

SCHEME OF VALUATION

Scoring Indicators

Course code: 3001

Revision: 2015

Course Title: ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

Qst No.	Scoring indicator	Split up score	Subtotal	Total
I.1	Mineral resources are non-renewable and include metals (e.g. iron, copper, and aluminum), and non-metals (e.g. salt, gypsum, clay, sand, phosphates).	4 x ½		2
I.2	Ecological succession is the process of change in the species structure of an ecological community over time. The time scale can be decades (for example, after a wildfire), or even millions of years after a mass extinction.	2		2
I.3	<ol style="list-style-type: none"> 1. Incineration 2. Landfill 3. Composting 4. Vermi-composting 	4 x ½		2
I.4	<ol style="list-style-type: none"> 1. Reduce noise at the source 2. Block the path of noise 3. Increase the path length 4. Protect the recipient 	4 x ½		2
I.5	Vulnerability-is the inability to resist a hazard or to respond when a disaster has occurred. For instance, people who live on plains are more vulnerable to floods than people who live higher up	2		2
II.1	<ol style="list-style-type: none"> 1. Environmental: the disappearance of habitats essential for flora and fauna and, therefore, the extinction of species. 2. Economic: If the erosion of fertile soil 			

	<p>continues at the same rate, agricultural commodity prices will inevitably soar.</p> <p>3. For Health: if we do not take care of the forests there will be fewer CO₂ sinks and therefore more air pollution.</p>	3 x 2		6
II.2	<p>1. Energy conservation is the effort made to reduce the consumption of energy by using less of an energy service.</p> <p>2. This can be achieved either by using energy more efficiently</p> <p>3. Energy conservation reduces the need for energy services and can result in increased environmental quality, national security, personal financial security and higher savings.</p> <p>4. It also lowers energy costs by preventing future resource depletion.</p> <p>5. Energy can be conserved by reducing wastage and losses, improving efficiency through technological upgrades and improved operation and maintenance.</p> <p>6. It is possible to minimize these losses by adopting green engineering practices to improve life cycle of the components.</p>	6 x 1		6
II.3	<p>1. Tropical Rain Forests: -They are found near the equator. They are characterized by high temperature. They have broad leaf trees like teak and 1. and the animals like lion, tiger and monkey.</p> <p>2. Tropical deciduous forests: -They are found little away from the equator. They are characterized by a warm climate and rain is only during monsoon. They have</p>			

<p>II.4</p>	<p>different types of deciduous trees like maple, oak and hickory and animals like deer, fox, rabbit and rat.</p> <p>3. Tropical Scrub forests: -These are characterized by a dry climate for longer time. They small deciduous trees and shrubs and animals like maple, oak and hickory and animals like deer, fox, etc.,</p> <p>4. Temperate Rain Forests: -They are found in temperate areas with adequate rainfall. They are characterized by coniferous trees like pines, firs, red wood etc., and animals like, squirrels, fox, cats, bear etc.,</p> <p>5. Temperate deciduous forests: -They are found in areas with moderate temperatures. have major trees including broad leaf deciduous trees like oak, hickory and animals like deer, fox, bear, etc.,</p> <p>An ecosystem is composed of biotic communities that are structured by biological interactions and abiotic environmental factors.</p> <ol style="list-style-type: none"> 1. Some of the important abiotic environmental factors of aquatic ecosystems include substrate type, water depth, nutrient levels, temperature, salinity, and flow. 2. It is often difficult to determine the relative importance of these factors without rather large experiments. 3. There may be complicated feedback loops. For example, sediment may determine the presence of aquatic plants, but aquatic plants may also trap sediment, and add to the sediment through peat. 4. The amount of dissolved oxygen in a water body is frequently the key substance in determining the extent and kinds of organic life in the water body. 5. Fish need dissolved oxygen to survive, although 	<p>6</p>	<p>6</p>	<p>3</p>
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	<p>their tolerance to low oxygen varies among species; in extreme cases of low oxygen some fish even resort to air gulping</p> <p>The biotic characteristics are mainly determined by the organisms that occur.</p> <ol style="list-style-type: none"> 1. For example, wetland plants may produce dense canopies that cover large areas of sediment—or snails or geese may graze the vegetation leaving large mud flats. Aquatic environments have relatively low oxygen levels, forcing adaptation by the organisms found there. 2. For example, many wetland plants must produce aerenchyma to carry oxygen to roots. Other biotic characteristics are more subtle and difficult to measure, such as the relative importance of competition, mutualism or predation. 3. There are a growing number of cases where predation by coastal herbivores including snails, geese and mammals appears to be a dominant biotic factor. 			
II.5	<p>Scrubbers, Air Filters, Cyclones, Electrostatic Precipitators, Mist Collectors, Incinerators, Catalytic Reactors, Bio filters</p> <p>Listing any four devices,</p> <p>Explanation</p>			
		6		6
		4 x 1/2	2	
II.6	<ol style="list-style-type: none"> 1. Disasters and development are closely linked. Disasters can both destroy development initiatives and create development opportunities. 2. Development schemes can both increase and decrease vulnerability. 3. Disasters set back development programming, destroying years of development initiatives 	4 x 1	4	6
		1 x 6		6

