UNIVERSITY GRANTS COMMISSION NET BUREAU

Subject: Disaster Management **Code No.: 104**

Syllabus

This syllabus contains ten units:

Unit I: Introduction to Disaster Management

Unit II: Research Methodology for Disaster Management

Unit III: Legal Framework, Policies and Governance

Unit IV: Society, Development and Disasters

Unit V: Community Based Disaster Risk Reduction and Disaster Management

Unit VI: Health and Disasters

Unit VII: Environment, Ecology and Climate Change Aspects

Unit VII: Remote Sensing and Geographic Information System

Unit IX: Information & Communications Technology and Other Emerging Technologies

Unit X: Emergency Response and Management

Contents:

Unit I: Introduction to Disaster Management

- **Introduction to Disaster Management (DM):**

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Key Terms, Definitions and Concepts related to Disaster – Hazard, Risk, Vulnerability, Exposure, Coping Capacity, Resilience, Conflict, Emergencies and related terms; Disaster cycle - Phases of Disaster; Applications of different concepts related to disaster; Methods of hazard, vulnerability and capacity assessment (HVCA)

- **Natural Hazard:**

Classification of Disaster in detail - History of Disasters and Types of Natural Hazards: Earthquakes, Volcanism, Cyclones, Tsunamis, Floods, Droughts, Famines, Landslides, Avalanches and Glacial Lake Outburst Flood; Characteristics, causes and damage potential of different natural hazards

- **Human Induced Disaster:**

Classification of Man-made disasters; Socio-Technical Disaster-Technological Disaster; Chemical, Biological, Radiological and Nuclear Disasters

- **Vulnerability and Risk - Assessment and Management:**

Basics of vulnerability and risk assessment; Concepts of exposure, sensitivity, and adaptive capacity; Analysis of inherent and chronic vulnerabilities; Disaster risk and its associated parameters; Disaster risk mitigation measures; Early warning systems; Common Alert Protocols (CAP)

- **Disaster Management in India:**

Hazard and Vulnerability profile of India; Regional aspects of hazard, risk and vulnerability; Emerging paradigms and recent developments

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Unit II: Research Methodology for Disaster Management

- **Research - Meaning and Concepts:**

Definitions; Sources of knowledge, History of scientific thought, Paradigm of research; Theoretical framework of research; Types of research; Social research, applied research, action research, participatory research; Formulating research problem; Literature review—sources of literatures, importance of literature review, Critical literature review, Identifying gap areas from literature

review; Hypothesis—different types, significance, development of working hypothesis, directional and non-directional hypothesis; Validity & reliability

- **Research Design, Data Collection and Analysis and Methods:**

Research design—Basic principles, need of research design, features of good design, important concepts relating to research design; Laws and theories; Research approaches; Developing a research plan; Determining experimental and sample designs; Types of research methods; Methods, sources or tools for data collection; Construction of questionnaire, interview schedule and interview guide; Sampling—Concepts, types and techniques; Variables; Data processing; Data analysis and statistics; Methods of hypothesis testing; Type of errors; Generalization and interpretation of data

- **Ethical Considerations:**

Ethical issues in research; Identifying and avoiding bias; Academic integrity and prevention of plagiarism; Guidelines in research; Informed consent; Privacy concerns

- **Disaster Research:**

Definitions and concepts in disaster research; Methodology and methods of transdisciplinary research; Methods in contemporary disaster research; Research methods in disaster and humanitarian settings—Qualitative, quantitative, mixed; Qualitative and quantitative approaches to risk assessment and risk reduction; Approaches to qualitative research - Narrative research, Phenomenology, Grounded theory, Ethnography, Autobiography, Case study, Ethnomethodology; Community-based participatory research (CBPR); Research methods for Health emergency and disaster risk management (Health-EDRM); Research methods for natural and environmental disasters; Computational methods for disaster research; Geographical methods for disaster research; Disaster reconnaissance; Ethics and ethical dilemmas in disasters.

