

**B.E. CIVIL ENGINEERING SECOND YEAR FIRST SEMESTER
SUPPLEMENTARY EXAM 2018**

FLUID MECHANICS- II

Time: Three hours

Marks: 100

(Answer any FIVE questions)

*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) What are the flow measurement devices are used in engineering application. ? 4
 b) Derive the expression for the discharge through a triangular notch. 6
 c) An oil of specific gravity 0.8 is flowing through a horizontal venturimeter of inlet pipe and throat diameters are 30 cm and 15 cm respectively. The pressure intensity at inlet is 10 N/cm² while the vacuum pressure at the throat is 30 cm of Hg. Determine the rate of flow if co-efficient of discharge is 0.96. 10

2. a) Derive an expression for Hagen Poiseuille's equation stating its assumptions. 12
 b) An oil of viscosity 1 poise and density 800 kg/m³ is flowing through a circular pipe of diameter 40 mm and length 100 m. The rate of flow of fluid through pipe is 10 litres/s. Find the pressure drop in a length of 100 m and shear stress at the pipe wall. 8

3. a) What are the different losses in pipe flow? 4
 b) Derive the expression for the head loss due to sudden enlargement in the pipe flow. 8
 c) The rate of flow of water through a horizontal pipe of diameter 10 cm which is suddenly enlarged to 30 cm diameter. If the pressure in the smaller pipe is 15N/cm² and discharge is 0.2 m³/s, calculate the head loss due to sudden enlargement and pressure in the large pipe. 8

4. a) What do you mean by open channel flow? 5
b) What do you mean by most economical cross section of channels? What are the conditions for the rectangular channel of the best section? 7
c) Derive the expression for the discharge through an open channel (Chezy's formula). 8
5. a) Draw a schematic diagram of a hydro-electric power plant showing its major components. 8
b) A Pelton wheel having tangential velocity 50 m/s operates under a net head of 500 m. Bucket deflects at 165° and discharges 120 liter per second. Determine power developed and hydraulic efficiency of the turbine if coefficient of velocity is 0.96. Draw velocity triangles 12
6. a) Show the different components of a centrifugal pump with a neat sketch. 8
b) The outer and inner diameters of the impeller of a centrifugal pump are 600mm and 400mm respectively. The vane angle at outlet is 35° . Pump delivers a discharge of $0.12\text{m}^3/\text{s}$ of water against a head of 10m at a speed of 1050rpm. If the flow area of the pump remains constant from inlet to the outlet, determine the manometric efficiency and vane angle at inlet. Draw the velocity triangle. 12
7. Write short notes on: (any **FOUR**) 4 X 5 20
a) Reynold's experiments.
b) Moody's diagram.
c) Stokes Law
d) Draft Tube
e) Hydraulic Jump
f) Specific energy curve