

Course Structure and Syllabi of M.Sc. in Disaster Management



**DEPARTMENT OF COASTAL DISASTER MANAGEMENT
SCHOOL OF PHYSICAL, CHEMICAL & APPLIED SCIENCES
PONDICHERRY UNIVERSITY
PORT BLAIR CAMPUS**

Department of Coastal Disaster Management

PONDICHERRY UNIVERSITY, PORT BLAIR CAMPUS

1. Revised Syllabus of M.Sc. (Disaster Management)
2. Eligibility for admission into M.Sc & Ph.D (Disaster Management)

Eligibility for Two years M.Sc. (Disaster Management) course:

Bachelor's degree in any discipline in Science/B.A. Geography with 55% of marks.

Eligibility for Ph.D (Disaster Management) programme:

Master degree in Disaster Management /Geology/Applied Geology/ Geography
Geophysics/Marine Geophysics/Environmental science/Civil
Engineering/Geotechnical Engineering/Geoinformatics/GIS/Geomatics/Spatial
Technology/Environmental Engineering with 55% of marks.

Department of Coastal Disaster Management

PONDICHERRY UNIVERSITY, PORT BLAIR CAMPUS

Revised Syllabus of M.Sc (Disaster Management)
Effective from 2025-26 onwards

Course Structure

Code	Subject	Credits
First Semester		
DMPB411	Introduction to Hazards and Disasters	3
DMPB412	Principles of Remote Sensing	3
DMPB413	Earth systems dynamics and rock types	3
DMPB414	Structure and Active Tectonics	3
DMPB415	Geomorphology (Soft Core)	3
DMPB416	Practical I (412,413)	3
DMPB417	Practical II (414,415)	3
Second Semester		
DMPB511	Geographic Information Systems	3
DMPB512	Geophysical Exploration	3
DMPB513	Earthquakes, Volcanism, Landslides and Desertification	3
DMPB514	Floods, Tsunami and Cyclones and Other Coastal Problems	3
DMPB515	Biological and Technological Disasters (Soft Core)	3
DMPB516	Practical III (511, 514, 515)	3
DMPB517	Practical IV (512,513)	3
Third Semester		
DMPB611	Climate Change and Environmental Disasters	3
DMPB612	Disasters and Environmental Strategic Assessment (ESA)	3
DMPB613	Disaster Preparedness, Response and Rehabilitation	3
DMPB614	Disaster Risk Reduction and Management	3
DMPB615	Disaster Resistant Structures (Soft Core)	3
DMPB616	Practical V (611,612)	3
DMPB617	Practical VI (613, 614)	3
Fourth Semester		
DMPB711	Research Methods for the Preparation of Project = Credit 1 Collection of relevant Literature to M.Sc. Project = Credit 1 Project Report = Credit 4 Viva = Credit 3	9
	Total	72

DMPB 411 - Introduction to Hazards and Disasters

Unit 1

12 Hours

Understanding of key concepts in Disasters Management: Hazards, Disasters, Vulnerability, Resilience, Disaster Management, Disaster Cycle, risk, prevention, mitigation, relief and response, recovery and rehabilitation etc – Brief history of disaster management in India and world- The emerging field of disaster management- Role of social sciences and natural sciences and multidisciplinary nature of disaster management as applied disciplines

Unit II

10 Hours

Different typologies and classification of disasters, cataclysmic – slow-onset, natural- manmade etc- Critique of different classifications, what magnitude constitutes a “disaster” for the government. Effects of hazards: Primary, secondary and tertiary.

Unit III

8 Hours

Consequences and impact of disasters; Flood, cyclones, tsunamis, earthquakes, landslides, volcanic eruption, desertification, drought, salinity ingress – Overview through case studies

Unit IV

8 Hours

Climate change, environmental stress, Biological and Technological disasters – Overview through case studies

Unit V

10 Hours

Nature of challenges in disaster management for people and environment, Lessons (overview of the field of study and nature of functions required of different professionals learnt, Role of disaster management in contemporary times).

Text Books:

1. Edward A Keller and Robert H Blodgett. 2008. Natural hazards. Pearson Prentice Hall, 488p.
2. Donald Hyndman and David Hyndman. 2009. Natural hazards and disasters. Brooks/Cole. 555p.

References

1. Bankoff, G., Frerks, G. and Hilhorst, D. 2004. (eds.) Mapping Vulnerability: Disasters, Development, and People, Earthscan, London.
2. Birkmann, J. 2007. "Risk and vulnerability Indicators at Different Scales: Applicability, Usefulness and Policy Implications", *Environmental Hazards*, 7 (1): 20-31.
3. Burton, I., Kates, R.W. And White, G.F. 1968. "The Human Ecology of Extreme GeoPhysical Events", *Natural Hazard Research*, Working Paper#1
4. MacManus, S.A. 2011. "Gauging Disaster Vulnerabilities at the Local Level: Divergence and Convergence in an all Hazard System", *Administration and Society*, XXX:1-26
5. Quarantelli, E. L. 1998 (eds) What is a Disaster? Perspectives on the Question, Routledge, London.
6. Wisner, B., Blaikie, P., Cannon, T. and Davis, I. 2004. *At Risk: Natural Hazards, People's Vulnerability and Disasters*, Second Edition, Routledge, London.
7. Birkmann J (2006): Measuring Vulnerability to promote disaster resilient societies: Conceptual frameworks and definitions, United Nations University Press, Pg. 9-54.
8. Coburn, Spence & Pomonis (1991): Actions to reduce risk in Disaster Mitigation, UNDP-UNDRO Manual, Pg. 15 – 27.
9. Bryant Edwards, 2005. *Natural hazard*. Cambridge University press, UK.
10. Coburn, Spence & Pomonis (1991): Mitigation Strategies, UNDP-UNDRO Manual, Pg. 29 – 34.
11. Jeannette Sutton and Kathleen Tierney (2006) *Disaster Preparedness: Concepts, Guidance, and Research*, Natural Hazards Center, Institute of Behavioral Science, University of Colorado, Accessible at McEntire D A (2005): Why Vulnerability Matters: Exploring the merit of an inclusive disaster reduction concept, *Disaster Prevention and Management*, 14 (2), Pg. 206- 222.
12. Morrow B H (1999): Identifying and Mapping Community Vulnerability, *Disasters*, 23 (1): 1-18.
13. Rautela P and RK Pande (2005): Implications of ignoring the old disaster management plans: Lessons from the Amparav tragedy of 23 September 2004 in the Nainital district of Uttaranchal (India), *Disaster Prevention and Management*, 14 (2), Pg. 388-394.
14. Weichselgartner F (2001): Disaster Mitigation: The concept of Vulnerability Revisited, *Disaster Prevention and Management*, 10 (2), Pg. 85- 94.
15. Wisner B (2004): Assessment of Capability and Vulnerability in Bankoff G, Frerks G and Hilhorst D eds. 'Mapping Vulnerability: Disasters, Development & People', Earthscan, Pg. 183- 193.
16. Wisner B et al (2005): *At Risk: Natural Hazards, People's Vulnerability and Disasters*, London and New York, Routledge, Pg. 319 – 376.
17. Wisner B et al (2005): *At Risk: Natural Hazards, People's Vulnerability and Disasters*, London and New York, Routledge, Pg. 49-87.

DMPB 412 - Principles of Remote Sensing

Unit -I

8 Hours

Aerial Photography: History - Types of Photographs-classifications - Films and filters, FCC, Characteristic features of aerial photographs – scale, overlap, sidelap, vertical exaggeration Photo Mosaics: Photo mosaic (uncontrolled, semi controlled & Controlled mosaics) – Flight planning – Aerial triangulation.