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Unit III: Legal Framework, Policies and Governance

- **Legal Framework Related to Disasters in India:**

Disaster Management Act, 2005; Other related acts, policies, plans, programmes and legislations

- **International Legal Framework Related to Disasters:**

Major International legal instruments dealing specifically with Disasters; Sendai Framework for DRR 2015-2030; Hyogo Framework for Action 2005-2015; Yokohama Strategy; Sustainable Development Goals (SDGs) and Disaster Risk Reduction (DRR)

- **Policies Related to Disasters:**

National Policy on Disaster Management 2009; National Disaster Management Plan 2019; State Disaster Management Plans (SDMPs); District Disaster Management Plans (DDMPs)

- **Institutional Arrangements in DM:**

National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), District Disaster Management Authority (DDMA), National Disaster Response Force (NDRF)

- **Disaster Financial Management:**

Disaster Financial Management Team Composition; Cash flow management, debt monitoring, risk avoidance; Disaster assessment and expense reimbursement pertaining to damage, emergency protective measures; Project and Portfolio Management - performing financial analysis, maintaining accurate financial records and documents in preparation for audits; Supply chain management; Knowledge of Procurement and Contracting Practices; Disaster Financial Management Activities; Disaster Financial Accounting Systems and Management Processes, Disaster Financial Assistance Programs, Financial management for humanitarian response; Disaster Mitigation Fund and Disaster Response Fund at Central and State Levels

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Unit IV: Society, Development and Disasters

- **Disaster Challenges of Vulnerable Population:**

Dimensions and Factors affecting vulnerabilities; Differential vulnerability of people based on caste, class, gender, age, location, disability, religion, etc.; Disaster challenges due to multiple vulnerabilities; Cascading vulnerabilities and impacts; Intersectionality, vulnerability and resilience

- **Gender and Disasters:**

Understanding Sex, Gender and Gendered Vulnerability in Disasters; Gender differentials in disaster cycle, coping strategies and resilience; Gender-Inclusive and Gender-Sensitive DM and their best practices; Women, work and livelihood issue in disasters

- **Children and Disasters:**

Basic Concepts in Child-Centered DRR; Vulnerability of Children in Disasters; Children in disaster cycle, their coping strategies and resilience; Child-Inclusive and Child-Sensitive DM and their best practices

- **Elderly and Disasters:**

Basic Concepts of DRR for elderly population; Vulnerability of elderly in Disasters; Older people in disaster cycle, their coping strategies and resilience; Elderly-Inclusive and Elderly-Sensitive DM and their best practices

- **Disability and Disasters:**

Basic Concepts and Terminologies related to Disability e.g. Impairment, Disability and Handicap, etc.; Convention on the Rights of Persons with Disabilities (CRPD); Rights of Persons with Disabilities Act (2016); Types and Models of Disability; Vulnerability of Persons with Disabilities (PwD); Differential impact of Disasters on PwD; Disability issues in disaster cycle; Coping strategies and resilience of PwD; Disability inclusive DRR (Approaches; Identifying PwD; VCA and Early Warning Systems; Search, Rescue and Evacuation; Shelter Management; Guidelines for Accessibility; Information,

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Education and Communication (IEC) material; Rehabilitation); Disability-Sensitive DM and their best practices; Disaster and Emergency Frameworks and their References to Disability; Disability Frameworks and their References to Disasters

- **Development and Disasters:**

Sustainable development; Impact of development projects such as dams, embankments, changes in land-use etc.; Vulnerability to shanty settlements; Vulnerability in the city, Risk in Urban areas, Issues in urban planning, Initiatives for risk reduction in India; Disaster Resilient Infrastructure

- **Indian Knowledge System in Disaster Management:**

Local knowledge and practices for DRR; Indian knowledge about disasters - early warning systems and indicators; coping strategies and disaster response; Distinctive settlement patterns, livelihood preferences, sociocultural practices and traditions; Managing the natural resources and disaster risks; Literary sources about DM; Global best practices and lessons learned.

- **Economic Aspects of Disasters:**

Identifying the Natural Disasters with Potential Financial Implications; Measuring Local Government Financial Vulnerability to Natural Disasters; Measuring the Financial Capacity of Local Governments to Address Natural Disasters; Identifying Regional Financial Vulnerabilities; Direct and Indirect costs due to disasters; Welfare losses and damages due to disasters; Challenges in making economic assessments of disaster losses

- **Poverty, Livelihood and Disasters:**

Poverty and DRR; Livelihoods and DRR

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Unit V: Community Based Disaster Risk Reduction and Disaster Management

- **Roles of Local Institutions:**

Roles and Responsibilities of Community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), Non-Governmental Organizations (NGOs) and other stake-holders in DM

