

॥ सा विद्या या विमुक्तये ॥



# स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

“ज्ञानतीर्थ” परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED**

“Dnyanteerth”, Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade



## ACADEMIC (1-BOARD OF STUDIES) SECTION

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वाणिज्य व व्यवस्थापन अभ्यास  
विद्याशाखेतील विविध पदवी व पदव्युत्तर  
विषयांचे सी.बी.सी.एस. पॅटर्नचे अभ्यासक्रम  
शैक्षणिक वर्ष २०१९-२० पासून लागू  
करण्याबाबत. .

### प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४ व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र. १५/४४-२०१९ च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या संलग्नित महाविद्यालयांतील वाणिज्य व व्यवस्थापन विद्याशाखेतील पदवी व पदव्युत्तर स्तरावरील खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९-२० पासून लागू करण्यात येत आहेत.

- 1) M.Com. (Affiliated College) I year (I&II Sem.)
- 2) M.Com. (External Mode) Syllabus.
- 3) M.Com. I year Syllabus (School of Commerce and Management Sciences. S.R.T.M.U.N. Campus Syllabus.
- 4) M.Com. (Banking & Insurance) I year I & II Sem. Syllabus for Bhokar and Sengaoon College.
- 5) M.Com. I year Syllabus (New Model College, Hingoli)
- 6) B.B.A. I year Syllabus (New Model College, Hingoli)
- 7) M.B.A. I year (School of Commerce & Management Science, S.R.T.M.U. Compus) Syllabus.
- 8) M.B.A. I year (Sub-Centre Latur).
- 9) B.Com. I year (Banking & Insurance) I year Syllabus.
- 10) D.D.M. Syllabus. (Sub-Centre, Latur)
- 11) M.Com. I year Syllabus. (Sub-Centre, Latur)
- 12) B.Com.- I,II,III year Syllabus. (New Model Degree College, Hingoli)

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या [www.srtmun.ac.in](http://www.srtmun.ac.in) या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

‘ज्ञानतीर्थ’ परिसर,

विष्णुपुरी, नांदेड - ४३१ ६०६.

जा.क्र.: शैक्षणिक-०१/परिपत्रक/पदवी व पदव्युत्तर-सीबीसीएस

अभ्यासक्रम/२०१९-२०/८९

दिनांक : २०.०६.२०१९.

प्रत माहिती व पुढील कार्यवाहीस्तव :

- १) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- २) मा. संचालक, परीक्षा व मूल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
- ३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
- ४) उपकुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
- ५) साहाय्यक कुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
- ६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

स्वाक्षरित / -

**उपकुलसचिव**

शैक्षणिक (१-अभ्यासमंडळ विभाग)

Diploma in Disaster Management (D.D.M.),  
School of Management Sciences, S.R.T.M.U.N. Sub-centre, Latur



## **CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**OF**

**Diploma in Disaster Management**

**(D.D.M.)**

**Implemented From the Academic Year 2019-2020**

### DDM syllabus based on Choice Based Credit System [CBCS] pattern from the Academic Year 2019-20

Semester – I			Semester – II		
Paper No.	Subject	Credits	Paper No.	Subject	Credits
<b>Compulsory Subjects (DM 101 to DM 104)</b>			<b>Compulsory Subjects (DM 201 to DM 204)</b>		
DM 101	Introduction to Disaster Management	04	DM 201	Disaster Preparedness	04
DM 102	ICT for Disaster Management	04	DM 202	Disaster Response	04
DM 103	GIS in Disaster Management	04	DM 203	Rehabilitation Reconstruction and Recovery	04
DM 104	Practical Work	04	DM 204	Project Work	04
DM 105	Industrial Disaster Management	04	DM 205	Industrial Safety Management	04
<b>Elective ( Any one subjects from DM 106 to DM 108)</b>			<b>Elective ( Any one subjects from DM 206 to DM 208)</b>		
DM 106	Risk Assessment and Vulnerability Analysis	04	DM 206	Managing Human Behavior	04
DM 107	Environment Studies	04	DM 207	Finance and Insurance in Disaster Management	04
DM 108	Research Methodology in Disaster Management	04	DM 208	Disaster Management Policy and Administration	04
<b>Total Credits</b>		<b>24</b>	<b>Total Credits</b>		<b>24</b>

- In both semester first five Courses are compulsory ( For Semester- I, DM 101 to DM 105 and for Semester- II, DM 201 to DM 205). Out of the remaining Courses student shall select any one Courses in both semester ( For Semester- I, DM 106 to DM 108 and for Semester- II, DM 206 to DM 208)
- Revised syllabus based on choice based credit system [CBCS] pattern for one year full time UGC sponsored Diploma in Disaster Management effective from Academic Year 2019-20

### **(I) Introduction**

The name of the course shall be *Diploma in Disaster Management (D.D.M.)*

### **(II) Objectives**

The basic objectives of the course are-

1. To minimize the risk of disasters with the effective use of Remote sensing and GIS
2. To train students on various aspects of Disaster Management
3. To create safe and sustainable environment by community strengthening capacity building
4. To assist local administration by providing expertise in the field of Disaster Management

### **(III) Eligibility for Admission**

The candidate should fulfill the following eligibility criteria:

Any graduate students passed with minimum of **50%** marks in aggregate\* or equivalent CGPA (**45%** in case of candidates of backward class categories and Persons with Disability belonging to Maharashtra State only) from any **of the Universities** incorporated by an act of the central or state legislature in India or other educational institutions established by an act of Parliament or declared to be deemed as a University under Section 3 of the UGC Act.

