

IDENTIFYING INFORMATION

Paper Title: **Foundation course in Disaster Management and Climate Sustainability**

Paper Code: **DMM - 101**

UNIT-I

Disaster: definitions and key concepts; History of disaster management; Trends of disasters; Concept of climate change and sustainability; Theories of climate change; Impact of climate change; Disaster management and global sustainability

UNIT-II

Typology and classification of disasters; Natural disaster: floods, droughts, cyclones; Manmade disasters: war, conflict; industrial accidents; Environmental and societal impact of disasters

UNIT-III

Disaster management; approaches and models; Disaster management cycle; Vulnerability analysis; Risk analysis; Disaster risk reduction (DRR); Disaster management ethics; Integrated disaster management

UNIT-IV

Climate sustainability and disaster management; Climate change mitigation and adaptation; Role of remote sensing and GIS in climate change studies and disaster management; Concerns and prospects of disaster management; United Nations Office for Disaster Risk Reduction (UNDRR); Disaster Management Act, 2005

Suggested Readings:

Rodríguez, H., Donner, W., Trainor, J. E., (Eds.). 2018. Handbook of Disaster Research, Second Edition, Springer, Gewerbestrasse Cham, Switzerland

Quarantelli, E. L. (Ed.). 1998. What is a disaster? Perspectives on the Question. London: Routledge

Bosher, L.; Chmutina, K., 2017. Disaster Risk Reduction for the Built Environment, Wiley Blackwell, West Sussex, UK

Coppola, D.P. 2015. Introduction to International Disaster Management, Butterworth-Heinemann, Oxford, UK

Bullock, J.B., Haddow, G.D., Haddow, K.S., Coppola, D.P. 2016. Living with Climate Change: How Communities Are Surviving and Thriving in a Changing Climate, CRC Press, Boca Raton, USA

IDENTIFYING INFORMATION

Paper title: **Deep earth and Surface Processes, Earth Materials and Resources**

Paper code: **DMM – 102**

Unit-I - Deep Earth Processes: Interior of the earth and its composition; Characterization of the Thermal, Petrophysical and Mechanical properties of Crust and mantle; Mantle convection; – Wegener, Wilson Cycle; Sea floor Spreading; Continental Drift; Forces of Crustal Instability: Concept of Plate Tectonics, Dynamics of Plate Margins, Mountain belts and adjacent sedimentary basin; Subduction Processes: Accretion, deformation and exhumation.

Unit-II – Lithosphere and Earth Surface Processes: Concept of Gradation - types, classification and effects of weathering; mass wasting; cycle of erosion. Kinematics of Orogenic belts; Examine relation between Deep earth and surface processes in different tectonic regions (mountains; coastal; oceanic belt); Geophysical techniques and seismological methods of imaging deep earth (Geotomography; Electrical; Electromagnetic; Gravity; Seismic and Magnetotelluric passive source tomography).

Unit-III - Earth Materials: Origin and Classification of Rocks: Igneous, Sedimentary and Metamorphic Rocks; Metamorphic and Igneous petrology; constraints and dynamics of plate origin; Mountain belts and adjacent sedimentary basins; Rock Properties Affecting Ground Water, Vertical Distribution of Sub-surface Water, Types of Aquifers, Hydrological Cycle; Groundwater Resource Development and Management. Soils: Process of Formation, Soil profile and Soil types.

Unit-IV – Resources: Types of Resources: Minerals, Rocks, Soil, Water, Oil and Gas formations; Ores - Metallic and Non-Metallic ores; Mineral Exploration - Geological and Geophysical Prospecting, Mining, Environmental Considerations for Mining. Fossil fuels: Coal and Petroleum (Formation, Types, Uses and Environmental Hazards).

Suggested Readings:

1. Strahler A (1996): *Introducing Physical Geography*, John Wiley and Sons.
2. Singh S (2015): *Geomorphology*, Pravalika Publications. Allahabad.
3. Hagget R (2010): *Physical Geography: The Key Concepts*. Taylor and Francis. London and New York.
4. Phillip A (1997): *Earth Surface Process*. Wiley-Blackwell. ISBN-0632035072.
5. Steven ID (2012): *Earth Material and Resources (Earth Science)*. Har/Psc Edition.

IDENTIFYING INFORMATION

Paper title: **Applied Geomorphology**

Paper Code: **DMM – 103**

Unit 1 – Concept and Approaches: Nature, Scope and Objectives of Applied Geomorphology; Fundamental concepts in Geomorphology; Historical and Process Geomorphology; Concepts: Uniformitarianism and Neocatastrophism; Equilibrium and its Types; Concept of Space and Time in Geomorphology.

