

Hall Ticket No

Question Paper Code: ACE015



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-1

B.Tech VII Semester End Examinations, November - 2019

Regulations: R16

ENVIRONMENTAL ENGINEERING

CIVIL ENGINEERING

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT-I

1. a) What are the various purposes for which provision should be made in the average daily per capita demand of water in a water supply scheme? Explain. [7M]
b) The population of a locality as obtained from census report is as follows : [7M]
Census year 2011 2001 1991 981 1971
Population 2,76,000 4,12,000 9,40,000 15,06,000 15,69,000
Estimate the population of the locality in the year 2021 by using Incremental method.
2. a) What are the common impurities mostly found in natural water? Explain their effect on the quality of water. [7M]
b) What is the main process involved in Plain Sedimentation? Design the sedimentation tank of a water works to treat 12×10^6 litres of water per day. Assume the velocity of flow in the sedimentation tank as 20 cm/min and the detention period of 11 hours. [7M]

UNIT-II

3. a) With the help of a neat sketch describe a Pressure Filter. [7M]
b) A private estate uses a Pressure filter to treat 500 cu.m./day of turbid water. If filter operates from 04.00 pm to 08.00 am every day, find the size of pressure filter. Also find the approximate HP of the pump that supplies water to pressure filter under pressure. [7M]

4. a) Differentiate between temporary and permanent hardness. Mention any three methods of softening of water. [7M]
b) What are the requirements of a good distribution system? Describe in brief various types of distribution systems? [7M]

UNIT-III

5. a) Explain the process of Sedimentation in the treatment of water. Discuss the difference between Plain Sedimentation and Coagulation. [7M]
b) Explain the theory of Filtration as used in the purification of water. Sketch and describe an outlet for a Slow Sand Filter [7M]
6. a) What do you understand by the term „disinfection of water“? What should be the requirements of good disinfectant? [7M]
b) What do you understand “Hardness of water”? What trouble it may create if not removed? [7M]

UNIT-IV

7. a) Write a note on the layout of distribution systems which are commonly used in India. [7M]
b) Write a note on various types of elevated reservoirs commonly used in water distribution system. [7M]
8. a) Write short notes on Sluice valve and Pressure-relief valve. [7M]
b) Explain the working principle of sludge digestion tank. [7M]

UNIT- V

9. a) Explain the principle of oxidation ponds ? [7M]
b) Discuss in brief various design parameters used for settling tanks? [7M]
10. a) Explain the function of a soak pit with a neat sketch. [7M]
b) Why dewatering of sludge is necessary? Explain the method of dewatering the sludge on sludge drying beds.. [7M]



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COURSE OBJECTIVES:

The course should enable the students to:

I	Outline the different sources of water and its per capita demand.
II	Describe the basic characteristics of water and study the procedure for determination
III	Design the water supply lines, water collection and different distribution networks.
IV	Construct and design waste water treatment units such as oxidation ponds, sludge digestion tanks, soak pits etc.

COURSE OUTCOMES (COs):

CO 1	Describe population forecasts, design period, water demand, types of demand, factors affecting fluctuations, fire demand, storage capacity, water quality and testing. Drinking water standards
CO 2	Determine Layout and general outline of water treatment units, sedimentation, uniform settling velocity, principles, design factors, surface loading, jar test, optimum dosage of coagulant, coagulation, flocculation, clarifier design, coagulants, and feeding arrangements. filtration
CO 3	Understand Conservancy and water carriage systems, sewage and storm water estimation, type of concentration, storm water over flows combined flow characteristics of sewage, cycles of decay, decomposition of sewage, examination of sewage.
CO 4	Explore Lay out and general outline of various units in a waste water treatment plant, primary treatment design of screens, grit chambers, skimming tanks-sedimentation tanks-principles and design of biological treatment, trickling filters, standard and high rate..
CO 5	Construction and design of oxidation ponds, sludge digestion tanks, factors effecting, design of digestion tank, sludge disposal by drying, septic tanks working principles and design-soak pits. Ultimate disposal of waste water, self-purification of rivers, sewage farming.

COURSE LEARNING OUTCOMES (CLOs):

ACE015.01	Understand the concept and importance of Protected water supply..
ACE015.02	Estimate the Population for the design period by using different forecasting methods.
ACE015.03	Calculate and Understand the water demand, types of demand, factors affecting fluctuations.
ACE015.04	Calculate the fire demand, storage capacity, water quality and its testing.
ACE015.05	Understand the concept of Drinking water standards. Comparison from quality and quantity and other considerations..
ACE015.06	Understand the intakes, infiltration galleries, confined and unconfined aquifers.
ACE015.07	Understand the, distribution systems, requirements, methods and different layouts
ACE015.08	Understand the Layout and general outline of water treatment system