Unit -II

10 Hours

Global Remote Sensing Satellites; **Spectral Response pattern of objects** - terrestrial, coastal and oceanic features. Sensors and Platforms: Resolutions (Spectral, Spatial, Temporal, Radiometric) - Platforms - Sensors - Scanning & Orbiting Mechanisms of Satellites and Data Acquisition. Optical Remote Sensing: Basic concepts – Optical sensors and scanners.

Unit -III

10 Hours

Thermal & Microwave Remote Sensing: Thermal Remote Sensing: Basic concepts - Thermal sensors & scanners - Thermal Inertia. Microwave Remote Sensing: Basic concepts - Microwave sensors and Radiometers - Geometric characters - Radargrammetry (SLAR / SAR) - **LIDAR – Hyper spectral Remote Sensing:** basic concepts and applications.

Unit -IV

10 Hours

Photo Interpretation Keys & Elements: Photo Interpretation Keys (Definition, its parts, Key sets, Types of Study) - Photo Interpretation Elements (Photo elements - Tone, Texture, Color, Shadow) - Geotechnical / Geomorphic elements (Landforms, Drainage, Erosional pattern, vegetative cover, Landuse, Shape & size of objects). Microwave Satellite Image Processing - concepts, keys and techniques.

Unit - V

10 Hours

Cutting Edge Technologies in Remote Sensing: **Unmanned Aerial Photography (UAV) and Drones**, Low Cost Sensor Networks. Integration of geophysical and biochemical technologies with Remote Sensing. **Cloud based Processing Platforms:** Google Earth Engine - Image Series and advance processing; Bhuvan and Copernicus.

References:

1. Wolf, P.R. Elements of Photogrammetry McGraw Hill Book Co., Tokyo. 1974.
2. Moffit H.F. And Edward, M.M, Photogrammetry, 3rd Edition, Harper and Row Publishers, New York. 1980.
3. Bhatt. A.B., Aerial Photography & Remote Sensing (An Introduction), Bishen Singh& Mahendra Pal Singh Pub., 1994.
4. Rampal, Handbook of Aerial Photography and Interpretation, Concept publishing. 1999.
5. Lillesand, T.M. And P.W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York. Third Edition, 2007.
6. Curran, P. Principles of Remote Sensing, Longman, London. 1985.
7. Sabins, F.F.Jr., Remote Sensing Principles and Interpretation, Freeman, Sanfrancisco. 1978.
8. Mukesh Gupta. Remote Sensing for Geophysicists, CRC Press, New York, 2025
9. Burnside, C.D., Mapping From Aerial Photographs, Collins Publishers. 1985.
10. Nicolas Baghdadi and Mehrez Zribi. Microwave Remote Sensing of Land Surfaces, Techniques and Methods, ISTE Press - Elsevier, 2017 <https://doi.org/10.1016/C2016-0-00232-2>
11. Colwell, Robert, Manual of Photographic Interpretation, American Society Of Photogrammetry, ASP Falls Church, Virginia. 1960.
12. David Paine. Aerial Photography and Image Interpretation for Resource Management, John Wiley & Sons, New York. 2003.
13. George Joseph, Fundamentals of Remote Sensing, Cambridge University Press, 2nd Edition.
14. Shiv N. Pandey, Principles and Applications of Photogeology, Wiley Eastern Limited, India.1987.
15. Michel Kasser and Yves Egels, Digital Photogrammetry, Taylor & Francis Inc., 2002.
16. Jeffrey A. Cardille, Morgan A. Crowley, David Saah, Nicholas E. Clinton. Cloud-Based Remote Sensing with Google Earth Engine - Fundamentals and Applications. Springer Cham, 2024. <https://doi.org/10.1007/978-3-031-26588-4>
17. American Society of Photogrammetry, Manual of Remote Sensing (II Edition), ASP, Falls Church, Virginia. 1983.
18. Burnside, C.D., Mapping From Aerial Photographs, Collins Publishers. 1985.

19. John, T.Smith Jr, Manual of Colour Aerial Photography (I Edition) American Society of Photogrammetry, ASP Falls Church, Virginia, 1968.
20. Woodhouse, I.H. (2006). Introduction to Microwave Remote Sensing (1st ed.). CRC Press. <https://doi.org/10.1201/9781315272573>.
21. David Paine. Aerial Photography and Image Interpretation for Resource Management, John Wiley & Sons, New York. 2003.
22. George Joseph, Fundamentals of Remote Sensing, Cambridge University Press, 2nd Edition.
23. Shiv N. Pandey, Principles and Applications of Photogeology, Wiley Eastern Limited, India.1987.
24. Michel Kasser and Yves Egels, Digital Photogrammetry, Taylor & Francis Inc., 2002.

DMPB413- Earth System Dynamics and Rock Types**Unit I****10 Hours**

Earth system: solar system- origin of the earth- Age of the Earth (different hypotheses)- interior of the Earth-lithosphere - asthenosphere. Three classes of rocks – Igneous rocks, Sedimentary and Metamorphic rocks, and the distribution of rocks in the Earth. Earth structure and petro– tectonic Assemblages, Asthenosphere, Thermal gradient lithosphere.

Unit II**10 Hours**

Igneous rock: Origin of Magma – Evolution of Magmas - Factors controlling the viscosity of magmas – Mode of occurrence of igneous rocks - Classification of Igneous rock – Types of igneous rock – Volcanic rock- Basaltic lava, Pyroclastic rocks Intrusive rocks- Granite, Granodiorites and related rocks, and carbonatites - Igneous rock occurrence in India.

Unit III**10 Hours**

Sedimentary Rocks: Terrigenous, Chemical and biochemical rocks- Structure and texture of the sedimentary rocks: Grain size, shape, Mineralogy and chemistry of sedimentary rocks- Classification of sedimentary rocks: Conglomerate rocks, Breccias, sandstone, Arkoses, Greywacke, Mud rock, Shale, Siltstone, Carbonate rock, Evaporates. Lithification and Diagenesis, Oxidation and Reduction.

Unit IV**10 Hours**

Metamorphic Rocks: Definition of metamorphism- Agents and types of Metamorphism (Pressure, stress, Temperature, Chemical Activities of fluids)- Local Metamorphism and Continental Metamorphism- Dynamo Thermal Metamorphism- importance of Metamorphic rocks, migmatites, Eclogite, Mylonite and Serpentine. Ophiolite: Structure and Composition of Ophiolite, Origin of Ophiolite, Tectonics of the Andaman region.

Unit V**8 Hours**

Earth System- Rock types, their relation to continental, oceanic crust in seismicity, Ophiolite suite, island arc, mid-oceanic ridge, zone of fissure, volcanic necks and seismicity, paleoseismicity.

REFERENCES

1. Dexter Perkins and Kevin R. Henke, Minerals in thin section; Prentice Hall, 2nd edition, 2003.
2. Tyrrell, G.W., Principles of Petrology – An Introduction to the Science of Rocks, Aitbs Publishers And Distributors, Delhi, India, 2012.
3. Loren A. Raymond, Petrology: The study of Igneous, sedimentary and metamorphic rocks, Waveland Press, Inc.; 2nd edition, 2007.
4. Sam Boggs, JR., Principles of Sedimentology and Stratigraphy, Prentice Hall; 4th edition, 2005.