Unit II – Tropical Geomorphology: Geological Framework of the Tropical Lands; Erosion and Land Cover in the Tropics; Tropical Hydrology; Process Geomorphology in the Tropics; Weathering, Slopes; Tropical Highlands; Anthropogenic Alteration of Geomorphic Processes in the Tropics; Urban Geomorphology in the Tropics; Future with Climate Change.

UNIT III – Fluvial Geomorphology: Overview of river processes; River Basin morphology: drainage networks, runoff processes; Mechanics of fluvial erosion: overview of open channel flow; overland, through and ground water flow; Hydraulic geometry: at a station, downstream; Sediment transport: suspended and bedload; River metamorphosis and Quaternary fluvial systems. Fluvial Hazards: River Floods, river shifting, river pollution and their causes, consequences, viability and management.

UNIT IV – Coastal Geomorphology: Coastline, shoreline, hinterland; Coastal evolution and shoreline change; Shore zone processes: tides, waves and currents, swells, breakers and surfs, storm surges and Tsunami; The Tropical Coasts; Processes of Weathering, erosion and transportation in coastal areas; coastal sediments: Production and transport; Coastal zones hazards and management.

Suggested Readings:

1. Robin Davidson-Arnott (2010): Introduction to Coastal Process and Geomorphology; Cambridge University Press. 1st Edition.
2. Masselink Gerhard (2003): An Introduction to Coastal Process and Geomorphology; A Hodder Arnold Publication.
3. Bird EC (1984): Introduction to Coastal Geomorphology, Orient Longman, Calcutta.
4. King CAM (1972): Beaches and Coast, Edward Arnold, London.
5. Bloom AI (2002): Geomorphology, Third Edition, Prentice Hall of India, new Delhi.
6. Goudie AS (2004): (Eds) Encyclopedia of geomorphology, Routledge, London.
7. Hart MG (1986): Geomorphology Pure and Applied. George Allen and Unwin, London.
8. Chorley RJ, Schumm, SA, Sugden DE (1984): Geomorphology, Methuen, London.
9. Faniran A and Jeje LK (1983): Humid Tropical Geomorphology, Longman, London.
10. Thomas MF (1994): Geomorphology in the Tropics: A study of weathering and denudation in low latitudes. John Wiley and Sons.
11. Singh S (2002): Geomorphology, Prayag Pustak Bhawan, Allahabad.

IDENTIFYING INFORMATION

Paper Title: **Geophysical and Meteorological Methods in Disaster and Climate Studies.**

Paper Code: **DMM – 104**

UNIT-I

Geophysics: Concepts and Fundamentals; Geophysical properties of Earth material; Seismic Wave velocity of Rocks; Variation of density in Rocks; Geophysical Methods: Seismic Method, Gravity Method, Electrical Resistivity Method, Electromagnetic method, Geo-thermal method and GPR.

Unit-II

Application of Geophysical Method in Seismology; Ground Penetration Radar (GPR); Ground Water Investigation; Landslide Studies and Site Exploration; Subsurface Cavity, Subsidence and Faults and interpretation. Sources of Data: Numerical Weather and Climate Models, Remote Sensing (e.g. satellite, radars), In-situ Observation.

Unit-III

Metrology: Concepts and Fundamentals; Metrology and Weather Forecasting; Forecasting Methods: Synoptic Method, Numerical Method, Statistical Method; Forecasting Tools: Surface data, Soundings, Satellite data, Radar data, Aircraft data; Types of Forecasting: Quantitative Forecasting: Climatology Method, Analogue Method, Persistence and Trend Method.

Unit-IV

Remote Sensing based Forecasting and Monitoring of Weather Phenomena: Flood: Flood Frequency Analysis, Hydraulic parameters and Models; Drought: Drought Prediction, Standardized Precipitation and Evapotranspiration Index, Rainfall and Vegetation based Drought monitoring; Thunderstorm; Cyclone; Remote Sensing and Forecasting Methods: Drift Method, Time Series Method, and Judgmental Methods.

Suggested Readings:

1. Pandey M (2014): Disaster Management. ISBN: 9788126549245, 8126549246.
2. Parasnis DS (1997). Principles of Applied Geophysics. 4th Edition. Chapman and Hall.
3. Griffiths DH and King RF (1981): Applied geophysics for geologists and engineers. 2nd Edition. Pergamon, Oxford.
4. Elliott G (1988): Weather forecasting rules techniques and procedures. American Press.
5. Samui P, Kim D and Ghosh C (2018): Integrating disaster science and management. 1st Edition, Elsevier.
6. Shroder J (2014): Hydro-meteorological hazards, risks and disasters. 1st Edition. Elsevier.

