

WATER RESOURCES ENGINEERING

VI Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE014	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
<p>COURSE OBJECTIVES:</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> I. Enrich the knowledge of hydrology that deals with the occurrence, distribution and movement of water on the earth. II. Design unlined and lined irrigation canals; mitigate sediment problems associated with canal. III. Identifying, formulating and management of water resource related issues. IV. Discuss the limitations and applications of hydrograph flood analysis <p>COURSE OUTCOMES (COs):</p> <p>CO 1: Understand the basic knowledge of hydrology, hydrological cycle, precipitation and movement of water on earth and below the earth surface in addition to importance and estimation of runoff</p> <p>CO 2: Determining the importance of different types of hydrographs</p> <p>CO 3: Importance and occurrence of Ground water, estimation of discharge through various types of aquifers, wells development</p> <p>CO 4: Analyze the importance of irrigation and their types, methods of application of irrigation water, duty and delta, irrigation efficiencies, water logging.</p> <p>CO 5: Understand the classification of canals, design of irrigation canals, IS standards for a canal design canal lining, SCS curve number method, flood frequency analysis of stream flow</p> <p>COURSE LEARNING OUTCOMES (CLOs):</p> <ol style="list-style-type: none"> 1. Understand the basic concepts of Hydrology and its applications. And also understand different forms and types of precipitation. 2. Understand the Rainfall measurement methods and different types of Rain gauges 3. Compute the average rainfall over a basin, processing of rainfall data, and adjustment of rainfall record and usage of double mass curve. 4. Understand the concepts of runoff, factors affecting runoff, runoff over a catchment, empirical and rational formulae. 5. Understand the abstraction from rainfall, evaporation, factors affecting evaporation, measurement of evaporation, evapo-transpiration, penman and Blaney-Criddle methods and infiltration 6. Understand the concept of Hydrograph, effective rainfall, and base flow separation 7. Analyze the concept of direct runoff hydrograph 8. Analyze the importance of unit hydrograph, definition, and limitations applications of unit hydrograph. 9. Understand the derivation of unit hydrograph from direct runoff hydrograph and runoff hydrograph to unit hydrograph 10. Understand the concept of synthetic unit hydrograph and its applications. 11. Understand the Ground water Occurrence and types of aquifers 12. Define and understand the different terminology of water resource engineering like aquifer parameters, porosity, specific yield, permeability, and Transmissivity. 13. Determine the radial flow to wells in confined and unconfined aquifers 14. Understand the concept of Darcy's law in aquifers 15. Understand the Types of wells, well construction, and well development. 								

<p>16. Understand the work necessity and importance of irrigation, advantages and ill effects of irrigation, types of irrigation</p> <p>17. Explain the methods of application of irrigation water and understand the India agricultural soils, methods of improving soil fertility, crop rotation, and preparation of land for irrigation</p> <p>18. Understand the standards of quality for irrigation water, soil, water, plant relationship, vertical distribution of soil moisture, soil moisture constants.</p> <p>19. Calculate the soil moisture tension, consumptive use, duty and delta and understand the factors affecting duty.</p> <p>20. Determination of design discharge for a water course. Depth and frequency of irrigation, irrigation efficiencies, water logging.</p> <p>21. Understand the mechanical classification of canals.</p> <p>22. Design of irrigation canals by Kennedy,,s and Lacey’s theories, balancing depth of cutting</p> <p>23. Calculate by using IS standards for a canal design canal lining. Design discharge over a catchment, computation of design discharge, rational formula.</p> <p>24. Understand the SCS curve number method and flood frequency analysis of stream flow</p>		
Unit-I	INTRODUCTION TO ENGINEERING HYDROLOGY AND ITS APPLICATIONS	Classes: 09
<p>Introduction to engineering hydrology and its applications, hydrologic cycle, types and forms of participation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data, adjustment of record, rainfall double mass curve runoff, factors affecting runoff, runoff over a catchment, empirical and rational formulae. Abstraction from rainfall, evaporation, factors affecting evaporation, measurement of evaporation, evapo-transpiration, penman and Blaney & Criddle methods, infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.</p>		
Unit -II	DISTRIBUTION OF RUNOFF	Classes: 09
<p>Hydrograph analysis flood hydrograph, effective rainfall, base flow separation, direct runoff hydrograph, unit hydrograph, definition, and limitations applications of unit hydrograph, derivation of unit hydrograph from direct runoff hydrograph and vice versa, hydrograph, synthetic unit hydrograph.</p>		
Unit -III	GROUND WATER OCCURRENCE	Classes: 09
<p>Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient.</p> <p>Darcy,,s law, radial flow to wells in confined and unconfined aquifers. Types of wells, well construction, well development.</p>		
Unit -IV	NECESSITY AND IMPORTANCE OF IRRIGATION	Classes: 09
<p>Work necessity and importance of irrigation, advantages and ill effects of irrigation, types of irrigation, and methods of application of irrigation water, India agricultural soils, methods of improving soil fertility, crop rotation, and preparation of land for irrigation, standards of quality for irrigation water, soil, water, plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, duty and delta, factors affecting duty, design discharge for a water course. Depth and frequency of irrigation, irrigation efficiencies, water logging.</p>		
Unit -V	CLASSIFICATION OF CANALS	Classes: 09
<p>Mechanical classification of canals, design of irrigation canals by Kennedy,,s and Lacey,,s theories, balancing depth of cutting, IS standards for a canal design canal lining. Design discharge over a catchment, computation of design discharge, rational formula, SCS curve number method, flood frequency analysis of stream flow.</p>		

Text Books:

1. Jayarami Reddy, "Engineering hydrology", Laxmi publications Pvt. New Delhi, 2005.
2. Punmia & Lal, "Irrigation and Water Power Engineering", Laxmi publications Pvt. Ltd, New Delhi, 1992.
3. V.P.Singh, "Elementary hydrology", PHI publications, 1992.
4. D.K.Majundar, "Irrigation Water Management", Prentice Hall of India, 2002.

Reference Books:

1. Elementary hydrology by V.P.Singh, PHI publications.
2. Irrigation and water Resources & Water power by P.N.Modi, Standard Book House.
3. Irrigation and water Management by Dr.Majumdar, Printice Hall of India.
4. Irrigation and Hydraulic Structures by S.K. Garg.
5. Applied hydrology by Ven Te Chow, David R.Mays Tata Mc Graw Hill.
6. Introduction to hydrology by Warren Viessvann, Jr, Garyl.Lewis, PHI.