### (IV) Course Structure of Graduate Diploma in Disaster Management

DDM course is divided in to two semesters; details of each semester are as given below:

#### Course Structure of DDM Semester: I

Course No	Course	Credits	Total Lectures	Internal Marks	University Exam Marks	Total Marks
DM 101	Introduction to Disaster Management	4	60	50	50	100
DM 102	ICT for Disaster Management	4	60	50	50	100
DM 103	GIS in Disaster Management	4	60	50	50	100
DM 104	Practical Work	4	60	50	50	100
DM 105	Industrial Disaster Management	4	60	50	50	100
<b>Elective</b> <b>( Any one subjects from DM 106 to DM 108)</b>						
DM 106	Risk Assessment and Vulnerability Analysis	4	60	50	50	100
DM 107	Environment Studies	4	60	50	50	100
DM 108	Research Methodology in Disaster Management	4	60	50	50	100
<b>Total</b>		<b>24</b>		<b>300</b>	<b>300</b>	<b>600</b>

### Course Structure of DDM Semester: II

Course No	Course	Credits	Total Lectures	Internal Marks	University Exam Marks	Total Marks
DM 201	Disaster Preparedness	4	60	50	50	100
DM 202	Disaster Response	4	60	50	50	100
DM 203	Rehabilitation Reconstruction and Recovery	4	60	50	50	100
DM 204	Project Work	4	60	50	50	100
DM 205	Industrial Safety Management	4	60	50	50	100
<b>Elective</b> <b>( Any one subjects from DM 206 to DM 208)</b>						
DM 206	Managing Human Behavior	4	60	50	50	100
DM 207	Finance and Insurance in Disaster Management	4	60	50	50	100
DM 208	Disaster Management Policy and Administration	4	60	50	50	100
<b>Total</b>		<b>24</b>		<b>300</b>	<b>300</b>	<b>600</b>

**Notes:-**

1. The duration of Lecture is 60 minutes.
2. After every three years, syllabus will be revised.

### ( V ) Pattern of Examination

*Each Paper will have two components, internal and external with equal weightage.*

#### a. Examination patter for Theory subjects

Internal Component ( 50 Marks )			External Component ( 50 Marks )	Total
Test 1	Test 2	Home Assignment	Semester end exam	
15	15	20	50	100

#### b. Examination patter for Practical subject

Internal Component ( 50 Marks )		External Component ( 50 Marks )	Total
Test	Practical Journal	Semester end exam	
25	25	50	100

### (VI) The grading will given on CGPA as practiced by University

### (VII) STANDARD OF PASSING

1. Every candidate must secure minimum 50% marks in aggregate for passing. For passing, student shall score minimum 25 out of 50 marks in both internal as well as external examination in every subject.
2. The internal and external assessment will constitute separate heads of passing and they will be shown separately in the transcripts.
3. For each Courses / course the ratio of marks of internal assessment in relation to the external assessment shall be 50:50.
4. The external assessment shall be based on the external written examination to be held at the end of each semester for each Course / course. The project report and viva shall constitute one head of passing.
5. Marks in internal assessment should be communicated to the university before the commencement of the semester examination.

# **DDM Semester - I**



**DDM Semester I**

**Course No. DM 101**

**Paper Title: Introduction to Disaster management**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives**

- To orient students about various natural and manmade disasters
- To teach the concept of Disaster management and measures to be taken at different stages of disaster management
- To provide insight about global, national and regional level scenario of disaster management

**Module 1 –Introduction**

*Unit 1:* Hazard, Risk, Vulnerability, Disaster;

*Unit 2:* Disaster Management, Meaning, Nature Importance, Dimensions & Scope of Disaster Management, Disaster Management Cycle.

*Unit 3 :* National disaster management framework; financial arrangements for Disaster management, International Strategy for Disaster reduction.

**Module 2 – Natural Disasters**

*Unit 1:* Natural Disasters- Meaning and nature of natural disasters, their types and effects

*Unit 2:* Hydrological Disasters - Flood, Flash flood , Drought, cloud burst

*Unit 3:* Geological Disasters- Earthquakes, Landslides, Avalanches, Volcanic eruptions, Mudflow

*Unit 4:* Wind related- Cyclone, Storm, Storm surge, tidal waves

*Unit 5:* Heat and cold Waves, Climatic Change, Global warming, Sea Level rise, Ozone Depletion

**Module 3 – Man made Disaster**

*Unit 1:* CBRN – Chemical disasters, biological disasters, radiological disasters, nuclear disasters

*Unit 2:* Fire – building fire, coal fire, forest fire, Oil fire

*Unit 3* Accidents- road accidents, rail accidents, air accidents, sea accidents

*Unit 4:* Pollution and deforestation- air pollution, water pollution, deforestation, Industrial wastewater pollution, deforestation

*Unit 5:* Stampede, Bomb blast, Riots, Epidemics :- Causes, Effects, mitigation Strategies

#### **Module 4 Disaster Determinants**

*Unit 1* Factors affecting damage – types, scale population, social status, habitation pattern, physiology and climate.

*Unit 2:* Factors affecting mitigation measures, prediction, preparation, communication, area and accessibility, population, physiology and climate,

#### **Module 5: Case study**

#### **Course Outcome:**

Students will learn different disasters and measures to reduce the risk due to these disasters. Also, students will learn institutional frame work for disaster management at national as well as global level

#### **Suggested Readings:**

- Goel S.L., (2007), Disaster Administration and Management, Text & Case studies, Deep and Deep Publications, New Delhi.
- Ghosh G.K, (2006), Disaster Management, 6<sup>th</sup> edition, A.P.H. Publishing Corporation, New Delhi.
- Singh S.K.& Kundu S.C., Disaster management , William Publications, New Delhi.
- Sharma V.K. & Vinod K, (1995), Disaster Management, IIPA, New Delhi.
- Goel S.L., (2006), Encyclopedia of Disaster Management, Deep and Deep Publications, New Delhi.

