

## AR DISASTER RESISTANT ARCHITECTURE (ELECTIVE II)

**Module I:** Building safety from natural Hazards: earthquake, fire safety in buildings, cyclone effects, high winds, storm surge and safety aspects in buildings, related to cyclones, floods, landslides, Elementary seismology:, Occurrence of earthquake in the world, plate tectonics, faults, earthquake hazard maps of India and the states, Causes of earthquake, seismic waves, magnitude, intensity, epicentre and energy release, characteristics of strong earthquake ground motions, Seismological Instruments, seismograph, Accelerograph, Seismoscope/ Multi SAR, Introduction to Theory of Vibrations:, Single degree undamped and damped systems, resonance, response to earthquakes, elastic response, concepts of response spectrum, Flexibility of long and short period structures

**Module II:** Site Planning, Building Forms and Architectural Design Concepts for earthquake Resistance, Historical experiences Site selection, Site development, Building forms: Horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc, Seismic effects related to building configuration, plan and vertical irregularities, redundancy and setbacks, Special aspects, torsion, appendages, staircases, adjacency, pounding, contemporary international approaches, Performances of Ground and Buildings in Past Earthquakes:, Earthquake effects; on ground, soil rupture, liquefaction, landslides, behaviour of various types of buildings, structures, power plants, switch yards, equipments, lifelines and collapse patterns, behaviour of non structural elements like services, fixtures, mountings, social and economic consequences of earthquakes, Lab simulations of models, Seismic Design Principles, Concept of seismic design, stiffness, strength, period, ductility, damping, hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities, Ductility based design, Design of energy absorbing devices, seismic base isolation and seismic active control.

**Module III:** Structural detailing; Innovations and selection of appropriate materials; IS Code provisions for the buildings- IS 1893-2002, IS4326-1993 Horizontal and vertical seismic coefficients, valuation of base shear, distribution of shear forces in multi-storey building, Seismic detailing provisions, masonry and wooden buildings (Is 4326, IS 13828) Adobe houses (IS 13827) Seismic designs and detailing of RC and steel buildings IS 1893-2002, IS13920-1993, IS 456-2000, IS 800-2004, Special reinforcing and connection details in structural drawings, Earthquake resistance Construction Details:, Various types and construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, underground and overhead tanks, staircases and isolation of structures, local practices, traditional regional responses

**Module IV:** Construction quality Control, Sequences of construction: Good supervision practices, critical check points and certification at certain stages, reporting, maintenance of records, testing, Vulnerability assessments and seismic strengthening of buildings, Seismic vulnerability evaluation of existing buildings, weakness in existing buildings, aging, weathering development of cracks, concepts in repair, restoration and seismic strengthening, materials and equipments for restoration of masonry and concrete structures, methodologies for seismic retrofitting

### Reference Books

1. Abbott L Patidc Natural disasters
2. Arhold Christopher and Others Building configuration and Seismic design
3. Disasters and development
4. National Geographic restless earth, disaster of nature
5. Singh PP and Sharma sandhir Modern dictionary of natural disasters

# VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Semester: 8<sup>th</sup>

## LESSON PLAN

Subject : DISASTER RESISTANT ARCHITECTURE

Session: Jan 2017 – May 2017

Theory / Sessional

Branch/Course: **Architecture**

Name of the Faculty Member: **Ar. Mitali Madhusmita**

Period	Module/Number	Topic to be covered	Remarks/ Sign. of Faculty Member
02	<b>1</b>	Brief Introduction of Disasters ,Hazard, Risk, Vulnerability etc.	
03		Building safety from natural Hazards: earthquake,	
04		Fire safety in buildings,	
05		Fire safety in buildings,	
06		cyclone effects, high winds, storm surge	
07		Safety aspects in buildings, related to cyclones, floods, landslides,	
08		Safety aspects in buildings, related to cyclones, floods, landslides,	
09		Elementary seismology:, Occurrence of earthquake in the world,	
10		plate tectonics, faults, earthquake hazard maps of India and the states,	
11		Causes of earthquake, seismic waves, magnitude, intensity, epicentre and energy release,	
12		characteristics of strong earthquake ground motions,	
13		Seismological Instruments, seismograph, Accelerograph, Seismoscope/ Multi SAR,	
14		Introduction to Theory of Vibrations:, Single degree undamped and damped systems, resonance, response to earthquakes, elastic response, concepts of response spectrum,	
15		Introduction to Theory of Vibrations:, Single degree undamped and damped systems,resonance	
16		Response to earthquakes, elastic response, concepts of response spectrum,, Flexibility of long and short period structures	
17	<b>2</b>	Site Planning, Building Forms and Architectural Design Concepts for earthquake Resistance,	
18		Historical experiences Site selection, Site development,	
19		Historical experiences Site selection, Site development,	
20		Building forms: Horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc,	
21		Seismic effects related to building configuration, plan and vertical irregularities, redundancy and setbacks,	
22		Special aspects, torsion, appendages, staircases, adjacency, pounding,	

23		contemporary international approaches, Performances of Ground and Buildings in Past Earthquakes:.,	
24		Earthquake effects; on ground, soil rupture, liquefaction, landslides,	
25		behaviour of non structural elements like services, fixtures, mountings, social and economic consequences of earthquakes,	
26		Lab simulations of models, Seismic Design Principles,	
27		Concept of seismic design, stiffness, strength, period, ductility, damping,	
28		hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities, Ductility based design,	
29		hysteric energy dissipation, center of mass, center of rigidity, torsion, design eccentricities, Ductility based design,	
30	<b>3</b>	Structural detailing; Innovations and selection of appropriate materials;	
31		IS Code provisions for the buildings- IS 1893-	
32		2002, IS4326-1993 Horizontal and vertical seismic coefficients,	
33		valuation of base shear, distribution of shear forces in multi- storey building, Seismic detailing	
34		provisions, masonry and wooden buildings (Is 4326, IS 13828) Adobe houses (IS 13827) Seismic designs and detailing of RC and steel buildings IS 1893-2002,	
35		IS13920-1993, IS 456-2000, IS 800-2004, Special reinforcing and connection details in structural drawings, Earthquake resistance Construction Details:.,	
36		Various types and construction details of: Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets,	
37		Various types and construction details of: boundary walls, underground and overhead tanks, staircases and isolation of structures, local practices, traditional regional responses	
38	<b>4</b>	Construction quality Control, Sequences of construction: Good supervision practices, critical check points and certification at certain stages, reporting,	
39		maintenance of records, testing, Vulnerability assessments and seismic strengthening of buildings,	
40		Seismic vulnerability evaluation of existing buildings, weakness in existing buildings, aging, weathering development of cracks,	
41		concepts in repair, restoration and seismic strengthening,	
42		materials and equipments for restoration of masonry and concrete structures, methodologies for seismic retrofitting	

Signature of the Faculty Member :

Date:

Counter Signature of H.O.D.