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ADM. NO:- U18CO081 (81)

BRANCH :- COMPUTER ENGINEERING

YEAR : BTech 3RD YEAR

SUBJECT : DISASTER MANAGEMENT

EXAM : END SEMESTER

PAGES : 21

DATE : MAY 7, 2021

Ans 1:

- b) Geographic Information System or GIS provides a tool for efficient and effective storage and manipulation of remotely sensed data and other spatial and non spatial data for both scientific management and policy oriented information.
- This can be used to facilitate measurement, mapping, and modelling of variety of data related to natural phenomenon.
 - Remote Sensing is used by the Indian National Remote Sensing Agency (INRSA), defined as, the techniques of deriving some information about objects without physically coming in contact with them.
 - There are three types of Remote Sensing:-
 - Optical :- Optical data is useful to interpret imagery and characterise the disaster.
 - Thermal :- As energy decreases with increasing wavelength, the thermal image has resolution that can identify such complexities.
 - SAR :- Synthetic Aperture Radar (SAR) is an active microwave sensor that is capable of acquiring data in harsh weather.

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Application of Remote Sensing and GIS:-

- Disaster Information, Quick Processing and Analysis.
- Disaster Mapping
- Sea Scenario simulation, Disaster trend forecasting.
- Emergency Response Support tool.

During Drought,

- GIS and Remote Sensing can be used in drought relief management such as early warning systems that predict drought like conditions.

During Earthquake,

- It can be used for preparing against seismic hazards maps in order to assess the exact nature of drought.

During Floods,

- It can be used to map flood inundated areas, flood damage assessments, flood hazard zoning and post-flood survey.

During Landslides,

- It can be used to prepare zonal maps that helps us get a probabilistic analysis of terrain.

Search and Rescue:-

- It helps us carry out relief activities in an effective manner by identifying areas that are disaster prone and zoning them according to risk magnitudes.

- Case Study of Algeria:
 - In Recent Years, remote sensing and GIS has been of considerable interest to all bodies of emergency services and disaster management in Algeria.
 - The use of remote sensing and GIS has become integrated, well developed and successful tool in disaster management.
- For the risk of a large earthquake of Magnitude > 6.8 in May 2003, in Algiers - Boumerdes Basin area (Algeria), Synthetic Aperture Radar Interferometry (SAR InSAR) has shown to be valuable tool for monitoring relative surface displacement due to various crustal movements and for creating accurate DEM's using pairs of SAR Images.

c)

- During times of disaster, hospitals play an integral role with the health care system by providing essential medical care to the communities.
- An incident that causes loss of infrastructure or patient surge, such as natural disaster, terrorism, chemical, biological or radioactive hazard often requires multi-jurisdictional and multifunctional response and recovery effort.
- It must include provision of healthcare.
- Without appropriate planning, local health systems can easily become overwhelmed in attempting to provide care in a critical situation.
- Hospitals are complex and potentially vulnerable institutions dependent on external support and supply lines.
- Employee attrition and shortage of critical equipment and supplies can reduce access to needed care and support.
- Hospital emergency management is a continuous process requiring seamless integration of planning and response efforts with local and national programmes.
- The principles and recommendations outlined are generic, applicable to all the contingencies and based on all hazards approach, which are:
 - Coordination and Management
 - Planning, Training and Drills
 - Information and Communication
 - Safety and Security
 - Human Resources
 - Logistics, Supply and Finance Management
 - Safe Community Continuity of Essential Services

K.R.Ruk

- Triage
- Surge Capacity for Medical Response
- Post-Disaster Recovery
- Patient Handling
- Volunteer Involvement and Management
- Area Level Networking of Hospitals
- Coordination and Collaboration of Wider Disaster Preparedness Initiatives

To ensure adequate safety and security, every hospital facility shall:-

- Appoint a hospital security team.
- Prioritize security needs of a hospital.
- Gain early control of facility access points.
- Establish reliable modes of identifying authorized hospital personnel.
- Define security measures for safe and efficient evacuation.
- Solicit inputs from hospital security team.
- Implement procedures to ensure secure collection, storage and reporting of confidential information.
- Define the threshold and procedures for involving local law enforcement.

