

SCHEME OF VALUATION (SCORING INDICATOR)

REVISION-15

COURSE CODE - 3001

COURSE TITLE – ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

Qst.No	Scoring indicator	Split up score	Su tot
I(i)	<p>PART A</p> <p>1.pond, lake</p> <p>2. Eutrophication means over nourishment. So algae grows rapidly and adversely affects food chain</p> <p>3.air ,soil, light</p> <p>4. Pollution refers to any undesirable change in the physical, chemical or biological characteristics of our environment</p> <p>5. Global Information System, Management Information System</p>	<p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p>	10
II(1)	<p>PART B</p> <p>problems due to de-forestation.</p> <p>Food problems, Ecological imbalance, Increasing CO₂,Floods leading to soil erosion, Destruction of resources, Loss of bio-diversity</p> <p>Deforestation can cause the climate to become extreme in nature. The occurrence and strength of floods and droughts affecting the economy.</p> <p>Environmental pollution,, Global warming. (any six)</p>	6	6
II(2)	<p>problems due to the use of artificial fertilizers and pesticides</p> <p>Fertilizer related . problems:- Micronutrient Imbalance. Most of the chemical fertilizers used in modern agriculture have nitrogen, phosphorus and potassium which are essential macronutrients Farmers use these indiscriminately to boost up crop growth.</p> <p>Nitrate Pollution :- Nitrogenous fertilizers applied in the fields often leach deep into soil and ultimately contaminate the ground water The nitrates get concentrated in the water and when their concentration exceeds 25 mg/L, they become the cause of a serious health hazard called “Blue Baby syndrome”.</p> <p>Eutrophication :-Eutrophication means over nourishment .Due to eutrophication lakes get invaded by algal blooms; these algae grows very fast by rapidly using up the nutrients, they often are toxic and badly affect the food chain. (any three)</p> <p>Pesticide related problems:- Pesticides are poisons. Exposure to pesticides can cause a number of health effects. They are linked to a range of serious illnesses and diseases from respiratory problems to cancer.</p> <p>Death of nontarget organisms - Many insecticides not only kill the target species but also several nontarget species which are useful to us (any three)</p>	3	6
II(3)	<p>Abiotic Components – soil, air,temperature</p> <p>Biotic Components</p> <p>Producers – grasses, few herbs and shrubs.</p> <p>Primary consumers – grassing animals-</p>	1	1

	<p>cows, deers, rabbit.</p> <p>Secondary consumers – snake, lizard, birds, fox</p> <p>Tertiary consumers – hawks.</p> <p>Decomposers – bacteria.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	6
II(4)	<p>Global warming occurs when carbon dioxide (CO₂) and other air pollutants and greenhouse gases collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface.</p> <p>The effects of global warming include rising sea levels, regional changes in precipitation, more frequent extreme weather events such as heat waves, and expansion of deserts, Ocean acidification.. Higher temperatures bring more rain and snowfall, but for some regions droughts and wildfires increase instead. Climate change threatens to diminish crop yields, harming food security, and rising sea levels may flood coastal infrastructure .</p>	<p>2</p> <p>4</p>	6
II(5)	<p>Causes of Air Pollution</p> <p>Burning of Fossil Fuels</p> <p>The combustion of fossil fuels emits a large amount of sulphur dioxide. Carbon monoxide released by incomplete combustion of fossil fuels also results in air pollution.</p> <p>Automobiles</p> <p>The gases emitted from vehicles pollute the environment. These are the major sources of greenhouse gases and also result in diseases among individuals.</p> <p>Agricultural Activities</p> <p>Ammonia is one of the most hazardous gases emitted during agricultural activities. The insecticides, pesticides and fertilizers emit harmful chemicals in the atmosphere and contaminate it.</p> <p>Factories and Industries</p> <p>Factories and industries are the main source of carbon monoxide, organic compounds, hydrocarbons, and chemicals. These are released into the air degrading its quality.</p> <p>Mining Activities</p> <p>. The dust and chemicals released during the process not only pollute the air but also deteriorate the health of the workers and people living in the nearby areas.</p> <p style="text-align: right;">(any three)</p> <p>Effects of Air Pollution</p> <p>Diseases</p> <p>Air pollution has resulted in several respiratory disorders and heart diseases among humans.</p> <p>Global Warming</p> <p>Due to the emission of greenhouse gases, there is an imbalance in the gaseous composition of the air.</p> <p>Acid Rain</p>	<p>3</p>	

