BACHELOR OF CIVIL ENGINEERING (EVENING) EXAMINATION 2017 (1st Year. 1st Semester Supplementary)

FLUID MECHANICS II

Time: Three hours

(Answer any FIVE questions)

Marks: 100

Different parts of the same question should be <u>answered together</u>. All symbols carry their usual meanings unless otherwise mentioned. Assume any relevant data if necessary.

1.	a) What is orifice meter? Derive an expression for the discharge through an	10
	Orifice meter.	
	b) A Venturimeter of diameter (30 cm \times 15 cm) is installed in pipe through which	10
	a fluid of sp. gravity is 0.9 is flowing. The pressure head measured	1
	using a differential mercury manometer is 60 cm. Calculate the discharge	
	when the co-efficient of discharge of the meter is 0.95. Draw the schematic of	
	the Venturimeter.	
2.	a) Derive the expression for the loss of head of a viscous fluid flowing through a	10
	circular pipe.	
	b) An oil of viscosity 0.1Ns/m ² and sp. gravity 0.8 is flowing through a circular	
	pipe of diameter 60 mm and length 200 m. Calculate the pressure drop in a	10
	length of 200m and the shear stress at the pipe wall if the discharge through	
	the pipe is 4 litres/s.	
3.	a) Derive the expression for the head loss due to sudden enlargement.	12
	b)A 200 mm diameter pipe reduces in diameter abruptly to 100 mm diameter.	
	Calculate the pressure loss across the contraction if flow through the pipe is	
	40 litres/s. Assume co-efficient of contraction as 0.7.	8
4.	a) Find an expression for the power transmission through pipes. What is the	10
	condition for maximum transmission of power and corresponding efficiency of	
	transmission?	
	b) A 80 mm diameter pipe carries water under a head of 10 m with a velocity of	10
	6 m/s. If the axis of the pipe turns through 45°, calculate the magnitude and	
	direction of the resultant force at the bend.	

5.	a) How water turbines are classified? Draw a schematic of different components	10
	of a Pelton wheel.	
	b) A Francis turbine rotates at 300 rpm under a head of 50m. Its diameter at	
	inlet is 1.2m and the flow area is 0.6m ² . The angles made by the absolute and	
	relative velocities at inlet are 20° and 30° respectively with the tangential	10
	velocities. Calculate the discharge, the power developed and hydraulic	
	efficiency. (Assume radial flow at outlet).	į
6.	a) Discuss the main components of a centrifugal pump with suitable diagram.	6
	b) A centrifugal pump delivers water against a net head of 16 meters at a speed	
	of 1000 rpm. Vane angle at outlet is 30°. Impeller diameter is 300mm and	
	outlet width 50mm. Manometric efficiency of the pump is 90%. Determine the	8
	discharge of the pump.	
	c) Derive the expression for the specific speed of a turbine.	6
7.	Write short notes on: (any FOUR) 4 X 5	20
	a) Moody's Diagram	
	b) Equivalent pipe	
	c) Draft tube	
	d) Governing of Pelton Turbine	
	e) Hydraulic jump	