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- d)
- The growth of chemical industries has led to an increase in the risk of occurrence of chemical disasters associated with hazardous chemicals (HAZCHEM).
 - A chemical industry that incorporates the best principles of safety can largely prevent such incidents.
 - Common causes for industrial accidents are deficiencies in safety management systems and human errors or they may occur as a natural consequence of calamities or sabotage activities.
 - Chemical accidents result in fire, explosion, or toxic release.
 - The nature of chemical agents and their concentration during exploding ultimately decides the toxicity and damaging effects on living organisms in form of symptoms or signs like irreversible pain, suffering and death.
 - Bhopal Gas Tragedy Tragedy was one such event where the leakage of MIC due to safety negligence had caused widespread panic and disturbance.
 - The victims of Bhopal Gas Tragedy, are till date, experiencing abnormal living conditions, uncertain organ damage, unhealthy offsprings and babies and permanent damage to their senses.

- Guidelines Regarding Chemical Disaster Management have some of the following points:
 - Strengthening the present regulatory framework to meet the defined national policies and aspirations,
 - Augmentation of technical support functions.
 - A supportive and 'technologically' neutral regulation framework.
 - Legislation on land-use policy.
 - Standardisation of national codes and practices.
 - Emphasis on regular safety audit, identification and selection of professional organisations and their accreditation.
 - Commissioning and Decommissioning of chemical industries.
 - Preparation of onsite and off-site plans.
 - Regular testing of emergency plans.
 - Need of medical first responders
 - Crisis Management Plans of hospitals to manage victims of chemical emergencies.
 - Concept of mobile hospitals and mobile teams.
 - Issues related to public health response, medical rehabilitation and harmful effects of environment.
 - Post disaster documentation and survey analysis.

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9)

- Fire Hazard is a situation in which there is a greater hazard harm to people and property due to fire.
- The fire triangle, for a fire to start requires three substances:
 - Oxygen
 - Fuel
 - Temperature for Ignition.
- Once the fire starts, the rising temperature creates more flammable gases and increase the intensity of fire.

Elements of Fire Safety Policies:

- Fire Safety Policies apply at the construction of buildings and throughout its operating life.
- Building Codes are enacted by local or national governments to ensure that features such as fire stops and fire rated doors and windows, walls, fire exits, etc.. are functional.
- Fire codes regulate requirements such as maximum occupancy for buildings.
- Local Authorities charged with fire safety may conduct regular inspections for fire exits and proper exit signage, functional fire extinguishers, proper storage and handling of flammable substances.
- Managers must ensure that buildings comply with fire evacuation regulations and that building features such as spray fireproofing remains undamaged.

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- Residential Fire Safety:
 - 30 seconds → fire alarms should be activated alerting the residents.
 - 60 seconds → if fire goes unchecked, it will quickly spread and release toxic gases.
 - 3 minutes → All the contents in the room will be burnt and fire spreads to other rooms.
- Building Plans to consider fire safety:
 - Passive fire protection
 - Non-combustible materials must be used to build the buildings.
 - Staircases and lift lobbies must be enclosed in the external wall of the building.
 - Fire escape or external staircases shall be made taking into account the number of residents in the building at any given time.
 - Proper ventilation and air conditioning.
 - Fire dampers shall be located in air ducts and return air duct passages.
 - Fire detection and alarm systems must be functional.
 - Automatic Sprinkler System.

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- DO's and DON'Ts :-
 - Don't use lift.
 - Don't run in fire zone without extinguisher.
 - Don't open door.
 - Don't switch on exhaust fan.
 - Don't waste time.
 - Don't jump out of window.
- Do use wet towel to cover your head.
- Do lie below and crawl to avoid smoke.
- Do use water buckets.
- Do close windows and doors as you leave firezone.

f)

- NGOs are Non Profit Organisations or associations of private citizens with common interest to assist the disaster affected people.
- NGO response is focussed on emergency food relief, temporary shelter, emergency medical aid, debris removal and habitat restoration.

- In pre-disaster phase, NGO should include awareness generation, education, training and formation of village level task force.
- Disaster management committees and teams, develop Disaster Management Plans, conduct mock drills, vulnerability assessments and coordination with government and non government agencies.

- During the post disaster phase, the NGOs take a lead by providing technical and material support for safe construction, rental of educational institutions and restoration of means of livelihood.
- They also assist the government in monitoring the pace of implementation of various reconstruction and recovery programmes.
- Opportunities provided by NGOs:
 - Setting up Anchored NGO coordination Platform during non emergency times
 - NGO institutional arrangements
 - Common accessibility to disaster affected areas
 - Focus on the most vulnerable
- Challenges encountered:
 - Weak Coordination
 - Brief time span for relief intervention
 - Neglect of remote and in accessible disaster areas
 - Tendency to rush to disaster epicenters

Case Study of NGOs with relief and Reconstruction during Bhuj Earthquake 2001:

- About 65 NGOs were active in Kutch alone who adopted 211 villages and constructed 32000 houses at cost of 185 crore rupees.
- A public private partnership program was started to help in reconstruction, which was undertaken by GS DMA.
- A number of NGOs like FICCI-CART ventures, MANAV SAHANA, RASHTRIYA SHABHIMAN, etc.. came forward to help.

