M.Sc., Coastal Disaster Management

(Syllabus - April 2007 Onwards)

(Semester Pattern)

	Hard Core			Soft Core	
Course Code	**Theory / Practical**	**Credit**	**Course Code**	**Theory / Practical**	**Credit**
	I SEMESTER				
MCDM 420	Physical Oceanography and Meteorology	4			
MCDM 421	Chemical Oceanography	4			
MCDM 422	Biological Oceanography	4			
MCDM 423	Marine Geology	4			
MCDM 461	Lab - I covering courses 420, 421	2			
MCDM 462	Lab - II covering courses 422, 423	2			
	II SEMESTER				
MCDM 425	Coastal Geomorphology	4			
MCDM 426	Natural and Man Made Hazards	4			
MCDM 427	Environmental Pollution	4	MCDM 429	Earthquake Seismology	3
MCDM 428	Disaster Management Principals and Practices	4	MCDM 430	Design and Protection Structure	3
MCDM 463	Lab –III covering courses 425, 426	2	MCDM 431	Electronics and Instrumentation	3
MCDM 464	Lab–IV covering courses 427, 428	2	MABO 517	Marine Biotechnology	4
MCDM 465	Internship	2			
	III SEMESTER				
MCDM 520	Remote Sensing	4	MCDM 524	Capability Models of Disaster Risk Assessment	3
MCDM	Geographical Information	4	MCDM	Disaster Prediction	3

521	System (GIS)		525	and Regional Forecasting	
MCDM 522	Living Resources – Its Disaster Management	4	MCDM 526	Conservation of Island Resources	3
MCDM 523	Resources for Disaster Management	4			
MCDM 561	Lab –V covering course 520,521	2			
MCDM 562	Lab –VI covering course 522, 523	2			
	IV SEMESTER				
MCDM 540	Project Work	6			
		68			

SEMESTER I

MCDM - 420 PHYSICAL OCEANOGRAPHY AND METEOROLOGY

UNIT-1 **10 HOURS**

Introduction to Oceanography - History of Oceanography - Oceanographic Instruments. Physical Properties of Seawater- Density, viscosity, surface tension, conductivity and their relationship, UV radiation, Acoustics.

UNIT –II **12 HOURS**

Concept of Earth and atmosphere – horizontal and vertical dimensions, composition, structure – Troposphere, Stratosphere and Mesosphere. Sun as a source of energy – short wave, and long wave radiation; Green House effect and heat balance.

UNIT –111 **12 HOURS**

Waves and Tides – Theories on waves - Tidal waves- formation of swells – internal and standing waves- storm surges – Tsunami - tide generating forces- tidal currents- tidal effects in coastal areas – Tide and wave energy.

UNIT- IV **14 HOURS**

Concept of Pressure, Pressure gradient and pressure systems, temperature and its diurnal variation, sea breeze, humidity, importance of water vapour in the atmosphere; Concepts of stability and instability in the atmosphere, formation of thunderstorms, disasters due to lightning, squalls and cloud burst.

UNIT-V **12 HOURS**

General Surface Circulation – Tropical cyclones, introduction, characteristics, formation and life cycle- horizontal and vertical structure – Movement and associated hazards- role of Radar and satellite in detection of cyclones. Forces causing currents, Boundary currents, Languir circulation, Geostropic currents, Turbidity currents, Monsoon & trade winds, Up well formation.

Text Books.

1. Grant Gross, M., 1993 Oceanography: A view of the earth (sixth edition). Prentice Hall Inc. New Jersey.
2. Thurman, Harold., 2001 Introduction to Oceanography . Prentice Hall Inc. New Jersey.

Reference Books

1 David A. Ross, 1977. Introduction of Oceanography. Prentice Hall Inc. New Jersey

2. Asnani, G.C., 2000. Tropical Meterology. Pub: G.C. Asnani, 822, Sindh colony, Aundh, Pune – 411 007.
3. Qasim, S.Z. 1999. The Indian Ocean, Images and realities. Oxford and IBH.
4. Sverdrup, H.U., M.W. Johnson and R.H. Fleming, 1958. The Oceans- their Physics, Chemistry and General Biology, Prentice- Hall Inc. New Jersey.
5. Katharine Anderson, Predicting the Weather: Victorians and the Science of Meteorology, University Chicago Press, P.182.

MCDM - 421 CHEMICAL OCEANOGRAPHY

UNIT-1 **10 HOURS**

Introduction to Marine Chemistry- Ocean as a chemical system and a Biological environment- Origin of sea salts- properties of water molecules differences between fresh and seawater- Ocean as a geochemical resources and its different ocean distributions.

UNIT –II **13 HOURS**

Chemical Composition of Seawater- ionic, Major and minor constituents, Constancy- Compositions and factors affecting constancy- Major and minor elements, **Trace Elements**- their importance, distribution. Analytical chemistry of seawater constituents- Concept of Chlorinity and Salinity - Methods of measurements**.**

UNIT –111 **13 HOURS**

Radio nuclides in the sea- Origin, distribution and use as a tracers of water mass.
Dissolved Gases- **Carbon-Dioxide**- Origin, importance and distribution in the oceans.
Dissolved Oxygen- Origin, and factors governing the distribution- BOD and COD.
Other Gases -noble – Origin distribution and importance.

