Time: 3 hours **Marks: 80**

N.B. (1) Question No 1 is compulsory
(2) Attempt any three questions out of remaining five questions
(3) Assumption made, if any should be clearly stated
(4) Figures to the right indicate full marks.

Q1	**Solve any Four out of Five**	**20**
a)	Define Newtonian and Non- Newtonian fluids with suitable examples.	
b)	Two horizontal plates are placed 1.25 cm apart, the space between them being filled with oil of viscosity 14 poises. Calculate the shear stress in oil if upper plate is moved with a velocity of 2.5 m/s.	
c)	Write a short note on Surface Tension.	
d)	What are the various types of losses occurring in pipe	
e)	Differentiate between NPSHA and NPSHR.	
Q2		
a)	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 15cm pipe ,if the average velocity in 20 cm diameter pipe is 2 m/s.	**10**
b)	State the Bernoulli's theorem for compressible flow. Derive an expression for Bernoulli's equation for Isothermal process.	**10**
Q3		
a)	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 centre lines of the pipes) are found to be same and equal to 35cm. Determine the difference of pressure between the pipes.	**10**
b)	What is an Orificemeter? Derive an expression for the discharge through Orificemeter.	**10**
Q4		
a)	Derive an expression for Hagen Poiseuille's equation?	**10**
b)	An oil of specific gravity 0.7 is flowing through the pipe of diameter 300 mm at the rate of 500 lit/sec. Find the head lost due to friction and power required to maintain the flow for a length of 1000 m. Take kinematic viscosity as 0.29 stokes.	**10**
Q5		
a)	Derive an expression for terminal settling velocity for a one dimensional motion of a particle in a fluid.	**10**
b)	Calculate the stagnation pressure, temperature and density at the stagnation point on the nose of a plane, which is flying at 800 km/hour through still air having a pressure 8 N/cm^2 (abs.) and temperature -10° C. Take R= 287 J/(kg K) and k=1.4.	**10**
Q6		
a)	Explain Gate valve and Globe valve with neat sketch.	**10**
b)	Explain the characteristics curves of centrifugal pump	**10**

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