



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	INDUSTRIAL WASTE WATER TREATMENT
Course Code	:	ACE526
Program	:	B.Tech
Semester	:	VI
Branch	:	CivilEngineering
Section	:	A & B
Course Faculty	:	Ch. Bala Krishna, Assistant Professor

OBJECTIVES:

I	Enrich the knowledge on sources and characteristics of industrial wastewater.
II	Discuss the different methods of waste water treatment such as de-nitrification, membrane separation, air stripping, etc.
III	Understand the characteristics and composition of wastewater generated from industrial processes.
IV	Design and operate effluent treatment plants for joint treatment of raw industrial wastewater and domestic sewerage.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
UNIT-I						
1	What does industrial wastewater contain?	Activated sludge is a biochemical process for treating sewage and industrial wastewater that uses air (or oxygen) and microorganisms to biologically oxidize organic pollutants, producing a waste sludge (or floc) containing the oxidized material.	Remember	CO 1	CLO 1	ACE526.01
2	What causes Industrial waste?	Inefficient Waste Disposal: Water pollution and soil pollution are often caused directly due to inefficiency in disposal of waste. Long term exposure to polluted air and water causes chronic health problems, making the issue of industrial pollution into a severe one.	Understand	CO 1	CLO 1	ACE526.01
3	What are the harmful effects of sewage?	The resulting water pollution causes the quality of the water to deteriorate and affects aquatic ecosystems. Pollutants can also seep down and effect groundwater deposits. Sewage and industrial wastes are discharged into the rivers. Because of this,	Remember	CO 1	CLO 1	ACE526.01

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		pollutants enter groundwater, rivers, and other water bodies				
4	How does effluent affect the environment?	Wastes are generated from the machining process in the form of effluent waste, solid waste, atmospheric emission, and energy emission. These wastes, if not recycled or treated properly before disposal, will have a detrimental impact on the environment through air, water, and soil pollution.	Understand	CO 1	CLO 2	ACE526.02
5	What is septic sludge?	Septage or "septic tank sludge" is partially treated sludge that is accumulated and stored in a septic tank or similar onsite sewage facility. Septage is a by-product from the pretreatment of household wastewater (sewage) in a septic tank. Septic tanks are receiving blackwater from flush toilets, as well as greywater.	Understand	CO 1	CLO 2	ACE526.02
6	What is Sewers system?	Sewer is a large underground channel that carries waste matter and rain water away, usually to a place where it is treated and made harmless.	Understand	CO 1	CLO 2	ACE526.02
7	How do you treat sludge?	In sludge thickening, the dry solids (DS) content of sludge is increased by reducing the water content with low energy input. Sludge thickening can be applied both as a pre-treatment for digestion as well as a pre-treatment for dewatering in waste water treatment plants that operate without digestion.	Remember	CO 1	CLO 2	ACE526.02
8	Define Sullage.	Sullage is a term used to indicate the waste water from bath rooms, kitchens, washing places and wash basins etc. it does not create bad smell since organic matter in it is either absent or is of negligible amount.	Understand	CO 1	CLO 3	ACE526.03
9	What do you mean by Night soil?	It is a term used to indicate the human and animal excreta.	Understand	CO 1	CLO 3	ACE526.03
10	Define the term Sewerage	Sewerage means the structure, device, equipment and appurtenances intended for the collection, transportation and pumping of sewage and liquid waste but excluding works for the treatment of sewage	Remember	CO 1	CLO 3	ACE526.03
11	Define the term Sludge.	Sludge is a semi-solid slurry and can be produced as sewage sludge from wastewater treatment processes or as a settled suspension obtained from conventional drinking water treatment and numerous other industrial processes. The term is also sometimes used as a generic term for solids separated from suspension in a liquid.	Remember	CO 1	CLO 3	ACE526.03

