6.2 EARTHQUAKE RESISTANT BUILDING CONSTRUCTION

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RATIONALE

Diploma holders in civil engineering have to supervise construction of various earthquake resistant buildings. Therefore, the students should have requisite knowledge regarding terminology of earthquake and the precautions to be taken while constructing earthquake resistant buildings.

COURSE OUTCOMES

After undergoing the training, the students will be able to:

CO1 Classify the earthquakes
CO2 Explain seismic behavior of traditionally built constructions
CO3 Supervise construction of earthquake resistant buildings
CO4 Draw reinforcement detailing in earthquake resistant structures
CO5 Manage all rescue operation caused due to earthquake

DETAILED CONTENTS

UNIT-I

1. Elements of Engineering Seismology-

1.1 Concept of Earthquake & Earthquake Seismology
1.2 Various important terminologies related with earthquake seismology
1.3 Earthquake- Causes, effects and classification
1.4 Seismic waves- Concept, types and characteristics
1.5 Earthquake size- magnitude and intensity
1.6 Recording of an earthquake- Seismograph and Seismogram its working, Applications
1.7 Seismic zoning map of India with their importance
1.8 Concept of static loading, dynamic loading and fundamental period

UNIT-II

2.1 Seismic Behaviour of Traditionally-Built Constructions of India

2.1.1 Name of various past earthquake and their magnitude

2.1.2 Seismic performance of masonry building during earthquakes

2.1.3 Common mode of failures of masonry building- Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failurewith their causes & characteristics

2.2 Modern techniques and Special construction methods of earthquake resistant buildings

2.2.1 Modern techniques used in the construction of earthquake resistant buildings- pneumatic. Base isolation and Seismic dumpers and others latest, with their advantages, disadvantages and utility.

2.2.2 Special construction method- tips and precautions to be observed while planning, designing and construction of earthquake resistant building.

UNIT-III

3. Introduction of Various Types of Earthquake Resistant Building Construction Codes as per BIS.

3.1 IS: 1893 (Part-1) 2002, IS: 13920 (1993), IS: 4326 (1993), IS: 13828 (1993) SP 22: 1982 (Introduction only)

3.2 Importance of seismic codes in various aspects

3.3 Assumptions made in IS: 1893: 2000 for the earthquake resistant design of structure.

3.4 General specifications of IS: 13920: 1993

3.5 General principles considered as per IS: 4326

UNIT-IV

4.1 Seismic Provision of Strengthening and Retrofitting measures for Building Construction (Masonry & RCC Structure)

4.1.1 Seismic provision of strengthening-Concept and objectives

4.1.2 Definitions of Repairing, Restoration, Retrofitting

4.1.3 Retrofitting-Concept, objectives and classification.

4.1.4 Non Conventional methods of retrofitting used for RCC Building

4.1.5 Retrofitting in masonry construction- Methods/Techniques used

4.1.6 Retrofitting in RCC Structures- Methods/Techniques used

4.2 Provision of reinforcement detailing in masonry and RCC constructions

4.2.1 Necessity of seismic strengthening arrangements of masonry building

4.2.2 Concept of horizontal bend in masonry building
4.2.3 Various types of horizontal bends & their functions.

UNIT-V

5. Disaster Management
5.1 Disaster- Concept and types
5.2 Disaster management-Concept, function and their objectives
5.3 Disaster rescue- Psychology of rescue, rescue workers and their role, rescue plan & stages, rescue by steps, rescue equipment, safety in rescue operations
5.4 Definition of debris clearance, Percussion in debris clearance
5.5 Casuality management- Concept, function and classification

RECOMMENDED BOOKS

1. Elements of Earthquake Engineering by Jai Krishana and AR Chandersekaran; Sarita Parkashan, Meerut.
2. Building Construction by BL Gupta and NL Arora; Satya Prakashan, New Delhi
3. Manual Published by Earthquake Engineering department, IIT Roorkee / IIT Kanpur IS 13920, IS: 13827, IS: 13828, IS 1893-2002, IS 4326 (latest edition)
5. Dynamics of Structure by AK Chopra; Prentice Hall Inc. New Delhi
6. Earthquake Resistant Building Construction by Neelam Sharma
7. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

RECOMMENDED WEBSITES

1. https://swayam.gov.in/
2. https://www.udemy.com/
3. https://www.upgrad.com/
4. https://www.khanacademy.org/

INSTRUCTIONAL STRATEGY

The student may be taken for visit to various building construction sites where precautions related to earthquake resistant construction are being taken so that the students may appreciate the importance of the subject. This subject contains five units of equal weightage.