	<p>The burning of fossil fuels releases harmful gases such as nitrogen oxides and sulphur oxides in the air. The water droplets combine with these pollutants, become acidic, and fall as acid rain which damages human, animal and plant life.</p> <p>Ozone Layer Depletion</p> <p>The release of chlorofluorocarbons, halons, and hydrochlorofluorocarbons in the atmosphere is the major cause of depletion of ozone layer . (any three)</p>	3	6
II(6)	<p>A hazard is a process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.</p> <p>Disaster can be defined as a serious disruption, occurring over a relatively short time, of the functioning of a community or a society involving widespread human, material, economic, societal or environmental loss and impacts. Such impacts include loss of property, death, injury, trauma or post-traumatic stress disorder.</p> <p>Disaster can take various forms, including hurricane, volcano, tsunami, earthquake, drought, famine, plague, disease, rail crash, car crash, tornado, deforestation, flooding, toxic release, and spills (oil, chemicals).</p>	3	6
II(7)	<p>Transport Emergency Cards (TREM Cards) are cards that workers carry at all times when their work involves transporting hazardous wastes. These cards are provided by the occupier or operator of a facility and must be kept in the cab of any vehicle transporting dangerous goods, unless they are in sufficiently low quantities.</p> <p>TREM Cards carry information about the particular goods being transported and provide instructions to the driver or emergency responders in the event of an incident. Details of TREM card given below</p> <p>LOAD</p> <p>Name of substance(s):</p> <p>.NATURE OF DANGER ·</p> <p>PERSONAL PROTECTION INTERVENTION EQUIPMENT</p> <p>GENERAL ACTIONS BY THE DRIVER ·</p> <p>ADDITIONAL AND/OR SPECIAL ACTIONS BY THE DRIVER · SUPPLEMENTARY INFORMATION FOR EMERGENCY SERVICES</p>	3	6
III(a)	<p>PART C</p> <p>i) Dam construction and submersion leads to significant loss of farmland and forest and land submergence</p> <p>ii) Siltation of reservoirs, water logging and salinization in surrounding lands reduces agricultural productivity</p> <p>iii) Serious impacts on ecosystems - significant and irreversible loss of species and ecosystems, deforestation and loss of bio-diversity, affects aquaculture</p> <p>iv) Socio economic problems for example, displacement, rehabilitation and resettlement of tribal people.</p> <p>v) Fragmentation and physical transformation of rivers</p> <p>vi) Displacement of people - People living in the catchment area, lose property and livelihood</p>	3	6