IDENTIFYING INFORMATION

Paper Title: **Geoinformatics in Disaster and Climate Studies**

Paper code: **DMM – 105**

Unit-1

Meaning and Scope of Geoinformatics: Fundamentals of Remote sensing; Digital Image Processing; GIS; GPS; Photogrammetry; Understanding of Maps; Scale; Projection.

Unit-II Spatial and non-spatial data for disaster and climate studies; toposheet on different scales; satellite data: Panchromatic, multispectral, hyper-spectral, aerial photographs and Radar data; Meteorological Data.

Unit-III Application of Geoinformatics in Natural Disasters: Vulnerability and Risk Assessment of Landslides, Floods, Droughts, Earthquakes, Cyclones; Role of Geoinformatics in Rescue, Relief and Rehabilitation.

Unit-IV

Application of Geoinformatics in Man-made disasters: Vulnerability and Risk Assessment of Industrial, Biological, Chemical, Wars, Riots, Terrorist Attacks, Famine; Role of Geoinformatics in Rescue, Relief, Rehabilitation.

Suggested Readings:

1. Sisi zlatanova and Andrea Fabbri jonathanli (2007): Geometrics solutions for Disaster management, Springer Verlag, 2007.
2. C. Emdad Haque (2005): Mitigation of natural Hazards and disasters, Kluwer Academic publishers group.
3. Linda C. Bottersll and ponald A. wilhite (2005): From Disaster response to Risk management. Kluwer Academic publishers group.
4. Sdidmore A (2002): Environmental modeling with GIS and Remote Sensing, Taylor and Francis.
5. Anji Reddy (2004): Geoinformatics for Environmental management. BS Publications.
6. Edmond Mathez (2009): Climate Change: the science of global warmong and our energy future. Columbia University Press. 1st edition. ISBN-0231146426.
7. Gavin Schmidt, Jochua wolfe and Jeffrey D. Sachs (2009): Climate change: picturing the Science. WW Norton and company. ISBN-0393331253.

IDENTIFYING INFORMATION

Paper Title: **Application of Geo-informatics tools**

Paper code: **DMM – 107**

Unit -I: Introduction to Computer & Software

Introduction to computer: Operating systems; Hardware requirements for Geo-informatics software; Graphical user interface: Arc GIS; Erdas Imagine; ENVI; QGIS and Google Earth

Unit - II: Pre-processing, Data Base Creation and spatial statistics

Import and export of spatial data; Pre-processing of spatial data: Geometric correction; spatial enhancement; radiometric correction; spatial data base creation: data base creation in DBF format; linking spatial data with non-spatial data; statistical analysis: zonal statistics; spatial auto-correlation.

Unit-III: Spatial Analysis

Hydrology: extraction of stream from DEM; delineation of watershed; stream ordering; Surface analysis: slope, aspect; hillshade; contour; Interpolation: inverse distance weighted (IDW); Kriging; Overlay analysis: weighted overlay; Fuzzy membership

Unit IV: Global Positioning System

Selection of datum, units and scale; GPS measurement: Collection of GCPs through handheld GPS and Differential GPS; Mobile mapping; Transfer of GPS data in to GIS software.

Suggested Readings:

1. Bernhardsen (2003) *Geographic Information Systems: An Introduction*, 3ed, Wiley India Pvt. Ltd., New Delhi.
2. Demers (2004) *Fundamentals of Geographic Information Systems*, 3ed, Wiley India Pvt. Ltd., New Delhi.
3. Joseph George (2003) *Fundamentals of Remote Sensing*, University Press. Hyderabad
4. Lillesand T.M and Keifer R.W. (2000) *Remote Sensing and Image Interpretation*, IVth Eds. John Wiley and Sons, New York.
5. Lo C.P. & Yeung A.K.W., (2004). *Concepts and Techniques of GIS*, Prentice-Hall of India, New Delhi
6. LO & YEUNG (2009) *Concepts and Techniques of Geographic Information Systems*, 2nd ed., PHI Learning Pvt. Ltd, New Delhi.
7. Laurini, Robert and Direk Thompson, 1992, *Fundamentals of Spatial Information Systems*, Academic Press.
8. N.K.Agarwal (2004), *Essentials of GPS*, Spatial Network Pvt. Ltd.