet can be conveniently used for obtaining all the response quantities and their peak values. The same can also be displayed graphically. The same spread sheet can also be used for plotting the response spectrum as well.

Studies have been carried out on various SDOF system subjected to: (1) Elcentro earthquake input (2) Koyna earthquake input to understand the effect of frequency and damping.

The project report has been written in 3 chapters as follows:

The first chapter covers the introduction, relevant to the present investigation. The second chapter gives the detailed explanation of numerical integration scheme adopted here. The third chapter covers the response of SDOF system subjected to ground motion. A small note on the response spectrum is also

included in this chapter. The appendix at the end of the project allows the user to utilize the spread sheet effectively.