Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE372	**ENGINEERING HYDROLOGY**	**3-0-0-3**	**2016**

Pre-requisite : CE309 : Water Resources Engineering

Course objectives:

- To have a good understanding of all the components of hydrologic cycle
- To understand the mechanics of rainfall, its spatial and temporal distribution.
- To understand the fitting of probability distribution and statistical analysis of rainfall and Runoff.

Syllabus :

Basic concept of Hydrology and Hydrologic cycle - Test for consistency of rainfall records - Analysis of rainfall data - Hydrologic abstractions-infiltration-Evapotranspiration - methods of estimation-catchment characteristic-stream gauging - stage-discharge curve - its extension and adjustment. Computation of runoff- Rainfall- runoff correlation using linear regression techniques- Partial differential equation governing unsteady groundwater flow- Evaluation of aquifer parameters- Well flow near aquifer boundaries - Method of images - surface investigation of groundwater- Graphical representation of hydrochemical data- Pollution of ground water, sources, Seawater intrusion, Artificial recharge of groundwater- Design flood –Estimation of design flood- Flood frequency studies-Gumbel's method- Flood routing through reservoirs and Channel routing- Flood control methods, Flood forecasting and warning.

Expected Outcomes:

The students will be able to

1. understand the procedure, applicability and limitations of various methods of geotechnical investigation;
2. make proper engineering judgments and take appropriate decisions related to geotechnical investigations.

Text Books:

1. Deodhar.M.J., Elementary Engineering Hydrology, Pearson, 2009
2. Ojha, C.S.P, R. Berndtsson, P.Bhunya, Engineering Hydrology, Oxford University Press, 2015.
3. Reghunath. H M, Hydrology, New Age International Publications, 1987.
4. Subramanya. K, Engineering Hydrology, Tata McGraw Hill, 1984

References:

1. Garg S. K. Hydrology and Water Resources Engineering, Khanna Publishers, 2005
2. Ghanshyam Das, Hydrology and soil conservation Engineering, Prentice-hall of India, 2004.
3. Jayarami Reddy P, A Text Book of Hydrology, Laxmi Publications, 2005.
4. Maidment D.R., Hand book of Hydrology, Mc Graw Hill, 1993
5. Todd D. K., Ground Water Hydrology, Wiley, 2005
6. Ven Te Chow, David R Maidment, L. W. Mays, Applied Hydrology, McGraw Hill, 1988
7. Warren Viessman, Gary L Lewis, Introduction to Hydrology, Pearson, 2015.

COURSE PLAN

Module	Contents	Hours	Sem. Exam Marks %

I	Basic concept of Hydrology and Hydrologic cycle -Test for consistency of rainfall records - Analysis of rainfall data - correlation between intensity and duration – intensity, duration and frequency - depth area duration (DAD) curve. Hydrologic abstractions- infiltration- - Green Ampt method-Evapotranspiration – different methods - Blaney Criddle method - penman method.	7	15
II	Catchment characteristics - classification of streams - stream pattern-stream order – stream gauging – rating of current meter - Extension of stage discharge curve - Adjustment of stage discharge curve-selection of site for stream gauging stations.	6	15
FIRST INTERNAL EXAMINATION		
III	Runoff - Computation of runoff– Hydrograph analysis-Rational method –- S-hydrograph - unit hydrograph from complex storm - synthetic unit hydrograph- Instantaneous unit hydrograph (Brief description only) – linear reservoir model.	7	15
IV	Partial differential equation governing unsteady groundwater flow- Evaluation of aquifer parameters - Theis method -Jacob's approximation method. Well flow near aquifer boundaries - Method of images - surface investigation of groundwater - Electrical resistivity method. Graphical representation of hydrochemical data - Pollution of groundwater, sources. Seawater intrusion- Ghyben-Herzberg relationship –Method of control of seawater intrusion- Artificial recharge of groundwater.	6	15
	SECOND INTERNAL EXAMINATION		
V	Rainfall- runoff correlation using linear regression and multiple linear regression analysis. Design flood and their Estimation - Different methods - Flood frequency studies -Gumbel's method.	8	20
VI	Flood routing through reservoirs - ISD method- Modified Pulse method. Flood routing through channels by Muskingum method. Flood control methods - Flood forecasting and warning (Brief descriptions only)	8	20
	END SEMESTER EXAMINATION		

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks :100   **Exam Duration: 3 Hrs**

Part A -Module I & II   :   2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI :   2 questions out of 3 questions carrying 20 marks each

 Note : 1.Each part should have at least one question from each module

        2. Each question can have a maximum of 4 subdivisions (a,b,c,d)