**DDM Semester I**

**Course No. DM 102**

**Paper Title: ICT for Disaster Management**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives:**

- To teach basic concepts of ICT
- To educate students about recent ICT technologies in the field of Disaster Management

**Module 1 Computer Systems**

Computer, Basic Organization of Computers, Classification of Computers, Hardware, Software, Computer Languages, Computer Memory, Types of Memory (Primary And Secondary), Secondary Storage Devices , I/O Devices, Application software, Software Package, Operating Systems, Database Management System, Data Warehousing and Data Mining

**Module 2 Information Communication Technology**

Business Data Processing- Data storage hierarchy, methods of organizing data, file management Data Communications and Computer Networks- Elements of Communication Systems, Data transmission modes, speed, media; Digital and Analog data transmission, Switching techniques, Routing Techniques, Network topologies, Network Types, Communication protocols, wireless networks, Internet, multimedia

**Module 3 Information Processing**

Definition , difference between Data and Information, Relevance of Information to Decision Making, Source and Types of Information, Quality of Information, Value of information, Data Collection methods, Assessing Information Needs, Management Information Systems, Decision Making Concept-Models of Decision Making

**Module 4 Advanced Information Communication Technology**

Tsunami Early Warning System, Forest Resource Information System, ,GIS, Remote Sensing, Digital Image Processing, emergency communication System, Bluetooth and Wireless communication, HAM Radio.

**Module 5 Disaster Management Information Sources**

**Forecasting & warning:** Indian meteorological department, tsunami warning centre, pacific disaster centre, central water commission; **Resources:** UNISDR, USAID, Red Cross ,Indian disaster resource network; **Other :** National disaster management authority, National Institute of disaster management, National Geophysical Research Institute, Bhuwan, National disaster response force, State and district disaster management centre

**Suggested Readings:-**

1. P. K. Sinha, Computer Fundamentals- BPB Publications
2. V.Rajaraman, Fundamentals of Computers - PHI Publication, IVth Edition.
3. Raj K.Jain Fundamentals of Programming - S.Chand Publication
4. Abraham Silberschatz and Henry Korth, Sudarshan, Database System Concepts -: Tata McGraw-Hill- IVth Edition, ISBN : 0-07-120413-X
5. Elmasri and Navathe , Addison-Wesley (1999). Fundamentals of Data base Systems – IIIrd Edition
6. Noam Levin November (1999) Fundamentals of Remote Sensing
7. Dr Robert Sanderson Introduction to Remote Sensing - New Mexico State University

**DDM Semester I**

**Course No. DM 103**

**Paper Title: Geographical Information System in Disaster Management**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives:**

To study the concept of GIS and its applications in the field of Disaster Management

**Module 1 Introduction**

Geographical Information Systems - definition, development, data sources, data structures, raster and vector, data capturing, pre-processing, Introduction to Geomorphology and Geology, Study the statigraphy of India, Morphometric analysis with the help of remote sensing & gis techniques.

**Module 2 Data base management systems in GSI**

Concept and scope, data manipulations and product generation- Environmental GIS, Data acquisition system using GPS On line GPS applications.

**Module 3 Geographical Information System**

*Unit 1:* - Spatial data; sources of error and data quality; database design, convention, mapping concepts and Coordinate systems.

*Unit 2 :* Methods of spatial interpolations in Geographical Information Systems; visualizations in Geographical Information Systems, Linking terrain, climate and socio economical parameters to target the vulnerability due to natural disasters using GIS and Remote Sensing.

**Module 4 GIS SOFTWARE**

Over view of GIS software - Arc Info; Arc View Principles, operation protocols and hands on training query based information retrieval Web GIS Online GIS and its data applications. Development of GIS based decision support for disaster risk reduction, Introduction to open source GIS software.

**Course Outcome:**

Trained students with the help of GIS will assist disaster management teams in reducing disaster risk .

**Suggested readings**

- Panda B.C. (2013), Remote Sensing Principles & Applications, Viva Book Pvt.Ltd.
- Reddy Anji M.( 2001), Remote Sensing and Geographical Information systems, , B.S.Publications, Hyderabad.
- Narayan L.R.A.(1999), Remote Sensing and its applications, University Press.
- Burragh P. A. and Rachael A.( 2004), Principals of Geo physical Information Systems, Oxford Publishers.

- Albert C.P.Lo, Yongng K.W., Concepts & Techniques of GIS, Prentice Hall (India) Publications.

**DDM Semester I**

**Module No. DM 104**

**Paper Title: PRACTICAL WORK**

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**Total Credits: 4**

**Total Hours: 60**

This is full credit course based on Use of GIS software especially Arc GIS. Students are expected to carry out GIS practicals on different phases of Disaster Management such as Disaster preparedness, mitigation, response, recovery rehabilitation and reconstruction. Each student shall perform ten practical on any aspects of disaster management and shall submit the Journal book at the end of the semester. The weightage for internal and external components is 50 % each. Internal components comprises of class test and practical journal, each carrying 25 marks.

