KUMARAGURU
college of technology
character is life

B.E/B.TECH DEGREE EXAMINATIONS: APRIL /MAY 2024

(Regulation 2018)

Fourth Semester

MECHANICAL ENGINEERING

U18MEI4202**:** Fluid Mechanics and Machinery

COURSE OUTCOMES

CO1:   State and explain various fluid properties.

CO2:   Apply the knowledge of fluid statics for solving the problems in buoyancy and manometers.

CO3:   Solve problems in mass, momentum and energy balance equations in fluid dynamics.

CO4:   Determine the flow rate through Venturi-meter and orifice meter.

CO5:   Analyze the performance of turbines and pumps.

CO6:   Illustrate the various tools for solving fluid dynamic problems.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	State the impact of temperature and pressure on viscosity.	CO1	[K_2]
2.	Consider a glass tube of diameter less than 5 mm, closed at top end and opened at bottom end. Enumerate about the capillary rise in this pipe particularly when inserted into water bath, with that of the same pipe having opened end at top and bottom of the pipe.	CO1	[K_2]
3.	Classify manometers.	CO2	[K_2]
4.	State necessary conditions for a submarine to stay at a particular depth in the sea.	CO2	[K_2]
5.	List the limitations of Bernoulli's equation.	CO3	[K_2]
6.	Write continuity equation.	CO3	[K_2]
7.	Name any two flow measuring devices.	CO4	[K_2]
8.	Define co-efficient of discharge.	CO4	[K_2]
9.	Define positive displacement pump.	CO5	[K_2]
10.	Mention some of the commercial software available for solving fluid flow problems numerically.	CO6	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 Poise. The shaft is of diameter 0.4m and rotates at 190 rpm. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm.	16	CO1	[K$_3$]

12.	An inverted U-tube manometer is connected to two 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 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.	16	CO2	[K$_3$]
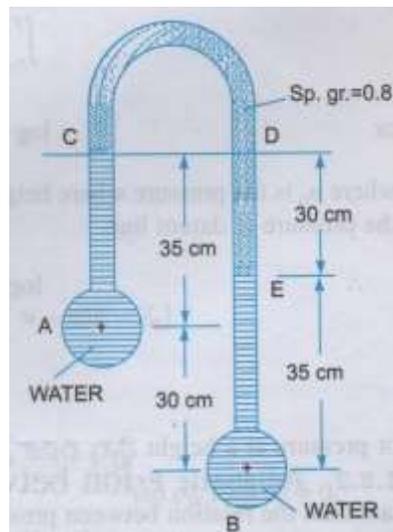
13.	Derive Euler's equation by stating the assumptions.	16	CO3	[K$_2$]

14.	A horizontal venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow rate of water. The pressure at inlet is 17.658 N/cm^2. and the vacuum pressure at the throat is 30 cm of mercury. Find the discharge of water through venturimeter. Take Cd=0.98.	16	CO4	[K$_3$]

15. A Pelton wheel has a mean bucket speed of 10 meters per second with a jet of 16   CO5   [K₃] water flowing at the rate of 700 litres /s under a head of 30 meters. The buckets deflect the jet through an angle of 160º. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98.

16. Explain the step-by-step procedure to solve a non-Newtonian and compressible 16   CO6   [K₃] fluid flow problem numerically using a commercial software.

****