**BUNDELKHAND UNIVERSITY, JHANSI**

*SYLLABUS*FOR UNDERGRADUATE COURSESB.SC. (HONS.)

**Disaster Management**

Total Credits: 4

**UNIT I: *Introduction to Disasters***

Understanding of Hazard, Vulnerability & Disasters.Concept of Risks, Evaluation of Risks.Climate change Risk (IPCC Report): Natural & man-made factors.Driving forces of Vulnerability of cities.Landforms Developingforces:Endogenetic&Exogenetic.Concept of on-site Disasters.

**UNIT II :*Types of Disasters***

Classification of Disasters. (Natural & man-made)Natural Disasters:Climatic Disasters (wind & water related): Tropical Cyclone, Floods & Drought.Earth related Disasters (Geological Disaster): Earthquake, Tsunami, Landslides& Volcano Eruption.

Man-made Disasters:Industrial (on-site) Disasters: Toxic Gas leak, Exploision, Nuclear & chemical Disaster (BLEVE)Technological Disasters (Accidental Disasters): Rail, Road, Air & Sea.Ecological Disasters: Pollution, Soil Degradation, Loss of Biodiversity & Global warming.Epidemics: Cholera, Typhoid.Biological Disasters : COVID-19

**UNIT III :*Disaster Management***

Basic measures for Disaster management***:*** Preventive Measures***,*** Preparedness Measures (Disaster mapping profile), Predictability, Forecasting & Warning.Response and Relief measures.Recovery & Rehabilitation measures.

***UNIT – IV: Disaster Preparedness and Training***

Disaster Management Bill, 2005.Institutional Framework for Disaster Management.Role of Media in Disaster Management.Basic Safety Measures (Pre and During): Earthquake & Floods.

**Unit V: *Mitigation Strategies***

Disaster Mitigation – Emerging Trends in Disaster Management - UN Draft Resolution on Strengthening of Coordination of Humanitarian Emergency Assistance

**References:**

* IPCC, 2001: Impacts Adaptation and Vulnerability, GRID, Aewndal.
* Natural Hazards, Bryant Edwards (2005), Cambridge University Press, U.K.
* Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Roy, P.S. (2000), Indian Institute of Remote Sensing (NRSA), Dehradun.
* Natural Disaster, Sharma, R.K. & Sharma, G. (2005), (ed) APH Publishing Corporation, New Delhi
* Disaster Management : A disaster Manager’s Handbook, Carter, N W. (1992), Asian Development Bank, Manila.

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**Energy and Environment**

Total Credits: 4

***Unit-I: Basic Introduction about energy***

Introduction about Energy.Classification of Energy sources]. Scenario of Energy Potential in India.Energy Scenario – Global and Indian, development and environment.

***Unit-II : Conventional Sources of Energy***

Non-Renewable Sources of Energy (Advantages & Disadvantages).Fossil Fuel based Energy. Coal Energy,Petroleum Fuel Energy (or crude oil), Natural Gas Energy.Refinery products of petroleum (i.e. Crude oil).Nuclear Fuel Energy and radioactive Hazards.

***Unit-III:Non-conventional Sources of Energy***

Solar Energy and their applications.Solar Energy Advantages & their limitations.Hydro-Electric Energy (Hydro power).Wind Energy.Biomass Energy [wood waste, Biofuels viz; Ethanol & Biodiesel]Biomass and the Environment. Alcohol as a source of Energy (Gasohol, Methanol & Ethanol).Biogas generation Technology.Geothermal Energy and Environment.Various forms of Geothermal energy Reservoirs &their uses.Tidal Energy and Sea-wave Energy.Ocean Thermal Energy Conversion (OTEC).

***Unit – IV: Energy Management***

Definitions and significance, objectives, Energy Management program, Energy strategies and energy planning Energy Audit, Energy management control systems

***Unit – V: Energy conservation***

Principles, Energy economics, Energy conservation technologies, cogeneration, Waste heat recovery,Combined cycle power generation, Energy policies, Energy strategy for future

**Suggested readings**

1. Non-Conventional Energy Sources, Rai, G.D.(2001), Khanna Publishers, New Delhi.
2. Solar Energy, Sukhatme, S.P.(1996), Tata McGraw Hill Publishing Company.
3. Renewable Energy Sources & Conversion Technology, Bansal N. K., Kleemann M. & Michael, Meliss., (1990), Tata McGraw Hill Publishing Company.
4. Biotechnology and Oother Alternative Technologies, Chakraverty, A. (1998.). Oxford and IBH Publishing Co. Pvt. Ltd.,
5. Biomass- Regenerable Energy, D.O. Hall & R.P. Overend (1987), John Wiley.
6. Renewable Energy Sources, Mathur A. N. &Rathore N. S (1992), Bohra Ganesh Publications.

