



QUESTION BANK

Year / Semester: **III B.Tech VI Semester**

Regulation: **R23**

Subject and Code: **DISASTER MANAGEMENT (OE – II) & 230CE361A**

SYLLABUS

III B. Tech –VI Semester

230CE361A

DISASTER MANAGEMENT (OE – II)

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COURSE EDUCATIONAL OBJECTIVES

The objectives of this course are to make the student:

1. **To understand** the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.
2. **To analyze** the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.
3. **To apply** wind engineering principles and computational techniques in designing wind-resistant structures.
4. **To evaluate** earthquake effects on buildings and develop strategies for seismic retrofitting.
5. **To assess** seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.

UNIT-I

(9)

Introduction to Natural Disasters– Brief Introduction to Different Types of Natural Disasters, Occurrence of Disasters in different Climatic and Geographical Regions, Hazard Maps (Earthquake and Cyclone) of The World and India, Regulations for Disaster Risk Reduction, Post-Disaster Recovery and Rehabilitation (Socioeconomic Consequences).

UNIT- II

(9)

Cyclones and Their Impact– Climate Change and Its Impact On Tropical Cyclones, Nature of Cyclonic Wind, Velocities and Pressure, Cyclone Effects, Storm Surges, Floods, and Landslides. Behavior of Structures in Past Cyclones and Windstorms, Case Studies. Cyclonic Retrofitting, Strengthening of Structures, and Adaptive Sustainable Reconstruction. Life-Line Structures Such as Temporary Cyclone Shelters.

UNIT- III

(9)

Wind Engineering and Structural Response– Basic Wind Engineering, Aerodynamics of Bluff Bodies, Vortex Shedding, and Associated Unsteadiness Along and Across Wind forces. Lab: Wind Tunnel Testing and Its Salient Features. Introduction to Computational Fluid Dynamics (CFD). General Planning and Design Considerations Under Windstorms and Cyclones. Wind Effects On Buildings, towers, Glass Panels, Etc., and Wind-Resistant Features in Design. Coda Provisions, Design Wind Speed, Pressure Coefficients. Coastal Zoning Regulations for Construction and Reconstruction in Coastal Areas.



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Innovative Construction Materials and Techniques, Traditional Construction Techniques in Coastal Areas.

UNIT- IV (9)

Seismology and Earthquake Effects– Causes of Earthquakes, Plate Tectonics, Faults, Seismic Waves; Magnitude, Intensity, Epicenter, Energy Release, and Ground Motions. Earthquake Effects– On Ground, Soil Rupture, Liquefaction, Landslides. Performance of Ground and Buildings in Past Earthquakes– Behavior of Various Types of Buildings and Structures, Collapse Patterns; Behavior of Non-Structural Elements Such as Services, Fixtures, and Mountings – Case Studies. Seismic Retrofitting– Weaknesses Existing Buildings, Aging, Concepts in Repair, Restoration, and Seismic Strengthening.

UNIT- V (9)

Planning and Design Considerations for Seismic Safety– General Planning and Design Considerations; Building forms, Horizontal and Vertical Eccentricities, Mass and Stiffness Distribution, Soft Story Effects, Etc.; Seismic Effects Related to Building Configuration. Plan and Vertical Irregularities, Redundancy, and Setbacks. Construction Details– Various Types 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. Innovative Construction Materials and Techniques. Local Practices– Traditional Regional Responses. Computational Investigation Techniques.

Total Hours: 45

COURSE OUTCOMES:

On successful completion of the course, students will be able to		Pos
CO1	Understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.	PO1,PO6,PO8,PO9
CO2	Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.	PO2,PO5
CO3	Apply wind engineering principles and computational techniques in designing wind resistant structures.	PO1,PO7,PO4
CO4	Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.	PO3,PO5,PO8
CO5	Assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures	PO4,PO6,PO7,PO8,PO9

TEXT BOOKS:

1. David Alexander, Natural Disasters, 1st Edition, CRC Press, 2017.
2. Edward A. Keller and Duane E. DeVecchio, Natural Hazards: Earth's Processes as



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Hazards, Disasters, and Catastrophes, 5th Edition, Routledge, 2019.

