

MINOR SPECIALIZATION

NATURAL HAZARDS AND DISASTERMANAGEMENT

Outcome of the course:

- Students who take this course will gain a thorough, critical understanding of advancedseismology and earthquakes. Specialization
- Students will gain an understanding of flood and drought.
- Students who take this course will gain a basic knowledge of Landslide Hazard Assessment and Mitigation.
- Students will gain a detailed understanding of Disaster Management.

Course structure

Subject code	Subject name	Department	L	T	P	Credit	Sem
CE10801A	Engineering Seismology	CE	3	0	0	3	IV
CE10802A	Flood and Drought	CE	3	0	0	3	V
CE10803A	Landslide Hazard Assessment And Mitigation	CE	3	0	0	3	VI
CE10804A	Disaster Management	CE	3	0	0	3	VII
CE10702A	Seminar	CE	0	0	2	1	VII
CE10604A	Project	CE	0	0	14	7	VIII
TOTAL CREDIT						20	

Minor specialization (Semester: IV)
ENGINEERING SEISMOLOGY [3 003]
Subject code: CE10801A

Course Outcomes:

CO1: Students who take this course will gain a thorough, critical understanding of seismology and causes of earthquakes.

CO2: Understanding of seismic hazard and a detailed understanding of wave equations and their solutions. Students will be able to use, interpret and evaluate.

CO3: Assess the design basis ground motion parameters and its application in earthquake engineering for disaster mitigation.

CO4: Processing, analysis and interpretation of earthquake data, determination of magnitude, epicentral distance, focal depth, focal mechanism.

Module no.	Description	Hours
1	Propagation of earthquake Waves, Body & surface waves, laws of reflection, refraction and attenuation, travel times curves, internal structure of earth	7
2	Seismicity of earth, major earthquakes in the world, important Indian Earthquakes, earthquake catalogs, plate tectonics, causes of earthquakes. Magnitude, energy, intensity, acceleration, return period, frequency, Ground Motion characteristics.	15
4	Earthquake recording instruments, seismographs, different modes of recording analogue, digital, micro earthquake, teleseismic, local, strong motion, band width and their engineering implications.	8
5	Processing, analysis and interpretation of earthquake data, determination of magnitude, epicentral distance, focal depth, focal mechanism, seismic Hazard and risk, seismic zoning. Introduction to earthquake prediction – a brief idea.	10
	TOTAL	38

References:

1. Richter, C.F. Elementary Seismology, Eurasia Publishing House (Pvt)LTD, New Delhi 2.
2. Agrawal, P.N., Engineering Seismology, Oxford & IBH Publishing Co.Pvt.Ltd, NewDelhi
3. Aki,K and Richard, P.G. Quantitative seismology, Theory and Methods, Vol.I andII.W.H. Freeman & Co.
4. Rikitake, T., 1976 Earthquake Prediction, Elsevier Science, Amsterdam 5.
5. Oldham, 1989 Report on Great Earthquake of 12th June 1897, Memoir Geological Survey of India, V29.
6. Latest Codes of IS-1893-part-ERS

Minor specialization (Semester: V)
FLOOD AND DROUGHT [3003]
Subject code: CE10802A

Course Outcomes:

CO1: An understanding of flood and flood routing.

CO2: An understanding of the Drought and Drought management system.

CO3: To know the water resources scenario in India.

Module no.	Description	Hours
1	Introduction: Definition and scope of the subject, Flood and drought with human Introduction	03
2	Flood: Rational Method, Empirical Formulae, Unit Hydrograph Method, Flood Frequency Method, Gumbel's Method, Log-Pearson Type III Distribution, Partial duration series, Regional Flood Frequency Analysis, Extremes of Extremes-Envelope curve, Data for frequency studies, Design Flood, Design. Storm, Risk, Reliability and safety factor	12
3	Flood Routing: Introduction, Basic equations, Level pool routing, Attenuation, Hydrologic Channel routing, Hydraulic method of flood routing, Clark's method for IUH, Nash conceptual model, Flood control, Flood control in India.	05
4	Drought: Classification, Types of drought, Aridity Index, Impact of drought, Possible modification of drought components Drought Management: Definition , Water Harvesting, Rain water Harvesting, Flood water harvesting, Different types of water harvesting	12
5	Droughts in India: Causes, Status, Surface water resources of India Utilizable water resources, Total water requirement and available water Resources scenario in India	06
Total		38

References:

1. Ven te Chow, Applied Hydrology, McGraw Hill.
2. Mutreja, Applied Hydrology, McGraw Hill.
3. Subramanya K, Engineering Hydrology, Tata McGraw Hill.
4. Raghunath H M, Hydrology, Wiley New Delhi, Kanna Publishers.
5. Nelson, Introduction to Copula, Springer.

Minor specialization (Semester: VI)
LANDSLIDE HAZARD ASSESSMENT AND MITIGATION [3 0 0 31]
Subject code: CE10803A

Course Outcomes:

CO1: Students who take this course will gain a basic knowledge of landslides and factorsLandslides.

CO2: Students will gain a detailed knowledge of classification and mapping of landslides.

CO3: Students will gain a detailed understanding of landslides hazard and effect of stability ofSlopes.

CO4: Students will gain a detailed understanding of landslides control measures and case studies of landslides.

