DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF COURSE WORK

Course Details:

Course Title	**Water Resources Engineering-I**
Course Code	**20CE1118**
L T P C	**3 0 0 3**
Program	**B.Tech.**
Specialization	**CIVIL ENGINEERING**
Semester	**V**
Prerequisites	**Fluid Mechanics**
Courses to which it is a prerequisite	**Water Resources Engineering-II, Groundwater Development and Management , Watershed Management**

COURSE OUTCOMES (COs):

After completion of this course the student would be able to

CO	Course Outcomes	Learning Outcomes
1	Describe the various hydrological parameters and interpreted the useful information.	1. Explain the various stages of hydrologic cycle and their influencing factors (L2) 2. Compute the average precipitation of the river basin (L3) 3. Analyse the useful information from the hydrological data (L3)
2	Apply hydrograph analysis for estimating peak runoff from a catchment.	1. Explain the factors affecting runoff (L2) 2. Describe the gauging methods to measure stream discharge (L2) 3. Apply the hydrograph concept to develop unit hydrograph of a catchment (L3)
3	Estimate the peak floods and solve hydrologic flood routing models.	1. Compute the peak discharge using traditional and probabilistic methods (L3) 2. Explain the concept of flood routing (L2) 3. Estimate the flood peak at downstream using Muskingum method (L2)
4	Assess the aquifer properties and compute the yield from a well.	1. Describe the aquifer properties influencing the groundwater flow (L2) 2. Compute the radial discharge from a single well in both confined and unconfined aquifers (L3) 3. Explain the Drarcy's law (L2)
5	Compute the quantity of water required for different crops.	1. Explain the necessity and importance of irrigation (L2) 2. Describe the various moisture constants available for crop growth (L2) 3. Compute the crop water requirement for irrigation (L3)

PROGRAMME OUTCOMES

1. Graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals to solve complex civil engineering problems.
2. Graduates will attain the capability to identify, formulate and analyse problems related to

civil engineering and substantiate the conclusions

3. Graduates will be in a position to design solutions for civil engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.
4. Graduates will be able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5. Graduates will be able to select and apply appropriate techniques from the available resources and modern civil engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.
6. Graduates will be able to carry out their professional practice in civil engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
7. Graduates will be able to understand the impact of the professional engineering solutions on environmental safety and legal issues.
8. Graduates will transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9. Graduates will be able to function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10. Graduates will be able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11. Graduates will be able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
12. Graduates will engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of civil engineering.

PROGRAMME SPECIFIC OUTCOMES(PSOs):

1. Collect, process and analyse the data from topographic surveys, remote sensing, hydrogeological investigations, geotechnical explorations, and integrate the data for planning of civil engineering infrastructure.
2. Analyse and design of substructures and superstructure for buildings, bridges, irrigation

structures and pavements.

3. Estimate, cost evaluation, execution and management of civil engineering projects.

Course Outcome Vs Program Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	2	1	-	-	-	-	1
CO2	3	3	3	2	2	1	1	-	-	-	-	1
CO3	3	3	3	2	2	1	1	-	-	-	-	1
CO4	3	3	3	2	2	2	1	1	-	-	-	1
CO5	3	3	3	3	2	2	2	-	-	-	-	1

Course Outcome Vs Programme Specific Outcomes:

CO	PSO1	PSO2	PSO3
CO1	2	2	-
CO2	2	2	-
CO3	2	2	-
CO4	2	2	-
CO5	2	2	-

Mapping Levels:

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), put -: No Correlation

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation:

Week	TOPIC / CONTENTS	CO	Sample questions	Teaching - learning strategy	Assessment Method & Schedule
1	Introduction to Engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement.	1	Describe the hydrologic cycle?	Lecture	Assignment/ Quiz
2	Types of rain gauges, computation of average rainfall over a basin, processing of rainfall data and estimation of missing precipitation data.	1	What are the types of rain gauges and computation of average rainfall at a station?	Lecture Problem solving	
3	Abstraction of rainfall-evaporation, factors affecting evaporation, measurement of evaporation, evapotranspiration-infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.	1	Define infiltration and what are the factors affecting infiltration.	Lecture Problem solving	
4	Run-off, components of run-off, factors affecting runoff.	2	What are the factors affecting run-off?	Lecture	
5	Stream gauging: necessity, selection of gauging sites, methods of measurement of discharge.	2	What are the methods of measurement of discharge?	Lecture	
6	Hydrograph analysis-Base flow separation, effective rainfall, unit hydrograph- definition, limitation and applications.	2	What is Unit-Hydrograph and its limitation?	Lecture	

7	Derivation of Unit-Hydrograph, Shydrograph, IUH, Synthetic UH.	2	Explain S-hydrograph.	Lecture Problem solving	
8	Estimation of peak discharge, rational method, SCS method, Design flood, return period, flood frequency analysis, Gumbel's and log Pearson Type III methods.	3	Explain SCS method	Lecture Problem solving	
9	**MID TEST – I**				
10	Basic concepts of flood routing, hydraulic and hydrologic routing, channel and reservoir routing, Muskingum method of channel routing.	3	Explain Muskingum method of channel routing.	Lecture Problem solving	Assignment/ Quiz
11	Ground water - Occurrence, types of aquifers, aquifer parameters porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells.	4	What are the types of aquifers?	Lecture	
12	Darcy's law, radial flow to wells in confined and unconfined aquifers, determination of hydraulic properties of aquifers.	4	Explain Darcy's law.	Lecture Problem solving	
13	Necessity and importance of irrigation, advantages and ill-effects of irrigation, types, methods of application of irrigation water, Indian agricultural soils.	5	Explain methods of application of irrigation water.	Lecture	
14	Methods of improving soil fertility, preparation of land for irrigation, standards of quality for irrigation water.	5	What are the methods of improving soil fertility?	Lecture	
15	Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use.	5	Describe Soil-water-plant relationship?	Lecture	
16	Crop seasons in India, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, determination of irrigation requirements of crops.	5	Explain duty and delta?	Lecture Problem solving	
17	**MID TEST - II**				
18	**END EXAM**				