UNIT-IV **10 HOURS**

Plant nutrients- Inorganic, origin, distribution and important role in the fertility of the sea. Types of Nitrogen, Phosphorous and Silicon in the sea- analytical method, distribution, cycling, regeneration concept- "new and regenerated" production, N: P ratio and significance.

UNIT- V **14 HOURS**

Organic matter- dissolved, particulate and colloidal species, sources, classification, composition, estimation, distribution, seasonal variation- ecological significance- growth promoting and growth inhibiting effects **–** Biogeochemical cycle. **Mineral wealth of the sea**- salts, glauconite, petroleum, phospharite, manganese nodules- potential, economy of extraction. **Desalination-** recovery of chemicals.

Text Books

1. Pilson, M.E.Q., 1998. An Introduction to the Chemistry of the Sea Prentice Hall New Jersey.
2. Millero F.J 2002. Chemical Oceanography CRC press.

Reference Books

3. Riley, J.P. and Skirrow, 1975-1984. Chemical Oceanography Vols. 1 to 8. Academic Press, London.
4. Hill, M.N. 1963. The Sea Vols. 1 to3. Inter science Publishers, New York.
5. Strickland J.D.H and T.R Parson 1972. A Practical handbooks of seawater analysis. Fisheries Research Board of Canada, Ottawa, Bulletin 167.
6. Grasshoff, Klaus 1999. Methods of Sea water Analysis. Wiley VCH New York

MCDM - 422 BIOLOGICAL OCEANOGRAPHY

UNIT-1 **15 HOURS**

Sea as a biological environment-Plankton- classification based on size, mode of life and habitat. **Phytoplankton and Zooplankton** - Methods of collection, Estimation of Standing crop-Wet and dry weight estimation-Plankton volume settling and displacement methods. **Phytoplankton and Zooplankton** interrelationship- **Microbial loop- Red tide** phenomenon- its causes and effect.

UNIT–II **13 HOURS**

Sea weed- Occurrence and distribution in India- economical importance- **Sea grass-** Occurrence and distribution in India- economical importance. **Mangroves-** distribution, adaptation (morphological, anatomical and physiological) and conservation **Salt marsh and sand dunes vegetates.** Biological resource assessment using remote sensing techniques**.**

UNIT –111 **11 HOURS**

Marine Environment – divisions and classifications. **Pelagic Ecology –** Neritic, Epi pelagic, Meso pelagic, bathy pelagic, Abyssal pelagic. **Benthic Ecology –** Intertidal Ecology – rocky, sandy, muddy environments, zonation, fauna and their adaptations. Deep Sea Ecology – Characteristics of the deep sea adaptations and its distribution.

UNIT- IV **11 HOURS**

Animal Association in Marine Environment – endoecism, inquilinism, phoresis, epizoism, mutualism, communalism, symbiosis, parasitism. **Marine Borers and Fouler –** biology and adaptations, anti fouling measures, relationship between fouling and corrosion.

UNIT-V **10 HOURS**

Population Ecology – group attributes, population growth, density variations, concept of carrying capacity, dispersal, prey-predator relationship, density dependent, density interdependent factors. **Marine Ecosystem –** concepts, principal components, marine food chains, trophic structure, food web, ecological pyramids, energy flow, evolution and management system of ecology and modeling.

Text Books

1. Sumich, J. L., 1999. Introduction to the biology of Marine Life 7th Edition. The Mc Graw Hill Companies Inc.
2. Nybakken, J. W 2001. Marine Biology – an Ecological Approach 4th edition. Addison Wesley Edu. Pub. Inc.

Reference Books

1. Tomas, Carmelo, R. 1997. Identifying Marine Phytoplankton. Academic Press
2. Chapman, V.J. 1978. Coastal vegetation. Pergamon Press, Oxford.
3. Peter McRoy, C. and G. Helferich, 1977, Seagrass Ecosystems. A scientific Perspective. Marcel Dekker Inc., New York.
4. Parsons, T.R., M. Takahashi and B. Hargrave (II Ed.), 1977. Biological Oceanography Processes. Pergamon Press Oxford.
5. Naskar, K and R. Mandal, 1999 Ecology and Biodiversity of Indian Mangroves Vol. I & II Daya Publishing House.

MCDM - 423 MARINE GEOLOGY

UNIT-1 **13 HOURS**

Marine Geology - Origin of Earth and Oceans - Bathymetry of the coast and storm surge at different locations in India - Continental shelf; slope; raise; Abyssal hills-plains: Submarine Canyons – Special reference to Indian Ocean.

UNIT –II **13 HOURS**

Marine Geological Instrumentation – Van Veen Grab, Peterson Grab, Boomerang grab, Gravity Corer, Box Corer, Rock core drill, Dredger, Seismograph, Magnetometer, Gravimeter, Side Scan Sonar, Eco Sounder, GPS, Shoran, Loran, Decca, Delerac, Sextant, Drilling Platforms, Submersible, Scuba.