REFERENCE BOOKS:

1. Ben Wisner, J.C. Gaillard, and Ilan Kelman (Editors), Handbook of Hazards and Disaster Risk Reduction and Management, 2nd Edition, Routledge, 2012.
2. Damon P. Coppola, Introduction to International Disaster Management, 4th Edition, Butterworth-Heinemann, 2020.
3. Bimal Kanti Paul, Environmental Hazards and Disasters: Contexts, Perspectives and Management, 2nd Edition, Wiley-Blackwell, 2020.

Online Learning Resources:

<https://nptel.ac.in/courses/124107010>

https://onlinecourses.swayam2.ac.in/cec19_hs20/preview

CO-PO MAPPING:

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	-	-	-	-	2	-	2	2	-	-	-	3	3
CO-2	-	3	-	-	2	-	-	-	-	-	-	2	3	-
CO-3	3	-	-	3	-	-	3	-	-	2	-	-	-	3
CO-4	-	-	3	-	3	-	-	2	-	-	-	-	3	-
CO-5	-	-	-	3	-	3	3	3	2	-	-	-	-	3



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Max Marks: 10

S.No.	CO	Questions	BT
Unit I: (Introduction to Natural Disasters)			
1	1	Explain the concept of natural disasters and give a brief description of the different types of natural disasters.	L4
2	1	Discuss the occurrence and distribution of natural disasters in different climatic regions of the world with suitable examples.	L3
3	1	Describe the geographical regions prone to earthquakes and explain the significance of the world earthquake hazard map.	L4
4	1	Explain the cyclone-prone regions of the world and India with the help of a hazard map.	L3
5	1	Discuss the factors influencing the occurrence of natural disasters in different geographical regions.	L5
6	1	Explain the importance and preparation of hazard maps for earthquakes and cyclones.	L4
7	1	Describe the earthquake hazard zones of India and explain their significance in disaster management.	L3
8	1	Discuss the National Disaster Management Act (2005) and its significance in reducing disaster risk in India.	L5
9	1	What is post-disaster recovery and rehabilitation? Explain its major components with examples.	L4
10	1	Evaluate the socio economic consequences of natural disasters on affected regions. Provide suitable case studies.	L3
S.No.	CO	Questions	BT
Unit II: (Cyclones and Their Impact)			
1	2	Explain the formation and characteristics of tropical cyclones and discuss the influence of climate change on their intensity and frequency.	L4



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2	2	Describe the nature of cyclonic winds, explaining wind velocities, pressure variation, and their effects on structures.	L3
3	2	Discuss the primary and secondary impacts of cyclones, including storm surges, floods, and landslides.	L4
4	2	What is a storm surge? Explain the meteorological and oceanographic factors responsible for storm surge formation and discuss its destructive impacts.	L3
5	2	Explain the mechanism of storm surges and their role in coastal flooding during cyclones.	L5
6	2	Analyze the behavior of structures during past cyclones and windstorms, highlighting common modes of failure.	L4
7	2	With suitable case studies, discuss the lessons learned from major cyclones affecting India or other parts of the world.	L3
8	2	Explain the concept of cyclonic retrofitting and discuss various techniques used to improve wind resistance of buildings.	L5
9	2	Describe the methods of strengthening structures to withstand cyclonic winds and associated hazards.	L4
10	2	Discuss the principles of adaptive and sustainable reconstruction in cyclone-affected regions.	L3
11	2	Explain the importance, planning, and design considerations of lifeline structures, such as temporary cyclone shelters, in disaster-prone areas.	L4
S.No.	CO	Questions	BT
Unit III: (Wind Engineering and Structural Response)			
1	3	Explain the basic principles of wind engineering and their role in the analysis and design of structures.	L4
2	3	Describe the aerodynamics of bluff bodies and explain the phenomenon of vortex shedding and its associated unsteady wind effects.	L3



