**17CE3201 – ENVIRONMENTAL ENGINEERING-I**

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| **Course Category**  | Professional Core | **Credits**  | 4 |
| **Course Type**  | Theory | **Lecture - Tutorial - Practical**  | 3 - 2 - 0 |
| **Prerequisite**  | None | **Sessional Evaluation** | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks**  | 100 |

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| **Course Objectives** | 1. To understand about the water demand, design period depending upon population forecasting, different water sources, and intake works for collection.
2. To understand about the characteristics of water and different units in conventional treatment plant.
3. To understand about the suitability of different types of filters depends upon the characteristics of water
4. To understand about the suitability of disinfection depending upon the quantity of organic matter and type of bacteria.
5. To understand about the treatment of salt water and waste water by using advanced treatment methods.
6. To understand about the different types of water distribution networks, pipe networks depending upon the locality.
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| **Course Outcomes** | CO1 | Identify the sources of water and intake works for collection. Be able to forecast and calculate water demand. |
| CO2 | Determine the water quality and understand the conventional methods of water treatment. |
| CO3 | Understand the concepts of filtration. |
| CO4 | Understand the concepts of disinfection. |
| CO5 | Apply the advanced water treatment methods. |
| CO6 | Understand the various methods of conveyance and distribution of water. Be able to design pipe-networks by hardy-cross method. Understand various joints, valves and house service connections. |
| **Course Content** | **UNIT – I****SOURCES, DEMAND AND COLLECTION OF WATER:** Sources of water – Source Selection – Water demand – Types – Factors affecting water demand – Fluctuations in water demand – Design period – Population forecasting methods and their suitability – Intake structures – Site selection. **UNIT – II****WATER QUALITY:** Need for protected water supply –Water quality – Characterization – Water quality standards – Water-borne diseases.**CONVENTIONAL TREATMENT OF WATER:** General outline of conventional water treatment units and their functions – Theory of aeration – Aeration methods –Principles and design of sedimentation – Coagulation, flocculation and clarification. **UNIT – III****FILTRATION:** Theory of filtration – Types of filters – Working and design of slow and rapid sand filters – Operational troubles in filters. **UNIT – IV****DISINFECTION:** Disinfection–Types of disinfectants – Theory of chlorination – Types of chlorination – Forms of application – Break point chlorination.**UNIT – V****ADVANCED TREATMENT METHODS:** Removal of salinity – Adsorption technique – Removal of arsenic–Ion exchange process – Removal of hardness – Chemical oxidation and precipitation – Removal of Iron, manganese and fluorides – Membrane process.**UNIT – VI****CONVEYANCE SYSTEM:** Systems of conveyance of water – Pipe materials Hydraulics of flow in pipes.**WATER DISTRIBUTION:** Requirements of water distribution–Components–Service reservoirs– Layout of distribution networks–Design of pipe networks–Hardy cross and equivalent pipe method–Pipe joints–Valves–House service connections. |
| **Textbooks****and****References** | **TEXTBOOKS:**1. Water Supply Engineering by S.K. Garg. 2. Water Supply and Sanitary Engineering G. S. Birdie & J. S. Birdie 3. Water Supply Engineering by B.C.Punmia. **REFERENCE BOOKS:** 1. Environmental Engineering I Water Supply Engineering by Modi. P. N 2. Water Treatment Principles and Design by James M. Montgomery. 3. Environmental Engineering by H.S. Peavy et al., |