III(b)	<p>vii) Impacts on lives, livelihoods, cultures and spiritual existence of indigenous and tribal people</p> <p>1) Ground water pollution:- Mining by disturbing hydrological cycle contaminates the ground water. Heavy metals get leached down and pollute the ground water..</p> <p>2)Surface water pollution:- Heavy metals from mining area, acids from mine drainage and radioactive substances from mine wastes contaminate water bodies like rivers, streams, lakes, ponds etc., and kill the aquatic flora and fauna.</p> <p>3)Air pollution:- During smelting of mineral resources huge amount of air pollutants in the form of suspended particulate matter, sulphur dioxide, arsenic particles, lead, cadmium etc., are issued in the atmosphere. These air pollutants cause severe health problems and pollution in the air.</p> <p>4) Land subsidence:- Land subsidence occurs due to underground mining. It results in crack in houses, buckling of roads, destruction of rail tracks. Leaking of gas pipes etc.,</p> <p>5) De-vegetation and defacing of landscapes:- Deforestation and de-vegetation due to mining leads to environmental losses in the form of deterioration of landscapes and soil erosion.</p> <p>6) Occupational health hazards:- Mine workers suffer from asbestosis, silicosis, fibrosis, black lung diseases, and respiratory diseases due to constant exposure to toxic substances and suspended particulate matter that originate from them. (any four)</p>	7	7
IV(a)	<p>A renewable resource is a natural resource with the ability to reproduce through biological or natural processes and replenished with the passage of time.</p> <p>Renewable resources are part of our natural environment and form our eco-system. Examples are trees in forests, grass in grass lands, fresh water in lakes, deposits of ground water, fresh air, and fertile soil.</p> <p>These are inexhaustible in nature. Solar radiation, tides, winds, geothermal, biomass and other natural elements are renewable resources of energy now called renewable energies because they can be used again and again</p> <p>Nonrenewable resources are natural resources which cannot be regenerated once they are exhausted.</p> <p>They cannot be used again. Example: Coal, petroleum, natural gas, and nuclear fuels.</p> <p>They are exhaustible in nature because they are not replaced by natural processes.</p> <p>Metals, petroleum products etc are prime examples of nonrenewable resources..</p> <p>(definition of each -3 and example -1</p>	8	8
IV(b)	<p>Role of an individual in conservation of natural resources.</p> <p>Conserve Water Don't keep water taps running while brushing, shaving, washing or bathing. Check for water leaks in pipes and toilets and repair them promptly.</p> <p>Conserve energy Turn off lights, fans and other appliances when not in use. Dry the clothes in sun instead of drier if it is a sunny day. Use solar cooker for cooking your food on sunny days Try riding bicycle or just walk down small distances instead of using your car or scooter.</p> <p>Protect the soil While constructing your house, don't uproot the trees as far as possible. Make</p>	3+3+1	7

compost from your kitchen waste and use it for your kitchen-garden or flower-pots. Use mixed cropping so that some specific soil nutrients do not get depleted. (any eight)

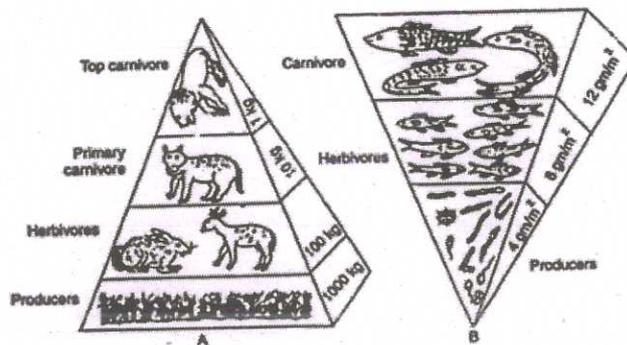
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V(a)

The trophic levels of an ecosystem can be expressed in a diagrammatic way in the form of **ecological pyramids**. The ecological pyramid basically consists of three parts; the base, body and the apex.

The producers form the base; the body consists of successive trophic levels and the top carnivores form the apex. Ecological pyramids represented in three different ways

- Pyramid of numbers
- Pyramid of biomass, and
- Pyramid of energy or productivity



Pyramid of number

The pyramid of numbers shows the relationship between producers, herbivores and carnivores at successive trophic levels in terms of their numbers.

Pyramid of biomass

If the numbers of consumers at each trophic level are multiplied by their weight, then, what we obtain is the pyramid of biomass.

Pyramid of energy

The pyramid of energy is based on the total energy content of each trophic level. The total energy content of each trophic level depends on the following factors.