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3	3	Explain along-wind and across-wind responses of structures under wind loading, highlighting their significance in tall buildings and towers.	L4
4	3	Describe the wind tunnel testing method, explaining its setup, working principle, and salient features.	L3
5	3	Discuss the role of wind tunnel experiments in understanding wind effects on buildings and other structures.	L5
6	3	Give an introduction to Computational Fluid Dynamics (CFD) and explain its applications in wind engineering.	L4
7	3	Explain the general planning and design considerations for structures subjected to windstorms and cyclones.	L3
8	3	Discuss the wind effects on buildings, towers, glass panels, and similar structures, including typical modes of failure.	L5
9	3	Explain the code provisions for wind-resistant design, including design wind speed and pressure coefficients as per relevant standards.	L4
10	3	Discuss coastal zoning regulations for construction and reconstruction in cyclone-prone areas. How do these regulations reduce structural and human risk?	L3
11	3	Explain innovative construction materials and techniques used for wind-resistant structures. Give examples of their applications.	L3

S.No.	CO	Questions	BT
Unit IV: (Seismology and Earthquake Effects)			
1	4	Explain the causes of earthquakes with reference to plate tectonics, faults, and stress accumulation.	L4
2	4	Differentiate between seismic magnitude and intensity. How are they measured, and what is their significance in earthquake engineering?	L3
3	4	Describe the types of seismic waves (P, S, and surface waves) and their impact on structures during an earthquake.	L4
4	4	Explain the concepts of epicenter, hypocenter, and energy release during an earthquake. How do they affect ground shaking?	L3



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5	4	Discuss the effects of earthquakes on the ground, including soil rupture, liquefaction, and induced landslides.	L5
6	4	Discuss the performance of ground and buildings during past earthquakes, highlighting typical damage patterns.	L4
7	4	Explain the behavior and collapse patterns of various types of buildings and structures during earthquakes.	L3
8	4	Discuss the behaviour of non-structural elements such as services, fixtures, and mountings during earthquakes with suitable examples.	L5
9	4	Explain the concept of seismic retrofitting. What are the common weaknesses of existing buildings that retrofitting addresses?	L4
10	4	Discuss techniques used in repair, restoration, and seismic strengthening of aged or damaged structures. Provide examples.	L3
11	4	Describe the role of soil type and ground conditions in influencing earthquake-induced damage to buildings.	L3

S.No.	CO	Questions	BT
Unit V: (Planning and Design Considerations for Seismic Safety)			
1	5	Explain general planning and design considerations for seismic safety in buildings.	L4
2	5	Discuss the influence of building forms, horizontal and vertical eccentricities, and mass distribution on seismic performance.	L3
3	5	Explain the effects of soft stories in multi-storey buildings during earthquakes and methods to mitigate them.	L4
4	5	Analyze seismic effects related to building configuration, including plan and vertical irregularities.	L3
5	5	Discuss the importance of redundancy and setbacks in seismic-resistant building design.	L5
6	5	Explain the design and seismic considerations for various types of foundations under different soil conditions.	L4
7	5	Describe soil stabilization techniques and their importance in seismic-resistant construction.	L3
8	5	Discuss the design of retaining walls and plinth fill to improve earthquake resilience.	L5
9	5	Explain seismic design considerations for floors, walls, roofs, terraces, parapets, and openings.	L4



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10	5	Discuss seismic design aspects of staircases, boundary walls, and water tanks (overhead and underground).	L3
11	5	Explain the role of innovative construction materials and techniques in improving seismic safety.	L3

Note: L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating

Instruction to Faculty Members:

The Six Levels of Bloom's Taxonomy:

1. **Remembering:** Retrieving, recognizing, and recalling relevant knowledge from long-term memory (e.g., list, define, name, locate).
2. **Understanding:** Constructing meaning, explaining ideas, or concepts (e.g., summarize, interpret, classify, compare).
3. **Applying:** Using information in new situations or implementing procedures to solve problems (e.g., solve, use, demonstrate, implement).
4. **Analyzing:** Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure (e.g., contrast, categorize, distinguish, diagram).
5. **Evaluating:** Making judgments based on criteria and standards through checking and critiquing (e.g., judge, critique, justify, defend, argue).
6. **Creating:** Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure (e.g., design, construct, develop, formulate).