INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

AERONAUTICAL ENGINEERING

TUTORIAL ASSIGNMENT

Course Name	:	**MECHANICS OF FLUIDS**
Course Code	:	**R15-A30103**
Class	:	II B. Tech I Semester
Branch	:	Aeronautical Engineering
Year	:	2016 – 2017
Course Coordinator	:	Mr. C.Satya Sandeep , Assistant Professor
Course Faculty	:	Mr. C.Satya Sandeep, Assistant Professor

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 **UNIT I :FLUID PROPERTIES , SUBMERGED BODIES AND MANOMETERS**		
1	Define density, weight density.	Understanding	1
2	Define specific volume and specific gravity.	Understanding	1
3	Define Newton's laws of viscosity.	Understanding	1
4	Define surface tension.	Understanding	1
5	What is surface tension? Derive an expression for surface tension on a water droplet and a bubble.	Explain	2
6	Explain capillarity and derive an expression for capillary rise and fall.	Apply	3
7	A u-tube manometer is used to measure pressure in a pipe line, Which is in excess with the atmospheric pressure, the right limb of the manometer contains mercury and is open to water in the mainline, if the difference in the level of mercury in the limbs of u tube is 10 cm and the free surface of the mercury is in the level with the center of the pipe. If the pressure of water in the pipeline is reduced to 9810 N/m.sq, calculate the new difference for the level of mercury, Sketch the arrangement in both cases.	Apply	1
8	An inverted u-tube manometer is connected to 2 horizontal pipes A and B through which water is flowing. The vertical distance between the axes of these pipes is 30 cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of the water columns in the 2 limbs of inverted manometer (when measured from the respective center lines of the pipes) are found to be same equal to 35 cm. Determine the difference of pressure between the pipes.	Apply	1
9	Find the density of a metallic body which floats at the interface of mercury of specific gravity 13.6 and water, such that 40% of each volume is submerged in mercury and 60% in water.	Apply	1

S. No	Question	Blooms Taxonomy Level	Course Outcome
UNIT –II **FLUID KINEMATICS**			
1	Define laminar and turbulent flows.	Understanding	4
2	Define compressible and incompressible flows.	Understanding	5
3	Define the equation of continuity.	Understanding	4
4	Define the terms velocity potential and stream functions.	Understanding	5
5	Define the terms vertex, free vortex flows and forced vortex flows.	Understanding	5
6	Obtain an expression for continuity equation for a 3-D Flow.	Apply	4
7	Bring out the mathematical and physical distinction between rotational and irrotational flows.	Apply	4
8	Describe the use and limitations of flow nets	Analyze	4
9	Obtain an expression for continuity equation for a 3-D Flow.	Apply	4
ASSIGNMENT-II **UNIT –III FLUID DYNAMYCS**			
1	What is Euler's equation? How will you obtain Bernoulli's equation from it?	Apply	9
2	Discuss the relative merits and demerits of ventuimeter with respect to orifice meter.	Apply	5
3	What is the difference between the pivot tube and pivot static tube.	Apply	5
4	What is Euler's equation? How will you obtain Bernoulli's equation from it?	Apply	9
5	Two velocity components are given in the following case, find the third component such that they satisfy the continuity equation. $U= x^3 + y^2+2z^2$ $V= -x^2y - yz -xy$	Apply & evaluate	6
7	Two velocity components are given in the following case, find the third component such that they satisfy the continuity equation. $U= x^3 + y^2+2z^2$ $V= -x^2y - yz -xy$	Apply & evaluate	6
UNIT-IV BOUNDARY LAYER THEORY			
1	What is meant by boundary layer?	Understanding	9
2	What do you mean by boundary layer separation?	Remembering	9
3	Define displacement thickness.	Remembering	9
4	What are the different methods of preventing the separation of boundary layers?	Understanding	9
5	Define laminar sub layer and boundary layer thickness.	Understanding	9
6	Define the terms drag, lift and momentum thickness.	Understanding	9
UNIT-V FLOW IN PIPES			
1	Derive the equation for head loss in pipes due to friction Darcy-Weisbach equation.	Apply	10
2	What are the minor losses in pipes? Give the appropriate formulae to calculate the losses.	Apply	11
3	What do you understand by turbulent flow? What factor decides the type of flow in pipes?	Apply	11
4	Derive an expression for the loss of head due to friction in pipes.	Apply	11
5	Derive the equation for head loss in pipes due to friction Darcy-Weisbach equation.	Apply	10
6	What are the minor losses in pipes? Give the appropriate formulae to calculate the losses.	Apply	11
7	A 0.3m diameter pipe 2340m long is connected with a reservoir whose surface is 72m above the discharging end of the pipe. If for the last 1170m, a second pipe of the same diameter be laid beside the first and connected to it. What would be the increase in the discharge? Take f=0.02	Evaluate	9
8	A compound piping system consists of 1800m of 0.50m, 1200m of 0.40m and	Evaluate	10

S. No	Question	Blooms Taxonomy Level	Course Outcome
	600m of 0.30m new cast iron pipes connected in series. Convert the system to (a) an equivalent length of 0.40m pipe and (b) Equivalent size pipe 3600m long.		
9	A pipe having a length of 6km and diameter 0.70m connects two reservoirs A and B, the difference between their water levels is 30m. Half way along the pipe there is a branch through which water can be supplied to a third reservoir C. Taking f = 0.024 determine the rate of flow of reservoir B when a) no water is discharged to reservoir C b) The quantity of water discharged to reservoir C is 0.15 m^3/s neglect minor losses.	Evaluate	9
10	A 0.3m diameter pipe 2340m long is connected with a reservoir whose surface is 72m above the discharging end of the pipe. If for the last 1170m, a second pipe of the same diameter be laid beside the first and connected to it. What would be the increase in the discharge? Take f=0.02	Evaluate	9

Prepared By: Mr. C. Satya Sandeep, Assistant Professor

HOD, AERONAUTICAL ENGINEERING