II.7	<ol style="list-style-type: none"> 1) The Disaster Management Act, 2005, received the assent of The President of India on 9 January 2006. 2) The Disaster Management Act, 2005 has 11 chapters and 79 sections. 3) The Act provides for "the effective management of disasters and for matters connected there with or incidental thereto. 4) " The Act calls for the establishment of National Disaster Management Authority (NDMA), with the Prime Minister of India as chairperson. 5) The NDMA may have no more than nine members including a Vice-Chairperson. 6) The tenure of the members of the NDMA shall be five years. The NDMA which was initially established on 30 May 2005 by an executive order, was constituted under Section-3(1) of the Disaster Management Act, on 27 September 2006. 			
III.a	<p>Advantages:</p> <ol style="list-style-type: none"> 1. Mainly Hydroelectricity power is generated which is reliable than wind and solar energy. 2. Creates reserve of water for drinking and irrigational purpose. 3. Flood control and protection of low lying areas during heavy rainfall. 4. Serves for navigation. 5. Fishing can be done. 6. Tourism and Tourist spots are developed. <p>Disadvantages: -</p> <ol style="list-style-type: none"> 1. Dams are very expensive to construct and time consuming. 2. These projects initially devast human lives and biodiversity by inundating thousands of acres of forests and agricultural lands. 	6 x 1		6

III.b	<p>3. Deforestation takes place.</p> <p>4. Increases risk of Earthquakes.</p> <p>5. Block of fish migration.</p> <p>6. Blocks sediments flow.</p> <p>1. It leads to the emission of dust, suspended particle and gases which cause air pollution.</p> <p>2. Release of harmful trace element e.g., CO, Pb, Cd etc. leads to the contamination of surface water.</p> <p>3. Underground water is also contaminated due to seepage and infiltration of leached drainage.</p> <p>4. Mining leads to the degradation of soil quality, fertility and makes it toxic.</p> <p>5. Natural vegetation get adversely effected due to leached trace element.</p> <p>6. The major consequences of mining is the deforestation which results in loss of flora and fauna.</p> <p>7. It directly affect the ecosystem and its stability as many species are killed due to toxicity of water and soil and loss of habitat</p>	8 x 1		8
IV.a	<p>1. Chemicals added to soil mean a deviation from the normal composition. It may seem benefiting for man at first but it creates a sort of imbalance. It renders the soil infertile after few years of use.</p> <p>2. These fertilizers increase the nutrients in soil to meet the agricultural demands. But the disproportionate use creates a problem. Plants need both macro and micronutrients in specific amounts. But current use in India is not in conformity with the requirements. Macronutrients especially nitrogen rich urea is used the most, depriving soil of a proportional amount of micronutrients leading to deterioration of soil quality after long use.</p> <p>3. The overuse of chemicals diminishes the soil</p>	7 x 1		7