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
12	Define the term Turbidity.	The turbidity of waste water depends on the quantity of solid matters present in the suspension state. Turbidity is a measure of light-emitting properties of waste water, and turbidity test is used to indicate the quality of waste discharge with respect or waste water.	Understand	CO 1	CLO 4	ACE526.04
13	How do water bodies get contaminated by the effluents from industries?	Surface water is usually rain water that collects in surface water bodies, like oceans, lakes, or streams. Surface water can become contaminated in many ways, one of which is direct recharge can come from industries sources photosynthesis.	Understand	CO 1	CLO 4	ACE526.04
14	What is pH in influent water?	A measure of acidity or alkalinity of water soluble substances (pH stands for 'potential of Hydrogen'). A pH value is a number from 1 to 14, with 7 as the middle (neutral) point. Values below 7 indicate acidity which increases as the number decreases, 1 being the most acidic.	Understand	CO 1	CLO 4	ACE526.04
15	Define the term Theoretical oxygen demand.	Theoretical oxygen demand (ThOD) is the calculated amount of oxygen required to oxidize a compound to its final oxidation products	Understand	CO 1	CLO 4	ACE526.04
UNIT-II						
1	What is Grit Chamber?	Usually in municipal wastewater treatment, a chamber or tank in which primary influent is slowed down so heavy typically inorganic solids can drop out, such as metals and plastics.	Understand	CO 2	CLO 5	ACE526.05
2	What is Specific Conductivity in waste water?	The total amount of dissolved salts present in water can be easily estimated by measuring the specific conductivity of water.	Understand	CO 2	CLO 5	ACE526.05
3	Define the term Sludge digestion.	Sludge digestion is a biological process in which organic solids are decomposed into stable substances. Digestion reduces the total mass of solids, destroys pathogens, and makes it easier to dewater or dry the sludge	Remember	CO 2	CLO 5	ACE526.05
4	What is Physical Characteristics of Water?	Physical characteristics of water (temperature, colour, taste, odour and etc.) are determined by senses of touch, sight, smell and taste.	Understand	CO 2	CLO 6	ACE526.06
5	What are Inorganic Minerals in waste water?	Runoff causes erosion and weathering of geological formation, rocks and soils as the runoff travels to the surface-water bodies. During this period of contact with rocks and soils the water dissolves inorganic minerals, which enter the natural waters.	Understand	CO 2	CLO 6	ACE526.06
6	What is Carbonate Equilibrium in wastewater?	The carbonate - bicarbonate system is presumably the most important chemical system in natural waters. The carbonate system provides the	Understand	CO 2	CLO 7	ACE526.07

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		buffering capacity essential for maintaining the pH of natural water systems in the range required by bacteria and other aquatic species.				
7	What is Alkalinity?	Alkalinity is defined as the capacity of natural water to neutralize acid added to it. Total alkalinity is the amount of acid required to reach a specific pH (pH = 4,3 to 4,8).	Remember	CO 2	CLO 7	ACE526.07
8	Define the term Neutralization.	A neutralization reaction is when an acid and a base react to form water and a salt and involves the combination of H ⁺ ions and OH ⁻ ions to generate water. The neutralization of a strong acid and strong base has a pH equal to 7.	Remember	CO 2	CLO 8	ACE526.08
9	What is Sodium Adsorption Ratio?	The Sodium Adsorption Ratio (SAR) is used to evaluate the hazard in irrigation waters caused by sodium (Na ⁺). The SAR relates the concentration of sodium ions to the concentration of magnesium (Mg ²⁺) and calcium (Ca ²⁺) ions.	Understand	CO 2	CLO 8	ACE526.08
10	What are Organic Materials?	Organic chemicals are made up of carbon (C), hydrogen (H), as well as nitrogen (N) and oxygen (O). Organic compounds are derived from living organism as well as industrial sources	Understand	CO 2	CLO 8	ACE526.08
11	What is Facultative bacteria?	The Bacteria which can survive with or without free oxygen.	Remember	CO 2	CLO 9	ACE526.09
12	What does tertiary treatment remove and why is it important?	Tertiary treatment is the final cleaning process that improves wastewater quality before it is reused, recycled or discharged to the environment. The treatment removes remaining inorganic compounds, and substances, such as the nitrogen and phosphorus.	Remember	CO 2	CLO 9	ACE526.09
13	What is sedimentation process?	Sedimentation is a physical water treatment process using gravity to remove suspended solids from water. Solid particles entrained by the turbulence of moving water may be removed naturally by sedimentation in the still water of lakes and oceans.	Remember	CO 2	CLO 9	ACE526.09
13	Define the Dissolved air flotation process.	Dissolved air flotation (DAF) is a water treatment process that clarifies wastewaters (or other waters) by the removal of suspended matter such as oil or solids	Understand	CO 2	CLO 10	ACE526.10
14	What is vacuum flotation process?	A vacuum is then applied to the flotation tank to produce small bubbles. This process has been used in the paper industry to recover the process water. Because of the expensive equipment required to maintain the vacuum, the flotation process has been replaced by pressurized flotation.	Remember	CO 2	CLO 10	ACE526.10

