# Punyashlok Ahilyadevi Holkar Solapur University, Solapur


**NAAC Accredited-2015**
**'B' Grade (CGPA 2.62)**

## Name of the Faculty: Science and Technology

**CHOICE BASED CREDIT SYSTEM**

## Structure & Syllabus: Civil Engineering

**Name of the Course: Honors Degree**

**(Syllabus to be implemented from w.e.f. June 2021)**

# PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

## FACULTY OF ENGINEERING & TECHNOLOGY

Honors in Disaster Management and Mitigation

(With B. Tech. Civil Engineering)

**WEF batch of 2020-21**

**Effective to S. Y. B. Tech Hons. batch of 2021-22**

| *Course Code* | *Course Name* | *Hrs./week* | | | *Credits* | *Examination Scheme* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | *L* | *T* | *P* | | *ESE* | *ISE* | *ICA* | *Total* |
| Semester - IV | | | | | | | | | |
| Hn411 | Disaster Management | 3 | 1 | | 4 | 70 | 30 | 25 | 125 |
| Semester - V | | | | | | | | | |
| Hn512 | Risk Assessment and Vulnerability Analysis | 3 | | 2 | 4 | 70 | 30 | 25 | 125 |
| Semester - VI | | | | | | | | | |
| Hn613 | Disaster Preparedness and Response | 4 | | 2 | 5 | 70 | 30 | 25 | 125 |
| | Seminar | | | 2* | 1 | | | 50 | 50 |
| Semester - VII | | | | | | | | | |
| Hn714 | Recovery, Rehabilitation and Reconstruction | 3 | | 2 | 4 | 70 | 30 | 25 | 125 |
| | Mini Project | | | 2* | 1 | | | 50 | 50 |
| **Sub Total** | | 13 | 1 | 10 | 19 | 280 | 120 | 200 | 600 |

* indicates contact hours

**Punyashlok Ahilyadevi Holkar Solapur University, Solapur**

**S. Y. B. Tech. (Civil Engineering) – II, Semester- IV**

**Hn411: Disaster Management**

| **Teaching Scheme** | **Examination Scheme** |
|---|---|
| **Lectures –** 3 Hrs/Week, 3 Credits | **ISE –** 30 Marks |
| **Tutorial –** 1 Hr/Week, 1 Credit | **ESE –**70 Marks |
| | **ICA** – 25 Marks |

**Course outcomes:**

Upon successful completion of course, the students will be able to:

1. Elaborate the basic concepts of various types of disasters.
2. Acquire the skills of managing the various types of disasters
3. Identify the impacts of various types of disasters
4. Identify the disaster Determinants
5. Acquire the skills needed for organizing and effective dissemination of information during disaster
6. Apply the knowledge of advanced technologies for warning systems in disaster management

**SECTION-I**

**Unit 1: Introduction (4)**

Introduction of terminology: Hazard, Risk, Vulnerability, Disaster, Nature, Importance, Dimensions & Scope of Disaster Management. Disaster Management Cycle.

**Unit 2: Natural Disasters (6)**

**Natural Disasters**- Meaning and nature of natural disasters, their types and effects.

**Hydrological Disasters** - Flood, Flash flood, Drought, cloud burst.

Geological Disasters- Earthquakes, Tsunamis, Landslides, Avalanches, Volcanic eruptions, Mudflow

**Wind related Disasters**- Cyclone, Storm, Storm surge, Tidal waves, Heat and cold Waves.

Climatic Change, Global warming, Sea Level rise, Ozone Depletion

**Unit 3: Manmade Disasters (6)**

Chemical disasters, biological disasters, radiological disasters, nuclear disasters.

Fire – building fire, coal fire, forest fire, Oil fire

Accidents- road accidents, rail accidents, air accidents, sea accidents, Pollution - air pollution, water pollution, Deforestation, Industrial waste.

**Unit 4: Disaster Case studies (8)**

Global Case Studies in Disaster Management: Japan's Tohoku Earth Quake 2011 and Nepal Earthquake (2015), China floods2016 and Thailand floods 2017, Hurricane Katrina (2005), East Africa Drought (2011), Volcanic Eruptions: Case Studies of Italy.