	<p>fertility and fertility regaining capacity gradually.</p> <p>4. Once a fertilizer is used, it has to be used again and again because being in the simplest forms the molecules are quickly absorbed by the plants giving faster growth.</p> <p>5. Many soil macro- and microorganisms are also subjected to these chemicals and are adversely affected- an imbalance in soil ecosystem.</p> <p>6. These chemicals enter our food chain and through biomagnification pose greatest health threats to human beings, their being at the apex of trophic chain.</p> <p>7. pesticides not only kill pests but also kill non targeted organisms which might even be essential for soil, for example, earthworms.</p> <p>8. overuse of pesticides gradually develops resistance in pests creating a need for even stronger pesticides.</p>			
IV.b	<p>Any Eight points with explanation</p> <p>Definition: -</p> <p>Development that meets the needs of the present without compromising the ability of future generations to meet their own needs...</p> <p>Importance of sustainable development: -</p> <p>Economic growth – building a strong, competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and identifying then coordinating development requirements.</p> <p>Environmental protection – contributing to protecting and enhancing our natural and developed environment, while helping to improve biodiversity, use natural resources wisely, minimizing waste and pollution, and adapting to</p>	8 x 1		8
		2		
		5	7	7

V.a	<p>and helping to decrease climate change, including a global shift to low-carbon economy.</p> <p>Social inclusion – supporting strong, vibrant and healthy communities by providing the supply of housing required to meet the needs of present and future generations; and by creating a high-quality of development, with accessible local services that reflect the community’s needs and support its health, social and cultural well-being.</p> <p>Bio magnification: -</p> <p>Which stands for Biological Magnification, which means the increase of contaminated substances or toxic chemicals that take place in the food chains. These substances often arise from intoxicated or contaminated environments. The contaminants include heavy metals namely mercury, arsenic, pesticides such as DDT, and polychlorinated biphenyls (PCBs) compounds which are then taken up by organisms because of the food they consume or the intoxication of their environment</p> <p>Impact on human health: -</p> <p>Humans become more susceptible to cancers, liver and kidney failure, respiratory disorders, birth defects in pregnant women, brain damage, and heart diseases are a result of mercury, cadmium, lead, cobalt, chromium and other chemical poisoning. For instance, diseases like hepatitis and cancer have been attributed to consuming seafood that has been poisoned by mercury and polycyclic aromatic hydrocarbons (PAHs).</p> <p>Destruction of the coral reefs: -</p> <p>The coral reefs are destroyed by cyanide which is used in leaching gold and in fishing.</p> <p>Disruption of the food chain: -</p> <p>Many sea creatures depend on the natural food chain for survival. When chemicals and other toxins are carried into the soils, rivers, lakes or oceans and taken up by various</p>	2		
		2		
		2	8	8
		2		

<p>V.b</p>	<p>organisms, it disrupts the interconnected relationships within the food chain.</p> <p>Pyramid of Numbers:-In this type of ecological pyramid, the number of organisms in each trophic level is considered as a level in the pyramid. The pyramid of numbers is usually upright except for some situations like that of the detritus food chain, where many organisms feed on one dead plant or animal.</p> <p>Pyramid of Biomass:- In this particular type of ecological pyramid, each level takes into account the amount of biomass produced by each trophic level. The pyramid of biomass is also upright except for that observed in oceans where large numbers of zooplanktons depend on a relatively smaller number of phytoplanktons.</p> <p>Pyramid of Energy: -Pyramid of energy is the only type of ecological pyramid, which is always upright as the energy flow in a food chain is always unidirectional. Also, with every increasing trophic level, some energy is lost into the environment.</p>	<p>7</p>	<p>7</p>	<p>7</p>
<p>VI.a</p>	<p>1.Aridity: - It is the common characteristic of all the deserts on the earth. Aridity simply implies the deficiency of moistures or dryness. Desert experience very less rainfall and thus result in aridity.</p> <p>2.Less rainfall/ precipitation: - Less precipitation is one of the major features of deserts and also the reason behind the dryness. The rainfall in deserts is seasonal and occurs only for a limited duration. The annual rainfall that a desert receives every year is just 25-30 centimeters.</p> <p>3.Extreme temperature: - Desert ecosystems experience extreme temperatures during</p>	<p></p>	<p></p>	<p></p>

