

B.E. CIVIL ENGINEERING (PART TIME) FIRST YEAR FIRST SEMESTER - 2018**FLUID MECHANICS II**

Time: Three hours

(Answer any FIVE questions)

Marks: 100

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

1. a) Derive an expression for the discharge through an orifice meter. 8
- b) A Venturimeter of 15 cm diameter is installed in pipe of 30 cm diameter through which an oil of SG 0.8 is flowing. The pressure difference measured using a differential mercury manometer is 50 cm. Calculate the discharge when the coefficient of discharge of the meter is 0.96. 8
- c) What are the differences between a Notch and weir? 4
2. a) Derive the expression for the loss of head of a viscous fluid flowing through a circular pipe. 12
- b) An oil of viscosity 0.1Ns/m^2 and SG 0.8 is flowing through a circular pipe of diameter 50 mm and length 100 m. Calculate the pressure drop in a length of 100 m and the shear stress at the pipe wall if the discharge through the pipe is 10 litres/s. 8
3. a) What are the different losses in pipe flow? 5
- b) Derive the expression for the head loss due to sudden enlargement. 8
- c) A 300 mm diameter pipe reduces in diameter abruptly to 100 mm diameter. Calculate the head loss across the contraction if the discharge through the pipe is 40 litres/s. Assume co-efficient of contraction as 0.6. 7
4. a) Derive the condition for the maximum transmission of power through a pipe. What is the corresponding transmission efficiency? 8
- b) What do you mean by open channel flow? Derive the expression for the discharge through an open channel by Chezy's formula. 8
- c) What do you mean by most economic channel? 4

5. a) How water turbines are classified? 4
- b) Draw a schematic layout of a hydroelectric power plant with its different components. 8
- c) A Pelton wheel of mean bucket diameter 1 m is running at a speed of 1000 rpm under a head of 700 m. Determine the power developed and hydraulic efficiency of the wheel when discharge is 110 liters per second. Bucket deflects at 165 Degree. 8
6. a) Draw a schematic diagram of a centrifugal pump with its major components. Briefly state the functions of different components. 10
- b) Define the specific speed of a pump. Derive the expression for the specific speed of a pump. 6
- c) Draw and explain the performance characteristics curve of a centrifugal pump. 4
7. Write short notes on: (any **FOUR**) 4 X 5 20
- a) Pitot tube
- b) Moody's diagram
- c) Equivalent pipe
- d) Draft tube
- e) Hydraulic jump