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**Drinking water quality assessment**

Total Credits: 4

***Unit 1:Water source and pollution***

Introduction about water resources.Various forms of water resources.Quantity of waterin different resources/global distribution of water.Concepts of water stress and adaptations.Global water cycle.Surface water resources.Underground water resources.Types of aquifers.Effects of over exploitation of Underground water.Principal sources and causes of Groundwater Pollution.Plume movement in groundwater aquifers.Fluoride Problem in Drinking water & their removal techniques.Arsenic contamination in Groundwater.

***Unit – 2: Basics of drinking water***

Raw water sources, i.e., rivers, lakes, reservoirs, groundwater, that can be exploited for drinking water production. Basic drinking water chemistry.

***Unit – 3: Water Quality Fundamentals***

* Quality aspects of water :
	+ 1. Physical aspects : temperature, colour, turbidity , tastes and odour , pH and conductivity.
		2. Chemical aspects : salinity(Na and Cl ions) and TDS, DO, BOD & COD
		3. Biological aspects : Bacteria and Virus
* Tolerance limits of water quality for irrigation purposes.
* Colour of water under different pH range (Based on various Indicator).
* Treatment of water for removal of taste &odours.

***Unit – 4: Treatment methods for drinking water***

Introduction to common methods for drinking water treatment from different sources: sand and membrane filtration, coagulation/flocculation, sedimentation, water softening, softening, ion exchange, adsorption on granular activated carbon, different disinfection methods.

***Unit – 5: Drinking water management***

Freshwater Crisis. Management of Water Availability:- Surface water development, ground water development, weather modification and water conservation; inter basin transfer of water, wastewater reuse, desalination and other approcaches Management of extremes such as flood-structral and non-structural approach, droughts

**Suggested readings**

Birde G.S. and Birde J.S. (2004) Water Supply and Sanitary Engineering, 7th ed., New Delhi, DhanpatRai Publishing.

Chatterjee A.K. (2010) Water Supply, Waste Disposal and Environmental Engineering, 8th ed., New Delhi, Khanna Publisher.

Eckenfelder W.Jr. (1999) Industrial Water Pollution Control, 3rd ed., New York, McGraw-Hill.

Metcalf and Eddy (2003) Wastewater Engineering: Treatment and Reuse, 4th ed., New Delhi, Tata McGraw-Hill.

Nathanson J.A. (2009) Basic Environmental Technology: Water Supply, Waste Management and Pollution Control, 4th ed., New Delhi, PHI Learning.

*Drinking Water - Principles and Practice* by De Moel, Verberk, and Van Dijk.

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**Water Conservation and River Linking**

Total Credits: 4

***Unit – I: Hydrology***

Water and its importance, scenario of water resources, hydrological cycle, elementary knowledge of ground water, aquifers, surface water resources, water quality and its impact on human being.

***Unit – II: Water Pollution and Quality Assessment***

Different types of pollutants, water borne diseases, sources of water pollution, chemical nature and tansport of water pollutants, effects of water pollutant on plants, animals and human health, water quality monitoring, Eutrophication, Minamata tragedy, GAP, YAP.

***Unit – III: Monitoring and Management of water resources***

Water conservation, elementary knowledge regarding conservation methodology, water harvesting: need, principles of water harvesting, general water harvesting methods – rain water harvesting, rooftop rain water harvesting, mostly used in urban areas, farm ponding, watershed management, water foot print.

***Unit – IV: Interlinking of rivers***

Interlinking of rivers: benefits and challenges, nationwide river interlinking Plan, Governmental procedure for interlinking (Feasibility Report, Detailed Project Report and memorandum of Understanding). Proposed plan for Ken – Betwa link project (Conservation Plan for Dam, Reservoir, Cananls), Interlinking impact on wildlife (KBLP & Wildlife). Human Wildlife conflict.

***Unit – V: Community Participation***

Community invovment in water management, role of Panchayati Raj, institutions, NGO, educational sector, medias, political parties and farmer associations in conservation of water resources. Public awareness programs and awareness strategis.

**Suggested readings:**

1. **Natural** **resource conservation: management for a sustainable Future** by Dan Chiras, Pearson, 10th Edition, 2014.
2. **Managing Natural Resources: Focus on Land and Water** By Harikesh N. MishraPrentice Hall India Learning Private Limited, 1st edition, 2017.
3. **Green Management: Theory and Application** by M. Karpagam, Geetha Jaikumar, Ane Books Pvt. Ltd. 2010.
4. **Environmental Pollution: Cause, Effects and Control** by K.C. Agrawal, Nidhi Publications, 2001.