**Areas of GIS Practical**

1. GIS database design.
2. Spatial interpretation of GIS.
3. GIS application in land slide inventory studies.
4. GIS applications earthquake studies.
5. GIS applications in flood hazard.
6. GIS applications in forest fire.
7. GIS applications in cyclone hazard.
8. GIS applications in tsunami hazard.
9. Hazard mapping with GIS
10. Use of GIS in Risk assessment and Vulnerability Analysis
11. GIS applications in Urban planning
12. GIS application in traffic management
13. GIS application in health management
14. Any other application related to disaster management

**DDM Semester I**

**Course No. DM 105**

**Paper Title: Industrial Disaster Management**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives**

- To educate students about various industrial hazards
- To train students in risk assessment and hazard analysis of Industries
- To train students in preparing offsite and onsite plans

**Module 1 Introduction**

Concept, Need and Importance of Industrial Disaster Management

**Module 2 Industrial Hazards**

Chemical hazards, Biological hazards, Radiological hazards, nuclear hazards, Physical hazards, Electrical hazards, Fire hazard, Gas hazards etc.

**Module 3 Risk Assessment & Hazard Identification**

*Unit 1:* Checklist procedure, Preliminary hazard analysis, What if analysis, Failure mode effect analysis, Hazard and operability (HAZOP) studies, Hazard analysis techniques: Fault tree analysis, Event tree analysis, General outline of DOW index, Risk estimation and management, Major hazard control

*Unit 2:* Identification of hazard, Categorization methods for elimination of hazard, Mechanical hazards;

Machine guarding, safety with hand tools/ portable power tools, Pressure vessel hazards and their control, Safety in material handling: hazards and safe Practices, safety with storage of materials

**Module 4 Disaster Management Plans**

*Unit 1:* Onsite Plans

Standard operating procedures, control room, safety officer, Different committees for Disaster management, rescue team, training, exercises and mock drills

*Unit 2:* Offsite Plans

Dissemination of information, identification of vulnerable locations, need and damage assessment, rescue and relief plans, compensation

**Module 5: Case study**

**Suggested Readings:**

- Goel S.L., (2007), Disaster Administration and Management, Text & Case studies, Deep and Deep Publications, New Delhi.
- Talwar A., Hazardous Materials Disaster Management, Commonwealth Publisher, New Delhi.
- Heinrich H.W. (1980), Industrial Accident Prevention, McGraw-Hill Company, New York.

- Krishnan N.V. (1996), Safety in Industry, Jaico Publishery House, New Delhi

### **DDM Semester I**

### **Course No. DM 106**

### **Paper Title: Risk Assessment & Vulnerability Analysis**

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**Total Credits: 4**

**Total Hours: 60**

#### **Learning Objectives:**

- To train students in doing Risk assessment and Vulnerability analysis
- To teach students vulnerability reduction strategies

#### **Module 1 Introduction**

Hazard, Risk and Vulnerability, Risk Concepts, Elements Of Risk, Perception of Risk, Acceptable risk, Requirements in Risk assessment

#### **Module 2 Risk Assessment & Reduction**

*Unit 1* : 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 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

*Unit 3* : 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 4* : Vulnerability analysis and Risk assessment:

Addressing Semantics, Approaches to vulnerability Analysis, Models of Vulnerability analysis, Quantification of vulnerability, Assessment of Risk Vulnerability and capacity analysis (VCA), Vulnerability of Himalayan Eco- system

*Unit 5* : Hazard mapping using GIS, Use of remote sensing and GIS for risk assessment , multi hazard risk analysis using GIS

#### **Module 3 Vulnerability**

*Unit 1* : Observation and perception of vulnerability- Vulnerability Identification, Vulnerability types and dimensions, Vulnerability- Social factors and economic factors

*Unit 2* : Vulnerability to shanty settlements- Vulnerability in the city, Risk in Urban areas, Issues in urban planning, Initiatives for risk reduction in India

#### **Module 4 Strategic development for Vulnerability reduction:**

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



**Course outcome:** It will help in identifying vulnerable regions and calculating risk associated with the disaster. Minimizing loss due to disasters

**Suggested Readings:**

- Goel S.L., (2007), Disaster Administration and Management, Text & Case studies, Deep and Deep Publications, New Delhi.
- Ghosh G.K, (2006), Disaster Management, 6th edition, A.P.H. Publishing Corporation, New Delhi
- Singh S.K.& Kundu S.C., Disaster management, William Publications, New Delhi
- Sharma V. K. (2013), Disaster Management, Scientific International Pvt, Ltd.
- Sahni P. (2004), Disaster Risk Reduction in South Asia, 1<sup>st</sup> edition, Prentice-Hall of India Pvt.Ltd.
- Sahni P. (2004), Disaster Mitigation – Experiences and reflections, Prentice- Hall of India Pvt.Ltd.

**DDM Semester I**

**Course No. DM 107**

**Paper Title: ENVIRONMENT STUDIES**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives:**

- To study the ecosystem and various natural sources
- To orient students about the biodiversity in India
- To discuss various issues related to environment and their impact

**Module 1: Introduction:**

Definition; Scope and importance, Need for public awareness

**Module 2 : Natural Resources:**

Renewable and non-renewable resources; Natural resources and associated problems;

*Unit 1:* Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects

*Unit 2 :*Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems

*Unit 3 :*Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies

*Unit 4 :*Food resources: World food problems, changes caused by agriculture and overgrazing ,effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies

*Unit 5 :* Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies

*Unit 6:* Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification

- Role of an individual in conservation of natural resources
- Equitable use of resources for sustainable lifestyles

**Module 3: Ecosystems**

*Unit 1:* Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

*Unit 2 :* Introduction, types, characteristic features, structure and function of the following ecosystem: -

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

*Unit 3:* Biodiversity and its Conservation

- Introduction-Definition: genetic, species and ecosystem diversity

- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

#### **Module 4: Social Issues and the Environment**

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust
- Wasteland reclamation
- Consumerism and waste products
- Environment Protection Act

#### **Course Outcome:**

After learning this module student will get familiarize with the ecosystem and issues related to environment system.

