CE/BOS/ CE C611/0709

K L UNIVERSITY

DESIGN OF TALL STRUCTURES (CE C611)

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SYLLABUS

UNIT – 1: Introduction

Why Tall Buildings, Factors affecting growth, Height and structural form
The Tall Building Structure: Design process, Philosophy, scope and content; **Design Criteria:** Design philosophy, Loading, Sequential loading, Strength and Stability, Stiffness and drift limitations, Human Comfort criteria, Creep, Shrinkage and temperature effects, Fire, Foundation settlement and soil structure interaction.

UNIT – 2: Loading On Tall Structures

Gravity loading:-Methods of live load reduction, Impact gravity loading, Construction loading, Wind loading:-Simple static loading, Dynamic loading, Earthquake loading:-Equivalent lateral force procedure, Model analysis procedure, Combination of loading:-Working stress design, Limit Sate design; **Structural Form:** Structural form:-Braced frame structures, Rigid Frame structures, In filled-Frame structures, Flat plate- Flat slab structures, Shear wall structures, Wall frame structures, Framed tube structures, Suspended structures, Floor systems :-(Reinforced concrete):-One-way slabs on beams or walls, One-way pan joints and Beams, One-way slab on beams and girders, Two-way Flat plate, Twoway flat slab, Waffle flat slabs, Two-way slab and beam, Floor systems :- (Steel framing):-Oneway beam system, Two-way beam system, Three way beam system, Composite Steel-Concrete floor system

UNIT – 3: Modeling For Analysis

Approaches to analysis:-Preliminary analyses, Intermediate and final analysis, Assumptions:-Materials, Participating components, Floor slabs, Negligible stiffnesses, Negligible deformations, Cracking, High-Rise Behavior, Modeling for Approximate analyses:-Approximate Representation Bents, Approximate modeling of slabs, Modeling for continuum analyses, Modeling for Accurate analyses:-Plane frames, Plane shear walls, Three dimensional frame and wall structures, P-Delta effects, The assembled model; **Braced Frames:** Types of bracings, Behavior of bracings, Behavior of bracing bents, Methods of analysis:-member force analysis, Drift analysis, Worked example for calculating drift by approximate methods, use large scale bracing.

UNIT – 4: Rigid-Frame Structures

Rigid frame behavior, Approximate determination of member forces caused by Gravity loading:-Girder forces-Code recommended values, two cycle moment distribution, and Column forces, Approximate Analysis of member forces caused by horizontal loading:-Allocation of loading between bents, member force analysis by portal frame method, Approximate method by cantilever method, Approximate analysis of rigid frames with setbacks, Approximate analysis for drift:- Components of drift, correction of excessive drift, Effective shear rigidity (GA), Flat plate

structures:-Analogues rigid frame, Worked examples, Computer analysis of rigid frames, Reduction of rigid frames for analysis:-Lumped girder frame, single-bay substite frame; **Shear Wall Structures:** Behavior of shear wall structures, Analysis of proportionate wall systems:-Proportionate Non twisting structures, Proportionate twisting structures, Non Proportionate structures:-No proportionate Non twisting structures, Non proportionate twisting structures, Behavior of nonproportionate structures, Effects of discontinuities at base, Stress analysis of shear wall:- Membrane finite element analysis, Analogous frame analysis

UNIT – 5: Tubular Structures

Structural behavior of tabular structures:-Framed- tube structures, Bundled Tube structures, Braced-Tube structures, General three dimensional structural analysis, Simplified Analytical models for symmetrical Tubular structures:-Reduction of three dimensional frame tube to an equivalent plane frame, Bundled-Tube structures, Diagonally braced frame tube structures;
Dynamic Analysis: Dynamic Response to Wind Loading:-Sensivity of structures wind forces, Dynamic structural response due to wind forces, Along wind response, Cross wind response, worked examples, Dynamic response to Earthquake motions:-Response of Tall buildings to ground accelerations, response spectrum analysis, Empirical relations for fundamental natural frequency, Structural damping ratios, Comfort criteria: Human response to building motions:-Human perception of building motion, Perception thresholds, Use of comfort criteria in design

TEXT BOOKS:

1. Tall Building Structures Analysis and Design by Bryan Stafford Smith & Alex Coull; A Wiley-Interscience Publications, Newyork,1991

Recommended References:

1. *Tall* Building *Structures* on Elastic Subgrade and Research of Semi-Analytical. Method [D] by Gong Yaoqing. Beijing: Tsinghua University, 2006
2. ETABS, Three Dimensional Analysis of Building Systems. Computers and Structures inc., Berkeley, California, 1989.