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B.Tech (ME) 4th Semester (F-Scheme)  
Examination, July-2022  
FLUID MECHANICS  
Paper- ME-208-F

Time allowed : 3 hours]

[Maximum marks : 100

*Note : Attempt any five questions in all. Question 1. is compulsory and selecting at least one question from each section.*

1. (a) What is real and Ideal Fluid? 4
- (b) Difference between Newtonian and Non-Newtonian fluid. 4
- (c) Write Bernoulli's equation. 4
- (d) Write short notes on Flow regimes. 4
- (e) What is Boundary layer concept? 4

Section-A

2. (a) Explain stability of floating body. 10
- (b) What is viscosity? Explain Newton's law of viscosity in detail. 10
3. Show that a cylindrical buoy of 1 m diameter and 2.0 m height weighing 7.848kN will not float vertically in sea water of density 1030kg/m<sup>3</sup>. Find the force necessary in a vertical chain attached at the centre of base of the buoy that will keep it vertical. 20

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Section-B

4. Discuss the Bernoulli's equation for fluid flow from the first principal. 20
5. (a) Differentiate between the Stream function and velocity potential function. 8  
(b) In a two dimensional incompressible flow, the fluid velocity components are given by  $u = x - 4y$  and  $v = -y - 4x$   
Show that velocity potential exists and determine its form. Find also the stream function. 12

Section-C

6. (a) Derive the Hagen Poiseuille formula. 10  
(b) Water at 15deg. celcius flow b/w two large parallel plates at a distance of 1.6mm apart. Determine (a) the max. Velocity. (b) the press. Drop per unit length (c) the shear stress at the walls of the plates if the avg. velocity is 0.2m/s . the viscosity of water at 15deg.celcius 0.01 poise. 10

7. Discuss the concept of power transmission through pipes with neat sketch. 20

Section-D

8. (a) Derive Von-Karman momentum integral equation. 10

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- (b) An oil of sp.gravity 0.9 and viscosity 0.06 poise is flowing through a pipe of dia. 200mm at the rate 60lit/sec. find the head loss due to friction for a 500m length of pipe. Find the power required to maintain this flow. 10
9. Explain the friction coefficients for smooth and rough pipes. 20

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