COURSE PLAN

Course Title: Mechanics of Fluids

Course Code CEPC12

No. of Credits 3

Department: Civil Engineering

Programme:

B.Tech. Civil Engineering

Pre-requisites: -

Co-requisites: -

Course Co-ordinator: Dr. R. Manjula

Course Teacher/Tutor: -

Learning Hours:

Sl. No.	Nature of teaching hours	No. of hours of teaching
1.	Learning hours	26
2.	Tutorial hours	10
3.	Assessment hours	

Course Type. PC

Student Quota -

Course Description

No prior co – requisite is requred

Course Objectives

- To understand the properties of fluids and fluid statics.
- To solve kinematic problems such as finding particle paths and stream lines.
- To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems.
- To study about specific speed and performance characteristics of different types of turbines.
- To study types of centrifugal Pumps, work done and efficiency of the different types centrifugal pumps and also study about performance of pumps & characteristic curves.

Course Content

Continuum concept - CGS, MKS and SI systems - Properties of Fluids - Ideal and real fluid - Flow classification, stream lines, streak lines, continuity equation, velocity, tangential, normal, local and convective acceleration, types of fluid motions, stream function, velocity potential function, flownet.

Pressure at a point – pascal law - Hydrostatic law - pressure measurement – Hydrostatic forces on immersed plane and curved surfaces, Buoyancy, Stability of floating and submerged bodies. Bernoulli's equation, Energy correction factor, Coefficients of contraction, velocity and discharge, free vortex motion, Analysis of free liquid Jet, Cavitation.

Laminar and turbulent flow - Reynold's number - Navier stoke equations of motion - shear stress and pressure gradient - Laminar flow between parallel plates - Couette flow - Hagen Poiseuille equation for flow through circular pipes.

Turbulence - Major losses - Darcy-Weisbach equation for flow through circular pipe - Friction factor - Smooth and rough pipes - Moody diagram - Minor losses - pipes in series and parallel - Equivalent length - water hammer phenomena- flow measurement – orifice mouth piece, weirs, flow under sluice gates.

Centrifugal pump - minimum speed to start the pump – multistage Pumps –Positive displacement pumps – reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done- Turbines - draft tube and cavitations –classification - radial flow turbines - axial flow turbines – Impulse and Reaction turbines.

Course Learning Outcomes (CLOs)

1. Understands the basic principles of fluid mechanics.
2. Understands the concepts of statics and dynamics of fluid flow.
3. Develops skills in analyzing fluid flows through the proper use of modeling and the application of the basic fluid-flow principles.
4. Acquire knowledge in the selection of type of turbine required with reference to available head of water and also used for Identification of type of turbine with estimated specific speed.
5. Capable of estimating efficiency of different pumps and performance of the pumps with the study of characteristics curves.

Course Teaching and Learning Activities

Sl. No.	Weekly plan	Activity	CLO
1. 1.	1st week	Properties of Fluids - Ideal and real fluid - Flow classification, stream lines, streak lines	1
2. 2.	2nd week	continuity equation, velocity, tangential, normal, local and convective acceleration	1

3. 3.	3rd week	types of fluid motions, stream function, velocity potential function, flownet – tutorial problems	2
4.	4th week	Pressure at a point – pascal law - Hydrostatic law Hydrostatic forces on immersed plane and curved surfaces, Buoyancy and **Quiz I**	2
5.	5th week	and Bernoulli's equation, Energy correction factor, Coefficients of contraction	3
6.	6th week	Velocity and discharge, free vortex motion, Analysis of free liquid Jet, Cavitation.	3
7.	7th week	Laminar and turbulent flow - Reynold's number - Navier stoke equations of motion - shear stress and pressure gradient - Laminar flow between parallel plates	3
8.	8th week	**Quiz II** and Hagen Poiseuille equation for flow through circular pipes and tutorial problems	2
9.	9th week	Turbulence - Major losses - Darcy-Weisbach equation for flow through circular pipe - Friction factor	3
10.	10th week	**Midterm Examination** Smooth and rough pipes - Moody diagram - Minor losses - pipes in series and parallel -	2
11.	11th week	Equivalent length - water hammer phenomena orifice mouth piece, weirs, flow under sluice gates. & Group task.	2
12.	12th week	Centrifugal pump - minimum speed to start the pump – multistage Pumps –Positive displacement pumps – reciprocating pump	5
13.	13th week	negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done- Turbines – Classification and description	4

Course Assessment Methods

Sl. No.	Assessment	%Weightage
1.	Quiz (I & II)	15
2.	Midterm examination	30
3.	Group task	5
4.	Summative assessment	50

Guidelines on grading

i) Relative grading policy

ii) The passing minimum shall be class mean by two or maximum by three, whichever is lower.

Essential Learning material

1. Nagaratnam, S., Fluid Mechanics, Khanna Publishers, 1995.

2. Natarajan, M.K. Principles of Fluid Mechanics, Oxford & IBH Publishing Co, 1994.

3. JagdishLal, Hydraulics and Fluid Mechanics, Tata McGraw Hill, 2001.

4. Streeter V.L., Fluid mechanics, Tata McGraw Hill, 1998.

Means/Processes for Student Feedback on Course

Feedback may be collected through **Questionnaire**

Course Policy and attendance requirement

Attendance requirement for summative assessment: 75%

However for genuine health and other extracurricular activities may be given due consideration of 15%.

Dr. R. Manjula
Faculty in charge

Class Committee Chairman

HoD/ Civil Engg.