DMPB 414- Structure and Active Tectonics**Unit I****Hours 10**

Crustal deformation- Deformation and active fault settings, Stress, strain and faults, Stress Ellipsoid and stress Ellipsoid, Lithostatic and Deviatoric stresses Strain: Nature of strain- Measurement of strain- Strain ellipsoids- Simple strain- Homogenous strain-Progressive deformation and Finite strain. Stress and strain in materials: Elastic, plastic and viscous strain- plastic, brittle and ductile deformation

Unit II**Hours 08**

Folds: Definition- Types and classification of folds- Geometry of the folds- Description of the folds –Expression of the folds in field and remote sensing data, Flexural slip and bending moment faults, Relationship of folds to faults

Unit III**Hours 10**

Faults: Definition, Geometry and the classification of faults- Rocks produced by faults, Paleo seismology of Normal, Strike slip and Compressional Environments, The Earthquake Deformation Cycle, Classification of Paleo seismic evidences, Major Faults of Andaman and Nicobar Islands.

Unit IV**Hours 10**

Geotectonic and Plate Tectonics: Active tectonics and plate boundaries- Convergent and Divergent plate margins, General style of Deformation in Compressional zones and Subduction systems, Earthquake ruptures and Megathrust earthquakes, Ocean floor spreading and Mid-oceanic ridges

Unit V**Hours 10**

Fault and seismicity- Secondary effects of earthquakes-Landslides, tsunami and fires, Liquefaction Induced features, Seismically Induced Landslides, Earthquake Resistant Buildings, Seismic audit of Building and Retrofitting.

References

1. Davis, G.H and Stephen J Reynolds (1996). Structural Geology of rocks and regions John Wiley & Sons.
2. Park, R.G. Foundations of structural Geology, Routledge, London, 195 p.
3. Hobbs, B.E, Means, W.D and Williams, P.F. (1986). An outline of structural Geology 2nd Edn, Wiley, New York.
4. Douglas W. Burbank and Robert S. Anderson, Tectonic Geomorphology, Wiley-Blackwell
5. McCalpin, J. P., & Nelson, A. R. (2009). Introduction to paleo seismology. International Geophysics, 95, 1-27. [https://doi.org/10.1016/S0074-6142\(09\)95001-X](https://doi.org/10.1016/S0074-6142(09)95001-X)

DMPB 415-Geomorphology (Soft Core)

Unit I

6 Hours

Principles of geomorphology: Basic principles of geomorphology and laws- processes and evolution of the surface of the Earth- Development of distinct morphology and constraint materials with specific characteristic properties

Unit II

12 Hours

Denudational and Tectonic Geomorphology Process of weathering:- physical, chemical and biological weathering ; Classification of denudational geomorphic features:- **Summit features** – denudational hills, inselbergs, Bornhorte, dissected denudational hills, tors, torcliffs, erosional plateaus, dissected erosional plateaus, gullied erosional plateaus. **Slope zone features:** concave slope, convex slope, plain slope, deep moderate and shallow slope, debris slopes, dissected slopes, gullied slopes, dip slope, upsequent slope, slope with complex folding, active and passive slopes, vertical slopes. **Foot hill features:** Talus cone, talus fan, debris cone, debris fan, debris avalanche, debris creek, solifluction. **Plains zone features:** pediments, dissected and dissected pediments, gullied pediments, Its expression in the field and in satellite data. **Valley features:** intermontanne valleys, barren valley and filled valley. anticlinal valleys, synclinal valleys, faultline valleys, fracture valleys. **Tectonic geomorphology:** Fault scarp, pressure and shutter ridge, sag ponds, plateaus, undissected plateaus, Marginally dipping plateaus, boat shaped plateaus, rolling plateaus, Escarpments: Retreating escarpment, rectilinear escarpments, faultline escarpments. questa, Butte, mesa, hogback ridges

Unit III

10 Hours

Fluvial and Coastal geomorphology; Fluvial geomorphology: source of drainages. types of drainages: permanent, semi permanent, ephemeral, intermittent, purely temporary drainages, dendritic, semidentric, trellis, radial, rectilinear, avulted, hide, deflected drainages, ponded streams, submerged, anomalous compressed meanders etc., **Life history of river:** youthful, mature and old stages – **Destructional and Constructional landforms of the youthful stage - Destructional landforms:** V shaped gullies, hanging valleys, waterfalls and rapids, pot holes, step like drainages. **Constructional landforms:** valley fills, colluvial fills, alluvial cone, alluvial fan, debris wash plain, piedmont zone. **Destructional landform of the mature stage:** Incised meanders, entrenched meander, river cut terraces. **Constructional landform of the mature stage:** flood plains (asymmetrical flood plain, symmetrical food plain, multilevel flood plain, meander scars, levees, backwaters, oxbox lakes and braided drainages) **Old stage landforms:** Apex of the delta, lobate delta, awkward delta, cusbate delta, digitate delta, protruding delta, symmetrical delta, asymmetrical delta, birdfoot delta. **Migratory pattern of drainages:** river migration, palaeo channel mapping, significance of river migration, reasons for river migration, dating of palaeo channels, prediction of future changes and migration and other significance of river migration. **Rejuvenated stage of river:** floodplain in youthful stage, incise meanders in youthful stage, extensive erosion and gully in old stage. **Coastal geomorphology; Definition of the coast** – classification of coast, straight shoreline, oscillating shore line, embayed coast, emergence coast, subsiding

coast, neutral coast, compound coast. **Land forms of emerging coast:** different types of delta, spits, etched shore line, eroded coast, offshore islands, beach ridges and swale complex including delta. **Landform of subsiding coast:** backwaters, lagoons, estuaries, tidal flats, creeks, shoals.

Unit IV

10 Hours

Aeolian, Glacial and Volcanic geomorphology; Destructional landform: exfoliation domes, windcarved features, rocky desert, desert pavement, hard fans, playa lakes, desert oasis, bornhorste. **Constructional landforms:** longitudinal dunes, barchan dunes, transverse dunes, combed dunes, star dunes, dune complexes, sand sheets, dust storms, loess. Buried channels **Volcanic features:** flow plateau, stepped escarpments in flows, volcanic cone, volcanic neck, volcanic crater, volcanic calderas, flope pediments, flope line. **Glacial landforms**

Unit V

10 Hours

Geomorphology and Natural disasters; Denudational landforms and landslides, seismicity and landslide, fluvial geomorphology and seismotectonic, fluvial geomorphology and flooding, Deltas as indicators of shoreline process, Fluvial geomorphology and Aeolian geomorphology as indicators of coastal hazards. Glacial geomorphology as indicators of global warming etc.,

Reference books

1. Thornbury. Principles of geomorphology.
2. Mateo Gutierrez (2013).. Geomorphology.CRC press, 1017p.
3. Dunn, A.J. and Beckinsale, R.P. (1964) The History of the Study of Landforms, Vol. 1, London:
4. Fairbridge, R.W. (ed.) (1968). Encyclopedia of Geomorphology, New York: Reinhold.
5. Walker, H.J. and Grabau, W.E. (1993) The Evolution of Geomorphology. A Nation-by-Nation Summary of Development, Chichester: Wiley.
6. Eric Bird. Coastal Geomorphology. John Wiley, 436p.
7. Andrews S Goudie. Encyclopedia of Geomorphology. Routledge (Taylor & Francis), 1202p.

