

Subject Code	10B11CE 513
Subject Name	<u>Water Resources Engineering</u>
Course Structure (L -T)	3-1
Course Credit	4

Course objective:

In we are working in the field of irrigation Engg. we should know how much water is going into the ground from where the plants can take their water

If we are concerned about the water resources we should know how much water is going into the river so that we can control the floods or we can avoid the lack of water for irrigation other area

1. The knowledge of hydrology is prerequisite for the irrigation engineering and also for design of hydraulic structure. So one of the objective of this course is to impart the knowledge of hydrology that deals with the occurrence, distribution, movement and properties of water on the earth
2. To impart the knowledge of various irrigation techniques , requirements of the crops,
3. To learn about distribution systems for canal irrigation, design of unlined and lined irrigation canals design sediment problems associated with canal

Course Outcome (CO)

On completion of this course, the student shall learn:

- CO- 1 Various components of hydrologic cycle that affect the movement of water in the earth
- CO- 2 Various Stream flow measurements technique
- CO- 3 the concepts of movement of ground water beneath the earth
- CO- 4 the basic requirements of irrigation and various irrigation techniques, requirements of the crops
- CO- 5 Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design
- CO- 6 Basic components of river Training works.
- CO- 7 Apply math, science, and technology in the field of water resource Engineering.

Programme Outcomes

- a. An ability to apply knowledge of mathematics, science, and engineering to solve real world problems.

- b. An ability to design and conduct experiments, as well as to analyze, interpret and validate.
- c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability.
- d. An ability to function on multi-disciplinary teams.
- e. An ability to identify, formulate and solve engineering problems.
- f. An understanding of professional and ethical responsibility to apply engineering solution taking into consideration the social and global aspects.
- g. An ability to communicate effectively
- h. Recognition of the need for, and an ability to engage in lifelong learning.
- i. An ability to use the techniques, skills, and modern engineering tools to real engineering problems.

Correlation of COs with Pos

10B11CE513	Water Resource Engineering	Course Outcomes	Strength of Correlation								Assessment (%)	
			H-High (3), M-Medium (2), L-Low (1)									
			Programme Outcomes									
			a	b	c	d	e	f	g	h		i
		CO1	H	M	L	H	M	M	H	M	H	78
		CO2	H	H	M	L	H	M	H	M	H	82
		CO3	H	M	M	L	H	M	M	H	M	74
		CO4	H	H	H	L	H	L	H	M	H	82
		CO5	H	H	M	M	H	M	M	M	H	82
		CO6	M	M	M	L	H	H	M	H	M	75
		CO7	H	H	M	M	M	M	M	M	M	74

Course Outline:

Hydrology: Hydrological cycle, precipitation, snowfall and snowmelt, evaporation, transpiration, depression storage, infiltration, overland flow, stream flow measurements,

hydrograph, flood frequency analysis, flood estimation, flood routing through a reservoir, channel flow routing methods.

Ground water flow : Specific yield, storage coefficient, coefficient of permeability, confined and unconfined aquifers, aquitards, radial flow into a well under confined and unconfined conditions, tube wells, pumping and recuperation tests, ground water potential.

Water Resources : Ground and surface water resource, single and multipurpose projects, storage capacity of reservoirs, reservoir losses, reservoir sedimentation and economics of water resources projects.

Irrigation Engineering: Water requirements of crops, Moisture-crop relationship, Irrigation requirements, duty and delta, Irrigation efficiencies, Design of conventional and modern methods of irrigation, Irrigation of arid lands, Salinity of soil, Salinity control, Quality of irrigation water, Contaminants and their effects on various crop types, Rain water management, conjunctive use of water, Water logging causes and control, drainage system design.

Canals : Distribution systems for canal irrigation, canal capacity, canal losses, alignment of main and distributory canals, most efficient section, lined canals, their design, regime theory, critical shear stress, bed load, local and suspended load transport, cost analysis of lined and unlined canals, drainage behind lining.

River training: Objectives of river training, methods of river training, river training structures

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

EVALUATION SCHEME:

Instrument	Duration	Marks
Mid term	2 hour	30
End term	3 hour	45
Internal Assessment*		25
Total		100

*** Internal Assessment is based on Assignments, Tutorials, Quizzes, and Regularity in Attendance**

	Total Nos.	Max. marks
Tutorials	9	9

Assignments	6	3
Attendance		5
Class Test 1	10 (marks)	8
Class Test 2	10 (marks)	
Class Test 3	10 (marks)	
Class Test 4	10 (marks)	
	Total	25

Text Books:

1. Garg, S. K., Irrigation Engineering and Hydraulic Structures, Khanna Publishers, 1997.
2. Todd, D. K., Ground water Hydrology, John Willey & Sons, New York, 1995
3. Bharat Singh, Fundamentals of Irrigation Engineering, Nem Chand and Brothers.
4. Subramanya, K., Engineering Hydrology, McGraw Hill Education

Reference books:

1. Applied Hydrology - Ven T Chow, David R Maidment, Larry W Mays

Lecture plan

S No.	Topic	No of lecturers
1	Hydrological cycle, precipitation, DAD curve, mean rainfall over a drainage Basin, snowfall and snowmelt	4
2	Evaporation, transpiration, depression storage, infiltration, overland flow, Φ index, w-index, infiltration capacity, measurement of infiltration	2
3	stream flow measurements, direct measurements, measurement of stage, wire gauge, automatic stage recorder, float gauge gauge recorder, bubble gauge recorder, current meter, area velocity method, moving boat method, Dilution technique, indirect methods slope area method:	4
4	hydrograph, its application, factor affecting flood hydrograph, base flow separation methods, direct runoff hydrograph, Unit hydrograph	3
5	Flood, Rational methods, Empirical formulae, Envelope curve, determination of discharge (probability method)	2
6	Flood routing: Basic equations, channel flow routing method: Muskingum method, flood routing through a reservoir: Modified Pul's methods	3
7	Ground water flow : Specific yield, storage coefficient, coefficient of permeability, confined and unconfined aquifers, aquitards,	2

8	Radial flow into a well under confined and unconfined conditions, tube wells, pumping and recuperation tests, ground water potential.	2 22
9	Irrigation Engineering: Water requirements of crops, Moisture-crop relationship, Irrigation requirements, duty and delta, Irrigation efficiencies, Design of conventional and modern methods of irrigation, Irrigation of arid lands,	2
10	Salinity of soil, Salinity control, Quality of irrigation water, Contaminants and their effects on various crop types, Rain water management, conjunctive use of water, Water logging causes and control, drainage system design.	2
11	Canals : Distribution systems for canal irrigation, canal capacity, canal losses, alignment of main and distributory canals, drainage system	2
12	Alluvial and Non alluvial canals, design of alluvial channels, Kennedy theory, laceys theory, laaceys regime channels, design of Non- alluvial channels, design of lined canals, most efficient section	6
13	Sediment transport: regime theory, critical shear stress, bed load, local and suspended load transport, cost analysis of lined and unlined canals, drainage system.	4
14	Water Resources : Ground and surface water resource, single and multipurpose projects, storage capacity of reservoirs, reservoir losses, reservoir sedimentation and economics of water resources projects.	2
15	River training: Objectives of river training, methods of river training, river training structures	2
	Total	42