ACE015.09	Explain sedimentation, uniform settling velocity principles, design factors, surface loading
ACE015.10	Understand jar test, optimum dosage of coagulant, coagulation, flocculation, clarifier design, coagulants, and feeding arrangements.
ACE015.11	Evaluate Filtration theory, working of slow and rapid gravity filters, multimedia filters, design of filters, troubles in operation comparison of filters,.
ACE015.12	Understand disinfection, types of disinfection, theory of chlorination chlorine demand and other disinfection.
ACE015.13	Different treatment methods. distribution systems, types of layouts of distribution systems, design of distribution systems
ACE015.14	Analyze Hardy Cross and equivalent pipe methods
ACE015.15	Understand service reservoirs, joints, valves such as sluice valves, air valves, scour valves and check valves water meters, laying and testing of pipe lines, pump house.
ACE015.16	Explain Conservancy and water carriage systems, sewage and storm water estimation.
ACE015.17	Understand type of concentration , storm water over flows combined flow.
ACE015.18	Understand characteristics of sewage, cycles of decay, decomposition of sewage, examination of sewage, .B.O.D. and C.O.D. equations
ACE015.19	Analyze the design of sewers, shapes and materials, sewer appurtenances manhole, inverted siphon, catch basins, flushing tanks, ejectors, pumps and pump houses, house drainage.
ACE015.20	Understand different components requirements, sanitary fittings, traps, one pipe and two pipe systems of plumbing, ultimate disposal of sewage, sewage farming, and dilution.
ACE015.21	Understand and analyze Lay out and general outline of various units in a waste water treatment plant, primary treatment design of screens, grit chambers, skimming tanks- sedimentation tanks-principles.
ACE015.22	Evaluate the design of biological treatment, trickling filters, standard and high rate.
ACE015.23	Understand the septic tanks working principles and design-soak pits. Ultimate disposal of waste water, self-purification of rivers, sewage farming
ACE015.24	Understand the septic tanks working principles and design-soak pits. Ultimate disposal of waste water, self-purification of rivers, sewage farming

MAPPING OF SEMESTER END EXAMINATION - COURSE OUTCOMES

SEE Question No		Course Learning Outcomes	Course Outcomes	Blooms Taxonomy Level
1	a	ACE015.01 Understand the Layout and general outline of water treatment system	CO 1	Understand
	b	ACE015.02 Estimate the Population for the design period by using different forecasting methods	CO 1	Remember
2	a	ACE015.03 Calculate and Understand the water demand, types of demand, factors affecting fluctuations	CO 1	Understand
	b	ACE015.04 Calculate the fire demand, storage capacity, water quality and its testing	CO 1	Remember
3	a	ACE015.05 Understand the concept of Drinking water standards. Comparison from quality and quantity and other considerations..	CO 2	Understand
	b	ACE015.06 Understand the intakes, infiltration galleries, confined and unconfined aquifers.	CO 2	Remember

4	a	ACE015.07	Understand the, distribution systems, requirements, methods and different layouts	CO 2	Understand
	b	ACE015.08	Understand the Layout and general outline of water treatment system	CO 2	Remember
5	a	ACE015.09	Explain sedimentation, uniform settling velocity principles, design factors, surface loading	CO 3	Understand
	b	ACE015.10	Understand jar test, optimum dosage of coagulant, coagulation, flocculation, clarifier design, coagulants, and feeding arrangements.	CO 3	Remember
6	a	ACE015.11	Evaluate Filtration theory, working of slow and rapid gravity filters, multimedia filters, design of filters, troubles in operation comparison of filters,.	CO 3	Understand
	b	ACE015.12	Understand disinfection, types of disinfection, theory of chlorination chlorine demand and other disinfection.	CO 3	Remember
7	a	ACE015.13	Different treatment methods. distribution systems, types of layouts of distribution systems, design of distribution systems	CO 4	Understand
	b	ACE015.14	Analyze Hardy Cross and equivalent pipe methods	CO 4	Remember
8	a	ACE015.15	Understand service reservoirs, joints, valves such as sluice valves, air valves, scour valves and check valves water meters, laying and testing of pipe lines, pump house.	CO 4	Understand
	b	ACE015.16	Explain Conservancy and water carriage systems, sewage and storm water estimation.	CO 4	Remember
9	a	ACE015.17	Understand type of concentration, storm water over flows combined flow.	CO 5	Understand
	b	ACE015.18	Understand characteristics of sewage, cycles of decay, decomposition of sewage, examination of sewage, .B.O.D. and C.O.D. equations	CO 5	Remember
10	a	ACE015.19	Analyze the design of sewers, shapes and materials, sewer appurtenances manhole, inverted siphon, catch basins, flushing tanks, ejectors, pumps and pump houses, house drainage.	CO 5	Understand
	b	ACE015.21	Understand the septic tanks working principles and design-soak pits. Ultimate disposal of waste water, self-purification of rivers, sewage farming	CO 5	Remember

Signature of Course Coordinator

HOD, CE