National Case Studies in Disaster Management: Indian Ocean Earthquake (2004) (Tsunami) and Gujarat Earthquake (2001), Uttarakhand Flash Floods and Kashmir Floods, Drought Management in Gujarat & Rajasthan, Landslides in Shiwalik Hills Case Study, Avalanches in Jammu and Kashmir: Case Studies, Pukhrayan train derailment 20 November 2016 and Bhopal Gas Tragedy, Flood in Orissa.

**SECTION-II**

**Unit 5: Disaster Determinants (6)**

Factors affecting damage – types, social status, habitation pattern, physiology and climate.

Factors affecting mitigation measures, prediction, preparation, communication, area and accessibility, population, physiology and climate

**Unit 6: Importance of Information in Disasters (7)**

Methods of collecting relevant information – libraries, internet, interview questionnaires, survey, observation, Mass media, Meetings. Role of Information from disaster affected community, Disaster management Information System, Organizing and effective dissemination of information: feedback for improving information. Role of Communication in Disasters, Types of communication in case of disasters –HAM radio, Satellite, Video Conferencing, Electronics devices

**Unit 7: Advanced Technologies for Warning System (8)**

Definition of Early Warning System, Community Early Warning System, Core Components of People centered Early Warning System, Emergency Communication System, Wireless Communication, Bluetooth Wireless Technology, HAM Radio, GPS Application in

Emergency Communication, Remote Sensing and GIS Application in Warning System, Cyclone Warning System and Tsunami Warning System

## INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) submission shall consist of the following –

1. Assignments (One Assignment on each unit)

## TEXT BOOKS


1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.
4. Disaster Management, J. P. Singhal, Laxmi Publications
5. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role ofEnvironmental Knowledge, Narosa Publishing House, Delhi.


## REFERENCE BOOKS


1. "Natural Hazards and Disaster Management: Vulnerability and Mitigation" by R B Singh, Rawat Publications; Reprint edition (1 January 2006)
2. "Disaster Management and Mitigation" by Prof R B Singh, World Focus (1 January 2016)
3. "DISASTER MITIGATION: EXPERIENCES AND REFLECTIONS" by Alka Dhameja and Pardeep Dhameja, Prentice Hall India Learning Private Limited; New title edition (1 January 2001)
4. "Management and Mitigation of Natural Disasters" by Rajan Kumar Sahoo, Regal Publications; 1st edition (1 April 2014), Deep & Deep Publications (30 March 2007)
5. "Disaster Mitigation and Management: Post-Tsunami Perspectives" by Jegadish P Gandhi,
6. Disasters: Strengthening Community Mitigation and Preparedness" by Khanna B K, New India Publishing Agency (1 January 2011)
7. "Strengthening Resilience in Post – Disaster Situations: Stories, Experience and Lessons from South Asia" by IDRC Academic Foundation (1 January 2011)
8. "Disaster Management at Health Care Settings Comprehensive Assessment and Effective Mitigation" by Shreen Gaber, Lulu.com (18 November 2015)

9. “Disaster Education and Management” by Rajendra Kumar Bhandari, Springer Nature; 2014th edition (10 December 2013)
10. Disaster Science and Management, Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.

**Punyashlok Ahilyadevi Holkar Solapur University, Solapur**

**T. Y. B. Tech. (Civil Engineering) – II, Semester- ~~VI~~**

**Hn512: Risk Assessment and Vulnerability Analysis**

| **Teaching Scheme** | **Examination Scheme** |
|---|---|
| **Lectures –** 3 Hrs/Week, 3 Credits | **ISE –** 30 Marks |
| **Practical –** 2 Hr/Week, 1 Credit | **ESE –**70 Marks |
| | **ICA** – 25 Marks |

**Course outcomes:**

Upon successful completion of course, the students will be able to:

1. Elaborate the concept of risk and vulnerability
2. Asses the risk factors, and suggest initiatives for risk reduction.
3. Calculate risk and vulnerability factors
4. Develop strategic planning for vulnerability reduction
5. Acquire the knowledge about disaster epidemiology
6. Apply the emerging technologies in disaster preparedness

## SECTION-I

### Unit 1: Introduction (7)

Risk Concepts, Elements of Risk, Perception of Risk, Acceptable risk, Requirements in Risk Assessment, Risk Reduction-Mainstreaming "Risk", Role of science and technology in Disaster Risk Reduction, Strategies of Risk reduction, International Mobilization of Risk reduction.