UNIT –111 **13 HOURS**

Geo Tectonics – origin, evidence, plates, plate boundaries – construction, destruction and conservative - mountain building activities. Origin, evidence, different hypothesis on continuing crustal deformation – trenches, ridges, seamount, plains, hot spots, black smokers – special reference to Indian Ocean.

UNIT- IV **10 HOURS**

Marine Mineral Resources – Beach placers; petroleum; sand; phosphatic nodules; manganese nodules; authigenic minerals – origin, distribution and status of exploitation.

UNIT-V **11 HOURS**

Estuaries - Origin and classification – estuarine circulations- lagoons. **Sedimentation-** origin and physical properties of sediment (lithogenous, biogenous and cosmogenous), distribution and transport of sediment, determination of age of sediment.

Text Books:

1. James P. Kennett, 1981, Marine Geology, Prentice Hall, 813 p.
2. Erickson, 2002, Marine Geology, Fitzhenry & Whiteside, 243 p.

Reference Books

1. Christopher R. German, Jian Lin, and Lindsay M. Parson, Editors **,** Mid-Ocean Ridges, 2004, Hydrothermal Interactions between the Lithosphere and Oceans, Geophysical Monograph Series, Volume 148, 311 p.
2. Peter Clift, Pinxian Wang, Wolfgang Kuhnt, and Dennis Hayes, Editors, 2004, Continent-Ocean Interactions within East Asian Marginal Seas, Geophysical Monograph Series, Volume 149, 348 p.
3. David Spencer Cronan, 2000, Handbook of Marine Mineral Deposits, CRC Press, 406p 4. Met Monograph No.Synoptic Meteorology 5/2007: Probable Maximum Storm Surge Heights for the Maritime Districts of India. Issued by the Additional Director General of Meteorology (Research) Pune – 411 005.

MCDM - 461 - PRACTICAL -I

1. **Measuring Devices 1-** Secchi Disc Lux meter, Turbidity meter, Under water photometer.

2. **Measuring Devices- II** Current meter, Echo Sounder, Hygrometer.

3. **Sampling devices** Nansen, Go-Flo, Bacteriological water sampler, Van -Veen grab - Petersen grab, Vertical gravity corer.

4. **Estimation of** Salinity.

5. **Estimation of** Dissolved Oxygen.

6. **Determination of** Nitrite, Nitrate and Silicate.

7. **Determination of** Reactive Phosphate and Total phosphorous.

8. **Determination** of Wind Pattern, temperature and pressure from an area

MCDM - 462 - PRACTICAL -II

1. **Identification** of Phytoplanktons- Diatoms, Dinoflagellates Coccolithophores.

2. **Identification** of Zooplankton- Copepods, Hydromedusae, Pteropods, Chaetognatha, Thaliaceae and planktonic Larvae.

3. **Identification** of locally available Macroalgae, Seaweeds, Seagrasses and Mangrove.

4. **Extraction** and Estimation of Chlorophyll **a,** Primary productivity. Collection and identification of Rocky, Sandy and Muddy faunal assemblages.

5. **Identification** of Underwater Geomorphic Structure.

6. **Identification of** Detrital Minerals.

7. **Marine Geological Instruments-** Operations.

8. **Identification of Rocks -** Igneous, Metamorphic and Sedimentary Rocks

SEMESTER - II

MCDM - 425 COASTAL GEOMORPHOLOGY

UNIT-1 **12 HOURS**

Beaches- Nomenclature – Breaker Zone, Surf Zone, Swash Zone, Low Water Mark, Foreshore, Berm, Backshore – Classification of Beaches – Shingle Beach, Sandy Beach, Pebble Beach, Mudy Beach.

UNIT –II **13 HOURS**

Coast – Definition; Classification of Coast – Johnson, Cotton, King, Valentin, Shepard, Owen.

UNIT –111 **13 HOURS**

Coastal Process - Importance of waves, tides, winds; long shore currents; Coastal sediment budget; problem of changing sea level.

UNIT- IV **11 HOURS**

Coastal Protection – Sea wall; Groynes; Jetties; Backwaters, Sills; Cliff Stabilization; Beach Feeding; Dune Building. Artificial Nourishment – success examples.

UNIT-V **11 HOURS**

Coastal Landforms - spits, beach ridge, dune, lagoon, island, island arc, tombolo, baymouth bars, headlands, bays, barrier island, fiord, ria, wave-cut abrasion platform, wave-built depositional terrace.

Text Books

1. Peter W. French, 1997, Coastal and Estuarine Management , Routledge, UK, 251 p.,
2. Peter W. French, 1998, Coastal Defences: Processes, Problems and Solutions, Routledge, UK, 208 p.

Reference Books

1. Duncan M. FitzGerald, 2003, Beaches and Coasts**,** Blackwell Publishing, 448 p.,
2. Colin David Woodroffe, 2002, Coasts: Form, Process, and Evolution, Cambridge University Press, 638 p.
3. Simon K. Haslett, 2000, Coastal Systems, Routledge, 218 p.
4. F. John. Vernberg, Winona B. Vernberg**,** 2001**,** The Coastal Zone: Past, Present, and Future**,** Univ of South Carolina Press, 191 p.

