

**March 2022**  
**B.Tech - 3rd Sem**  
**Fluid Mechanics and Machines (PCC-ME-303/21)**

**Duration: 90 Minutes**

**Max. Marks: 25**

**Instructions:**

- It is compulsory to answer all the questions (1 mark each) of Part-A in short.
- Answer any four questions from Part-B in detail.
- Different sub-parts of a question are to be attempted adjacent to each other.

**PART A**

- Q1**
- |  |     |
|--|-----|
| (a) Define specific gravity.                             | (1) |
| (b) State Newton's law of viscosity.                     | (1) |
| (c) Define streak line.                                  | (1) |
| (d) Define displacement thickness of boundary layer.     | (1) |
| (e) Write Darcy Weisbach equation.                       | (1) |
| (f) Define Euler's number.                               | (1) |
| (g) What is the use of governing mechanism in a turbine? | (1) |
| (h) Define cavitation.                                   | (1) |
| (i) What is the use of unit quantities?                  | (1) |
| (j) What is an indicator diagram?                        | (1) |

**PART B**

- Q2**
- |   |     |
|---|-----|
| (a) Define metacentric height. How it will help in determining the stability of a floating bodies?  | (3) |
| (b) A solid cylinder 2 m in diameter and 2 m high is floating in water with its axis vertical. If the specific gravity of the material of cylinder is 0.65. Find the metacentric height. State whether the equilibrium is stable or unstable. | (2) |
- Q3**
- |  |     |
|--|-----|
| (a) What is the use of venturimeter? Draw a neat dimensional sketch of a venturimeter.                   | (3) |
| (b) Define Bernoulli's Theorem. Also write various assumptions made while deriving Bernoulli's equation. | (2) |

- Q4** (a) Write various types of losses in pipes. (3)
- (b) An oil of specific gravity 0.92 and viscosity 0.03 poise is to be transported at 2500 litres/sec through a 1.2 m diameter pipe. Test were conducted on a 12 cm diameter pipe using water at 20 degree centigrade. If the viscosity of water at 20 degree centigrade is 0.01 poise. Find velocity of flow in the model. (2)
- Q5** (a) Classify various types of turbines. (3)
- (b) A Pelton wheel of 1.1 m mean bucket diameter works under a head of 500 m. The deflection of the jet is 165 degree and its relative velocity is reduced over the bucket by 15% due to friction. If the diameter of the jet is 100 mm and the water is to leave the bucket without any whirl, determine the rotational speed of the wheel. (2)
- Q6** (a) Discuss any two efficiencies of centrifugal pump. (3)
- (b) A single acting reciprocating pump operating at 120 rpm has a piston diameter of 200 MM and stroke of 300 MM. The suction and delivery heads are 4 m and 20 m, respectively. If the efficiency of both suction and delivery stroke is 75%, determine the power required by the pump. (2)



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