



Fluid Mechanics and Hydraulic Machines
(ME)

Maximum Marks: 70

Date: 15.09.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 List out the physical properties of fluids.
- 2 Name the different types of Pressures.
- 3 Differentiate between steady and un steady flows
- 4 State the continuity equation.
- 5 Define drag and lift.
- 6 List out Minor losses in Pipes.
- 7 Mention different types of hydraulic turbines.
- 8 Mention the purpose of draft tube in turbine.
- 9 Define specific speed of a centrifugal pump.
- 10 Define the term NPSH.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Explain differential manometers with neat sketch. Derive the difference of pressure for U-tube Differential Manometer. (10M)

OR

- 12 Explain U-tube manometers with neat sketch and Find out the pressure (10M)
- 13 Water flows through a pipe AB 1.2m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE. (10M)

OR

- 14 a) Describe different types of flows. (5M)
b) A 30 cm diameter pipe conveying water branches in to two pipes of diameters 20cm and 15cm. If average velocity in 30cm diameter pipe is 2.5 m/s, find the discharge in this pipe and also determine the velocity of 15cm pipe, if the average velocity in 20cm diameter pipe is 2m/s.

(5M)

- 15 a) Describe Boundary Layer Concepts. (5M)
b) How Reynold's experiment could be useful to fluid Mechanics. (5M)

OR

- 16 Explain the separation of boundary layer with neat sketch. (10M)
- 17 a) Derive the expression for force exerted by the jet on a stationary vertical plate. (5M)
b) Derive the expression for force exerted by the jet on a stationary curved plate, where jet strikes at the centre. (5M)

OR

- 18 a) Explain with neat sketches of hydroelectric power station. (5M)
b) A turbine is to operate under a head of 25m at 200 r.p.m. The discharge is 9 comic. If the efficiency is 90%, determine the performance of the turbine under a head of 20 meters. (5M)
- 19 Explain about Reciprocating pump with neat sketch. (10M)

OR

- 20 Mention on which principle Centrifugal pump works. Explain the main parts of a Centrifugal pump with neat sketches. (10M)