MCDM - 426 NATURAL AND MAN MADE HAZARDS

UNIT-1 **13 HOURS**

Hazards – Natural – Man Made – **Natural** – **Earthquake** – concepts – hazards – mitigation – case histories – preferably Indian; **Landslides** - concepts – hazards – mitigation – case histories – preferably Indian.

UNIT–II **13 HOURS**

Flood - concepts – hazards – mitigation – case histories – preferably Indian; **Cyclone** – concepts – severe local storms, tornado, lightning and squally – hazards – mitigation – case histories – preferably Indian. Drought – mitigation – Indian case histories.

UNIT –111 **11 HOURS**

Tsunami - concepts – hazards – mitigation – case histories – preferably Indian; **Volcanoes** - concepts – hazards – mitigation – case histories – preferably Indian. Wildfire - concepts – hazards – mitigation – case histories – preferably Indian.

UNIT- IV **12 HOURS**

Man Made Hazards 1 - Mines & Quarries, Hunting, Hostile Encounters, Big Game Trapping, Driving, Booby Traps, Nuclear Hazards, Fire, Epidemics, Microbial accidents.

UNIT-V **11 HOURS**

Air Pollution - Meteorological factors responsible for air pollution, hazards, mitigation – Indian case histories. **Global Warming** – CO_2 - Methane – Ozone – Nitrous Oxide gas - Climate change, Sea level oscillation – its effect on biodiversity.

Text books

1. Geoff L. Wells, 1997, Major Hazards and Their Management, Gulf Publishing Company, 305 p.

2. Mohammed I., El-Sabh, SrinivasanVenkatesh, Cinna Lomnits, Tad S. Murty, (Editor), 2001, **.,** Earthquakes and Atmospheric Hazards: Preparedness Studies , Springer, 208 p.

Reference Books

3. Simon Ross, 1998, Natural Hazards**,** Nelson Thornes Ltd, USA, 96 p.

4. David R. Godschalk, 1998, Natural Hazard Mitigation: Recasting Disaster Policy and Planning**,** Island Press, 591 p.,

MCDM - 427 ENVIRONMENTAL POLLUTION

UNIT-1 **10 HOURS**

Pollution-definition- role of GESAMP- major pollutant- sources, transport path, dynamics and modeling (mass balance model). **Toxicology**- lethal and sub lethal effects of pollutants to marine organisms- bioconcentration, bioaccumulation and biomagnifications- methods of toxicity testing- factors influencing toxicity- synergistic and antagonistic effects- role of microcosms and mesocosms.

UNIT –II **12 HOURS**

Sewage Pollution- industrial, agriculture and domestic discharges- composition- disposal – impacts on land and marine environment. **Treatment methods** (Primary, secondary and tertiary). **Detergents** - composition- eutrophication and ecological significance- interference in the sewage treatment systems.

UNIT –111 **14 HOURS**

Heavy Metal Pollution - essential and nonessential- sources, distribution, fate- analytical approaches, toxicity and diseases. **Pesticides**- classification and composition - Organochlorine, Organophosphates, **Carbamates-** sources, transport, distribution and fate in the environment. **Analytical approaches,** biological concern and ecological impacts with special reference to land and marine fishes, birds and mammals.

UNIT- IV **12 HOURS**

Oil Pollution- composition, sources, biological impacts on fishes, birds, mammals, marine plants etc. treatment techniques (Chemical, biological and mechanical). **Thermal pollution-** sources- waste heat disposal- uses of waste heat – role of biocides, chlorine – ecological impacts. **Radioactive pollution-** sources (natural and artificial) – distribution, biological effects of radiation.

UNIT-V **12 HOURS**

Plastics and Litter impact of mining and dredging operation in the marine environment.
Environmental monitoring methods for critical pollutants- objectives status limitations- biological indicators- natural bioaccumulations (mussel watch – water quality assessment. Use of analytical instruments AAS, ICP, GLC, Spectroflurometer for analyzing Petroleum hydrocarbon, Pesticides, Heavy metals etc.

Text Books:

1. Johnston, R. (ed), 1976. Marine Pollution, Academic Press, London.
2. Goldberg, E. D. 1974. The Health of the oceans, UNESCO Press. Paris.

Reference Books

1. Clark R.B 1992. Marine pollution 3rd edition Clavendron, Press Oxford.
2. Williams 1996. Introduction to Marine Pollution Control. John Wiley.
3. Park, P .K, Kester D.R., J.W. Deudall and B.H Ketchum, 1983. Wastes in the ocean. Vols. 1 to 3. Wiley Interscience Publishers, New York.
4. Michael J.Kennish, 1994. Practical Handbook on Estuarine and Marine Pollution.

MCDM – 428 DISASTER MANAGEMENT PRINCIPLES AND PRACTICES

UNIT-1 **12 HOURS**

Disasters – Introduction, the disaster cycle, disaster impacts, disasters, development and sustainability

UNIT –II **10 HOURS**

Vulnerability and Risks – Understanding vulnerability, hazard, risk and vulnerability analysis; risk perception; social vulnerability – vulnerability Atlas of India. Global scenario on the risk.

UNIT –111 **15 HOURS**

Planning and Management – risk assessment; Role of Governmental agencies – Defence, civil administration, transportation, medical, communication, press, protection. National Policies – Global frame work – Role of Early Warning Systems (EWS) in disaster management- an assessment of EWS for cyclone, Tsunami, Storm surge, Earth quake, Coastal Erosion – Global best practices and India's Experience.

