

SYLLABUS CURRICULUM

COURSE	Course Name : Incompressible Fluid Machinery
	Course Code : TM 184778
	Credit : 3 sks
	Semester : 7

COURSE DESCRIPTION

This course contains principles on pipeline system analysis, code standardization, strength analysis and pipeline system design, and transient pipeline network analysis.

LEARNING OUTCOMES

LO8	Able to implement mathematics, science and engineering principles to solve engineering problems in mechanical systems.
LO9	Able to find the source of engineering problems in mechanical system through research that includes identification, formulation, analysis, data interpretation based on engineering principles.
LO10	Able to formulate the solution of engineering problem in mechanical system by considering economy, safety, environment and energy conservation.
LO11	Able to design mechanical system and the necessary components through analytical approach based on science and technology by considering technical standard and reliability.

COURSE LEARNING OUTCOMES

Student is able to explain classification, components, mechanism and application of incompressible fluid machinery on the field/industry. Student is able to distinguish different characteristics and make the selection of pump & turbines in accordance with optimum efficiency. Student is able to perform basic designing of incompressible fluid machinery. Student is able to measure & calculate the performance of incompressible fluid machinery (Head, capacity, power and efficiency). Student is able to explain about operation, maintenance basics & trouble shooting of incompressible fluid machinery.

MAIN SUBJECT

The focus of this course are as follows:

- Introduction : Classification, components, mechanism and application of incompressible fluida machinery on industry
- Review of fluid mechanics : Energy equation, Euler equation in fluid machinery ; Performance calculation : Effective head pump, capacity, power and efficiency produced by pump; specific speed.

- Positive displacement pump : Pump classification (screw, vane, gear, reciprocating) and mechanism. The characteristics work, main and second component.
- Dynamics pump : Classification pump (axial & centrifugal) and mechanism, specific speed, pump selection.
- Basics of pump impeller designing : Speed triangle, Head produced by pump, the effect of angle to the head and curve head-capacity.
- Pump characteristic : main characteristic, work characteristic, universal characteristic, combined series & parallel, complex circuit.
- Pump operation : Balanced axial force, Unstable operation(surging), basics maintenance of centrifugal pump.
- Water turbine : Classification (impuls & reaction, pelton, francis, kaplan), components, mechanism and application of turbine.
- Basics designing of water turbine impeller : speed triangle analysis.
Experiment of pump and water turbine.

PREREQUISITES

- Thermodynamics
- Fluid Mechanics

REFERENCE

1. M. Khetagurov, 1954, "*Marine Auxiliary Machinery and Systems*", Peace Publishers Moscow,.
2. Robert, W Fox & Alan T. McDonald (2010), "*Introduction to Fluid Mechanics 7th*, John Wiley & Sons, Inc, Asia
3. Kothandaraman C.P, 2007, " *Fluid Mechanics and Machinery*", 2th edition, New Age International Publisher, New Delhi
4. Igor Karassik, "*Pump Handbook*". 3th, McGraw Hill, New York, 2001.
5. Lazarkiewicz, Stephen and Troskolanski, A.T., "*Impeller Pump*". New York, Pergamon Press, 1965.
6. Nourbakhsh, Ahmad, Turbo pumps and Pumping Systems, Springer-Verlag, 2008.
7. Wagner, H.J, Introduction to HydroEnergy Systems, Springer-Verlag, 2011