DMPB 416 - PRACTICAL 1 (DMPB 412, DMPB 413)

12 hours

PART 1 (DMPB 412 – Principles of Remote Sensing)

1. Study of Pocket stereoscope, Mirror stereo scope, 3D view
2. Usage of topindex and identification of path and row of satellite
3. Data browsing and downloading
4. Image pre-processing
5. Exploring Desktop and Cloud based Platforms
6. Digital image processing: Image enhancement, image manipulation
7. Image classification supervised and unsupervised classification
8. Field investigation of identified features using GPS, Forestry and Geophysical Instruments

PART 1I (DMPB 413 – Earth System Dynamics and Rock Types)

Earth Systems Dynamics and Rock Types (DMPB 413)

11. Megascopic identification of igneous, sedimentary and metamorphic rocks
12. Microscopic identification of igneous, sedimentary and metamorphic rocks

Credits – 3

DMPB 417- Practical II

24 hours

(Practical for Structure and Tectonics (DMPB 414) and Geomorphology (DMPB 415))

1. Structural interpretation using satellite imagery,
2. Stress and strain analysis
3. Geomorphic mapping using satellite imagery,
4. Morphometric (Indices) analysis,
5. Paleochannel mapping using satellite imagery,
6. Drainage analysis
7. Risk assessment of Hazard and
8. Vulnerability mapping
9. Field report

DMPB 511 - Geographic Information Systems

Unit I

8 Hours

GIS: Components of a GIS -A Brief History of GIS - GIS Software Products - Elements of GIS - Applications of GIS - Integration of GIS, Web, and Mobile Technology.

COORDINATE SYSTEMS: Geographic Coordinate System - Map Projections, Types of Map Projections, Commonly Used Map Projections

Unit II

10 Hours

VECTOR DATA MODEL: Representation of Spatial Features – Topology: TIGER - Georelational Data Model- Object Based Data Model- Representation of Composite Features - Applications: Vector Data Model

RASTER DATA MODEL: Elements of the Raster Data Model - *Satellite Images* - Digital Elevation Models - Other Types of Raster Data - Raster Data Structure - Raster Data Compression, Data Conversion and Integration - Applications: Raster Data Model

Unit III

10 Hours

GIS DATA ACQUISITION: Existing GIS Data - Metadata - Conversion of Existing Data - Creation of New Data - Applications: GIS Data Acquisition

SPATIAL DATA ACCURACY AND QUALITY: Location Errors - Spatial Data Accuracy Standards - Topological Errors - Topological Editing - Nontopological Editing - Other Editing Operations - Applications: Spatial Data Accuracy and Quality - SPATIAL INTERPOLATION

Unit IV

10 Hours

ATTRIBUTE DATA MANAGEMENT: Attribute Data in GIS: Types of Attribute Tables, Database Management, Types of Attribute Data - The Relational Model - Joins, Relates, and Relationship Classes - Spatial Join - Attribute Data Entry

DATA EXPLORATION: Data Exploration - Map-Based Data Manipulation - Attribute Data Query - Spatial Data Query - Combining Attribute and Spatial Data Queries - Raster Data Query - Applications: Data Exploration

DATA DISPLAY AND CARTOGRAPHY: Cartographic Representation: Spatial Features and Map Symbols, Use of Color, Data Classification, Generalization - Types of Quantitative Maps – Typography - Map Design - Animated Maps - Map Production

Unit V

10 Hours

VECTOR DATA ANALYSIS : Buffering, Overlay, Distance Measurement, Pattern Analysis, Feature Manipulation, Applications: Vector Data Analysis

RASTER DATA ANALYSIS: Local Operations, Neighborhood Operations, Zonal Operations, Physical Distance Measure Operations, Other Raster Data Operations

TERRAIN MAPPING AND ANALYSIS: Data for Terrain Mapping and Analysis, Terrain Mapping, viewshed and watershed analysis - Applications of Least-Cost Path Analysis - Network Analysis - Basic Elements of GIS Modeling

REFERENCES:

1. An introduction to Geographical Information System by Kang-Tsung Chang, ninth edition, Mc Graw Hill Education 2018
2. Burrough, P.A Principles of Geographical Information Systems for Land Resources Assessment, Clarandone Press, Oxford, 1986.
3. Kang - Tsung Chang, Introduction to Geographic Information System, MC Graw Hill, Boston. 2002.
4. Campbell, J, Introductory Cartography, Printers Hall Englewood Cliffs, N.J, 1984.
5. Dent B.D, Principles of Thematic Map Design, Addition - Wesley, Reading, Mass. 1985.
6. Freeman, H and Pieroni, GG. Map Data Processing, Academic Press, New York. 1980.
7. Monmonier, M.A, Computer Assisted Cartography - Principles and Prospects, Prentice Hall, Englewood Cliffs, NJ, 1982.
8. Tomlinson, R.F Calkins, H.S and. Marble, D.F, Computer Handling of Geographic Data, UNESCO, Geneva. 1976.
9. Graeme F. & Bonham Carter, Geographic Information Systems for Geoscientists, Modelling with GIS, Pergamon Publications, 1994.
10. Anji Reddy, M. 2004, Geoinformatics for environmental management B.S. Publications

DMPB 512- Geophysical Exploration

Unit I

Hours 12

Composition and Rheology of earth of the Earth: The continental Crust and Ophiolites, the mantle and core, Seismology and Internal structure of the earth, Electrical resistivity of rocks; Natural radioactivity of rocks; Induced Polarization in rocks; Spontaneous Polarization; Dielectric constant of rocks; Effect of moisture on seismic Velocity; Variation of density in Rocks; Magnetic Susceptibility of rocks

Unit II

Hours 08

Seismic Methods, Seismic Reflection and refraction and seismic methods to detect tectonic fault Time distance diagram to measure seismic velocities in rocks, Geodesy Fundamentals and styles of strain - Near and far field techniques of Geodesy, GPS measurements.

Unit III

Hours 10

Electrical Resistivity techniques: Principle; controlling factors of resistivity, concept of depth penetration, Wenner- Schlumberger electrode configuration – apparent Resistivity. Resistivity profiling – Vertical Electrical sounding- Field procedure, interpretation. Electrical resistivity imaging for mapping of bed rocks and Delineation of fault structure.

Unit IV

Hours 8

Ground penetrating radar (GPR) Instrument Description and principle and field procedure, method to study landslide, subsurface cavity, subsidence, and fault interpretation, Field survey using Total station.

Unit V

Hours 10

Transient electromagnetic (TEM) Principle, description of the equipment, types of loop TERRA TEM, concept of frequency domain such as high, intermediate and low frequency duration for detection of the geological formations and water quality (salt Water intrusion).

References

- H. Robert Introduction to Applied Geophysics: Exploration the shallow Subsurface; W.W Norton & Company (july 6,2006)
2. Griffiths,D.H., and King, R.F.1981.applide geophysics for geologist and engineer ,2nd edition Pergamum, Oxford,UK
3. Hail wood, E.A.1989 Magnetostratigraphy, Blackwell scientific oxford .UK
4. Kasahara, K. 1981 Earthquake mechanisms. Cambridge university press, Cambridge, UK
5. Parasins, D.S 1997 .Principles of applied Geophysics, 4th edition Chapman and Hall.
6. William Lowry- Fundamentals of Geophysics-Cambridge-

DMPB 513- Earthquakes, Volcanism, Landslides and Desertification

Unit 1

Hours 10

Earthquake: Description, Ground Shaking and Damage Potential, Ground Failures and Deformation, Seismic waves types, detection of seismic waves, geophone, seismometer, ray path refraction, reflection, Snell's law, Seismic feature of Earth's interior core, mantle, seismic tomography.