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15	Define the term strength reduction.	In reducing the strength of wastes through process changes, the sanitary engineer is concerned with wastes that are most troublesome from a pollution standpoint.	Remember	CO 2	CLO 10	ACE526.10
UNIT-III						
1	What is clarification process?	Clarifiers consist of tanks or basins which hold water or wastewater for a period sufficient to allow the floc and other suspended materials to settle to the bottom. The clarification process makes the water clear by removing all kinds of particles, sediments, oil, natural organic matter and color.	Understand	CO 3	CLO 11	ACE526.11
2	Define the term Reduction process?	Reduction is gain of electrons and thus gaining of negative charge. The atom that acquired electrons is said to be reduced.	Understand	CO 3	CLO 11	ACE526.11
2	How is Nitrification performed by bacteria?	Nitrification is an aerobic process performed by small groups of autotrophic bacteria and archaea. This process was discovered by the Russian microbiologist Sergei Winogradsky.	Remember	CO 3	CLO 11	ACE526.11
3	What is conventional water treatment?	What is conventional water treatment? Conventional treatment consists of the following unit processes: coagulation, flocculation, clarification, and filtration, and is typically followed by disinfection at full-scale.	Remember	CO 3	CLO 12	ACE526.12
4	What is Enhanced biological phosphorus removal (EBPR) process?	Enhanced biological phosphorus removal (EBPR) is a sewage treatment configuration applied to activated sludge systems for the removal of phosphate. The common element in EBPR implementations is the presence of an anaerobic tank (nitrate and oxygen are absent) prior to the aeration tank.	Remember	CO 3	CLO 12	ACE526.12
5	What is High Rate Filtration Process?	In this technique, cationic polymer coagulant is added to sewage influent, which is then fed to an upward stream filter basin. In the basin SS and other suspended organic substances are captured by floating filter media (specific gravity: 0.9) and removed.	Understand	CO 3	CLO 12	ACE526.12
6	What is a humus tank?	Humus tank is a settling tank used to clarify effluent by the removal of humus solids that have been washed off filter media.	Remember	CO 3	CLO 13	ACE526.13
7	What is Diffused Aeration Process?	Aeration is used extensively for the biological (biochemical) oxidation of both domestic and industrial organic wastes. In wastewater treatment, the function of aeration is to introduce air into the water through the most effective and least costly methods that	Remember	CO 3	CLO 13	ACE526.13

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		will increase oxygen transfer (dissolved oxygen) in the wastewater.				
8	What is Waste water stabilization pond?	Wastewater Stabilization Ponds (WSPs) are large, man-made water bodies in which blackwater, greywater or faecal sludge are treated by natural occurring processes and the influence of solar light, wind, microorganisms and algae .	Understand	CO 3	CLO 13	ACE526.13
8	Why do some wastewater treatment facilities thicken the sludge?	Sludge thickening is important because it is the process used in wastewater treatment centers to increase the solids concentration and decrease the free water. This step minimizes the load on the downstream processes, such as sludge dewatering and digestion	Understand	CO 3	CLO 13	ACE526.13
9	What causes sludge bulking?	Sludge bulking occurs when the sludge fails to separate out in the sedimentation tanks. The main cause of sludge bulking is the growth of filamentous bacteria. Filamentous microorganisms grow in long strands that have much greater volume and surface area than conventional floc and are very slow to settle.	Understand	CO 3	CLO 14	ACE526.14
10	Define Imhoff tank.	The Imhoff tank, named for German engineer Karl Imhoff (1876–1965), is a chamber suitable for the reception and processing of sewage. It may be used for the clarification of sewage by simple settling and sedimentation, along with anaerobic digestion of the extracted sludge.	Remember	CO 3	CLO 14	ACE526.14
11	What is Rotating biological contactor?	Rotating Biological Contactors. Rotating biological contactors (RBC), also called rotating biological filters, are fixed-bed reactors consisting of stacks of rotating disks mounted on a horizontal shaft. They are partially submerged and rotated as wastewater flows through.	Remember	CO 3	CLO 14	ACE526.14
12	Define the term Leaching Cesspool.	Cesspools (or leaching pools) are pits into which concrete, brick or cement block walls have been placed. Wastewater flows into the cesspool and drains or “percolates” into the soil through perforated walls.	Understand	CO 3	CLO 14	ACE526.14
13	What Ammonia stripping process?	The ammonia stripping process is based on the principle of mass transfer. It is a process, by which wastewater is contacted with air to strip the ammonia gas present in the wastewater.	Remember	CO 3	CLO 15	ACE526.15
14	What is Diatomaceous earth filter?	Diatomaceous earth consists of fossilized remains of diatoms, a type of hard-shelled protist (chrysophytes). It is used as a filtration aid, mild abrasive in products including metal polishes and toothpaste, mechanical insecticide, absorbent for liquids,	Understand	CO 3	CLO 15	ACE526.15

