Total number of printed pages: 05

UG/4th Semester/UCH401

2023

Environmental Sciences

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Question no 1 is mandatary. Answer any four from the rest.

1.		Choose the correct answer	20 x 1 =20
	A)	Which of the following is a secondary pollutant?	
		(i) Ammonia	
		(ii) Hydrogen Sulfide	
		(iii) Carbon monoxide	
		(iv) PAN	
	B)	The radiation which is trapped by greenhouse gas CO_2	
		(i) Gamma radiation	
		(ii) UV radiation	
		(iii) IR radiation	
		(iv) Microweb radiation	
	C)	Molecule which is responsible for ozone layer destruction	
		(i) CF_2Cl_2	
		(ii) CCl_4	
		(iii) $CHCl_3$	
		(iv) CH_3Cl	
	D)	The main gaseous component of the stratosphere is	
		(i) N_2	
		(ii) O_3	
		(iii) CO_2	
		(iv) He	
	E)	The nature of ecological pyramid in a parasitic food chain is	
		(i) Inverted	
		(ii) Upright	

		(iii) Can be both Inverted and Upright	
		(iv) There is no ecological pyramid in parasitic food chain	
	F)	The earth's albedo is	
		(i) Incoming sun's radiation which fall on Earth's surface	
		(ii) Reflecting I.R. radiation from Earth's surface	
		(iii) Reflecting and absorbed radiation of sun by Earth's atmosphere	
		(iv) Sun's radiation which is absorbed by ozone layer	
	G)	PAN is the main component of	
		(i) Sulfurous smog	
		(ii) Photochemical smog	
		(iii) Acid rain	
		(iv) Volatile Organic Compound	
	H)	Water pollution is mainly due to the presence of	
		(i) Biodegradable materials	
		(ii) Non-biodegradable materials	
		(iii) Algae and fungus formation	
		(iv) Excessive microorganisms	
	I)	The gas which causes many people to die in Bhopal gas tragedy on the year 1984 was	
		(i) Hydrogen cyanide	
		(ii) Methyl isocyanate	
		(iii) Sulphur dioxide	
		(iv) Nitrogen dioxide	
	J)	Pyramid of energy of ecosystem is always upright as the energy of producer level is always	
		(i) Zero	
		(ii) Optimum	
		(iii) Maximum	
		(iv) Minimum	
	K)	Importance of ecosystem lies in	
		(i)Transfer of food	

		(ii) Flow of energy	
		(iii) Cycling of materials	
		(iv) Both (ii) and (iii)	
	L)	The nature of ecological pyramid in parasitic food chain is	
		(i) Can't be predicted	
		(ii) Upright	
		(iii) Inverted	
		(iv) Can be both (ii) and (iii)	
	M)	Identify the cause of eutrophication	
		(i) Increase pathogens	
		(ii) Increase of BOD	
		(iii) Increase algae's productivity	
		(iv) Increase of DO	
	N)	Temporary hardness of water is due to the presence of	
		(i) Cl^-	
		(ii) HCO_3^-	
		(iii) NO_3^-	
		(iv) SO_4^{2-}	
	O)	In COD test the oxidant used is	
		(i) Very weak	
		(ii) Moderate	
		(iii) Very strong	
		(iv) Oxidant is not necessary	
	P)	Incineration is a disposal method of	
		(i) Solid wastes	
		(ii) Air pollutants	
		(iii) Water pollutants	
		(iv) Can be used for all types of pollutants	
	Q)	Trickling filter is classified under	
		(i) Primary treatment	
		(ii) Secondary treatment	

		(iii) Tertiary treatment	
		(iv) Disinfectant	
	R)	"Activated sludge process" is applied for	
		(i) Wastewater treatment	
		(ii) Solid waste treatment	
		(iii) Treatment to reduce noise pollution	
		(iv) Reducing air pollutant in industrial area	
	S)	The value of Earth's albedo is	
		(i) 0.03	
		(ii) 0.3	
		(iii) 0.003	
		(iv) 3	
	T)	Which of the following metal is considered to be very toxic for human biological system	
		(i) Na	
		(ii) Fe	
		(iii) Ca	
		(iv) Hg	
2.	A)	Write short note on mercury pollution	4
	B)	What is the secondary biological treatment of waste water? What are the different methods? Describe "Activated sludge process"	1+3+4
	C)	Describe aerobic and anaerobic oxidation of waste materials	4
	D)	Write short notes on dissolved oxygen (DO) in water.	4
3.	A)	Write down the impacts of "greenhouse effect"	4
	B)	Write short notes on (i) Electrostatic Precipitator (ESP) (ii) Catalytic converter	8
	C)	Which substance is responsible for ozone layer depletion? What are the possible control measures?	4
	D)	Describe sources and biological effects of particulate matters	4
4.	A)	Classify different types of solid wastes and explain.	4
	B)	Write short notes on (any one) (a) Composting (b) Incineration	4
	C)	What is noise pollution? How will you measure noise pollution?	3

	D)	By modeling BOD as 1st order reaction prove that $L_t = L_0 e^{-kt}$ (Symbols have their usual meaning)	4
	E)	What is COD? What are the differences between COD and BOD?	5
5	A)	(i) Describe ecosystem of grassland with flow diagram (ii) Classify biotic components of ecosystem	3 2
	B)	Define (i) Predator food chain (ii) Parasitic food chain (iii) Saprophytic food chain with examples	6
	C)	What is black body? Explain Stephen-Boltzman law and Wein's displacement law.	5
	D)	Consider Earth as a black body with average temperature = 15^{o} C and surface area = 5.1×10^{14} m^2. Find the rate at which energy will be radiated and the wavelength of maximum radiation.	4
6.	A)	Describe the sources and effect of CO	4
	B)	What is sulfurous smog? How does it form? Explain with chemical equations.	4
	C)	Describe how Wien's displacement law can be applied to explain the mechanism of greenhouse effects?	4
	D)	Considering exponential growth theory, deduce expression for the population of earth after time "t". Using the same theory also calculate doubling time of population growth.	3 +2
	E)	Define the term "Environmental Resistance" with mathematical expression	3