Unit II

Hours 10

Locating Earthquake, rupture dimensions and displacement, measures of earthquake size, intensity, severity of earthquake and seismic movement, Magnitude of earthquake, prediction methods, time distance diagram to measure seismic velocities in rocks, Geological and Geographical Analysis, Mitigation and Management, Disaster Mitigation Programme in India, Earthquake events, Public awareness and Risk

Unit III

Hours 8

Landslides: Occurrences in India, causes of landslides, factors, slope, geology, water content, weathering, effect of vegetation, morphology of landslide and classification of landslides, falls, topples, slides, creep, spreads, earth flow, complex flow, Mitigation methods.

Unit IV

Hours 10

Volcanism: Description: Assessment and Mapping, Monitoring and Warning, Description of Volcanic hazards, Geographical and Geological analysis: Primary and Secondary, Event Modification, Role of volcanism in Geological Hazard Prediction and Mitigation, Risk Mitigation and Training.

Unit V

Hours 10

Drought, Famine, and stages. Impact and mitigation methods. Identification of human-made and natural voids, mine shafts, naturally occurring caves in karst terrain, depth, size and shape. Subsidence: tectonic causes, anthropogenic causes - groundwater extraction, oil extraction, unequal settling at the unconsolidated sediment bottom layer and impact of subsidence.

References:

1. Seth Stein and Michael Wysession, An Introduction to Seismology, Earthquakes, and Earth Structure, Wiley-Blackwell; 1st edition, 2002
2. John J. Clague and Douglas Stead, Landslides: Types, Mechanisms and Modeling, Cambridge university Press, 2012.
3. Bimal Dhawan, Earthquake and Volcano - Disaster Management, Oxford Book Company, Jaipur, India, 2024.
4. Looking into Earth: An Introduction to Geological Geophysics: Alan E. Musset and M.Aftab khan .Cambridge, 2000.

DMPB-514- Floods, Tsunami, Cyclones and Other Coastal Problems

Unit I

Hours-12

TROPICAL CYCLONES: Conditions for formation of cyclone, Structure of Tropical Cyclone, Coriolis force Global cyclone basins, Different forms of cyclone and their classification, Cyclone Hazard Assessment and Mapping, Tropical Cyclone Warning Strategy in India, Disaster Management and Mitigation Measures, Cyclone in the Bay of Bengal and Arabian sea: Pattern and Incidence, Robust Foundation System for Cyclone Prone Areas, Cyclone Risk and Engineering, India: Impact of Cyclones, Assessment and Management of Impact. Cyclone best track data & e-atlas (IMD). Storm surge

Unit II

Hours-10

Types of flood – Coastal flood –Anthropogenic impact – Flood hazard assessment and management-Flood hazard mapping- Flood hazard map of India- flood warning system, Flood forecasting, mitigation, planning and management –Flood resistant houses. Emerging techniques in flood hazard mapping & mitigation

Unit III

Hours-10

Ground water rise: Causes – Impacts: Structures, roads, sewage plants, public health, salting, water logging- Ground water fall – Ground water drought- Overexploitation – sea water intrusion, modeling and preventive measures. Ocean processes- Waves, wave parameters, types of waves- tides and classification - current and their types- causes of coastal erosion- coastal protection – Types & strategies (hard and soft engineering, natural based solutions) - Coastal habitat destruction, coral reef bleaching.

Unit IV

Hours-10

Tsunami, causes, impacts, Tsunami warning system and forecasting, Sumatra-Andaman 2004 Tsunami - lessons learned & gaps identified, nodal agencies in tsunami monitoring, EL-NINO, LA-NINA, ENSO, Lightening; Description, Frost hazards: Definition, Frost bite, Frost hazards in Agriculture and Highways, Wildfire Hazards.

Unit V

Hours-6

Sources-urban effluents-oil spills and its effect- counter measures-remote sensing in oil spills-control techniques - international convention on marine pollution.

Text Books:

1. Natural hazard. 2005, Edward Bryant. ISBN 0521537436
2. Natural disasters. 1998. David Alexander. ISBN 1857280946
3. Environmental hazards: Assessing risk & reducing disaster, 2004, Keith Smith, Rutledge. ISBN 0415318041
4. Natural hazards & Environmental change. 2002. Bill McGuire, Ian Mason & Chris Kilburn, Arnold Press. ISBN 0340742208

Reference Books

1. Geological hazards, 1999. Fred Bell, Spon Press. ISBN 0419169709
2. Global tectonics. 1996. Philip Kearney & Fred Vine. Blackwell. ISBN 0865429243
3. The mathematics of natural catastrophes. 1999. Gordon Woo. Imperial College press. ISBN 1860941826
4. Dangerous earth: An introduction to geological hazards. 1996. Barbara Murck et al. Wiley Press. ISBN 0471135658

DMPB 515 - Biological and Technological Disasters

Unit I

10 Hours

Definition – biohazards – classification, **Biodiversity extinction** – population extinction and saving biodiversity – species at risk – loss of biological diversity – population diversity and extinction rate. **Invasive Species** and its Impacts. Deforestation and loss of biological diversity and its ecological services. Human Animal Conflict - coexistence - land, coast and marine, socio-economic impacts.

Unit II

12 Hours

Locust outbreaks and tier management, Brown plant hopper attacks in paddy, Coconut mite and beetle attack. **Outbreak of epidemics and Pandemics** - dengue, malaria, COVID, contagious disease e.g. AIDS. Zoonotic Diseases: Bird's flu, rabies, mad cow disease. Monitoring, forecasting, protection and awareness measures - educating farmers and communities.

Unit III

8 Hours

Biotech and genetic manipulation – issue in biodiversity the emergency of biotechnology – public awareness of biotechnology. Dangerous trends in agricultural biotechnology – seeds breeding extinction – managing hazards of genetic engineering. **Carbon sequestration** - effects of deforestation and global climatic change in Blue Carbon and Green Carbon.

Unit IV

10 Hours

Definition – source and types of industrial hazards – toxic release – type of toxic effects toxic rate parameters. **Industrial hazards risk assessment**, Hazard identification, probability analysis, risk analysis. Reducing the impact of industrial disaster - **Fire & Safety** - Remote sensing and GIS in industrial hazard risk assessment – legislation – policies and guidelines – national policy

Unit V

8 Hours

Rapid ranking, qualitative, quantitative, semi-quantitative methods. Effect model – protection against contamination of the environment from radioactive fallout. Effluent contamination and acid rain – environment and ground water pollution and management – **solid waste management** – monitoring and protective measures – safe toxic waste disposal technologies.

Text Books:

1. King R.W and Magid, J. 2009, Industrial hazards and safety handbook, 825p
2. Sanjoy Banerjee, 2002, Industrial hazards and plant safety. Taylor and Francis groups UK 475p.
3. Bryant Edwards 2005, Natural hazard, Cambridge university press UK, 312p.
4. Peter H. Wald and Gregg M. Stage, 2002, Physical and Biological Hazards. 680p.

5. Encyclopaedia of Disaster management by Prof. Priya Ranjan trivedi, Jnanoda prakeshan, New Delhi.
6. Frank B, Glikman JA, Marchini S, eds. Human–Wildlife Interactions: Turning Conflict into Coexistence. Cambridge University Press; 2019.
7. Woodroffe R, Thirgood S, Rabinowitz A, eds. People and Wildlife, Conflict or Co-Existence? Cambridge University Press; 2005.
8. Draheim, Megan, and others (eds), Human-Wildlife Conflict: Complexity in the Marine Environment. Oxford, 2015.