Module no.	Description	Hours
1	Introduction: Definition; overview of Hazard assessment techniques on regional, semi detail and detailed scales and their application for planning purposes; Terrain classification and ma in methods, use of RS and GIS.	04
2	Factors for landslide: Causative factors of landslides natural including inherent factors and external factors as well as anthropogenic factors; Impacts of natural causative factors like lithology, structure, slope morphometry, relative relief, hydrogeological conditions and land use and land cover on stability of slopes Impacts of external factors like concentrated rain fall and earth quakes on slope stability; Various causes of slope instability in Himalaya; extreme hydro-meteorological conditions leading to landslide dams and Related damages	10
3	Classification and Mapping: Classification of landslides and mass movements, Landslide hazard zonation (LHZ) on regional scales in India; LHZ mapping technique suggested by Bureau of Indian Standards with exam les; Application of regional scale LHZ maps.	04
4	Landslide hazard studies and stability of slopes: Landslide hazard studies on detailed scale of 1: 1000; Mechanics of landslide; Markland test for landslide probability, Strength of slope materials; Assessment of rock mass properties; Overview of slope stability studies for slopes characterized by overburden debris and rock materials.	06
5	Landslide Control Measures: Landslide control measures – grading of slopes, retaining walls, breast walls, drainage measures, rock bolts and rock anchors, Biotechnical measures, Special toe walls and other stability Measures. Case studies in India: Case studies of important landslides of Himalaya and their control practices.	14
	Total	38

References:

1. Mitigation of Natural hazards and Disasters: International perspective. Haque, C. Emdad, Springer, Dordrecht. Mutreja.
2. Environmental geosciences. Keller, EA. John Wiley & Sons, NY.
3. Natural hazard risk assessment and Public policy. Petak, W.J. and Atkinson, A.D. Springer Verlag, NY.
4. Subramanya K, Engineering Hydrology, Tata McGraw Hill.
5. A field manual for landslide investigations, R. Anbalagan, B. Singh, D. Chakraborty and A. Kohli. DST Government of India, New Delhi.

Minor specialization (Semester: VII)
DISASTER MANAGEMENT [3003]
Subject code: CE10804A

Course Outcomes:

CO1: Students who take this course will gain a thorough, critical understanding of Disaster management and Risk and Vulnerability Analysis of Disaster.

CO2: Students will gain a detailed understanding of Disaster Preparedness and Response.

CO3: Students will gain a detailed understanding of Rehabilitation, Reconstruction and Recovery.

Module no.	Description	Hours
1	<p>Introduction on Disaster: Different Types of Disaster :</p> <p>A) Natural Disaster: such as Flood, Cyclone, Earthquakes, Landslides etc</p> <p>B) Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road), Structural failures (Building and Bridge), War & Terrorism etc.</p> <p>Causes, effects and practical examples for all disasters.</p>	10
2	<p>Risk and Vulnerability Analysis:</p> <ol style="list-style-type: none"> 1. Risk: Its concept and analysis 2. Risk Reduction 3. Vulnerability: Its concept and analysis 4. Strategic Development for Vulnerability Reduction. 	08
3	<p>Disaster Preparedness and Response:</p> <p>Preparedness-</p> <ol style="list-style-type: none"> 1. Disaster Preparedness: Concept and Nature 2. Disaster Preparedness Plan 3. Prediction, Early Warnings and Safety Measures of Disaster. 4. Role of Information, Education, Communication, And Training. 5. Role of Government, International and NGO Bodies. 6. Role of IT in Disaster Preparedness 7. Role of Engineers on Disaster Management. <p>Response</p> <ol style="list-style-type: none"> 8. Disaster Response: Introduction 9. Disaster Response Plan 10. Communication, Participation, and Activation of Emergency Preparedness Plan 11. Search, Rescue, Evacuation and Logistic Management 12. Role of Government, International and NGO Bodies 13. Psychological Response and Management (Trauma, Stress, Rumor and Panic) 14. Relief and Recovery 15. Medical Health Response to Different Disasters 	12

4	Rehabilitation, Reconstruction and Recovery: <ol style="list-style-type: none"> 1. Reconstruction and Rehabilitation as a Means of Development. 2. Damage Assessment 3. Post Disaster effects And Remedial Measures. 4. Creation of Long-term Job Opportunities and Livelihood Options, 5. Disaster Resistant House Construction 6. Sanitation and Hygiene 7. Education and Awareness, 8. Dealing with Victims' Psychology. 9. Long-term Counter Disaster Planning 10. Role of Educational Institute. 	08
	Total	38

References:

1. Dr. Mrinalini Pandey. Disaster Management. Wiley India Pvt. Ltd.
2. Jagbir Singh. Disaster Management: Future Challenges and Opportunities. Publishers Pvt. Ltd.
3. J. P. Singhal. Disaster Management. Laxmi Publications.
4. Shailesh Shukla, Shamna. Biodiversity, Environment and Disaster Management. Unique Publications.

SEMINAR [0 0 11]
Subject code: CE10702A

Serial No	Subject	Objective	Total Credit
1	Seminar	The students are required to undertake innovative and research oriented project under the direct supervision of a faculty member of the department. The Seminar should not only to reflect their knowledge gained in the previous semesters but also to acquire additional knowledge and skills by their own effort. The Seminar will be assigned at the 7 th Semester and the final evaluation is carried out at the end of 8 th Semester.	01

PROJECT [0 0 147]
Subject code: CE10604A

Serial No	Subject	Objective	Total Credit
1	Project	The students are required to undertake innovative and research oriented project under the direct supervision of a faculty member of the department. The Project should not only to reflect their knowledge gained in the previous semesters but also to acquire additional knowledge and skills by their own effort. The Projects will be assigned at the beginning of the 8 th Semester and the final evaluation is carried out at the end of 8 th Semester.	07