They are the amount of energy that

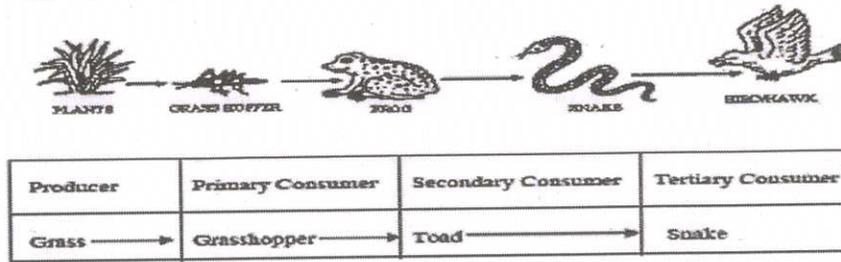
- Individuals take in
- Burn up during metabolism
- Remains in their waste product
- Individuals store in bodies

(explanation- 5, figure-2)

The patterns of eating and being eaten forms a linear chain called food chain

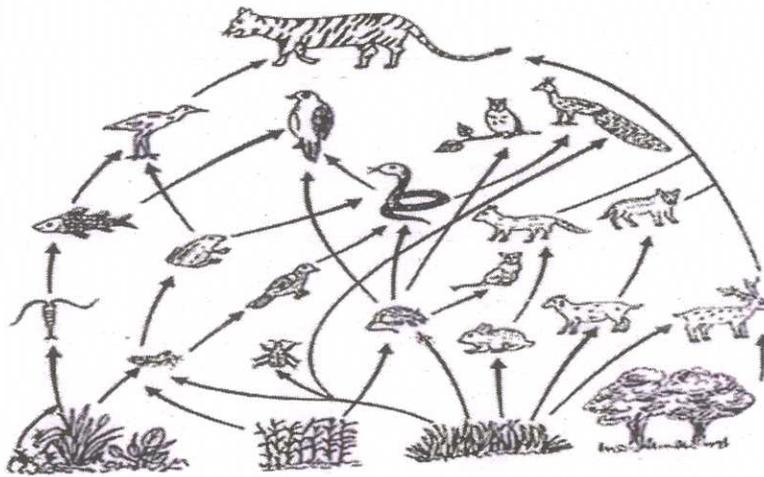
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V(b)



. A simple food chain

In a given ecosystem various food chains are linked together and inter connected each other to form a complex network called food Web.



Food Web

(Definition of each -2+fig of each-2)

4+4

VI(a)

Over the course of years it is observed that in nature one biotic community gradually gives way to a second, the second perhaps to a third, and even the third to a fourth. This phenomenon of transaction from one biotic community to another is called ecological or natural succession.

3

Succession occurs because the physical may be gradually modified by the growth of the biotic community itself, such that the area becomes more favourable to another group of species and less favourable to the present occupants

2

If the area has not been occupied previously, the process of initial invasion and then the progression from one biotic community, to the next is termed "Primary Succession".

When an area has been cleared by fire or by humans and then left alone, the surrounding ecosystem may gradually invade the area- not at once, but through a series of distinct stages termed secondary succession.

2

VI(b)

- . It consists of two parts:
- 1. Abiotic and

	<p>i) Hydro-electric power plants ii) Coal fired power plants iii) Nuclear power plants iv) Industrial effluents from power, textiles, paper and pulp industries</p> <p>2) Urban runoff : Storm water discharged to surface waters from roads and parking lots can also be a source of elevated water temperatures.</p> <p>3) Domestic sewage: Municipal sewage normally has a higher temperature.</p> <p>Effects of thermal pollution Elevated temperature typically decreases the level of dissolved oxygen (DO) in water. The decrease in levels of DO can harm aquatic animals such as fish and amphibians. The rising temperature changes the physical and chemical properties of water. In fishes, several activities like nest building, spawning, hatching, migration and reproduction etc. depend on some optimum temperature. Increased vulnerability to disease: Activities of several pathogenic microorganisms are accelerated by higher temperature. Hot water causes bacterial disease in salmon fish.</p>	4	7
VIII(a)	<p>Noise is defined as 'unwanted or offensive sound that unreasonably intrude into our daily activities' . .</p> <p>Effects of noise pollution: There are about 25000 hair cells in our ear which create wave in our ear, responding to different levels of frequencies. With increasing levels of sound the cells get destroyed decreasing our ability to hear the high frequency sound Be a Disturbance Sleep-effect performance, Workplace-lack of productivity Cause Stress, high Blood pressure / heart rate .Emotional or psychological effects - irritability, anxiety and stress. Lack of concentration and mental fatigue are significant health effects of noise. It has been observed that the performance of school children is poor in comprehension tasks when schools are situated in busy areas of a city Interferes with normal auditory communication, it may mask auditory warning signals and hence increases the rate of accidents especially in industries. The effects can range in severity from being extremely annoying to being extremely painful and hazardous Lowers workers efficiency and productivity and higher accident rates on the job (any eight points)</p>	4	7
VIII(b)	<p>Solid waste is defined as discarded solid fraction produced from domestic, commercial, trade, industrial, agricultural, institutional, mining activities and public services.</p> <p>Wastes are produced by human activities and include:</p> <ol style="list-style-type: none"> 1. Municipal wastes 2. Industrial wastes 3. Agricultural wastes 4. Mining and quarrying wastes 5. Energy generation wastes <p>The solid waste management has the following components: (i) Identification of waste and its minimization at the source (ii) Collection, segregation and storage at the site of collection (iii) Transportation (iv) Treatment (v) Energy recovery (vi) Disposal</p>	8	8
IX(a)		7	7