<p>VI.b</p>	<p>day and night. The days are very hot and the nights can be extremely cold. It is the sole characteristic of all the desert ecosystems either hot or cold all lacks moisture.</p> <p>Velocity of wind:-It tends to be very high in a desert ecosystem. This is the reason deserts experience sandstorms/ dust storms of high intensity resulting in the formation of huge sand dunes.</p> <p>4.Scarcity of water: -</p> <p>Due to less rainfall, there is a shortage of water in a desert ecosystem. Due to the scarcity of water deserts have to face the situation of drought half of the year.</p> <p>5.Humidity: -</p> <p>The humidity level in a desert ecosystem is very low in the daytime and relatively high at night.</p> <p>6.The quality of the soil: -</p> <p>In deserts is very low to grow vegetation. It is dry, rocky, thin, sandy, mainly grey in color and has no organic contents like nitrogen, phosphorus etc which are essential for the growth of plants.</p> <p>Explanation of four characteristics,</p> <p>1. Productive values:Biodiversity produces a number of products harvested from nature and sold in commercial markets. Indirectly it provides economic benefits to people which include water quality soil protection, equalisation of climate, environmental monitoring, scientific research, recreation etc.</p> <p>2. Consumptive value:The consumptive value can be assigned to goods such as fuel woods, leaves, forest products etc. which may be consumed locally and do not figure in national and international market.</p> <p>3. Social value:The loss of biodiversity directly influences the social life of the country possibly through influencing ecosystem functions (energy flow and biogeochemical cycle). This be easily understood by observing detrimental</p>	<p>4 x 2</p>	<p>8</p>	
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VII.a	<p>effects of global warming and acid rain which cause an unfavorable alteration in logical processes.</p> <p>4. Aesthetic value:Aesthetic values such as refreshing fragrance of the flowers, taste of berries, softness of mosses, melodious songs of birds, etc. compel the human beings to preserve them. The earth's natural beauty with its colour and hues, thick forest, and graceful beasts has inspired the human beings from their date of birth to take necessary steps for its maintenance. Similarly botanical and zoological gardens are the means of biodiversity conservation and are of aesthetic values.</p> <p>5. Legal values:Since earth is homeland of all living organisms, all have equal right to coexist on the surface of earth with all benefits. Unless some legal value is attached to biodiversity, it will not be possible to protect the rapid extinction of species.</p> <p>6. Ethical value:Biodiversity must be seen in the light of holding ethical value. Since man is the most intelligent amongst the living organisms, it should be prime responsibility and moral obligation of man to preserve and conserve other organisms which will directly or indirectly favour the existence of the man.</p> <p>7. Ecological value:Biodiversity holds great ecological value because it is indispensable to maintain the ecological balance. Any disturbance in the delicately fabricated ecological balance maintained by different organisms, will lead to severe problems, which may threaten the survival of human beings.</p> <p>Similar points with Explanation,</p> <p>1. Over longer time-scales there is no net heat inflow to Earth since incoming solar energy is re-emitted at exactly the same rate. To maintain Earth's thermal equilibrium, however, there must be a net outflow equal to the geothermal heat flow.</p>	7 x 1		7
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	<ol style="list-style-type: none"> 2. Performed calculations show that the net heat outflow in 1880 was equal to the geothermal heat flow, which is the only natural net heat source on Earth. Since then, heat dissipation from the global use of nonrenewable energy sources has resulted in additional net heating. In, e.g. Sweden, which is a sparsely populated country, this net heating is about three times greater than the geothermal heat flow. 3. Such thermal pollution contributes to global warming until the global temperature has reached a level where this heat is also emitted to space. 4. Heat dissipation from the global use of fossil fuels and nuclear power is the main source of thermal pollution. 1 			
VII.b	<p>Explanation of four points</p> <p>Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse. The different stages to prepare the report includes</p> <ol style="list-style-type: none"> 1. Identification: 2. Screening: 3. Scoping and Consideration of Alternatives: 4. Impact Prediction: 5. Mitigation: 6. Reporting To Decision-Making Body: 7. Public Hearing: 8. Review (EIA Report): 	4 x 2		8
VIII.a	<p>Explanation of EIA with the different stages,</p> <ol style="list-style-type: none"> 1. Introduction of sewage treatment plants to reduce BOD of final product before discharging into sea. 	7		7