#### **Suggested Readings:**

- Agarwal, K.C. (2001). Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad - 380013, India,
- Brunner R.C.(1989) Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clerk B.S., Marine Pollution, Clarendon Press Oxford (TB).
- Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.(2001). Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.

**DDM Semester I**

**Course No. DM 108**

**Paper Title: Research Methodology in Disaster Management**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives:**

To instill a comprehensive and step-wise understanding of the research process with a balanced blend of theory and applicative techniques; and also facilitate them to develop insights about basic concepts of research designs and methodology aimed at solving research problems

**Module 1 Introduction**

Meaning, Concept, nature steps types and characteristics of research, scientific inquiry Philosophical and Sociological foundations of research, Interdisciplinary approach and its implications in various research areas.

**Module 2 Methods of Research**

Qualitative and quantitative methods of research like Historical, case study, ethnography, ex-post facto, documentary and content analysis, survey (Normative, descriptive, evaluative etc.), field and laboratory experimental studies, Characteristics of methods and their implications in research area.

**Module 3 Development of Research Proposal**

Research proposal and its elements, Formulation of research problem-criteria of sources and definition, Development of objectives and characteristics of objectives, Development hypotheses and applications.

**Module 4 Methods of Data Collection and Analysis**

Concept of sampling and other concepts related to sampling. Probability and non-probability samples, their characteristics and implications. Tools of data collections, their types, attributes and uses. Redesigning, research tools-like questionnaire, opinion ire, observation, interviews, scales and tests etc. Analysis of qualitative data based on various tools. Analysis of quantitative data and its presentation with tables, graphs etc. Statistical tools and techniques of data analysis-measuresof central tendency, dispersion. Decision making with hypothesis testing through parametric and non-parametric tests. Validity and delimitations of research findings.

**Module 5 Report Writing and Evaluation**

Principles of report writing and guide lines according to style manuals, Writing and presentation of preliminary, main body and reference section of report, Evaluation of research report.

**Course Outcome:**

Course can be an asset to the disaster management team by providing well-equipped and scientifically skilled research professionals and managers for conducting research in every aspect of disaster management.

**Suggested readings:**

- Bajpai S. R. (1975). Methods of Social Survey and Research, Kitabghar, Kanpur
- Hans Raj (1988). Theory and Practice in Social Research ,Surjeet Publication, Kolhapur
- Krishnaswami O. R. (1988). Methodology of Research in Social Science, Himalaya Pub. House
- Kothari, C. R. (2005). Quantitative Technique, Vikas Publication House, New Delhi
- Gautam, N. C. (2004). Development of Research tools , Shree Publishers- New Delhi
- Gupta Santosh. (2005). Research Methodology and Statistical, Deep and Deep Publications

# **DDM Semester - II**



**DDM Semester II**

**Course No. DM 201**

**Paper Title: Disaster Preparedness**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives**

- To teach students preparedness measures for disasters
- To train students in preparing disaster preparedness plan

**Module 1 Introduction**

Disaster Management Cycle, 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

**Module 2 Disaster Preparedness Plan**

Concept and Significance, Disaster Preparedness Plan essentials, Community Based Disaster Preparedness plan

**Module 3 Disaster Preparation**

*Unit 1* : Material, relief required- sources of relief, modes and means of transport, medical facility and communication network, Preparation of manpower, awareness of damages, perception, reaction time. Authority: Hierarchy set-up, direction of communication

*Unit 2* : Hazard monitoring, tracking and modeling, Early warning systems, warning protocols ,India Disaster Resource Network, Emergency Sanitation/Shelter environments , worst scenario analysis, Emergency operation Centre, Role of Information, Education, Communication and Training

**Module 4 Emerging Technologies in Disaster Management**

Remote sensing, Disaster Mapping, Aerial Photography, land use zoning, Wireless and Radio, HAM radio

**Module 5 Case study**

**Course Outcome**

A structure preparedness plan will help in reducing risk associated with disasters.

**Suggested Readings:**

- Goel S.L., (2007), Disaster Administration and Management, Text & Case studies, Deep and Deep Publications, New Delhi.
- Ghosh G.K, (2006), Disaster Management, 6th edition, A.P.H. Publishing Corporation, New Delhi
- Singh S.K.& Kundu S.C., Disaster management , William Publications, New Delhi
- Sharma V. K. (2013) , Disaster Management, Scientific International Pvt, Ltd.



- Sahni P. (2004), Disaster Risk Reduction in South Asia, 1<sup>st</sup> edition, Prentice-Hall of India Pvt.Ltd.
- Sahni P. (2004), Disaster Mitigation – Experiences and reflections, Prentice- Hall of India Pvt.Ltd.
- R B Singh. Natural Hazards And Disaster Management : Vulnerability And Mitigation, Rawat Publications
- Sharma V.K. & Vinod K, (1995), Disaster Management, IIPA, New Delhi.