IX (a)	<p>Vulnerability describes the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include:</p> <ul style="list-style-type: none"> • poor design and construction of buildings, • inadequate protection of assets, • lack of public information and awareness, • limited official recognition of risks and preparedness measures, and • disregard for wise environmental management <p>Risk is the potential disaster losses (in terms of lives, health status, livelihoods, assets and services) which could occur to a particular community or a society over some specified future time period.</p> <p>It considers the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environmentally damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions.</p> <p>Risk can be calculated using the following equation: Risk = Probability of Hazard x Degree of Vulnerability.</p>	4	8
IX(b)	<p>Disaster management aims to reduce, or avoid, the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery. The Disaster management cycle illustrates the ongoing process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred. Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the shaping of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.</p> <p><u>Mitigation</u> - Minimizing the effects of disaster. Examples: building codes and zoning; vulnerability analyses; public education.</p> <p><u>Preparedness</u> - Planning how to respond. Examples: preparedness plans; emergency exercises/training; warning systems.</p> <p><u>Response</u> - Efforts to minimize the hazards created by a disaster. Examples: search and rescue; emergency relief .</p> <p><u>Recovery</u> - Returning the community to normal. Examples: temporary housing; grants; medical care.</p>	3	7
X (a)	<p>Community Based Disaster Preparedness is a process of bringing people together within the same community to enable them to collectively address a common disaster risk and to collectively pursue common disaster preparedness.</p> <p>CBDP is response mechanism to save life, livelihood, livestock and assetwith available resource e within the community. It is a list of activities a community decides to follow to prevent in case of a disaster. It also defines action to be taken by individual Community</p>		

<p>X(b)</p>	<p>Based Disaster Preparedness is a process of bringing people together within the same community to enable them to collectively address a common disaster risk and to collectively pursue common disaster preparedness. when an emergency warning is received. The plan involve providing training to the community to make them aware and responsible to protect themselves during and post disaster</p> <p>Safety audit is the structured process of collecting independent information on the efficiency, effectiveness and reliability of the total health and safety management system and drawing up plan for corrective action".</p> <p>safety Audit is normally carried out by an outside team and will examine all facilities and activities of an organisation from the angle of safety, assess the current level of prevention, protection and emergency management preparedness and subsequently prepare an action plan to upgrade safety inputs to avert mishaps and limit consequences .safety Audits are normally conducted with following objectives:</p> <p>To carry out a systematic, critical appraisal of all potential hazards involving personnel, plant, services and operation method; and to ensure that Safety and Health system fully satisfy the legal requirement and those of the company's written safety policies, objectives and progress.</p> <p>Depending on the requirements of the organisations, the audit can focus attention on the following aspects of a safety system:</p> <ul style="list-style-type: none"> Safety Management systems Fire and Explosion prevention, protection and emergency management Work injury prevention Health hazards control Evaluating emergency plan if already available 	<p>8</p> <p>3</p> <p>4</p>	<p>8</p> <p>7</p>
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