Reference Books:

1. Braj Kishore and Prasad Sing, 2008, Industrial Disaster management, Navyung publishers, New Delhi, 288p.
2. Disaster prevention and mitigation 1984, UNDRO publication, Geneva.
3. Hohenemser, C, R.W. Kates, et all 1983. The nature of technological hazards, 378-384p
4. Alexander D 1993, Natural disaster, UCL press ltd., London
5. World Disaster Report 1993, International Federation of Red Cross
6. Smith, K. 2001, Environmental hazards, Rutledge
7. Reena Mohanka, Chowdhary, Singh.M.P2010. Environmental resources and biological hazards A.P.H.publication 384.p.
8. Shaw, Disaster Management, Orient Longman, New Delhi
9. Alexander, D. 1993, Natural disaster , UCLpress Ltd, London
10. Bryant Edwards 2005, natural hazard, Cambridge university press UK
11. Gaur, Disaster management, Authors press, New Delhi
12. Zoonotic Diseases of Public Health Importance (Third Edition), Ministry of Health and Family Welfare, Government of India, 2016.
13. Technical Guidance on Zoonotic Disease - Prevention, Preparedness and Response using One Health approach. NCDC, India and WHO - India.

DMPB 516 – Practical III (DMPB 511, 514, 515)

PART 1 – (Geographical Information System – DMPB 511)

(Practical exercises for Geographic Information System (DMPB511))

1. Onscreen digitizing (point, line and polygon)
2. Data base design
3. Layout preparation
4. Querying database
5. Displaying data
6. Editing data
7. Working with layers and map symbology
8. Thematic map preparation
 - a. Road map
 - b. Drainage map
 - c. Contour map
 - d. Landuse map
 - e. Vulnerability map
9. Leica Photogrammetric suite

PART 1I – (DMPB 514- Flood, tsunami and cyclones and other coastal process and DMPB 515- Biological and Technological Disasters)

Practical exercises

1. Biodiversity Risk Assessment
 - a. Geospatial Analysis
 - b. Geophysical Analysis
 - c. Field survey
2. Carbon Sequestration Analysis
 - a. Geospatial analysis
 - b. Field survey
3. Analysis of Characteristic features of cyclones of Indian Ocean from data collected from IMD e-atlas and best track data

DMPB 517- Practical IV

24 Hours

(Part I- Geophysical Exploration (DMPB 512))

1. Calculation of apparent resistivities and geoelectrical parameters using Wenner and Schlumberger configuration
2. Estimation of seismic velocity and delineation of different layers and its thickness using seismic method
3. Geophysical survey in Delineating the position and nature of faults and fracture zones
4. Pollution studies, Beach profiling using Total station,
5. Sea Water Intrusion,
6. Ground Water,
7. Landslides study using, Electrical Tomographic Imaging, GPR, Resistivity meter etc.

(Part II- Earth quake, Volcanism, Landslides and Desertification , DMPB 513)

1. Measuring of Earthquake magnitude, location, time from seismogram , Evaluation of stress from earthquake data , fault plane solution related to stress , Time –Distance method to measure velocities

DMPB 611- Climate Change and Environmental Disaster

Unit I

8 Hours

Weather and climate, climate, albedo, Early Earth Climate- a Runway Greenhouse, Greenhouse effect on Earth Today, Climate History: Time scale in Millions of Years.

Unit II

6 Hours

Glacial Advances and Retreat : Time Scale In thousands of years , Climate variations :Time scale in thousands of years , Shorter- term climate change in multiyear- El Nino, La Nina Volcanism and climate effects, Sea level changes.

Unit III

8 Hours

Relationship between climate change- increase of Co₂ and- increase of global temperature- ocean acidification, understanding of carbonate and acidity, time series of atmospheric Co₂ and surface pH and Co₂ in the Ocean Surface, Ocean acidification differ in different ocean- causes, prediction of severity of ocean acidification

Unit IV

8 Hours

Ocean Acidification impacts on Southern ocean chemistry, ocean acidification – effect of on reef organisms, Ecological impact, Species interaction and ecosystem shifts, most vulnerable communities.

Unit V

6 Hours

Science- Policies issue- mitigation measure- adaptation strategies and action plans, Economic Implication of ocean acidification; A hidden risk for sustainable development, Role of United Nations and International community, Policy options, International Action on Mitigation and strategies , technology impact, information Generation and Dissemination.

References:

1. Grant Bigg. The ocean and climate (2nd ED). Cambridge university press, ISBN: 0-521-01634-7
2. Martin Beniston. From turbulence to climate. Springer ISBN:3-540-63495-9
3. Yoshiaki Toba: ocean – Atmosphere Interactions. Terra scientific publishing company, Tokyo and Kluwer academic publisher, Dordrecht, London, Boston, ISBN: 1-4020-1171-7
4. John Houghton. Global warming complete briefing (third Edition). Cambridge University Press, ISBN:0-521-52874-7
5. Trujillo, Thurman. Essentials of Oceanography (ten edition) (page 468-495). Prentice hall, ISBN:13-987-0-321-66812-7
6. Andrew A. Dessler , Edward Parson. The science and politics of global climate change- A guide to debate. Cambridge press. ISBN:0-521-53941-2
7. Peter Jassen. The interaction of ocean waves and winds. Cambridge University Press, ISBN:0-521-46540-0

DMPB 612 -Disasters and Strategic Environmental Assessment (SEA)

Unit I

5 Hours

EIA; Definition - Objective - Types-Brief history-Steps in conducting EIA, regulation in India, Disaster and their impact - social and environment- Risk assessment vs EIA and limitation of EIA; Definition - Importance of SEA- comparison EIA and SEA - arrangement and procedures- SEA aims, procedure and approach - SEA methodology- signification and aspects of social impact assessment.

Unit II

10 Hours

Impact assessment procedure - Application of Matrices, Network and overlay maps, data collection, Environmental evolution system - impact prediction - evaluation and mitigation - assessment of impact on physical, biological and socio-economic environment.

Unit III

10 Hours

Monitoring the Environment and Environmental auditing, Environment Management and Disaster management plans, cost-benefit analysis, and public participation. EIA report: Content and non-technical summary.

Unit IV

10 Hours

Environmental Management Plan and Policies; Key features of National Environmental Policy and Act, Conceptual linkages between approach - environmental impact studies and Disasters, Plan and management of environment from the perspective of Disaster vulnerability and post-disaster impacts. Integrating EIA & SIA in analyzing disaster, then impact and Post-Disaster recovery and reconstruction.

Unit V

5 Hours

Coastal Regulation Zone (CRZ) and Island Coastal Regulation Zone (ICRZ) guidelines and amendments, Classification of CRZ and ICRZ - Eco Sensitive Area and Non-Eco Sensitive area. Environmental impact statement and environmental management plan ISO 1400 - EIA guideline 1994 and their relevance for climate change and environmental impact of disasters.