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- **Reducing Risk of Disasters in Communities:**

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

- **Community Risk Management:**

Community Assets and Social Wealth; Community risk mapping; Living with Risk; Policy Perspectives -Sendai Framework for DRR; Conflict Resolution through Collaboration and Consensus; Citizens Forum, Public Voices and Public Sphere; Social Justice Challenges; Media Advocacy for DM; Building Resilience for Disaster Risk Management; Disaster Literacy of Communities

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Unit VI: Health and Disasters

- **Health Systems and Infrastructure:**

National and Local Health Systems; Tiers of Healthcare Services; Clinical Services; Health Information System; Human Resources for Health; Monitoring and evaluation of health systems; Evaluation of disaster programs and projects; Resilient and Sustainable Health Systems & Infrastructure

- **Disaster Health and Communicable Diseases:**

Concepts of Disaster Health, Endemic, Outbreak, Epidemic and Pandemic; Health Consequences of Disasters; Health-EDRM Framework; Public health preparedness and response; Communicable diseases as public health threats; Principles of communicable disease prevention and control; Major disease in emergency and non-emergency settings; Setting up disease control programmes; Monitoring, evaluation and research for disease control programmes

- **Water, Sanitation and Hygiene in Emergencies:**

Diseases related to water, sanitation and hygiene; Community involvement in hygiene promotion, disease prevention and mitigation; Improving environmental conditions; Water quantity and water quality; Emergency water supply strategy and techniques; Water-borne and water-induced diseases; Vector borne diseases control; Water and sanitation in cholera outbreak response; Hygiene

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and Food Safety; Solid waste management; Excreta disposal; Planning guidelines for institutions.

- **Disaster Epidemiology:**

Basic concepts of Epidemiology; Epidemiological triad; Role of the epidemiology in disasters; Methods and methodological challenges in disaster epidemiology; Disaster-related exposures, mortality and morbidity; Health Management Information System (HMIS); Post Disaster Needs Assessment (PDNA); Disaster Registries; Epidemiological Survey; Post-disaster epidemiological investigations/studies; Influenza epidemiology

- **Outbreak Investigation and Response:**

Definition and criteria of Outbreak; Steps of an Outbreak Investigation; Prevention of outbreaks; Trigger alerts; Principles and methods of investigations for Food, Water, Air, Vector borne outbreaks

- **Public Health Surveillance:**

Concept and types of surveillance; Indicator & Event based Surveillance; Surveillance - design, evaluation and common problems; Components of Surveillance System; Integrated Disease Surveillance Project (IDSP), Early Warning, Alert and Response System (EWARS)

- **Biological Disasters, Pandemics and Public Health Emergencies:**

Infectious diseases, Biological disasters, Epidemics, Pandemics and Public Health Emergencies – Concepts, Impacts, Prevention, Mitigation, Preparedness, Response, Recovery; Early Warnings and Containment Strategies; DRR and DM measures; Biological hazards – types and risk groups; Biological warfare and Bioterrorism - Threats, Capacity building, Response; Biosafety and Biosecurity; Agrocrime and Agroterrorism; Healthcare waste, biomedical waste and their management; Pandemic – Basics, Stages, Risks, Impacts, Mitigation and Case Studies; International Health Regulations (IHR); Public Health Emergencies of International Concern (PHEIC); Global Health Security Agenda (GHSA); Rapid Response Teams and Capacity Building; Mass vaccination issues

- **Emerging and Re-Emerging Diseases:**

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Emerging diseases; Remerging diseases; Factors for emergence of new diseases; Zoonotic diseases; Overview of common emerging and Re-Emerging diseases

- **Mental Health and Psychosocial Support:**

Stressors, protective factors and mental health disorder in emergencies and disasters; Disaster mental health – Basics, Phases, Response, Responders; Normal and abnormal human response to disaster; Post Traumatic Stress Disorder (PTSD); General measures and psychosocial support interventions; Psychological First Aid (PFA), Psychological Debriefings, Cognitive Behavioral Therapy (CBT), Community Based Interventions; Disaster Mental Health Counselling; Managing stress and well-being

- **One Health:**

Basics of One Health Concept, One Health Preparedness, One Health Approach for DM