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15	What do you mean by Intermittent Sand Filter?	Filters are used when the soil is too shallow or too permeable and the effluent requires treatment prior to surface or subsurface discharge. Typically effluent is pre-treated in a septic tank and then flows, or is pumped over a bed of sand under which is a drainpipe collection system.	Understand	CO 3	CLO 15	ACE526.15
UNIT-IV						
1	What is putrefaction of water?	Decomposition of organic matter, especially protein, by microorganisms, resulting in production of foul-smelling matter.	Understand	CO 4	CLO 16	ACE526.16
2	What is massecuite?	In sugar industry the partially crystallized syrup from the vacuum pan known as 'massecuite' is then transferred for complete crystallization of sugar.	Understand	CO 4	CLO 16	ACE526.16
3	Define the term Water stabilization pond.	Waste stabilization ponds (WSPs or wastewater stabilization lagoons) are ponds designed and built for waste water treatment to reduce the organic content and remove pathogens from wastewater.	Understand	CO 4	CLO 16	ACE526.16
4	What is a Blast furnace?	Blast furnace is a basic unit in an integrated steel plant. It consists of charging iron ore and coke as fuel. Pig iron is the metallic product of this unit.	Understand	CO 4	CLO 17	ACE526.17
5	Define steel ingots.	Steel ingots are produced due to the oxidation of unwanted impurities in pig iron.	Understand	CO 4	CLO 17	ACE526.17
6	What are the raw materials used in an integrated steel plant.	The principal raw materials for an integrated mill are iron ore, limestone, and coal (or coke). These materials are charged in batches into a blast furnace where the iron compounds in the ore give up excess oxygen and become liquid iron.	Understand	CO 4	CLO 17	ACE526.17
7	What is clariflocculator.	Clariflocculator is a combination of flocculation and clarification in a single tank. It has two concentric tanks where inner tank serves as a flocculation basin and the outer tank serves as a clarifier.	Understand	CO 4	CLO 18	ACE526.18
8	Define the term petrochemicals.	The chemicals derived from petroleum are often referred to as petrochemicals.	Understand	CO 4	CLO 18	ACE526.18
9	What are the various methods used for recovery of petroleum?	Stripping, scrubbing, adsorption and distillation.	Understand	CO 4	CLO 18	ACE526.18
10	What is clarigester?	The anaerobic clarigester is a form of anaerobic digester. A clarigester treats dilute biodegradable feedstocks and separates out solid and hydraulic (liquid) retention times.	Understand	CO 4	CLO 18	ACE526.18