**DDM Semester II**

**Course No. DM 202**

**Paper Title: Disaster Response**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives:**

- To orient students about Disaster on site situation
- To teach Disaster response techniques
- To educate students about Disaster response organizations

**Module 1 Introduction**

*Unit 1:* Essential Components of Disaster Response, Disaster Response Plan, Resource Management- Financial, Medical, equipments, communication, Human, transportation, Food and essential commodity (Identification, Procuring, Propositioning and deployment), Directing and controlling functions

*Unit 2:* Communication, Participation & activation of Emergency Preparedness Plan, Logistics Management, Emergency support functions, Need and damage assessment

**Module 2 Coordination in Disaster Response**

Disaster response organization, Disaster response & administration - Central, State, District and Local , Disaster Response: Policy & Other organization, Role of multiple stakeholders in Disaster Response NDRF, SDRF, ITBP, CRPF, SRPF, EMS

**Module 3 Quick Disaster Response**

*Unit 1:* First responder, medical first aid, life saving techniques, Golden time

*Unit 2:* Search & Rescue equipments- Search & Rescue equipments for different disasters, its use, procurement, maintenance

*Unit 3:* Search & Rescue Teams- Warning teams, evacuation teams, medical support, logistic management & other teams

*Unit 4 :* Individual and Group behavior, Psychological Response, Trauma & Stress Management, Rumor & Panic Management

**Module 4 Relief Measures**

Relief measures, Minimum standards of relief, managing relief, Funding relief, Recovery

**Module 5 Case study**

**Course Outcome:**

Trained students can act as a First Respondent and can handle Onsite situations

**Suggested Readings:**

- Goel S.L., (2007), Disaster Administration and Management, Text & Case studies, Deep and Deep Publications, New Delhi
- Levitt, Alan M - John Valley and Sons (1997), Disaster Planning and Recovery-, New York.

Diploma in Disaster Management (D.D.M.),  
School of Management Sciences, S.R.T.M.U.N. Sub-centre, Latur

- National Disaster Response Plan (2002), Ministry of Agriculture and Cooperation, Government of India, New Delhi.
- National Disaster Response Plan (2001), NCDM, New Delhi.
- Singh S.K.& Kundu S.C., Disaster management, William Publications, New Delhi
- Sharma V.K. & Vinod K, (1995), Disaster Management, IIPA, New Delhi.

**DDM Semester II**

**Course No. DM 203**

**Paper Title: Rehabilitation Reconstruction and Recovery**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives**

- To understand post disaster issues in recovery and rehabilitation
- To undertake reconstruction as an opportunity to build disaster resilient structures and safe habitat

**Module 1 Rehabilitation, Reconstruction and Development**

*Unit 1:* Reconstruction Rehabilitation and Development- Concept, Meaning, types of Rehabilitation and Reconstruction, Importance of Disaster Mitigation, Cost – benefit analysis, relationship between vulnerability and development

*Unit 2:* 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 3:* Role of Different organization in Rehabilitation

The Government and Disaster Recovery and rehabilitation; Disaster and Non governmental efforts ; Role of Local Institutions; Insurance, Police , Media

**Module 2 Reconstruction**

*Unit 1:* Speedy Reconstructions- Essential services, Social infrastructures, immediate shelters/camps, Contingency plans for reconstructions

*Unit 2:* Development of Physical and Economic Infrastructure- Developing Physical and Economic Infrastructure, Environmental Infrastructure development,

*Unit 3:* Disaster resistant House Construction- Guidelines for Disaster resistant construction, traditional techniques, Seismic strengthening of houses in low rain/High rainfall area, earthquake resistant construction technique

*Unit 4:* Funding arrangements- Funding arrangements at state level and central level, Fiscal discipline, role of International agencies, mobilization of community for resource generation

**Module 3 Rehabilitation**

*Unit 1:* Socio- economic Rehabilitation- Temporary Livelihood Options and Socio-Economic Rehabilitation,

*Unit 2:* Role of Housing / building authorities- Education and awareness and role of Information Dissemination, Participative Rehabilitation

*Unit 3:* Role of various agencies in Recovery Work- Monitoring and evaluation of rehabilitation work, Rehabilitation process

#### **Module 4 Recovery**

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

#### **Course outcome:**

This Course will help students in building safer environment through sustainable development. At the end of this course students are expected to carry out pre and post disaster damage assessment, understand disaster recovery and role of different agencies in the rehabilitation.

#### **Suggested Readings:**

- Disaster Mitigation in Asia and the Pacific (1991), Asian Development Bank, Manila ADB.
- Goel S.L., (2007), Disaster Administration and Management, Text & Case studies, Deep and Deep Publications, New Delhi
- Ghosh G.K, (2006), Disaster Management, 6th edition, A.P.H. Publishing Corporation, New Delhi
- Singh S.K. & Kundu S.C., Disaster management, William Publications, New Delhi
- Sharma V.K. & Vinod K, (1995), Disaster Management, IIPA, New Delhi.
- Goel S.L., (2006), Encyclopedia of Disaster Management, Deep and Deep Publications, New Delhi
- F.Y. Cheng & Y.Y. Wang, Post-Earthquake Rehabilitation and Reconstruction, Permagon Publications.

**DDM Semester II**

**Course No. DM 204**

**Paper Title: Project Work**

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**Total Credits: 4**

**Total Hours: 60**

- This is full credit course, being evaluated for 100 marks.
- The student shall choose a Research Topic after consultation with Faculty Research Guide at the end of first semester.
- The student should submit Project report at the mid of second semester, evaluation of the same will be done at the end of second semester. The evaluation scheme is as given below:

**EVALUATION SCHEME**

A) Problem Statement	05 Marks
B) Literature Review	05 Marks
C) Research Methodology	10 Marks
D) Data Analysis	10 Marks
E) Conclusion	10 Marks
F) Suggestions	10 Marks
G) Presentation	25 Marks
H) Viva Voce	25 Marks

Viva voce shall be conducted by panel of two members; one member would be external expert

### **Standard Guidelines for the Preparation of Research Project Report Submission**

Every Report/Dissertation should contain the following documents in the described sequence and format:

1. Front cover page of glossy photo paper or hard bound rexin cover, which should have printed or embossed descriptions.
2. The First inner cover page should contain the same description printed as in Appendix – 1 but on glossy paper if the cover page is rexin bound and embossed otherwise of on plain paper/ coloured paper
3. The Second inner page must contain the Certificate issued by the supervisor(s) endorsing the originality of the work and the declaration that this piece of work has been carried out under his/her/their supervision and at the deputed place, time, etc. and the endorsement of the HOD /Director to these statements .
4. The Third inner page is the certificate page as issued by the authority, where the student has undertaken the research or practicals etc.
5. The Fourth inner page is the page of Acknowledgement, which the student has to write and acknowledge the thanks, gratitude, obligation etc. for the successful completion of the assignment due to these individuals, authorities or institution or organization etc.
6. The Fifth inner page is the page for dedication in honour, like to - Parents/Teacher/Friend/Wife/Husband /Organization etc. But this page is not a compulsion.
7. The Sixth page is Index/Contents page, which must contain the Serial number, Title of each Chapter/part/prgramme and the page number .
8. The Seventh page should contain the Index of Graphs/supporting documents/survey samples/ tables/pictures/photographs etc., which are used as a part of the report. Each item has to have a title so that these can be prepared in the same manner as the Sixth page (Index/Contents page).
9. Each Chapter should be separated by a Partition page marked/printed with the CHAPTER NO. and CHAPTER TITLE as described in the Index/Contents page above (Point 7).
10. The Report/Dissertation must contain the References/Bibliography pages at the end of the last chapter. The references also should be noted, sequenced and described as per a

standard format and cannot be placed in any personally chosen order or description. It is very significant part of the report/dissertation for evaluation by the examiner. A standard pattern of References' page .

11. Each page should be numbered from the writing page of Chapter – I. Pages of Certificate of the supervisor till partition page of Chapter – I should be numbered in Roman digits (I, ii, iii,...ix,.. xiii etc.).
12. Avoid making underlines for each heading especially to the Capital letters. All headings should be with capital letters and sub-headings with bold small letters. Avoid use of Italics until unless it is required. Similarly, do not use different types of markers/symbols for explaining the content in points; rather follow 1-2 types of these only in consistence.
13. Follow a logical placement of facts, figures and analysis to explain the findings for a Layman understands of your report and accordingly you spell out/order/design the chapters.
14. One must use comprehensive English words to describe the Title of the work and the Chapters. Hence, avoid long expressions for these.
15. It is advisable to take support/help from a good English knowing person to correct the grammatical errors and construction of Active/Passive sentences, use of Phrases/Idioms in your report writing etc.
16. The printing pages should be of uniform page layout conditions and fonts for the total report (Font Size: Times New Roman 12 and for heading- Times New Roman 14; Line spacing 1.5; Page Margin : Left 1.1'' and right 1'' )



**DDM Semester II**

**Course No. DM 205**

**Paper Title: Industrial Safety Management**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives**

- To teach students Industrial safety rules and regulations
- To train students on safety investigation, monitoring and Audit

**Module 1 Introduction**

Need for safety, Safety legislation: Acts and rules, Factory Act 1948, Workman's Compensation Act, 1943, Employees State Insurance Act, 1948, Safety standards and codes, Safety policy: safety organization and responsibilities and authorities of different levels, Safety Management

**Module 2 Training for Safety**

Importance of training-identification of training needs-training methods – programmes, seminars, conferences, competitions – method of promoting safe practice - motivation – communication - role of government agencies and private consulting agencies in safety training – Safety awareness, Employee Participation, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety campaign – Domestic

**Module 3 Accident Investigation and Reporting**

Concept of an accident, reportable and non reportable accidents, reporting to statutory authorities – principles of accident prevention – accident investigation and analysis – records for accidents, departmental accident reports, documentation of accidents – unsafe act and condition – supervisory role – role of safety committee –cost of accident.

**Module 4 Safety Performance Monitoring and Audit**

*Unit 1: Safety Performance Monitoring-* ANSI (Z16.1) Recommended practices for compiling and measuring work injury experience-permanent total disabilities, permanent partial disabilities, temporary total disabilities - Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety "t" score, safety activity rate – problems.

*Unit 2 Safety Audit-*Components of safety audit, types of audit, audit methodology, non conformity reporting (NCR), audit checklist and report – review of inspection, remarks by government agencies, consultants, experts – perusal of accident and safety records, formats – implementation of audit indication - liaison with departments to ensure co-ordination – check list – identification of unsafe acts of workers and unsafe conditions in the shop floor

**Course outcome:**

This module will help students in reducing industrial accidents and building safer environment

**Suggested readings:**

- Heinrich H.W. ,(1980),Industrial Accident Prevention ,McGraw-Hill Company, New York.
- Krishnan N.V. ,(1997),Safety Management in Industry, Jaico Publishing House, Mumbai.
- Dan Petersen,(1981),Techniques of Safety Management, McGraw-Hill Company, Tokyo.
- Blake R.B.(1973), Industrial Safety” Prentice Hall, Inc., New Jersey.
- Slote.L.,Handbook of Occupational Safety and Health, John Willey and Sons, New York

**DDM Semester II**

**Course No.DM 206**

**Course Title: Managing Human Behaviour**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives:**

To develop an understanding of the structure and role of human behaviour in disaster management

**Module 1 Individual Dimensions of Organizational Behaviour**

Nature of Human Behaviour- Concept, Process, Managerial Implications, Individual differences,

Perception- Meaning, Perceptual Process, Perceptual Organization, Interpersonal Perception

Attitudes and Values- Formation, Theories of attitude formation, attitude change, Values

Motivation- Motivation and behaviour, Motivation and performance, Theories of motivation,

