Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: FLUID MECHANICS
Semester: III
Program: B.Tech(Applied Petroleum Engineering with Gas specialization)
Time 03 hrs.
Course Code: MECH2007 **Max. Marks: 100**

Instructions:

SECTION A(20 Marks)

S. No.		**Marks**	**CO**
Q 1	What do you mean by capillarity and surface tension?	**4**	**CO1**
Q 2	A rectangular plane surface 3 m wide and 4 m deep lies in water in such a way that its plane makes an angle of 30 degrees with the free surface of water. Determine the total pressure force and position of centre of pressure , when the upper edge is 2 m below the free surface.	**4**	**CO2**
Q 3	What do you mean by velocity potential function and stream function?	**4**	**CO2**
Q 4	Elaborate on Bernoulli's equation.	**4**	**CO3**
Q 5	Discuss the operation of pitot tube.	**4**	**CO4**

SECTION B(40 marks)

Q 6	An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orificemeter =0.64.	**10**	**CO4**
Q 7	In a 100mm diameter horizontal pipe a venturimeter of 0.5 contraction ratio has been fixed. The head of water on the metre when there is no flow is 3 m(gauge). Find the rate of flow for which the throat pressure will be 2 metres of water absolute. The co-efficient of discharge is 0.97. Take atmospheric pressure= 10.3 m of water.	**10**	**CO4**
Q 8	An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and of length 300m. The rate of flow of fluid through the pipe is 3.5 litres/second. Find the pressure drop in a length of 300m and also the shear stress at the pipe wall.	**10**	**CO5**
Q 9	Derive and discuss Hagen-Poiseuille's Equation. OR A rectangular plane surface 3 m wide and 4 m deep lies in water in such a way that its plane makes an angle of 30 degrees with the free surface of water. Determine the total pressure force and position of centre of pressure , when the upper edge is 2 m below the free surface.	**10**	**CO4**

SECTION-C(40 marks)			
Q 10	Water flows over a rectangular weir 1 m wide at a depth of 150mm and afterwards passes through a triangular right-angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively, find the depth over the triangular weir. OR Discuss turbulent flow and the relevant equations. Discuss different types of centrifugal pumps.	**20**	**CO5**
Q 11	Discuss different types of notches and weirs.	**20**	**CO5**