### Unit 2: Risk Assessment & Reduction (8)

Risk analysis techniques; Process of Risk assessment, Analytical systems for risk assessment, Natural hazard/ risk assessment, understanding climate risk, Mapping of risk assessment, Decision making for risk reduction, Problems in risk assessment, Participatory risk assessment - Rationale for people's participation, Role of civil society organizations, Impact of Globalization, Activities and roles for the community action
Risk reduction, Participatory risk assessment methods

### Unit 3: Vulnerability (8)

Observation and perception of vulnerability- Vulnerability Identification, Vulnerability types

and dimensions, Vulnerability- Social factors and economic factors, Vulnerability to shanty settlements; Vulnerability in the city, Risk in Urban areas, Issues in urban planning, Initiatives for risk reduction in India.

## SECTION-II

**Unit 4: Strategic development for Vulnerability reduction (8)**

Physical & Social infrastructure for Vulnerability reduction, Interactive areas for Vulnerability reduction & Policy making, Hazard resistant designs and construction, Systematic management and Strategic planning for vulnerability reduction

**Unit 5: Disaster Epidemiology (7)**

Epidemiological Study of Disaster, Education and Training in Health Management of Disasters, Role of Information and Communication Technology in Health Response, Prevention of Risk

**Unit 6: Emerging trends in Disaster Management (7)**

Use and Application of Emerging Technologies in Disaster Preparedness, Emerging trends in Disaster Management, Emerging Trends in Disaster Mitigation-I, Disaster and Development

## INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) submission shall consist of the following –

1. Assignments (One Assignment on each unit)

## TEXT BOOKS


1. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
2. Dr. Mrinalini Pandey, Disaster Management, Wiley India Pvt. Ltd.
3. Disaster Management: Future Challenges and Opportunities, Jagbir Singh, K W Publishers Pvt. Ltd.
4. Biodiversity, Environment and Disaster Management, Laxmi Publications. Biodiversity, Environment and Disaster Management, Shailesh Shukla, Shamna Hussain, Unique Publications.
5. Earth and Atmospheric Disaster Management: Nature and Manmade, C. K. Rajan Navale Pandharinath, B S Publication

## REFERENCE BOOKS


1. "Natural Hazards and Disaster Management: Vulnerability and Mitigation" by R B Singh, Rawat Publications; Reprint edition (1 January 2006)
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3. "DISASTER MITIGATION: EXPERIENCES AND REFLECTIONS" by Alka Dhameja and Pardeep Dhameja, Prentice Hall India Learning Private Limited; New title edition (1 January 2001)
4. "Management and Mitigation of Natural Disasters" by Rajan Kumar Sahoo, Regal Publications; 1st edition (1 April 2014), Deep & Deep Publications (30 March 2007)
5. "Disaster Mitigation and Management: Post-Tsunami Perspectives" by Jegadish P Gandhi,
6. Disasters: Strengthening Community Mitigation and Preparedness" by Khanna B K, New India Publishing Agency (1 January 2011)
7. "Strengthening Resilience in Post – Disaster Situations: Stories, Experience and Lessons from South Asia" by IDRC Academic Foundation (1 January 2011)
8. "Disaster Management at Health Care Settings Comprehensive Assessment and Effective Mitigation" by Shreen Gaber, Lulu.com (18 November 2015)
9. "Disaster Education and Management" by Rajendra Kumar Bhandari, Springer Nature; 2014th edition (10 December 2013)
10. Disaster Science and Management, Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.

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**T. Y. B. Tech. (Civil Engineering) – II, Semester- VI**

**Hn613: Disaster Preparedness and Response**

| **Teaching Scheme** | **Examination Scheme** |
|---|---|
| **Lectures –** 4 Hrs/Week, 4 Credits | **ISE –** 30 Marks |
| **Practical –** 2 Hr/Week, 1 Credit | **ESE –**70 Marks |
| | **ICA** – 25 Marks |

**Course outcomes:**

Upon successful completion of course, the students will be able to:

1. Build skills to respond to disaster
2. Execute the disaster preparedness plan
3. Explain the role of government and all other non-government organizations
4. Plan the disaster responses
5. Draft the reports/ documents using information after disasters

## SECTION I

### Unit 1: Disaster Preparedness (9)

Disaster Preparedness: concept and significance, Disaster Preparedness Measures, Institutional Mechanism for Disaster Preparedness, Disaster preparedness with special needs/ vulnerable groups, Disaster Preparedness: Policy and Programmes

### Unit 2: Disaster Preparedness Plan (9)

Concept and Significance of Disaster Preparedness Plan, Disaster Preparedness Plan essentials, Community Based Disaster Preparedness plan, Prediction, Early Warnings and Safety Measures of Disaster

### Unit 3: Role of Different Organizations / Institutions (10)

Role of Information, Education, Communication, and Training, Role of Government, International and NGO Bodies, Role of Information Technology (IT) in Disaster Preparedness, Role of Geographers on Disaster Management.