UNIT- IV **10 HOURS**

Role of Non Governmental agencies - civil administration, transportation, medical, communication, press, protection.

UNIT-V **13 HOURS**

Disaster Recovery; Post Disaster rehabilitation; Disaster mitigation and preparedness; Existing Laws on disaster management – National Guidelines – Use of micro finance.

Text Books

1. Raymond J. Burby, 1998, Cooperating With Nature: Confronting Natural Hazards with Land Use Planning for Sustainable**,** National Academy Press, 356 p.

2. Bill MacGuire, Ian Mason, Christopher Kilburn, 2002, Natural Hazards and Environmental Change, A Hodder Arnold Publication; Reissue edition, 202 p.

Reference Books

1. Chowdhury Emdadul. Haque, 2005, Mitigation of Natural Hazards And Disasters: International Perspectives**,** Springer, 239 p.

2. Ban Wisner, 2005, At Risk: Natural Hazards, People's Vulnerability and Disasters, Routledge, 464 p.

MCDM - 463 PRACTICAL-III

1. **Beach Profiling**
2. **Identification** of different geomorphic structures
3. **Sediment Analysis –** estimation of sand, silt and clay percentage in the sediments.
4. **Interpretation** of sedimentary environment and its impacts, Mapping of Hazard Prone Areas
5. **Preparation** of clay mineral slides for X-ray diffraction
6. **Identification** of size and shape of the sediments.
7. **Separation of** heavy minerals from the sediments
8. **Preparation of** heavy mineral slides.

MCDM - 464 PRACTICAL-1V

9. **Sample** collection for pollution studies
10. **Estimation** of heavy metals from the water
11. **Estimation** of heavy metals from the sediments
12. **Estimation** of heavy metals from the biological materials
13. **Risk** Assessment for Hazards.
14. **Vulnerability** Assessment for Hazards.
15. **Preparedness** for Hazard Occurrence – Evaluation of Early Warning Systems, Gap Analysis based on field visits, development of indicators, questionnaires and potential impact assessment.
16. **First Aid** Practices for Hazards

MCDM - 465 INTERNSHIP

In house training in other Institutes or Industries or in NGO's to be carried over by the students on their interested subject, on Disaster Management for 30 days.

SEMESTER -III

MCDM - 520 REMOTE SENSING

UNIT-1 **10 HOURS**

Introduction - Scope of remote sensing in natural resources survey, developments in aerial photography, modern developments, advantages, limitations, Aerial Photography - Introduction, geometric characters, film and filter combination.

UNIT –II **11 HOURS**

Aerial Photographic instrumentation; vertical exaggeration; preparation of photogeological map - quantitative determination of geological data, elements of aerial photo interpretation, application in disaster management.

UNIT –111 **11 HOURS**

Earth resource satellites - Early history of space imaging, Landsat programme, Sensors onboard Landsat, Meteorological satellites - Polar orbiting and Geostationary, Ocean monitoring Satellites. Thermal and multispectral scanning - blackbody radiation, radiation from real materials, atmospheric effects, thermal energy detectors, interpretation of thermal scanner imagery, FLIR systems. Interpretation of cloud pictures for convective clouds and tropical cyclones. Vegetation index from remote sensing for monitoring drought.

UNIT- IV **14 HOURS**

Multispectral scanners, operation and design consideration, imaging spectrometry, Microwave sensing - Radar development, SLAR system operation, geometric characteristics of SLAR Imagery, elements of passive microwave sensing, applications of passive microwave sensing. Remote sensing applications for disaster management - Role in Early Warning, predictions, hazard zonation, risk assessment and modeling

UNIT-V **14 HOURS**

Digital Image Processing - Image rectification and restoration, image enhancement, spatial feature manipulation, multi image manipulation, image classification, supervised image classification, unsupervised classification, data merging. Image interpretation-elements Interpretation; tools and techniques; Image Processing softwares – Repeat cycle satellite for Monitoring Disaster Recovery.

Text Books:

1.Agarwal, C. S. and Garg, P. K., 2000, Textbook on Remote Sensing in Natural Resources Monitoring and Management, Wheeler Publishing, A Division of A. H. Wheeler & Co. Ltd., New Delhi.

2.Arthur P. Cracknell, 1983, Remote sensing applications in marine science and technology, Steve Carver Publisher.

Reference Books

1. Taylor and Francis, 1998, Integrated Information Innovations in GIS 5, Steve Carver Publisher.

2. Seelye Martin , 2004, An Introduction to Ocean Remote Sensing**,** Cambridge.

MCDM - 521 GEOGRAPHICAL INFORMATION SYSTEM (GSI)

UNIT-1 **12 HOURS**

Geographical Information Systems - definition, development, data sources, data structures, raster and vector, data capturing, pre-processing.

UNIT –11 **10 HOURS**

Data base management systems in GSI, data manipulations and product generation- Environmental GIS. Data acquisition system using GPS – On line GPS applications.

UNIT- III **11 HOURS**

Geographical Information System - Spatial data; sources of error and data quality; database design, convention, mapping concepts and Coordinate systems.

