INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

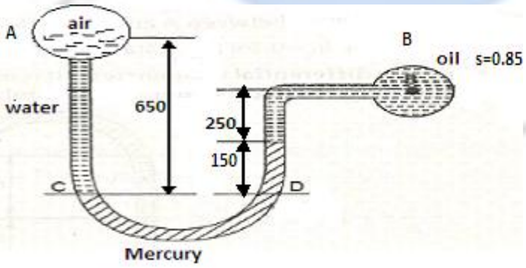
ASSIGNMENT

Course Name	:	**MECHANICS OF FLUIDS & HYDRAULIC MACHINES**
Course Code	:	**A40112**
Class	:	II B. Tech II Semester
Branch	:	Mechanical Engineering
Year	:	2016 – 2017
Course Faculty	:	Mr G. Sarat Raju, Associate Professor, Mr. N. Krishna Mohan.

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S. No	Question	Blooms Taxonomy Level	Course Outcome
	ASSIGNMENT-I		
1	a) State Newton's law viscosity and explain how viscosity varies with temperature for liquids and gases. b) Figure shows a differential manometer connected at two points A & B at A air pressure is 100 KN/m^2. Determine the absolute pressure at B  	Knowledge, Application	1, 3
2	a) An inverted u-tube manometer is connected to two horizontal pipes A & B through which water is flowing. The vertical distance between the axes of these points is 30 cm. When an oil of sp. gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective center lines of the pipes) are found to be same and equal to 35 cm. Determine the difference of pressure between the pipes. b) Derive an expression for surface tension on a liquid droplet.	Application, Synthesis	1, 3

S. No	Question	Blooms Taxonomy Level	Course Outcome
3	a) Define path line, stream line steam tube and streak line. b) Water flows through a pipe AB 1.2 m dia. at 3m/s and then pass through pipe BC 1.5 m dia. At C the pipe branches, branch CD is 0.8 m dia. And carries $1/^3$ rd of the flow in AB the flow velocity in branch CE is 2.5 m/s. Calculate the volume rate of flow in AB, the velocity in BC, the velocity in CD and dia. of CE.	Application, Knowledge	2
4	a) Explain body force, surface force and line force with examples b) How impulse momentum equation can be applied for the force exerted by fluid on the bend pipe.	Comprehension, Application	2
5	a) Define displacement thickness, momentum thickness and energy thickness. b) Calculate the displacement thickness, momentum thickness for the velocity distribution in the boundary layer given by $u/U=2(y/\delta) - \left(\frac{y}{\delta}\right)^2$	Knowledge, Application	6, 2
ASSIGNMENT-II			
1	a) Derive an expression for energy loss, if the pipe is suddenly enlarged? b) A horizontal pipe of diameter 500 mm is suddenly contracted to a diameter of 250 mm. The pressure intensities in the large and smaller pipe is given as 13.734 N/cm^2 and 11.772 N/cm^2 respectively. Find the loss of head due to contraction if Cc = 0.62. Also determine the rate of flow of water.	Synthesis, Application	2
2	a) Define the following; i. Unit speed ii. Unit discharge iii. Unit power iv. Degree of reaction b) A Pelton wheel having a mean bucket diameter of 1.0 m is running at 1000 r.p.m. the side clearance angle is 150 and discharge through the nozzle is 0.1 m^3/s, determine power available at the nozzle and hydraulic efficiency of the turbine.	Application , Knowledge	4
3	a) Explain the terms; i. Cavitation and ii. Water hammer b) A Kaplan turbine develops 24647.6 KW power at an average head of 39 m. assuming speed ratio of 2, flow ratio of 0.6, diameter of the boss = 0.35 x diameter of the runner and an overall efficiency of 90%. Calculate the diameter, speed and specific speed of the turbine.	Application , Comprehension	4
4	a) What is the necessity of priming in centrifugal pumps? b) A centrifugal pump is to discharge 0.118 m^3/s at a speed of 1450 rpm against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.	Knowledge, Application	5
5	a) Explain the importance of multistage centrifugal pump. b) A four stage centrifugal pump has four identical impellers keyed to the same shaft. The shaft is running at 400 rpm and the total manometric head developed by the multistage pump is 40 m. The discharge through the pump is 0.2 m^3/s. the vanes of each impeller are having outlet angle as45^0. If the width and diameter of each impeller at outlet is 5 cm and 6 cm respectively. Calculate the manometric efficiency.	Application , Comprehension	5

Prepared By: G. Sarat Raju, Associate Professor

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