ACE
Engineering College
(with a Difference in Excellence)
An AUTONOMOUS Institution

Question Paper Code: CE305PC

ACE-R20

Semester Supplementary Examination
II B. Tech- I Semester- SEPTEMBER-2022
FLUID MECHANICS
(Civil Engineering)

Time: 3 Hours

Max. Marks: 70

H. T. No										

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Marks
1. a)	Differentiate between: i) Liquids and Gases ii) Real and Ideal Fluids	7
b)	Determine the intensity of shear stress of an oil having viscosity = 1 poise. The oil is used for lubricating the clearance between a shaft of diameter 10 cm and its journal bearing. The clearance is 1.5 mm and the shaft rotates at 150 r.p.m.	7
2. a)	Define capillarity and derive the formula for finding the capillarity rise in a glass tube.	7
b)	The pressure outside the droplet of water of diameter 0.04 mm is 10.32 N/cm^2 (atmospheric pressure). Calculate the pressure within the droplet if surface tension is given as 0.0725 N/m of water.	7
3. a)	The pressure intensity at a point in a fluid is given 3.924 N/cm^2. Find the corresponding height of fluid when the fluid is: (a) water, and (b) oil of sp. gr. 0.9.	7
b)	A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s.	7
4. a)	Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s.	7
b)	What is viscosity ? Explain newton's law of viscosity in brief.	7
5. a)	Determine the height of a rectangular weir of length 6 m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.8 m and discharge is 2000 liters/s. Take C_d = 0.6 and neglect end contractions.	7
b)	A circular opening, 3 m diameter, in a vertical side of a tank is closed by a disc of 3 m diameter which can rotate about a horizontal diameter. Calculate: (i) the force on the disc, and (ii) the torque required to maintain the disc in equilibrium in the vertical position when the head of water above the horizontal diameter is 4 m.	7

6. a)	An oil of sp. gr. 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200 mm at the rate of 60 liters/s. Find the head lost due to friction for a 500 m length of pipe. Find the power required to maintain this flow. Take friction factor = 0.02.	7
b)	Obtain an expression for head loss due to friction in pipe. List all the assumptions made in the derivation.	7
7. a)	A pipe of diameter 25 cm and length 2000 m connects two reservoirs, having difference of water level 25 m. Determine the discharge through the pipe. If an additional pipe of diameter 25 cm and length 1000 m is attached to the last 1000 m length of the existing pipe, find the increase in discharge. Take f = 0.015. Neglect minor losses.	14
8. a)	What is boundary layer separation? What is the effect of pressure gradient on boundary layer separation?	7
b)	Explain the terms drag, lift and magnus effect.	7