

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
ENVIRONMENTAL ENGINEERING

Course Code: GR183004
III Year. I Semester

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Course Objectives: The objectives of this course is to make the student to

1. Identify opportunities in environmental engineering field.
2. Identify, formulate and solving problems on analysis of water.
3. Predict the population in a city such that design of water treatment plant and STP can be done and quantity of water required can be estimated.
4. Assess various techniques in treatment of water and wastewater.
5. Identify methods of disposal of sewage and their impact on environment

Course Outcomes: After completion of this course, students will be able to

1. Design and implement a drinking water supply system for a residential community
2. Identify the cause of outbreak of epidemics and eradicate.
3. Develop drinking water supply and waste water collection system for a town.
4. Identify safe disposal methods for wastewater
5. Design suitable treatment for wastewater.

UNIT I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – water demand – factors affecting – fluctuations – fire demand – storage capacity – water quality and testing – drinking water standards.

Sources of water: Comparison from quality, quantity and other considerations – intakes – infiltration galleries.

UNIT II

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation, flocculation, clarifier design – coagulants – feeding arrangements.

Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices- Miscellaneous treatment methods.

UNIT III

Distribution systems: requirements – methods and layouts, design procedures- Hardy Cross and equivalent pipe methods 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.

UNIT IV

Conservancy and water carriage systems: sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations. Design of sewers – shapes and materials – sewer appurtenances manholes –inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – components requirements – sanitary fittings- traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming – dilution.

UNIT V

Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate.

Construction and design of oxidation ponds - Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

TEXT BOOKS:

1. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi.
2. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.
3. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.

REFERENCES:

1. Water and Waste Water Technology by Mark J Hammer and Mark J. Hammer Jr.
2. Water and Waste Water Technology by Steel
3. Water and Waste Water Engineering by Fair, Geyer and Okun
4. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
5. Wastewater Engineering by Metcalf and Eddy.
6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International