**Module 2 Group Dimensions of Organizational Behaviour I**

Group Dynamics- Formal and Informal Groups, Group Behaviour, Group Decision Making

Team dynamics- Types of Teams, Effective Team, Team Creation, Task force, Quality Circle

Leadership- Concept, Leadership Styles, Leadership development, leadership & technology

**Module 3 Group Dimensions of Organizational Behaviour II**

Conflict-Levels of Conflict, Process, Conflict Management, Negotiation, Grievance management

Stress- Concept, Sources of stress, Stress Management, Stress and Performance

Change- Levels of change, Types of change, Change process, Change management

**Module 4 Training and Development**

Meaning, Objectives, Training Process, training needs analysis, Training Techniques and Methods, Evaluation, Training Budget, Training outsourcing, E-training, Emerging Trends in Training, Counseling

**Module 5 Cases of managing human behaviour in disaster management**

Indian cases in natural disasters and man-made disasters

Global cases in natural disasters and man-made disasters

**Suggested Readings:-**

- Robbins Stephen,(2001), Organizational Behavior, 9th Ed., Prentice Hall International Inc.
- Prasad L. M.(2014), Organizational Behavior, 5th Ed., Sultan Chand & sons publications
- Aswathapa K.(2016), Organizational Behavior, 12th Ed., Himalaya Publishing House

**DDM Semester II**

**Course No. DM 207**

**Paper Title: Finance and Insurance in Disaster Management**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives:**

To provide the understanding of life & non-life insurance, banking and other related issues pertaining to the finance sector.

**Module 1 Introduction to Banking & Finance**

Concept of Banking, Types of banks, Functions of banks; Tax administration; Public budgeting and finance systems; State and local finances.

**Module 2 Central Bank / Reserve Bank**

Role and function of central bank, RBI and Monetary Policy

**Module 3 Introduction to Insurance**

Evolution and Features of Insurance, Classification of Insurance, Conditions relating to risk, selection or Risk

**Module 4 Life Insurance & General Insurance**

Principles of LIC, Privatization of Life Insurance Business, Role and performance of LIC, Non-life insurance – Fire, Automobile, Marine, Health, Rural, Social and miscellaneous insurances.

**Module 5 Insurance Policies for Disaster Management**

Evaluation of risk funding and risk transfer policies; Catastrophe insurance pool; Reserve funds and contingent credit policies; Role of Government and market participants; Insurance policy design; Fiscal cost of relief and reconstruction; Grants and low interest loan for reconstruction.

**Course Outcome:**

Students will be able to understand the role of various financial agencies in providing financial support during disaster.

**Suggested readings:**

- Hajela T.N. (2009), Money, Banking & Public Finance, 8th Edition, Ane Books Pvt. Ltd
- Bhasin N.(2007), Banking and Financial Markets in India -1947 to 2007,New Century Publications.
- Desai V., Banks & Institutional Management, 1st Edition, Himalaya PublishingHouse
- Shekhar K.C., Shekhar L., Banking theory and practices, 19th Edition Vikas Publishing House
- Mishra M.N., Mishra S.B., Insurance principles & practice, 17<sup>th</sup> Edition S.Chand Publication
- Gupta P.K. (2011), Insurance and Risk Management, Himalaya Publishing House
- Palande P.S., Shah R.S., Lunawat M.L., Insurance in India, 6<sup>th</sup> Edition, Response Books
- National Disaster Response Plan, NCDM, New Delhi, 2001.

**DDM Semester II**

**Course No. DM 208**

**Paper Title: Disaster Management Policy & Administration**

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**Total Credits: 4**

**Total Hours: 60**

**Learning Objectives**

To ensure efficient mechanism for identification, assessment and monitoring of disaster Risk.  
To learn prevention and resilience at all levels through knowledge, innovation and education

**Module 1 –Introduction**

Disaster Management: Meaning, Concept, Importance, Objectives of Disaster Management Policy, Disaster Risks in India, Paradigm shift in Disaster Management, Sendai framework for disaster risk reduction.

**Module 2 – Disaster Management Policy**

Importance of DM Policy, Principles of Disaster management Policy, Features of Disaster Management Policy, Policy Making procedures, Policy Makers, Command and coordination in disaster management

**Module 3 Disaster Management Administration**

National Disaster Management Policy, Institutional framework for Disaster Management, Existing Institutional arrangement in India, State Disaster management policy, International strategy for Disaster risk reduction, International level organizations involved in disaster management

**Module 4 Disaster management and techno legal regime**

Study of different measures in different phases of Disasters, Revision of Municipal regulations, Land use planning, Safe Construction practices, Training and capacity development

**Module 5 Case studies**

Summary of Indian National Policy on Disaster Management, Disaster management policy of Asian/African countries, Disaster management policy of United state of America

**Course outcome:**

At the end of this course students are expected to analyze Disaster Risk in India, importance of disaster management, institutional framework, policy in disaster management and various dimensions of a sound disaster management policy.

**Suggested Readings:**

- Goel S.L., (2007), Disaster Administration and Management, Text & Case studies, Deep and Deep Publications, New Delhi
- Natural Hazards And Disaster Management : Vulnerability And Mitigation - R B Singh- Rawat Publications

Diploma in Disaster Management (D.D.M.),  
School of Management Sciences, S.R.T.M.U.N. Sub-centre, Latur

- Ghosh G.K, (2006),Disaster Management,6<sup>th</sup> edition, A.P.H. Publishing Corporation, New Delhi.
- Disaster management - H.K. Gupta, 2003
- Singh S.K.& Kundu S.C.,Disaster management ,William Publications, New Delhi
- Sharma V.K. & Vinod K, (1995),Disaster Management, IIPA, New Delhi.