References:

1. Betty Bowers Marriot, Environmental Impact Assessment: A Practical Guide, McGraw Hill, 1997.
2. Biswas, A and Agarwal, S.B.C, Environmental Impact Assessment for developing countries. Oxford: Butterworth-Heinemann Ltd, 2013.
3. UNEP, Environmental Impact Assessment Training Resource Manual. Second edition, Geneva, 2002.
4. Peter Morris & Riki Therivel, Methods of Environmental Impact Assessment, Rutledge, 2001.
5. Rau and Wooten, Environmental Impact Assessment Handbook, McGraw-Hill, 1981

DMPB 613- Disaster Preparedness, Response and Rehabilitation

Unit I

12 Hours

Early Warning System: Hazard Assessment for Flood, Cyclone, Tsunami, Earthquake, Landslide and Drought. Multi-hazard zonation mapping and modeling. **Vulnerability Assessment** – classification and methods. **Risk Forecasting** and Decision Support System. **Emergency Operation Centers** (State and District) and Integrated Command and Control Centers.

Unit II

10 Hours

Nature and type of preparedness and response, Policies, Legal Framework, mock drills. Organized Response- Government, Non-government, and Community based Organization, role of private sector and media. **Preparedness Planning**: evacuation routes, shelter management and Community Responders. **Response Planning**: Information management, Resource management, **Business Continuity Plans** for different sectors.

Unit III

8 Hours

Search and rescue, Health and Sanitation, Dead body disposal, Debris Management, **Restoration of key infrastructure**. Standards and Best Practices in Relief operations –SPHERE standards. **Humanitarian Supply Chain Management**: Distribution, Transport and warehousing, Store management. Approaches to integrated response- Incident management system (IMS), Incident Response system (IRS), Community based Response.

Unit IV

8 Hours

Concept of Recovery, Rehabilitation and Reconstruction. **Post Disaster Need Assessment**, Food, water, Health, Shelter etc. Impact of disaster on development. Eg: displacement; livelihood; infrastructural; public health; environmental; changes; political and organizational changes; changes in business environment.

Unit V

10 Hours

Rehabilitation and Resilience: Characteristics of resilience and its elements; Resilience concepts in re-construction. **Critical Infrastructure Resilience** - Transport, Electricity, Health, Education and other critical infrastructures. **Nature based Solutions**. Approaches and Methodologies to assess Institutional Resilience, Community Resilience and capacity building.

References

1. The Disaster Management Act, Government of India, 2005 (www.ndma.gov.in)
2. UNDP, Local Government In Tsunami Recovery: Lessons Learned And Emerging Principles, UNDP Banagkok, 2006
3. Vatsa, K.S and Joseph: 'Disaster management plan for the state of Maharashtra, India: Evolutionary process, Natural Hazard Rev, 4(4), 2003, pp.06-212
4. Bryant Edward (2005). Natural Hazard. Cambridge University Press, UK Alexander (1993). Natural Disaster, UCL Press Ltd, London
5. Tiago Ferreira and Hugo Rodrigues. 2022. Seismic Vulnerability Assessment of Civil Engineering Structures At Multiple Scales. Elsevier-Woodhead Publishing.
6. Biswajeet Pradhan, Pravat Kumar Shit, Gouri Sankar Bhunia, Partha Pratim Adhikary, Hamid Reza Pourghasemi. 2022. Spatial Modelling of Flood Risk and Flood Hazards - Societal Implications. Springer Cham.
7. Hamid Reza Pourghasemi, Mauro Rossi. 2019. Natural Hazards GIS-Based Spatial Modeling Using Data Mining Techniques. Springer Nature Switzerland.
8. Giuliano F. Panza, Vladimir G. Kossobokov, ... Benedetto De Vivo . 2021. Earthquakes and Sustainable Infrastructure-Neodeterministic (NDSHA) Approach Guarantees Prevention Rather Than Cure. Elsevier.
9. Nuno Martins, Gonzalo Lizarralde, Adib Hobeica. 2022. Investing in Disaster Risk Reduction for Resilience- Design, Methods and Knowledge in the face of Climate Change. Elsevier.
10. Angela Colucci and Giulia Pesaro. 2022. Ecosystems of Resilience Practices. Elsevier.

DMPB 614 - Disaster Risk Reduction and Management

Unit I

Hours 10

Hazard and Disasters: Evolution and Objectives of DRR, Community Based DRR, Disaster-Development Relationship, Case Studies of DRR Initiatives at National and Regional Level.

Unit II

Hours 15

Mitigation Planning and Policy Strategies: Disaster Management Act 2005, Institutions of governance NDMA, SDMA, NIDM , National and state Disaster Management Plans, National Building Codes, 2016, understanding Vulnerability, Nature of Vulnerability, Mapping Vulnerability, (Social , Economic and Political vulnerabilities)

Unit III

Hours 10

Hazard and Risk Reduction Strategies -: Mainstreaming DRR, Hyogo and Sendai framework for action and its History (Yokohama Strategy), International Decade for Natural Disaster Reduction, 1990's, International Disaster Response Laws, Rules & Principles (IDRL), 2007, International Health Regulations, 2005. Tampere Convention, 1998, Convention on Oil Pollution, 1990.

Unit IV

Hours 15

Planning for Emergency Management, Communication and risk Management (Policies & Planning), Developmental Planning in Relation to Capacity, Resilience and Vulnerability, Disaster Response: Planning for Response- Communication, Participation and Activation of Emergency Preparedness Plans, Needs and Damage Assessment, collaboration & coordination in Emergency Response Planning & Management with various institutions- local, communities, NCC, NDRF, Armed Forces, Government Departments, NGOs- case studies.

Unit V

Hours 10

Strategies of Risk reduction; People's participation; Role of civil society and volunteer organizations; Activities and roles of community action for DRR; Participatory risk assessment methods; Culture of safety, prevention, mitigation and preparedness.

References

1. Birkland, Thomas.2006.Lessons of Disaster: Policy change after Catastrophic Events, Washington, D.C.: Georgetown University Press.
2. Burby, Raymond (Ed.).1998. Cooperating with Nature: Confronting natural hazards with land –use planning for sustainable communities, Joseph Henry Press.
3. Drabek, Thomas.2010.The Human side of Disaster. Taylor and Francies.
4. Florida Department of Community Affairs.2010. Post – Disaster Redevelopment Planning: Guide for Florida Communities.
5. Disaster Response and Emergency Management; Alfred Scott, 2016. Syrawood Publishing Hou

6. Post-Earthquake Rehabilitation and Reconstruction; F.Y. Cheng and Y.Y. Wang, 1996.
7. Disaster management; H.K. Gupta, 2003.
8. Disaster Administration and Management, Text & Case studies- SL, Goel-Deep and Deep Publications
9. Disaster Management- G.K Ghosh-A.P.H. Publishing Corporation
10. Disaster management – S.K.Singh, S.C. Kundu, Shobha Singh A – 119, William Publications, New Delhi.
11. Disaster Management – Vinod K Sharma- NIDM, New Delhi
12. Disaster Risk Reduction in South Asia- by Pradeep Sahni - Prentice – Hall of India
13. Disaster Mitigation and Management Post – Tsunami Perspectives P, Jagadish Gandhi
14. Disaster Mitigation – Experiences and reflections – By Pradeep sahani - Prentice – Hall of India
15. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
16. Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008
17. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Rutledge.
18. Coppola P Damon, 2007. Introduction to International Disaster Management, Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.
19. Cluny, F. 1983. Development and Disasters, Oxford University Press.
20. Document on World Summit on Sustainable Development 2002.
21. Govt. of India: Disaster Management Act 2005, Government of India, New Delhi.
22. Government of India, 2009. National Disaster Management Policy,
23. Gupta Anil K, Sreeja S. Nair. 2011 Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi
24. Indian Journal of Social Work 2002. Special Issue on Psychosocial Aspects of Disasters, Volume 63, Issue 2, April.
25. Kapur, Anu & others, 2005: Disasters in India Studies of grim reality, Rawat Publishers, Jaipur
26. Kapur Anu 2010: Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi.
27. Parasuraman S, Acharya Niru 2000. Analyzing forms of vulnerability in a disaster, The Indian Journal of Social Work, vol 61, issue 4, October.
28. Pelting Mark, 2003 The Vulnerability of Cities: Natural Disaster and Social Resilience Earthscap publishers, London
29. Reducing risk of disasters in our communities, Disaster theory, Tear fund, 2006.
30. UNISDR, Natural Disasters and Sustainable Development: Understanding the links between Development, Environment and Natural Disasters, Background Paper No. 5. 2002.
31. IFRC, 2005. World Disaster Report: Focus on Information in Disaster, pp.182-225.