- **Other Emerging Health Related Issues:**

Risk Assessment and Management in Health Organizations; Health advice for emergency responders; Health in DRR Frameworks; Health related vulnerability and rehabilitation; CBRNe (Chemical, Biological, Radiological, Nuclear and explosive) disasters – Basics, Case studies and Management Strategies; Nutrition and Food Safety, Care of Road Traffic Injuries victims; Minimum Initial Service Package (MISP) for Sexual and Reproductive Health (SRH); Maternal health and safe motherhood; Infant and young child feeding; Antimicrobial Resistance

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Unit VII: Environment, Ecology and Climate Change Aspects

- **Introduction to Environment:**

The global concern; Natural Resources and Energy resources- Renewable and Non-Renewable; Water resources and Forest resources; Biodiversity and conservation, Threats to biodiversity

- **Introduction to Ecology:**

Branches of ecology, Habitat and Ecological niche; Ecosystem - Concepts, types, component, function and structure; Biogeochemical cycles

- **Energy Flow in Ecosystem:**

Law of thermodynamics, flow of energy in an ecosystem; Food chains, Food web; Ecological pyramids; Ecological balance; Community dynamics, hydrosphere, xerosere; Population dynamics - structural and functional aspects of population-death antagonism

- **Introduction to Environmental Pollution:**

Sources of pollution; Different types of pollution - Air, water, soil, marine, noise, thermal; Pollution case studies - London smog disaster, Ganga and Yamuna pollution, etc.; Cost of pollution management; Causes of environmental pollution

- **Climate Resilience:**

Climatology - Origin, composition and structure of the atmosphere; Insolation, Distribution of temperature, atmospheric pressure and motion; General atmospheric circulation; Classification of world climates; Koppen's and Thornthwaite's Schemes; Heat Budget; Hydrological Cycle; Climate resilience – meaning, concept, indicators, causes and theories

- **Environmental Health, Safety and Disasters:**

Hailstorms; Heat waves, terminal heat and heat related illness; Cold waves, frost and fog; Climate change - Global warming, Acid rains, Ozone layer depletion; Effect of weather, climate variability and climate change on population health

- **Eco-based Approach and Nature Based Solutions for Disaster Management:**

Ecosystem based Disaster Risk Reduction (EcoDRR) – Introduction, tools and approaches; Natural resources management, traditional environmental wisdom and disasters; Disaster risk management - PEDRR (Partnership for Environment and DRR), Strategic Environmental Assessment (SEA) and its linkages with EcoDRR; Ecological approaches and integrated ecosystem management; Nature Based Solutions (NBSs)

- **Occupational Health and Safety:**

Occupational Hazards – overview, classification, role in different industries; Indian Occupational Safety Scenario; Concept and spectrum of occupational health; Occupational health services – Basics, Structure, Functional units and

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Activities; Occupational health screening; Occupational diseases, Notifiable occupational diseases – effects and prevention; Cardio pulmonary resuscitation, audiometric tests, eye tests, vital function tests; Industrial toxicology - local, systemic, chronic, temporary and cumulative effects, carcinogens entry into human systems; Work Related Musculoskeletal Disorders and Ergonomics; Industrial disasters - classification, investigation, and prevention; Agricultural respiratory hazards and diseases; Corporate and office hazards and diseases; Occupational Health, safety and disaster prevention

- **Accident Investigation and Reporting:**

Incident Recall Technique (IRT); Disaster control; Job safety analysis, safety survey, safety inspection, safety sampling; Safety Audit; Concept of an accident, reportable and non-reportable accidents; Unsafe act and condition, Principles of accident prevention; Role of safety committee, Accident causation models, Cost of accident; Overall accident investigation process - Response to accidents, India reporting requirement, Planning document, Planning matrix, Investigators Kit, functions of investigator, four types of evidences, records of accidents, accident reports

- **Fire Disaster Safety:**

Forest Fire, Wild Fire and Fire Following Earthquakes; Vulnerability assessment; Risk Assessment; Mitigation, preparedness and response

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Unit VIII: Remote Sensing and Geographic Information System

- **Basics of Remote Sensing:**

History, Development, Definition, Concept & Principles of Remote Sensing; Electromagnetic Radiation (EMR) and its Characteristics; Wavelength Regions and their Significance; Interaction of EMR with Atmosphere and Earth's Surface - Absorption, Reflectance and Scattering, Atmospheric Windows, Energy Balance Equation, Spectral Response and Spectral Signature, Spectral, Spatial, Temporal and Radiometric resolutions; Concept of satellite, sensor, orbit; Satellite image and various interpretation techniques; Digital image processing techniques