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- h) Cyclones are caused by atmospheric disturbances around low pressure area distinguished by stiff and often destructive air circulation.
- Cyclones are usually accompanied by violent storms and bad weather.
- The air circulates inward in anti-clockwise direction in northern hemisphere and clockwise direction in southern hemisphere.
- They are classified as extra tropical cyclones and tropical cyclones.
- The Disaster Management Act 2005 lays down effective guidelines for Cyclone Disaster Management as well.
- A long coastline of about 7516 km of flat coastal terrain is extremely vulnerable to cyclone and its associated hazards.
- Though the frequency of Tropical Cyclones in the NIO covering the Bay of Bengal and Arabian Sea is the least, their impact is relatively more devastating.
- Some of the guidelines as per NDMA are as follows:-
 - Establishment of state of the art cyclone EWS involving observations, predictions, runnings, etc..
 - Structural safety of lifetime infrastructure is coastal areas.

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- Establishing a robust system of locating multi-purpose cyclone shelters.
- Enforcing cyclone resistant design standards in housing schemes.
- Building all weather links to all coastal habitations.
- Maintaining the full designed carrying capacity of main drains and canals.
- Construction of saline embankments to prevent ingress of saline water.
- Monitoring quality of water as well as assimilative capacities of open waters with institutionalised remedial measures.

Ans 2

- i)
- In the present era of electronic communication, the internet provides a useful platform for disaster mitigation communications.
 - Launching of well defined websites is a very cost effective means of making an intra national and international presence felt.
 - It provides new and potentially revolutionary options for rapid, automatic and global dissemination of disaster information.
 - A number of individuals and groups are, including several national meteorological services are experimenting with Social Media for real time dissemination of weather observations, forecastings and other data.

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- In the most critical phase of disasters electronic communication and Social Media have provided the most effective and in some instances, perhaps the only means of communication with the outside world.
 - Social Networking, Blogs, Collaborative Projects, Social Reviews are all helpful in the situation of distress.
 - 5 C's:- Collectivity, Connectivity, Completeness, Clarity, Collaboration.
- ii) 
- The Role of Police in Disaster Management is as follows:
 - Police is a symbol of law and authority. They are the arms of law enforcement.
 - They Perform Sovereign task of the State of Protecting life.
 - They design the tool for Implementing State Policies.
 - They are a trained human resource.
 - They provide Security and law enforcement at the location of disaster.
 - They prevent continuous cognizable offences against life, property and public tranquility.
 - Their well developed communication system, wider reach, familiarity with local terrain & area and awareness about people's sensibilities come really handy during times of distress.

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- Many states have shown interest in Capacity building of Police via SDRF.
- So far, 21 states have sent their Police for NDMA sponsored TOT course in Disaster Response.

iv) Prevention and Mitigation Measures for Heat Wave

Tasks

- Preparedness of Heat Wave
- Action Plan

→ Early Warning

→ Mitigating Heat Wave

→ Monitoring and Response

Responsibilities

- NDMA → Guideline on preparing the Plan
- SDMA → Preparing the Plan

IMD → Issue Heat Wave Alerts and forecasts

State Administration → To disseminate the information received from IMD.

Ministry of Urban Development → Construct Shelters, sheds, bus stands and provide drinking water points.

Creating medical posts at places of mass gathering

Ministry of Health and Family Welfare → Surveillance, Deployment of Rapid Response Team, Specific Care

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→ Occupational Support and Advisors → Take necessary measures

→ Media Campaign and IEC activities → Ministry of Information & Broadcasting
→ Extensive IEC campaigns to create awareness.

→ Documentation → Ministry of Health & Family Welfare
→ Collecting Data from States and maintaining National level database.

v) Some of the measures that can be taken to prevent accidents at construction sites are as follows:-
→ A safety officer should be specially appointed to take care of all safety related issues of construction site.

→ Personal Protective Equipments :- PPEs are the most basic front of protection and safety for workers. They are available as PPEs for head, eye, ear, hand protection, PPEs for working on high floors, respirators, etc.. For example, hard hat hats, safety boots, hi-viz jackets, etc..