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11	What is degerminating?	Degermed white corn meal, is the food prepared by grinding cleaned white corn and removing bran and germ	Understand	CO 4	CLO 18	ACE526.18
12	What is mean by deodorization?	Deodorization is actually a stripping process in which a given amount of a stripping agent (usually steam) is passed for a given period of time through hot oil at a low pressure. Hence, it is mainly a physical process in which various volatile components are removed	Understand	CO 4	CLO 19	ACE526.19
13	What are the various methods used for colour removal from waste water?	The following methods are used for colour removal and they are sorption system, precipitation systems, membrane systems, oxidation systems.	Remember	CO 4	CLO 19	ACE526.19
14	What are various chemicals used for treating textile waste water?	Sodium Hydrosulphite, Thioureadioxide, sodium borohydrade, sodium formaldehyde, and stannous chloride.	Remember	CO 4	CLO 19	ACE526.19
15	What are the various types of environmental audits?	Waste audit, Energy Audit, Health and safety audit, compliance audit, Management audit, Property transfer audit.	Remember	CO 4	CLO 19	ACE526.19
UNIT-V						
1	What are soaking pits?	A soak pit, also known as a soakaway or leach pit, is a covered, porous-walled chamber that allows water to slowly soak into the ground	Remember	CO 5	CLO 20	ACE526.20
2	What is tanning of leather?	Tanning is the process of treating skins and hides of animals to produce leather. Tanning hide into leather involves a process which permanently alters the protein structure of skin, making it more durable and less susceptible to decomposition, and also possibly coloring it.	Understand	CO 5	CLO 20	ACE526.20
3	What is deliming?	The deliming operation in leather processing is a drum/paddle or pit based operation where two main objectives are met. Removal of alkali from the pelt and the consequent deswelling of the fibres. Lowering of the liquor pH to the values used in the bating process.	Remember	CO 5	CLO 20	ACE526.20
4	What is black liquor?	black liquor is the waste product from the kraft process when digesting pulpwood into paper pulp removing lignin, hemicelluloses and other extractives from the wood to free the cellulose fibers	Understand	CO 5	CLO 21	ACE526.21
5	What is green liquor?	Green liquor is the dissolved smelt of sodium carbonate, sodium sulfide and other compounds from the recovery boiler in the kraft process	Understand	CO 5	CLO 21	ACE526.21
6	What is Membrane	Membrane system is adopted for treating pulp mill waste water for	Remember	CO 5	CLO 21	ACE526.21

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	system?	colour removal but membrane fouling is reported.				
7	What is volume reduction?	Solid waste volume reduction. Solid waste volume reduction can take place at several points in the waste management process. Precycling on the part of consumers is the best initial activity to reduce the volume of solid waste.	Remember	CO 5	CLO 22	ACE526.22
8	What do you mean by strength reduction?	Waste strength reduction is the second major objective for an industrial plant concerned with waste treatment. Any effort to find means of reducing the total pounds of polluting matter in industrial wastes will be well rewarded by the savings earned by reduced requirements for waste treatment.	Understand	CO 5	CLO 22	ACE526.22
9	What is by product recovery?	Product Recovery is the high utilization (or yield) of products or ingredients substantially eliminating waste - and thereby increasing profits - that would otherwise remain in suction or discharge process lines during changeovers, or at the end of production runs.	Remember	CO 5	CLO 22	ACE526.22
10	What is physico-chemical wastewater treatment?	Physico chemical treatment involves using chemicals which can modify physical state of colloidal particles which helps in making them more stable and coagulable for further treatment or filtration purposes.	Understand	CO 5	CLO 22	ACE526.22
11	What is Adsorption by Activated carbon in wastewater treatment?	Activated carbon filtration is a commonly used technology based on the adsorption of contaminants onto the surface of a filter. This method is effective in removing certain organics (such as unwanted taste and odours, micropollutants), chlorine, fluorine or radon from drinking water or wastewater.	Remember	CO 5	CLO 23	ACE526.23
12	Define the term clarigester.	The anaerobic clarigester is a form of anaerobic digester. It is regarded as being the ancestor of the upflow anaerobic sludge blanket digestion (UASB) anaerobic digester	Understand	CO 5	CLO 23	ACE526.23
13	What is prime lake pollutant?	Phosphorous is a prime lake pollutant that promotes the algal bloom and destroys the quality and appearance of a lake.	Remember	CO 5	CLO 23	ACE526.23
14	Which industry produced Sulfur dioxide and flu ash?	Thermal industries produced sulfur dioxide and flu ash	Remember	CO 5	CLO 23	ACE526.23

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15	Which of the following is called as contact bed?	Contact filters are water tight tanks which are used for the aerobic treatment of sewage. They are also called as contact bed.	Understand	CO 5	CLO 23	ACE526.23

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