Institute/College Name:Darbhanga College of Engineering.	
Program Name:	B.Tech (CE, 5 th semester).
Course Code:	PCC-CE-305
Course Name:	Hydrology and Water Resource Engineering.
Lecture/Tutorial(per week):	4/0
Course Credits:	03
Course Co-coordinator Name:	Mr. Prashant Kumar

<u>1.</u> Scope and Objectives of the Course

The course serves as an introduction to the field of engineering hydrology. It covers fundamentals such as the hydrological cycle, catchment, losses, hydrographs and hyetographs. Design topics covered will be selected from: flood frequency analysis, determination of design rainfall intensity and hyetographs, peak flow estimation, design hydrograph estimation, groundwater process and modelling, and drought risk analysis/yield hydrology.

Course Outcomes

CO1-Outline the physical processes in the context of flood hydrology, including the hydrological cycle in general, and rainfall, loss and groundwater transport mechanisms. Knowledge of the methods that can be used to measure rainfall and flow, as well as their relative advantages and disadvantages

CO2-Define and comprehend key concepts related to flood hydrology, such as relative and cumulative frequency, the use of statistical data distributions, time of concentration, major / minor systems, risk-cost trade-offs, runoff hydrographs, rainfall hyetographs, model calibration, catchment storage, flood routing, actual versus design rainfalls and flows and the value of data.

CO3-Apply a range of common techniques, such as flood frequency analysis, probabilistic rational, regional methods to estimate design peak flows in rural areas; Compare and evaluate (e.g. how they work, what their limitations are) a number of methods for determining peak flows and flood hydrographs for urban and rural areas, including flood frequency analysis, the probabilistic and deterministic rational methods, the regional method and runoff routing methods.

CO4-Solve an engineering design problem in the context of the conceptual design of a small urban drainage system by applying the deterministic rational method to estimate peaks flow in urban areas and comparing various urban drainage design options. Define and comprehend key concepts related to drought risk assessment, including the use of stochastic models, including water storage behaviour analysis.

CO5-Apply and evaluate stochastic modelling techniques and water storage behaviour analysis to estimate the yield of an underground water source and able to depict ground water potentials.

2. Textbooks

TB1: "Engineering Hydrology" by K. Subramaniya, Fouth edition, Mc Graw Hill Publication.

3. <u>Reference Books</u>

RB1: "Applied Hydrology" by Ven Te Chow, International edition, Mc Graw Hill Publication.

Other readings and relevant websites

S.No.	Link of Journals, Magazines, websites and Research Papers
1.	http://nptel.ac.in/courses/105101002/

2. Course Plan

Lecture Number	Date of Lecture	Topics	Web Links for video lectures	Text Book / Reference Book / Other reading material	Page numbers of Text Book(s
1-6		Introduction		TB1, RB1	1-59
		Hydrologic cycle and processes, Precipitation, Infiltration and Evapotranspiration, Forms of precipitation, measurement, analysis, depth-area-duration and intensity-duration frequency relations.	http://nptel.ac.in/cours es/105104029/		
7-14		Evaporation		TB1, RB1	73-152
/-14		Process, measurement and estimation, Infiltration process, measurement and estimation, Evapotranspiration measurement and estimation, Stream flow measurements		http://nptel.ac.in/courses /105101002/	13-132
	-	Ass	signment 1		
15-22		Runoff and Hydrographs		TB1, RB1	164-286
		Factors affecting flow hydrograph, Rainfall Runoff correlations, Flow duration curve, Mass curve, Unit hydrograph, its analysis and S-curve hydrograph. synthetic and instantaneous unit hydrographs	http://nptel.ac.in/cours es/105104029/		
		Ass	ignment 2		
23-30		Statistical analysisFloodfrequencyRationalmethod,timeAreacurves,DesignStorm,Risk		TB1, RB1 http://nptel.ac.in/courses /105101002/	296-330
		Mid-Semester Exam (Sylla	abus covered from 1-24	lectures)	
31-36		Channel and flood routing		TB1, RB1	340-358
		Time series analysis of droughts and floods		http://nptel.ac.in/courses /105101002/	
		Ass	ignment 3		•
37-40		Groundwater hydrology Flow equations confined and unconfined flow, Well hydraulics Steady and unsteady flow, Well losses, Specific capacity.	http://nptel.ac.in/cours es/105105042/ ignment 4	TB1, RB1	389-431

3. Evaluation Scheme:

Component 1	Mid Semester Exam	20	
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Component 2	Assignment Evaluation	10
Component 3**	End Term Examination**	70
	Total	100

** The End Term Comprehensive examination will be held at the end of semester. The mandatory requirement of 75% attendance in all theory classes is to be met for being eligible to appear in this component.

SYLLABUS

Topics	No of lectures	Weightage*
Introduction, Hydrologic cycle and processes, Precipitation, Infiltration and	6	10%
Evapotranspiration, Forms of precipitation, measurement, analysis,		
depth-area-duration and intensity-duration frequency relations.		
Evaporation, Process, measurement and estimation, Infiltration process,	8	20%
measurement and estimation, Evapotranspiration measurement and		
estimation, Stream flow measurements		/
Runoff and Hydrographs, Factors affecting flow hydrograph, Rainfall	8	20%
Runoff correlations, Flow duration curve, Mass curve, Unit hydrograph, its		
analysis and S-curve hydrograph. synthetic and instantaneous unit		
hydrographs		
Statistical analysis, Flood frequency studies, Rational method, time Area	8	20%
curves, Design flood, Design Storm, Risk		
Channel and flood routing, Time series analysis of droughts and floods	6	20%
Groundwater hydrology, Flow equations confined and unconfined flow,	4	10%
Well hydraulics Steady and unsteady flow, Well losses, Specific capacity		

* Weightages are based on the mid-term exam and not end semester exam since the question paper is set by Aryabhatta Knowledge University, Patna

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Mr. Prashant Kumar	
H.O.D	Mr. Shyam Sundar Choudhary	
Principal	Dr. Achintya	
Date		

Evaluation and Examination Blue Print:

Internal assessment is done through quiz tests, presentations, assignments and project work. Examination rules and regulations are uploaded on the student's portal. Evaluation is a very transparent process and the answer sheets of mid-term exam and internal assessment assignments are returned back to the students.

The components of evaluations alongwith their weightage followed by the University is given below

Mid-term exam

Assignments/Quiz Tests/Seminars	10%
End term examination	70%