→ Safe Access On site :- People must be able to reach the site of work. Edges should be guarded with rails, holes should be clearly marked. Lighting must be adequate.

→ Working at heights :- Use ladders or scaffolding with proper fixing. Check site clearance or over head powerlines before starting work.

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- Excavation Work :- Make sure excavation sites are inspected regularly.
- Assign responsibilities
- ~~Haz~~ Identify and Control Hazards.
- Training and Communication
- Documentation and Enforcement of Safety rules.

vi) Urban Flooding is an inundation of land in a constructed setting, particularly in densely populated regions.

It happens when rainfall or allied instances overwhelm the capacity of drainage systems.

Factors affecting Urban floods:-

- Flash floods
- Melting of Snow
- Water released from damaged Sewer Systems
- Overflow from drainage

Effects of Urban flooding:-

- Destruction of People and Property
- Spread of new diseases
- Hindrance to movement and travel
- Delay of logistics and delivery

- Steps to be taken after Urban flooding :-
 - Drink chlorinated or boiled water
 - Take clean and safe food
 - Sprinkle insecticides in stagnant water bodies
 - Cooperate with disaster survey teams
 - Prepare a safety kit with necessary tools and things such as torch, clothing, blankets, batteries, first aid kit, etc..

- Mitigation of Urban Floods :-
 - Need for Holistic engagement.
 - Developing Sponge cities
 - Wetland Policy
 - Drainage Planning
 - Water Sensitive Urban Design
 - Convergent Approach
- The Urban flood of Hyderabad is a notable example

vii)

- Mining accounts for 7% of fatal accidents at work place.
- It results in loss of life, serious body injuries, reportable injuries and other minor injuries.
- The Disaster Management Plan is a guide giving considerations directions and procedures for handling emergencies likely to arise from planned operations.
- Some of the guidelines for Mine Disaster Management are as follows :-
 - No child below the age of fourteen shall be employed to work in any factory or mine.

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→ Article 39 :- Health and Strength of Workess, men, women and the tender age of children are not abised and that citizens are not forced by economic necessity to enter avocations unsuited to their age and strength.

- Causes of Mine Disasters:-

- Fire
- Earthquake
- Explosion
- Cyclone
- Flood

- Prevention of Mine Disasters

- Organising Mock Drill and Proper training for Workess
- Inspection Planning
- Identification of dangers from within and adjacent mines
- Accident profile of mines
- Nature of violations & status of compliance
- Mine environment and condition regulation
- Disaster Risk and Emergency Preparedness

- Post Mine Disaster Activities

- Medical Checkups
- Collection of Records
- Inquiry
- Insurance claims
- Treatment of injured/affected workers

viii)

- A Blackout, also known as, Power Outage refers to the total loss of power to an area and is the most severe form of power failure that can occur.
- Blackouts which results from power failure stations tripping are particularly difficult to recover from, quickly.
- Classification of blackouts:
 - On the basis of inadequacy:
 - i) Transmission Inadequacy
 - ii) Generation Inadequacy
 - iii) Mixture of Both
 - Effects of Blackout:-
 - Economic losses
 - Delay in transportation
 - No food & water supply
 - Health & Welfare
 - Impact on computers & other electronic devices.

• Causes of Blackout:-

- External effects: Fires, lightning strikes, tree contacts
- Thermal effects: An overloaded line will melt and hence requires several minutes.
- Inadequate maintenance of power lines
- Ageing Equipment
- Insufficiently coordinated equipment maintenance.
- Inadequate System understanding and lack of situational awareness.

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- Prevention of Blackouts
 - Strengthening communication network
 - Regular maintenance of equipments
 - Replacement of old or failed equipments
 - Provision of Uninterrupted Power Supply with proper battery backup.
 - Audit of devices
 - Connecting power lines via reliable system & network
 - Planning of Intra-State and Inter-State Transmission Line Systems
 - Special Task forces consisting of experts must be made to study and carry out a detailed analysis of present grid conditions.
 - Training and Certification of System Operators.

- Safety Tips during Blackouts:-

- Turn off electrical equipments
- Use flashlights for emergency lighting
- Eliminate unnecessary travel.
- Don't touch electrical power lines.

Some prominent examples of Blackouts are as follows:-

- India's Blackout of 2012 that affected over 700 million people.
- California Blackout of 2000-2001 that affected over 1.4 million people in the state of San Diego Area.

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