## SECTION II

**Unit 4: Disaster Response (10)**

Essential Components of Disaster Response, Disaster Response Plan, Resource Management- Financial, Medical, equipment, communication, Human, transportation, Food and essential commodity (Identification, Procuring, Propositioning and deployment), Directing and controlling functions, Communication, Participation & activation of Emergency Preparedness Plan, Logistics Management, Emergency support functions, Need and damage assessment

**Unit 5: Coordination in Disaster Response (10)**

Disaster Response Plan - Communication, Participation, and Activation of Emergency Preparedness Plan, Search, Rescue, Evacuation and Logistic Management Psychological Response and Management (Trauma, Stress, Rumor and Panic), Relief and Recovery Medical Health Response to Different Disasters.

**Unit 6: Reporting, Information and Documentation in Disasters (10)**

Media, Types of Media, Importance of role of media – informative, suggestive and analytical, Role of Media in Disaster Mitigation, Factual and Ethical Reporting, Impact of Media Coverage and Public Communication and Handling of Media, Documentation, Principles of Report Writing and Guidelines according to style manuals

## INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) submission shall consist of the following –

2. Assignments (One Assignment on each unit)

## TEXT BOOKS


1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, ButterworthHeineman.
3. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.
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5. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role ofEnvironmental Knowledge, Narosa Publishing House, Delhi.

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6. Disasters: Strengthening Community Mitigation and Preparedness" by Khanna B K, New India Publishing Agency (1 January 2011)
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## Punyashlok Ahilyadevi Holkar Solapur University, Solapur

**T. Y. B. Tech. (Civil Engineering) – II, Semester- VI**

**Seminar**

| **Teaching Scheme** | **Examination Scheme** |
|---|---|
| **Practical –** 2 Hr/Week, 1 Credit | **ICA** – 50 Marks |

Students practice speaking in front of a scientific audience and to explore topics in detail. Students will research topics and organize presentations for faculty and other students. The topics may be any aspect of Disaster Management and Mitigation related activities. This Topic could be a synopsis of the Mini Project giving all the planning and theoretical Background and topic depth assessment related aspects. In addition, students are expected to attend all other seminars. It is expected that students will actively participate by asking questions of the speaker. Following submission is also expected before final delivery of the seminar.

Submit a hard copy of your topic description which will have a tentative title, a paragraph or two describing the topic, as well as several pertinent references (5-8 is sufficient). Proof-read your work for grammar and spelling. Use a citation format from a journal in your discipline, and be consistent in your format. Students will submit a detailed outline (1 – 1.5 pages) of their presentation and also a brief abstract (one or two paragraphs; **250 words max.**) describing their presentation.

**Punyashlok Ahilyadevi Holkar Solapur University, Solapur**

**Final. Y. B. Tech. (Civil Engineering) – I, Semester- VII**

**Hn714: Recovery, Rehabilitation and Reconstruction**

| **Teaching Scheme** | **Examination Scheme** |
|---|---|
| **Lectures –** 3 Hrs/Week, 3 Credits | **ISE –** 30 Marks |
| **Practical –** 2 Hr/Week, 1 Credit | **ESE –**70 Marks |
| | **ICA** – 25 Marks |

**Course outcomes:**

Upon successful completion of course, the students will be able to:

1. Provide the solution for rehabilitation, reconstruction and development
2. Demonstrate the role of different organizations in rehabilitation
3. Elaborate about disaster resistant house construction
4. Explain the concepts of speedy recovery, linking Recovery with safe development
5. Explain the community based approach in disaster management

**SECTION-I**

**Unit 1: Rehabilitation, Reconstruction and Development (8)**

Rehabilitation, Reconstruction and Development-Concept, Meaning, Types of Rehabilitation and Reconstruction, Importance of Disaster Mitigation, Cost – benefit analysis, relationship between vulnerability and development, Damage Assessment- Post Disaster Damage assessment, estimated damage assessment due to probable disasters. Sample Surveys, Epidemiological Surveillance, Nutrition Centered Health Assessment, Remote sensing and Aerial photography, nature and damage to houses and
infrastructure due to different disasters.