Web sites and Web Resources:

- a. NIDM Publications at <http://nidm.gov.in>- Official Website of National Institute of Disaster Management (NIDM), Ministry of Home Affairs,
- b. Government of India <http://cwc.gov.in>, <http://ekdrm.net>, <http://www.emdat.be>, <http://www.nws.noaa.gov>, <http://pubs.usgs.gov>, <http://nidm.gov.in>, <http://www.imd.gov.in>

DMPB 615 Disaster Resistant Structures (Soft Core)

Unit I

8 Hours

Earthquakes, seismic waves, lateral force resisting systems – Seismic effects on structures – Earthquake response in Architectural Features of buildings during Earthquakes- Buildings twist during Earthquakes - Seismic Design Philosophy for Buildings - flexibility of Buildings affects their Earthquake Response - Brick Masonry Houses behave during Earthquakes - simple Structural Configuration of Masonry Buildings - Indian Seismic Codes

Unit II

10 Hours

Appropriate technology in indigenous buildings Masonry Buildings - Earthquakes affect on Reinforced Concrete Buildings and its appropriate technology – resistance of beams in RC Buildings for Earthquakes - Columns in RC Buildings resist Earthquake - Open-Ground Storey Buildings vulnerable in Earthquakes – more damages of Short Columns during Earthquakes - Mitigation, Earthquake damage to structures: structural damage, Damage as a result of problem soils, structural problems - Secondary causes of structural damage. Earthquake resistance design, seismic isolation, passive energy dissipation, active control. The structure anti- earthquake anti-breeze design theories and structure vibrate a control. Seismic design of bridges: earthquake damages to bridges, seismic conceptual design, and seismic performance criteria. The large civil engineering structure - hang cord structure, pellicle structure, shell structure etc.

Unit III

8 Hours

Solid remediation procedures, (gravel drains, deep mixing method, sand compaction pile method, improving slope stability and preventing landslides), Soil structure interaction to improve earthquake response, structural elements that prevent damage and improve dynamic response). Buildings with Shear Walls preferred in Seismic Regions - reduce Earthquake Effects on Buildings. The disaster prevention function, design, method and norm standard of engineering structure. The large and complicated structure's safety assessment

Unit IV

10 Hours

Volcanoes- Effects of volcanic eruptions, Flooding -Effects of floods, Elements of design, Individual properties, General approach, Case study, Weather conditions – Storm, Wind effects on buildings, Hurricane and tornado, Lightning, Effects of lightning on buildings, Case study, Extreme temperatures, General design features, Effect of extreme temperatures on buildings, Case study, Center roof repair, New materials, Mass movement -Types of mass movement and slope failure, Case study

Unit V

10 Hours

Human-made Disasters – Conflict, Effect of conflict and terrorist attack on buildings, Case studies, Fire -Types fire, Fire disasters affecting wildland and forests, Fire disasters affecting humans, Monitoring and prevention strategy, Case study, Disasters resulting from human activities - Historic buildings destruction. Basics for assessment of existing structures:. Good building design and construction:- Code of minimum standards for house construction, House building checklist.

Rereference Books:

1. Williams, Martin, 1999, Structures: Theory and analysis. Palgrave Macmillan, 448p.
2. Chopra, Anil.K, 2000. Dynamics of structures: Theory and applications to earthquake engineering. Pearson Higher Education, 844p.
3. Coull. Alex. Stafford Smith and Bryan, 1991. Structural analysis and design of high rise building. Jhon Wiley and Sons. Ltd. 558p.
4. Priestely, M.J.N. and Paulay. Tom, 1992. Reinforced concrete and masonry buildings. John Wiley and Sons Ltd., 768p.
5. Berqado, D.T., Balasubramanian, A.S. and Alfaro, M.C. 1994. Improvement techniques of soft ground in subsiding and lowland environment. Swets & Zeitkinger Publishers, 232p.
6. Chen. W.F.,Lui. E.M., 2006 Earthquake engineering for structural design, Taylor & Francis, 235.
7. Schlie, T. W. (2000) Appropriate Technology: Some Concepts, Some Ideas, and Some Recent
8. Experiences in Africa Journal of Development, Vol. 7, Nos. 1- 2, 77- 108.
9. Drabek, Thomas. 2010. The Human Side of Disaster. Taylor and Francis
10. Introduction to Natural and Man-made Disasters and their Effects on Buildings, Roxanna McDonald, British Library Cataloguing in Publication Data

Additional reference:

1. Guidelines for repair, restoration and retrofitting of masonry buildings in Kachchh Earthquake affected areas of Gujarat, Gujarat state Disaster Management Authority, Government of Gujarat – March 2002
2. Basics for assessment of existing structures, Milan Holicky, Vladislava Navarova, Roman Gottfried, Michal Kronika, Jama Markova, Miroslav sykora, karel jung- lifelong learning programme, Published by Klokner Institute, Czech Technical University in Prague, Solinova 7, 166 08 Prague 6, Czech Republic ISBN:978-80-01-05420-8
3. Handbook on good building design and construction- International strategy for disaster reduction (ISDR), The Secretariat of the international strategy for disaster reduction, Switzerland.

DMPB 616 - Practical V

24 Hours

(Practical exercises DMPB 611- Climate change and Environmental Disasters and DMPB-612- DISASTERS AND STRATEGIC ENVIRONMENTAL ASSESSMENT)

Field Study:

1. Terrain and Topography
2. Climate and Meteorology
3. Soil quality
4. Geology formation underneath the site
5. Hydrogeology and water quality
6. Ecology of the site
7. Noise
8. Ambient air quality
9. Public consultation
10. Assessment of the potential environmental impact
11. Analysis and evaluation of risk mitigation and field report should be submitted
12. Laboratory: Data analysis of meteorological soil, water quality

DMPB 617 - Practical VI (613, 614) 24 Hours

(Practical exercises (DMPB 613- Disaster Preparedness, Response and Recovery, DMPB 614- Disaster Risk Reduction)

PART 1 (DMPB 613)

1. Hazard Analysis
2. Hazard exposure mapping
3. Vulnerability Assessment
4. Post Disaster Need Assessment

PART 1I (DMPB 614)

1. Building strength using GPR
2. Concrete thickness measurement
3. Strength of concrete pillar by GPR
4. Basement of building strength by Geophysical studies
5. Weakness of the building structure by Geophysical techniques
6. Preparation of Hazard Zonation maps
7. Geospatial technology in DRR
8. Geophysical techniques in DRR

Credits – 9

DMPB 711 - Project and Viva

46 hours

- Research Methods for the Preparation of Project = Credit 1
- Collection of Relevant Literature to M.Sc. Project = Credit 1
- Project Report = Credit 4
- Viva = Credit 3