VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: E1+TE1

Reg. No.
(To be filled by the student)

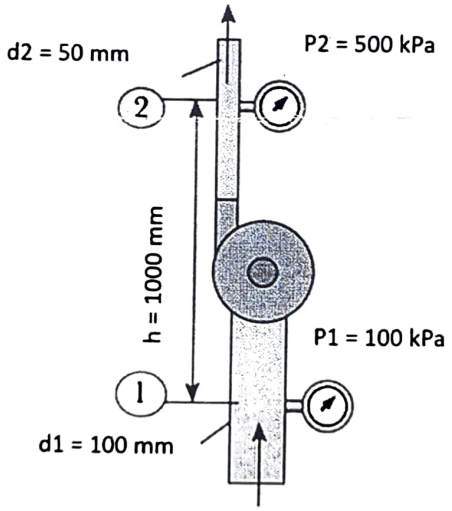
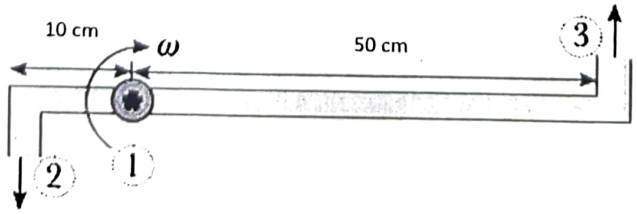
SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST – II
WINTER SEMESTER 2023-2024

GDN 123
36

Programme Name & Branch	**: BMA, BME, BMM**
Course Code	**: BMEE204L**
Course Name	**: Fluid Mechanics and Machines**
Faculty Name(s)	: Dr. Thundil Karuppa Raj R; Dr. Edison gundabattini; Dr. Aruna Kumar Behura; Dr. Abinash Mohanta; Dr. Deepakkumar R
Class Number(s)	**: VL2023240504559, VL2023240504562, VL2023240504558**
Slot	**: E1+TE1**
Date of the Exam	**: 05-04-2024**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

- *Answer all the questions*
- *Moody chart is attached*

Q. No	Question	Marks
1.	A pump in a supply line increases the pressure of water from 100 kPa to 500 kPa, as shown in Fig.1. The discharge through the pump is 1000 L/min. Calculate the power delivered to water by the pump. Neglect the losses due to friction.  Fig.1.	10
2.	A lawn sprinkler with unequal arms, shown in Fig. 2, discharges water at 2 L/s through its each opening of area 2 cm^2. Determine (a) the rotational speed of the sprinkler in absence of restraining torque (b) the restraining torque required to keep it stationary.  Fig.2.	10

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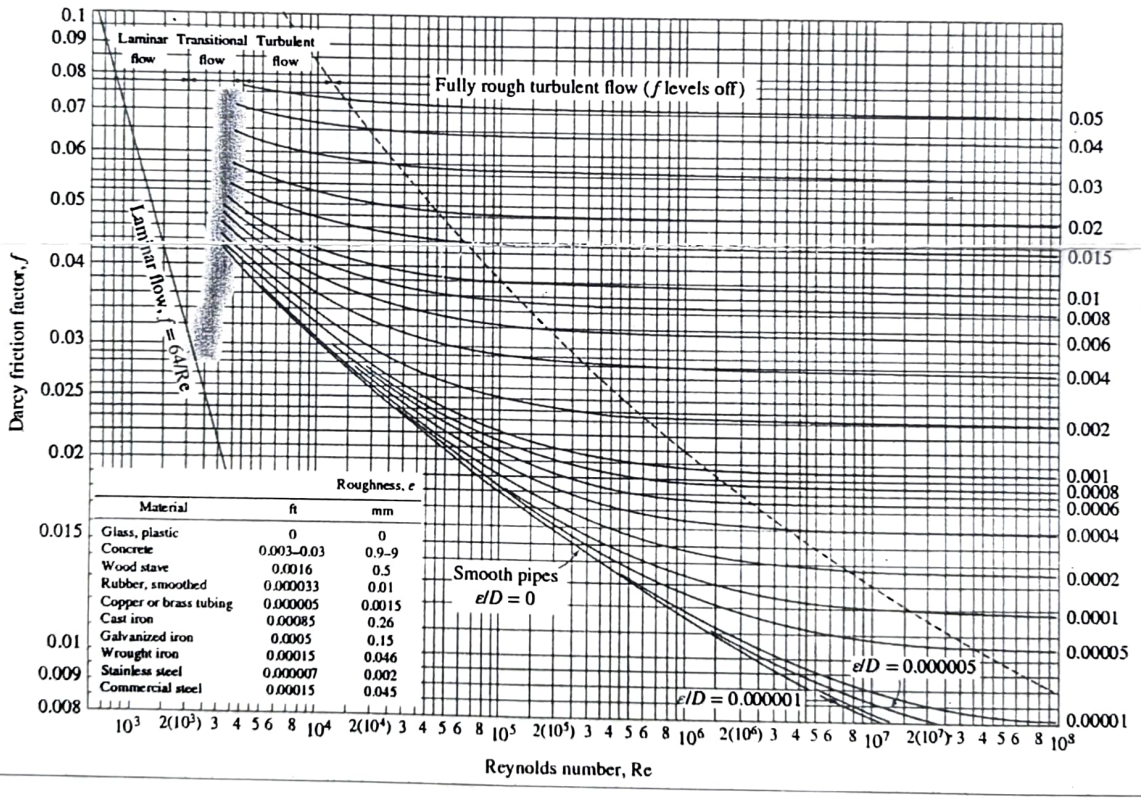
3.	A pump takes in water from a level 5 m below its centre line and delivers it at a height of 30 m above the centre line, the rate of flow being 3 m^3/hr. The diameter of the pipe line all through is 50 mm (ID). The fittings introduce losses equal to 10 m length of pipe in addition to the actual length of 45 m of pipe used. Determine the head to be developed by the pump. Take roughness height as 0.1mm, assume the properties of water at 20°C. Use Moody chart to find friction factor.	10
4.	Water flows in a 50 mm square pipe at a temperature of 10°C. The flow velocity is 0.012 m/s. Determine the head drop over a length of 10 m. Compare the same with circular section of the same area, take, $v = 1.4 \times 10^{-6}$ m^2/s.	10
5.	The drag force on a smooth sphere is found to be affected by the velocity of flow, u, the diameter D of the sphere and the fluid properties density ρ and viscosity μ. Using dimensional analysis obtain the dimensionless groups to correlate the parameters.	10

Moody Chart



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