UNIT –IV **11 HOURS**

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.

UNIT-V **16 HOURS**

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.

Text Books

1.Ian Heywood, 2006, An Introduction to Geographical Information Systems, Prentice Hall, 464 p.

2. Paul A. Longley, 2005, Geographic Information Systems and Science**,** John Wiley and Sons Ltd, 536 p.

Reference Books

1. Thomas Martin Lilisand, 2003, Remote Sensing and Image Interpretation, John Wiley and Sons (WIE), 784 p.

2. Michael F. Goodchild, 2005, Geographical Information Systems: Principles, Techniques, Management and Applications, John Wiley & Sons Inc., 404 p.

MCDM - 522 LIVING RESOURCES – ITS DISASTER MANAGEMENT

UNIT-1 **05 HOURS**

Living Resources – Land and Ocean – Impact of Hazards - Disaster recovery – philosophy – basic principles of disaster recovery – planning – continuity and recovery function.

UNIT –II **17 HOURS**

Steps for disaster recovery planning – organize the disaster recovery planning team – assessing risk in the recovery – establish the roles across departments and organization – policy and procedure development – preparation to handle the disaster recovery – ongoing management on disaster among stack holders.

UNIT –111 **13 HOURS**

Disaster recovery plan development – executive support – establishing leadership for disaster recovery planning – organizing disaster recovery team – role of IT staff and network mangers – organizing inter departmental committies.

UNIT- IV **10 HOURS**

Budgetary for disaster recovery planning and management – co-ordination with standard and regulatory bodies – assessing progress and preparation to move ahead- field oriented problems and its mitigation – Relief Standards – International codes.

UNIT-V **15 HOURS**

Collection of risk assessment data – legal requirements – labour requirements – social expectations and its related planning activities – humanitarian expectations – identification of threat and vulnerability – rehabilitation – Mock drills- Capability Models – Language.

Text Books:

1.April Wells, Charlyne Walker, and Timothy Walker, 2006, Disaster Recovery: Principles and Practices, Prentice Hall Security Series, 298 p.

2. David A. McEntire, 2006, Wiley Pathways Disaster Response and Recovery, Wiley, 504 p.

Reference Books

1. Mary c. Comerio**,** 1998, Disaster Hits Home: New Policy for Urban Housing Recovery, University of California Press; 326 p.

2. Robert A. Stallines**,** 2001, Methods of Disaster Research, Xlibris Corporation, 528 p.

MCDM - 523 RESOURCES FOR DISASTER MANAGEMENT

UNIT-1 **05 HOURS**

Infrastructural facilities – data base for community – terrain – communication – organization – Government as well as NGO.

UNIT –II **10 HOURS**

Hazard Mitigation – building codes – awareness development – vulnerability population – core group development – training of administrators and core group – NGO.

UNIT –111 **17 HOURS**

Preparedness and Capacity Building – Preparedness in State, District, Block and Village Level – Life line Building on hospital, schools, etc. retrofitting – man power development and upgradation of skills – Specialist teams on defence, doctors, paramedical, structural engineers, electricians, plumbers, etc. – Incident Command Systems.

UNIT- IV **13 HOURS**

Relief and Response – Search, rescue, first aid, relief coordination, shelter, shelter management, aids distribution, flood, hygienic, drinking water, electricity, transportation, communication, culture, language.

UNIT-V **15 HOURS**

Rehabilitation and Finance - Rehabilitation – same area – different area – local need – environmental problems – resources – micro finance, short term, medium term, long term – NGO role – political role – administrative role – countries need.

Text Books

1.April Wells, Charlyne Walker, and Timothy Walker, 2006, Disaster Recovery: Principles and Practices, Prentice Hall Security Series, 298 p.

2. David A. McEntire, 2006, Wiley Pathways Disaster Response and Recovery, Wiley, 504 p.

Reference Books

1. Mary c. Comerio**,** 1998, Disaster Hits Home: New Policy for Urban Housing Recovery, University of California Press; 326 p.

2. Robert A. Stallines**,** 2001, Methods of Disaster Research, Xlibris Corporation, 528 p.

MCDM - 561 PRACTICAL-V

1. **Study of elements** of aerial photographs.
2. **Lithological and structural** interpretation using aerial photographs.
3. **Drainage pattern** interpretation using aerial photographs
4. **Digital image processing**, image enhancement, image manipulation.
5. **Supervised** classification using digital images.
6. **Unsupervised** classification using digital images.
7. **Hazard identification** using digital images.
8. **Mapping of** Living resources

MCDM - 562 PRACTICAL-VI

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.

SEMESTER- IV

MCDM - 540 PROJECT WORK

1. Each Faculty member will guide minimum two students devoting 14 hours per week.

2. 140 hours of field oriented research work to be carried out by the student same as the time allotted for the theory paper.

3. The work will mainly consist of visiting to the field for sample collection and analyzing in the Laboratory and establishing any one themes of disaster management.