- **Basic Concepts of Geographic Information System (GIS):**

Definition, Philosophy & Historical evolution of GIS; Spatial vs. non-spatial data; Components of GIS, Spatial data models - Raster and Vector; advantages & disadvantages; Raster Data & its Representation - Data Structure & File format, Data Compression (block code, chain code, run length code, quadtree, MrSID); Vector data representation - Data Structure & File format, Topology; Advantage of DBMS in Context of GIS; Data input and projections, Geometric transformation of raster and vector data.

- **DRR Using GIS and RS:**

RS & GIS Global and national initiatives for Disaster Risk Management; Hazard Evaluation and Zonation - Risk and Vulnerability Assessment; Damage assessment - Land use planning and regulation for sustainable development

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Unit IX: Information & Communications Technology and Other Emerging Technologies

- **Introduction to Information & Communications Technology (ICT) and its Applications:**

ICT Approaches in DM; Changing Media Environments and the Efficient Use of ICT for Disaster Communication; Disaster Informatics and Multimedia Educational Application for Risk Reduction; Current State and Solutions for Future Challenges in Alerting Technologies; ICT Applications, tools and techniques; Efficient Deployment of ICT Tools; Utilizing ICT Applications for Decision Support in Disaster Mitigation

- **Sensor Technologies and Computing Infrastructure in DRR:**

Introduction to the Sensor Technologies; Types of Sensor Systems, benefits and limitations, efficient use; Design and Deployment practices; Use of Sensor Technologies and Computing Infrastructure for Environmental Risks, Emergency and Rescue Operations

- **Other Emerging Technologies for Disaster Risk Management:**

Big Data, Machine Learning and Database Management; Artificial Intelligence, Unmanned Aerial Vehicles (UAVs), Robotics; Social Media

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Unit X: Emergency Response and Management

- **Emergency Response:**

Standard Operation Procedure (SOP) for disaster response; Information Management System; Warning Dissemination; First Responders; Evacuation; Search and Rescue operations; Relief operations; Emergency Operation Center (EOC); Incident Response System – overview, features, Incident Response Teams; Resource Management & Networking - India Disaster Resource Network; Role of Disaster Response Forces and Community Based Organizations (CBO) in emergency response mechanism

- **Emergency Health Services:**

Health in Emergencies; Planning, continuity and access for Emergency Health Services; Prehospital Care - First Aid in different cases, Basic Life Support (BLS), Wound Management, Handling of injured persons; First Aid Triage - Principles, Types, and triage systems; Public Health Emergency Operations Centre (PHEOC) – Framework and key concepts; Mass Casualty Management; Emergency Medical Preparedness and Response; Hospital emergency disaster management plan; Hospital Safety and Preparedness; Health Emergency Teams; Identification and Handling of Human Remains

- **Risk Communication:**

Disaster and Communication - Role of Communication in Disaster, Nature and Scope of Communication; Models and Processes of Communication as Applied to DM; Sender and Receiver Oriented Views; Seven Traditions of Communication and its relevance to DM; Normative Perspective on Disaster Communication, Disaster Warnings as Risk Communication - Risk Perception, Hazard Awareness; Cultural Influences on Risk Communication; Cultural Cognition Theory of Risk Approaches Influencing Hazard Adjustment and Adoption

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- **Media and Public Affairs:**

Overview of the Media and Public Affairs; Role of Media in DM and Humanitarian Crisis; Objectives of Mass Media; Ethical Issues in Disaster Communication; Understanding News Media Coverage of Disaster, Biases and Stereotypes; Reporting on Disaster Issues and Challenges, Newsworthiness, Phases of Disaster Reporting, Sources of News, Checklist for Disaster Reporting; Media Relations during Emergency Situations; Alternative Media During Crisis; Tools for Social Media - Applications and Use

- **Shelter and Emergency Settlements:**

Assistance to self-sheltering populations; Emergency Shelter and Intermediate Shelter; Short-term shelter in existing buildings; Site selection and arrangement of emergency settlements; Longer-term issues for emergency settlements; Vector and Pest Control

- **Emergency Support Functions:**

Emergency Support Functions and their details

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