	<ol style="list-style-type: none"> 2. Cleaning oil from surface waters and contaminated beaches can be accelerated through the use of chemical dispersants which can be sprayed on the soil 3. Load on top system reduce oil pollution cleaned with high pressure jets of water 4. Crude oil washing: The clingage is removed by jets of crude oil while cargo is being unloaded 			
VIII.b	<p>Explanation of four points,</p> <ol style="list-style-type: none"> 1. Chernobyl (April 26, 1986) <p>Built in the late 1970s about 65 miles north of Kiev in the Ukraine, the Chernobyl plant was one of the largest and oldest nuclear power plants in the world. The explosion and subsequent meltdown that occurred there in April 1986 would claim thousands of lives, cause countless birth defects and unleash a thyroid cancer epidemic on the region. However, it would take years for the full story behind the catastrophe to emerge. A bungled experiment at one of the facility's four reactors created a sudden power surge, which in turn led to a series of blasts that blew the 1,000-ton steel top off of the reactor.</p> <ol style="list-style-type: none"> 2. Kyshtym (September 29, 1957) 3. Three Mile Island (March 28, 1979) 4. Windscale (October 10, 1957) 	4 x 2		8
IX.a	<p>Explanation of any one disaster</p> <p>Pre-disaster Stage: -</p> <ol style="list-style-type: none"> 1. Preparing hazard zonation maps, predictability and warning 2. Preparing disaster preparedness plan 3. Land use zoning 4. Preparedness through IEC 	7		7

	<p>5. Emergency stage</p> <p>6. Instant mobility in air, land</p> <p>7. Instant communication systems</p> <p>Post disaster stage: -</p> <p>1. Rehabilitation and reconstruction</p> <p>2. Political administrative aspect</p> <p>3. Economical aspect</p> <p>4. Environmental impacts</p> <p>Explanation of four points each,</p>			
IX.b	<p>1. National Disaster Management Authority (NDMA)</p> <p>2. State Disaster Management Authorities (SDMAs)</p> <p>3. District Disaster Management Authorities (DDMAs)</p> <p>4. National Disaster Response Force (NDRF) 5. National Institute for Disaster Management (NIDM)</p>	4 x 2		8
X.a	<p>1) Projecting damage scenarios</p> <p>2) Reliable risk analysis</p> <p>3) Planning and execution of any environment friendly development activity</p> <p>4) Mitigation of hazard related miseries</p> <p>Explanation of four points each,</p>			
X.b	<p>1.Preparing for disasters by developing plans and interventions that reduce and mitigate disaster risk,reduce poverty and work towards the sustainable use of natural resources</p> <p>2.Developing systems to identify and analyse hazard risk, climate variability and vulnerability to disaster.</p> <p>3.Raising awareness of the need for reducing disaster risk</p> <p>Explanation of the similar points</p>	7		7
		4 x 2		8



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