4. Data obtained is to be analyzed, complied and submitted as a dissertation.

SOFT CORE SYLLABUS
MCDM - 429 EARTHQUAKE SEISMOLOGY

UNIT-1 **08 HOURS**

Seismic methods in relation to the other geophysical methods - Role of seismic methods in hydrocarbon , water & mining explorations - Seismic methods (refraction and reflection) - Basic elasticity theory - Elementary wave propagation theory - Types of seismic waves and noises - Seismic velocities .

UNIT –II **09 HOURS**

Scope of earthquake seismology - Difference between earthquake seismology and seismic prospecting - Ambiguity of earthquake seismology - Crust (continental and oceanic) - Mantle (upper and lower) - Core (outer and inner).

UNIT –111 **07HOURS**

Basic types and essential properties (crustal , body and surface) - Propagation paths - Phase identification .

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UNIT- IV **08 HOURS**

Reasons - Place and space - Mechanism operation - Seismographs - Recording systems - Instrumental frequency characteristics - Analog and digital records - Travel times - Arrival times - Origin times.

UNIT-V **08 HOURS**

Interpretations - Local and regional events - Teleseismic events (10 < 10 & > 10) - Volcanic earthquakes - Unusual seismic records

Text Books.

1. Dobrin and Savit, Introduction to Geophysical Prospecting, Fourth Edition, McGraw-Hill, 1988.
2. Telford, W.M., L.P. Geldart, R.E. Sheriff, and D.A. Keys, Applied Geophysics, Cambridge University Press, 1976.

Reference Books

1. Dobrin, M., Introduction to Geophysical Prospecting, McGraw-Hill, 3rd Edition, 1973.
2. Grant, F.S., and G.F. West, Interpretation and Theory in Applied Geophysics.
3. Stacy, F.D., Physics of the Earth, Wiley, 1977.

MCDM - 430 DESIGN AND PROTECTION STRUCTURE

UNIT-1 **09 HOURS**

Long span structure systems, such as hang cord structure, pellicle structure, shell structure etc. High layers such as Giant structure, the space city structure, etc. extremely high layer new structure system. The city bridge with super across new structure system of great bridge.

UNIT –II **091 HOURS**

The disaster prevention function design method and norm standard of the important engineering structure. The large and complicated structure's safety assessment and health monitor.

UNIT –111 **07HOURS**

Earthquake resistance design, seismic isolation, passive energy dissipation, Active control. The structure anti- earthquake anti- breeze design theories and structure vibrate a control.

UNIT- IV **08 HOURS**

Material constitutive model, Non-linear analysis method, Initial stress method and initial strain method. Incremental method. The modern structure is large-scale to experiment a technique (numeral simulate, physics simulate). The long range is in conjunction with to experiment the software platform.

UNIT-V **07 HOURS**

The large civil engineering structure long-range monitor and laboratory. The emulation is in conjunction with to experiment research

Text Books:

1.Williams, Martin, 1999. Structures: Theory and Analysis. Palgrave Macmillan, 448 p.

2.Chopra, Anil. K, 2000. Dynamics of Structures: Theory and Applications to Earthquake Enginerring. Pearson Higher Education, 844 p.

Reference Books

1. Coull. Alex, Stafford Smith and Bryan, 1991. Structural Analysis and Design of High Rise Building. Jhon Wiley and Sons Ltd. 558 p.

2. Priestely, M.J.N. and Paulay. Tom, 1992. Reinforced Concrete and Masonary Buildings. John Wiley and Sons Ltd., 768 p.

3. Berqado, D.T., Balasubramaniam, A.S. and Alfaro, M.C., 1994. Improvement Techniques of Soft Ground in Subsiding and Lowland Environment. Swets & Zeitkinger Publishers, 232 p.

MCDM - 431 ELECTRONICS AND INSTRUMENTATION

UNIT-1 **08 HOURS**

Introduction to Electronics- Current, Voltage & Resistance - OHM'S Law, Power & Energy - Series Circuits - Parallel Circuits

UNIT –II **06 HOURS**

Series Parallel Circuits - DC Measuring Instruments - Network Theorems - Magnetism Magnetic Circuits.

UNIT –111 **08 HOURS**

Alternating Voltage & Current - AC Measuring Instruments - Capacitance and Capacitors Inductance and Inductors - Transformers - Alternating Current Circuits.

UNIT- IV **08 HOURS**

Resonance - Coupling and Filter Circuits - Semiconductor Fundamentals - Transistors and Thyristors - Amplifier Circuits - Integrated Circuits - Digital Electronics

UNIT-V **10 HOURS**

Marine Instruments – Water samplers – Sediment samplers – Data collection electronic equipments and its common electronic problem and its solution for mainteanance.

Text Books

1. Albert P. Malvino, 1988, Electronic Principles, McGraw-Hill Science/Engineering/Math.
2. Grob, 1997. Basic Electronics, McGraw-Hill Science/Engineering/Math; 960 pages,

Reference Books

1.Chih-Tang Sah, 1991, Fundamentals of Solid State Electronics, University of Florida, USA; 1040 pages.
2.Garry,I.H., 1995, Properties of Silicon Carbide, Institution of Engineering and Technology, New York, 295 pages.

MCDM- 524 CAPABILITY MODELS OF DISASTER RISK ASSESSMENT

UNIT-1 **06 HOURS**

Development of State and District Disaster Risk Assessment – Indian states and its districts, Hazards, its risk assessment.

