

[Time : Three hours]		[Marks: 100]
USMB 302	SET -3	
Please check whether you have received the right question paper		
N.B:	1. All questions carry equal marks 2. Attempt all questions	

Q.1	A.	Define the following:	(05)
		i) Bioaerosols <i>are</i> biological aerosols that is particles released from terrestrial and other ecosystems into the atmosphere. They consist of both living and non-living components including organisms.	
		ii) BOD- It is the amount of dissolved oxygen consumed by microorganisms during the biochemical oxidation of organic matter (carbonaceous) and inorganic (ammonia) matter.	
		iii) Littoral zone The littoral zone is the near shore area of the lake where sunlight penetrates all the way to the sediment and allows aquatic plants (macrophytes) to grow	
		iv) MPN-The most probable number (MPN) is the number of coliform organisms that are most likely to have produced acid and gas due to lactose fermentation in presumptive test	
		v) Phytoedaphon : consists mainly of algae and to a lesser extent the higher plants that are found in soil.	
Q.1	B.	State whether the following statements are true or false:	(05)
		i) Oxygen toxicity is due to dimolecular form of oxygen. False	
		ii) Effluent from primary treatment is taken and mixed with bacterial slurry known as activated sludge in aeration digestion tank. -True	
		iii) Disinfection is not an essential step in water purification. False	
		iv) Soil contains ten times more CO ₂ than air in the atmosphere (True)	
		v) Nitrification is an anaerobic process (False)	
Q.1	C.	Give one example for each of the following:	(05)
		i) Airborne plant pathogens- Puccinia graminis	
		ii) Chemical added to carry out flocculation in water purification. Alum or aluminium sulphate, ferric sulphate, ferric chloride	
		iii) Material used to make septic tank. Concrete, metal or fibre glass	
		iv) Iron oxidiser : Sulfolobus acidophilus, Acidithiobacillus ferrooxidans, leptospirillum ferrooxidans , Acidimicrobium ferrooxidans, Gallionella, Leptothrix, some Purple and green bacteria	
		v) Green house gas: (carbon di oxide, methane, chlorofluorocarbons, nitrous oxide)	

Q.1	D.		Select the most appropriate alternative:	(05)
		i)	The submicroscale transport involves short period of time under 10 minutes and relatively short distances under 100m. (submicroscale , microscale, mesoscale)	
		ii)	The biosolids obtained from various stages of sewage treatment is sludge . (sludge , compost, leachate)	
		iii)	The gas that can be recovered as an energy source during sludge digestion is methane (CO ₂ , methane , hydrogen sulphide)	
		iv)	Trickling filter is a type of Secondary treatment employed in treatment of sewage. (Primary, Secondary , Tertiary)	
		v)	The ratio of carbon to nitrogen to Phosphorus within the soil should range from- 100:10:1 , (10:1:10, 100:10:1, 10:10:1)	
Q.2	A		Answer any two of the following:	(20)
		i)	State the various methods of air sanitation . Discuss any two in details. (salle 661, 662, 663)	
		ii)	Explain stepwise microbiological analysis of drinking water to detect coliforms. (Salle 697, 698, Frobisher 709, Prescottt 1054, 1055)	
		iii)	Discuss---"Nucleic acid based methods for studying soil micro-organisms" Subba Rao Page 75 to 78)	
Q.3	A.		Answer any three of the following:	(18)
		i)	What is AMB pathway? Explain deposition of bioaerosols in detail. (Maier 87,89,90,91,Raina Maier 3rd editin pg 95, 98,99)	
		ii)	Explain intramural and extramural aeromicrobiology. State the environments that are included in them . (Maier 92,95 Raina Maier 3rd edition pg 107 ,111 and names only.)	
		iii)	Discuss air samplers based on electrostatic and thermal precipitation. (salle 657, 658)	
		iv)	Give an account of Lemon sampler and Anderson sampler. (salle 652, 654 . Maier 150, Raina Maier 3rd edt pg 104)	
		v)	Write a brief note on air centrifugal samplers. (salle 656, 657 . Maier 152, 153 , Raina Maier 3rd edition pg 104, 105)	
		vi)	Justify : Survival of microorganisms in air is influenced by many factors. (Maier 91,92 ,Raina Maier 3rd edt pg 106, 107)	
Q.3	B.		Do as directed:	(02)
		i)	List the names of bioaerosols according to their sizes. (Maier Pg 87 ,Raina Maier 3rd edt pg 93)	

		ii)	List any two air samplers employing liquid impingement techniques. (AGI -30, Lemon sampler)	
Q.4	A.		Answer any three of the following:	(18)
		i)	What are the different types of lakes with respect to its nutrient content ? (Maier 112-114, Raina Maier 3 rd edt pg 132 to 135)	
		ii)	What is composting ? List the different types of composting and their advantages. (Maier Pg 522,523 ,Raina Maier 3 rd edt pg 530 -532)	
		iii)	Write a brief note on oxidation ponds. (Maier 513, 515, Raina Maier 3 rd edt, pg 520)	
		iv)	Schematically explain a typical modern wastewater treatment plant. (Maier 507, Raina Maier 3 rd edt pg 508)	
		v)	Write a short note on the slow sand filter and rapid sand filter in water purification. (Frobisher)	
		vi)	Discuss processes to significantly reduce pathogens during sewage treatment. (Maier 511,512, Raina Maier 3 rd edt pg 518)	
Q.4	B.		Do as directed:	(02)
		i)	What is P- A test? The present absent test detects whether the target organism is present in a sample or not.	
		ii)	What are bogs?(Frobisher)	
Q.5	A.		Answer any three of the following:	(18)
		i)	"Bacteria and fungi are a very important part of the soil Microbiota"--- Justify (Kolzwan Pg 12)	
		ii)	How would you study soil respiration by the Warburg's Manometric technique? (Subba Rao Pg 74)	
		iii)	Diagrammatically represent the Phosphorous cycle. (Subba Rao Pg 295)	
		iv)	Discuss briefly the decomposition of cellulose and lignin. (Kolzwan pg 22 or Maier Pg 292, 294 and 295)	
		v)	Explain the process of Nitrogen fixation.(Maier pg 303)	
		vi)	"The division of bioremediation methods may be done depending on the level of environmental oxygenation as well as the location of the cleaning process".- - - Justify (Kolzwan Pg 32)	
Q.5	B.		Do as directed:	(02)
		i)	Give one advantage of immunological methods used to study soil micro-organisms. (They are very specific and very sensitive)	
		ii)	What is sulphur mineralization? (The release of Sulphur from organic forms)	