Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Fourth Semester B.Tech Degree (S, FE) Examination May 2023 (2015 Scheme)

Course Code: ME200
Course Name: FLUID MECHANICS AND MACHINERY (MC, SF)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any three questions. Each question carries 10 marks.

1	a)	Write short notes on i) Mass density ii) Weight density iii) Relative density iv) Specific volume.	(4)
	b)	What do you mean by the liquid property Surface tension? Derive the equation for pressure difference between inside and outside of a spherical liquid droplet.	(6)
2	a)	Two horizontal plates are placed 1cm apart, the space between them is filled with an oil of viscosity 11 poise and density 850 kg/m^3.Calculate the shear stress, if the upper plate is moving with a velocity of 2 m/s and kinematic viscosity.	(6)
	b)	Define the terms i) Viscosity ii) Kinematic viscosity iii)Compressibility iv) Bulk modulus.	(4)
3	a)	Define Atmospheric pressure, Absolute pressure, Gauge pressure and Vacuum pressure. From the above four terms write two mathematical expressions for finding Absolute pressure.	(6)
	b)	Define the following i) Total pressure and centre of pressure ii) Metacentre and metacentric height.	(4)
4	a)	The right limb of simple U-tube manometer contains mercury is open to atmosphere while the left limb is connected to a pipe in which water is flowing. The mercury level in the right limb is 13cm above the centre of the pipe. Find the intensity of pressure of water in the pipe if the mercury level in the left limb is 7cm below the centre of the pipe.	(5)
	b)	What are the conditions for stable equilibrium, unstable equilibrium and neutral equilibrium of a floating body?	(5)

PART B
Answer any three questions. Each question carries 10 marks

5 a) State Bernoulli's theorem. (2)

    b) Derive Bernoulli's equation from Euler's equation of motion. (8)

6 a) With neat sketch explain about Reynold's experiment. (6)

    b) Define i) Stream line ii) Path line iii) Streak line. (4)

7 a) Differentiate laminar and turbulent boundary layer? (4)

    b) Define displacement thickness. Derive the expression for displacement thickness over a smooth flat plate. (6)

8 a) Write short notes on pitot tube. (3)

    b) Derive the expression for discharge through a Venturimeter. (7)

PART C
Answer any four questions. Each question carries 10 marks.

9 a) What do you mean by Impact of jet? What are the assumptions made in the theory of impact of jet? (5)

    b) Write down the condition for maximum efficiency of jet for the following cases i) Jet strikes on a single moving plate ii) Jet strikes on a series of moving plates. (5)

10 a) Define the terms related to turbines i) Gross head ii) Hydraulic efficiency iii) Volumetric efficiency. (3)

    b) With neat sketch explain the constructional features of a Pelton wheel. (7)

11 a) Differentiate Kaplan turbine and Propeller turbine. (5)

    b) Discuss on Cavitation in turbines? (5)

12 With neat sketch explain the working of a single acting reciprocating pump. (10)

13 a) Define indicator diagram of a reciprocating pump and draw the ideal indicator diagram. (5)

    b) Define the following terms related to centrifugal pump i)Type number ii) Flow number iii) Power number. (5)

14 The internal and external diameters of the impeller of a centrifugal pump are 20 cm and 40 cm respectively. The pump is running at 1200 rpm. The vane Angles of the impeller at inlet and outlet are 20^0 and 30^0 respectively. The water enters radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. Also find the manometric head if the manometric efficiency is 75%. (10)