UNIT –II **06 HOURS**

Development of disaster risk assessment, management and response plans at Village / Ward/ Gram Panchayat, block/ Urban Local Body level and its capacity building mechanism.

UNIT –111 **08 HOURS**

Constitutions of Disaster Management Teams and Committees at all level - representation of women in all committees and team and its advantages and disadvantages.

UNIT- IV **10 HOURS**

Capacity building in cyclone and earthquake resistant features for houses in disaster prone districts, training in retrofitting and construction of technology demonstration units. Integration of disaster management plans with development plans of local self-governments.

UNIT-V **10 HOURS**

Capacity building of disaster management teams for drought, volcanoes, epidemic, biohazards, etc. Special training for women in first aid, shelter management, water and sanitation, rescue and evacuation, etc.

Text Books

1. Mary C. Comerio**,** 1998, Disaster Hits Home: New Policy for Urban Housing Recovery, University of California Press; 326 p.
2. Robert A. Stallines**,** 2001, Methods of Disaster Research, Xlibris Corporation, 528 p.

Reference Books

Web materials and different agencies policy plans.

MCDM- 525 DISASTER PREDICTION AND REGIONAL FORECASTING

UNIT-1 **08 HOURS**

Prediction, Forecasting and Managing - Principles - Nationwide HPC Grid – Integrating / Interfacing HPC and Satellite Resources - Togetherness of Disaster Strategic User Groups – Sharing of spatial and non spatial data - Security issues - Collaborative development of parallel stimulations – pre and post disaster information availability to end users.

UNIT –II **06 HOURS**

Models and their Utilization - Digital Elevation Model – Flood Forecast Models – Flood Stimulation Operations - Hazard Zoning Operations - Coastal Erosion Monitoring – Airborne Scanning Laser Altimetry – LiDAR Systems.

UNIT –111 **08 HOURS**

Tools for Hazards Prediction and Forecasting - Decision Support Centre (DSC) – National Emergency Operation Centre (NEOC) - Virtual Private Network (VPN) – National Emergency Communication Network - (NECN) – Early Warning Systems (EWS) for Hazards.

UNIT- IV **09 HOURS**

Early Warning Systems (EWS). – Tsunami Warning Systems (TWS) - principles - procedures - sub systems – communication – Equipments - user agencies – dissemination of information - countries involved and beneficiaries.

UNIT-V **09 HOURS**

Cyclone Warning System (CWS) – Cyclone Surveillance Radars – Satellite Pictures - Advance very High Resolution Radio-meter (A.V.H.R.R.) - Tiros Information Processor (T.I.P. data) - INSAT-LB - Meteorological Data Utilisation Centre (M.D.U.C.).

Text Books.

1.Katharine Anderson, Predicting the Weather: Victorians and the Science of Meteorology, University Chicago Press, P.182.

2. Met Monograph No.Synoptic Meteorology 5/2007: Probable Maximum Storm Surge Heights for the Maritime Districts of India. Issued by the Additional Director General of Meteorology (Research) Pune – 411 005.

Reference Books

Web materials and different agencies policy plans.

MCDM 526 CONSERVATION OF ISLAND RESOURCES

UNIT-1 **08 HOURS**

Resources of the Island – Plant – Animal – Forest – Tourism – Fresh Water – Marine Resources -

UNIT –II **06 HOURS**

Plant Resources and its conservation - Inland Resources - Evergreen forests, Semi-evergreen forests, Moist deciduous forests, Vascular climbers and epiphytes, Vegetation in cleared lands and open area, Grasslands/pastures, Aquatic and submerged vegetation, Planted forest trees, Agricultural crops - Field crops, Multiple cropping system in plantation crops, Agroforestry, Weeds-distribution and their management. **Littoral vegetation -** Submerged vegetation, Beach or sand covers, Mangrove forests (Mangal formation), Strand vegetation, Tidal or swamp forests.

UNIT –111 **08 HOURS**

Animal Resources and its Conservation –bats and rodents, crab-eating macaque and the Nicobar tree shrew, amphibian and reptilian, etc. - **Birds and its Conservation** - Nicobar Megapode, Andamans or Grey Teal, the Narcondam Hornbill, the Nicobar Pigeon, the Nicobar Parakeet, Andaman Wood Pigeon, the two species and races of the Crested Serpent Eagle.

UNIT- IV **09 HOURS**

Tribes of Andamans – Andamanese, Jarwa, Nicobaries, Sentinel, Onge, Shampein – distribution, problems and conservation,

UNIT-V **09 HOURS**

Marine Living – Fish, Corals, Marine Mammals, Marine Plants, and Non Living Resources and its conservation

Text Books.

1. Dagar, J.C. and N.T. Singh, 1999, Plant Resources of the Andaman & Nicobar Islands, 2 vols., 987 p.
2. Venkataraman, K., Jeyabaskaran, R., Raghuram, K.P. and Alfred, J.R.B. 2004, Records of the Zoological Survey of India – Bibliography and Checklist of Corals and Coral Reef Associated Organisms of India. Zoological Survey of India, Kolkatta, 468 p.

Reference Books

Web materials and different agencies policy plans.

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