**Unit 2: Role of Different Organizations in Rehabilitation (8)**

The Government and Disaster Recovery and rehabilitation, Disaster and Non-Governmental efforts, Role of Local Institutions; Insurance, Police, Media, Reconstruction, Speedy Reconstructions- Essential services, Social infrastructures, Immediate shelters/camps, Contingency plans for reconstructions, Development of Physical and Economic Infrastructure- Developing Physical and Economic Infrastructure, Environmental Infrastructure development

**Unit 3: Disaster Resistant House Construction (7)**

Guidelines for Disaster resistant construction, traditional techniques, Seismic strengthening of houses in low rain/High rainfall area, earthquake resistant construction technique, Funding arrangements- Funding arrangements at state level and central level, Fiscal discipline, role of International agencies, mobilization of community for resource generation

## SECTION-II

**Unit 4: Rehabilitation (7)**

Rehabilitation - Socio- economic Rehabilitation- Temporary Livelihood Options and Socio-Economic Rehabilitation, Education and awareness and role of Information Dissemination, Participative Rehabilitation, Role of various agencies in Recovery Work- Monitoring and Evaluation of rehabilitation work, Rehabilitation process

**Unit 5: Recovery (6)**

Concept of recovery, livelihood and approach to reconstruction, Livelihood restoration, Speedy recovery, Linking Recovery with safe development, Creation of Long-term job opportunities

**Unit 6: Community linkage in disaster management (8)**

Community based Approach, Community Based Disaster Management, Human Behavior and Response: Individual, Community, Institutional, Community Participation and Awareness, Community Health During Disasters: Drinking Water, Food and Nutrition, Hygiene and Sanitation, Community Health Management, Emergency Health Operations, Remote Area Planning, Leadership and Coordination in Disaster Management, Life skills, Time Management Skills

## INTERNAL CONTINUOUS ASSESSMENT (ICA)

Internal Continuous Assessment (ICA) submission shall consist of the following –

1. Assignments (One Assignment on each unit)

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1. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
2. Dr. Mrinalini Pandey, Disaster Management, Wiley India Pvt. Ltd.
3. Disaster Management: Future Challenges and Opportunities, Jagbir Singh, K W Publishers Pvt. Ltd.
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5. Earth and Atmospheric Disaster Management: Nature and Manmade, C. K. Rajan Navale Pandharinath, B S Publication


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5. "Disaster Mitigation and Management: Post-Tsunami Perspectives" by Jegadish P Gandhi,
6. Disasters: Strengthening Community Mitigation and Preparedness" by Khanna B K, New India Publishing Agency (1 January 2011)
7. "Strengthening Resilience in Post – Disaster Situations: Stories, Experience and Lessons from South Asia" by IDRC Academic Foundation (1 January 2011)
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## Punyashlok Ahilyadevi Holkar Solapur University, Solapur

### B. Tech. Civil Engg- I; Semester – VII

**Mini Project**

| **Teaching Scheme** | **Examination Scheme** |
|---|---|
| **Practical –** 2 Hr/Week, 1 Credit | **ICA** – 50 Marks |

The purpose of the mini project is to demonstrate applications of the techniques learned in the courses of the Disaster Management and Mitigation. Students should take a case study on any previous disaster or likely to be occurring disaster and apply the set of tools learned during the course for the possible mitigation of the impact of considered disaster. Students can also chose any other innovative ideas like development of some processes or product independent of any case and work on it.

The mini project should be supported with the logical flow of tools utilised for solving the selected case study. The assessment should be performed using rubrics based on following aspects:

i. Response of student during problem formulation of mini project
ii. Response of student during implementation stage of the Project
iii. Final assessment based on a presentation and a report on mini project covering Objectives, tools utilised to achieve objectives, results and conclusions.
iv. Any other tangible outcomes like participation in some competition, case study presented to any relevant authorities, Product development, patent filling or publication, Interaction with any outside agencies like industry and academic institution of repute.