Scheme G

Sample Test Paper-I

Course Name :-Diploma in Mechanical Engineering Group

Course Code :- ME/PG/PT/MH/MI/FE/FG

17411

Semester :- Fourth

Subject Title :- Fluid Mechanics and Machinery

Marks :- 25   **Time:-1 hour**

Instructions:

1. All questions are compulsory

2. Illustrate your answers with neat sketches wherever necessary

3. Figures to the right indicate full marks

4. Assume suitable data if necessary

5. Preferably, write the answers in sequential order

Q1. Attempt any THREE   **(9 Marks)**

1. Define Specific gravity, Specific volume and Vapour pressure.

2. Explain Total Pressure and Centre of Pressure.

3. State Bernoulli's Theorem.

4. Explain working principles of Pitot tube with a neat sketch?

Q2. Attempt any TWO   **(8 Marks)**

1. A circular plate of 6 m diameter is held in water in such a way that its maximum and minimum depth from surface of water is 3 m and 9 m. Determine the total pressure on the plate and the position of centre of pressure.

2. A tube manometer is used to measure pressure of oil specific gravity 0.85 flowing in a pipe line. Its left end is connected to pipe and right limb is open to atm. The centre of pipe is 100 mm below level of mercury in right limb. If the difference of mercury level in two limbs is 160 mm . Find absolute pressure in kPa. Take specific gravity of mercury =13.6.

3. Differentiate between i) laminar flow and turbulent flow

                         ii) steady flow and unsteady flow

                         iii)rotational flow and irrotational flow

Q3. Attempt any ONE   **(8 Marks)**

1. Explain with neat sketch working principle of venturimeter

2. State and Explain laws of fluid friction

Scheme G

Sample Test Paper-II

Course Name :-Diploma in Mechanical Engineering Group

Course Code :- ME/PG/PT/MH/MI/FE/FG

17411

Semester   :- Fourth

Subject Title :- Fluid Mechanics and Machinery

Marks   :- 25   **Time: 1 hour**

Instructions:

1. All questions are compulsory

2. Illustrate your answers with neat sketches wherever necessary

3. Figures to the right indicate full marks

4. Assume suitable data if necessary

5. Preferably, write the answers in sequential order

Q1. Attempt any THREE   **(9 Marks)**

1) Classify water turbines with an example of each.

2) Explain water hammer. How it is minimized?

3) A Pelton wheel turbine is to operate under a head of 42 m at 430 r.p.m. If the discharge is 11.5 m^3/s and turbine efficiency is 90%, calculate power generated by the turbine.

4) Explain the need of draft tube in reaction turbine.

Q2. Attempt any TWO   **(8 Marks)**

1) Draw a neat labeled sketch of Pelton turbine

2) State and draw different types of impellers in centrifugal pumps with application of each.

3) Explain the concept of cavitation in pumps

Q3. Attempt any ONE   **(8 Marks)**

1. Explain with a neat sketch working of submersible pump..

2. Explain the working of centrifugal pump with a neat labeled sketch.

Sample Question Paper-

Course Name :-Diploma in Mechanical Engineering Group

Course Code :- ME/PG/PT/MH/MI/FE/FG

17411

Semester :- Fourth

Subject Title :- Fluid Mechanics and Machinery

Marks :- 100   **Time:-3 hour**

Instructions :-
1. All Questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.
5. Use of Non-programmable Electronic Pocket Calculator is Permissible.

1. A) Attempt any SIX of the following: **(12 Marks)**

   a. Define Density and Surface Tension.

   b. Define fluid pressure intensity and pressure head.

   c. State the Bernoulli's theorem.

   d. Define the term Impact of jet.

   e. Define Laminar flow and Turbulent flow.

   f. State the function of air vessel.

   g. List the types of draft tubes.

   h. State the meaning of 'NPSH' with reference to centrifugal pumps.

B) Attempt any TWO of the following: **(8 Marks)**

   a. A circular plate 1.3 m in diameter is immersed vertically in water so that centre of the plate is 2.2 m below the free surface. Determine total pressure and the depth of centre of pressure.

   b. Explain Bourdon pressure gauge with a neat sketch.

   c. Explain Hydraulic Gradient Line and Total Energy Line.

2. Attempt any FOUR of the following: **(16 Marks)**

   a. Explain working principle of Differential manometer with neat sketch.

   b. Derive coefficient of discharge for Venturimeter.

c. A jet of water of diameter 10 cm strikes a flat plate normally with a velocity of 15 m/sec. The plate is moving with a velocity of 6m/sec in the direction of jet. Find: i) The force exerted by the jet on the plate ii) Work done by the jet on the plate per sec.

d. A pipe 850 m long connects two reservoirs whose level difference is 50 m. find the discharge in pipe in liters/sec, if diameter of pipe is 0.5 m. Take all losses into account. Assume f=0.01

e. State and explain minor losses in pipe fittings and valves

f. Explain concept of Absolute vacuum, Gauge pressure and Atmospheric pressure with a neat diagram.

3. Attempt any FOUR of the following: (16 Marks)

a. Classify hydraulic turbines and give application of each.

b. A Pelton wheel turbine is to operate under a head of 30 m at 300 r.p.m. If the discharge is 8 m^3/s and turbine efficiency is 90%, calculate power generated by the turbine.

c. Explain with a neat sketch the layout of a hydroelectric power plant.

d. A jet of water is moving with velocity of 20m/sec impinges at the centre of curved vane, which deflects it through 150^0. Find the force acting on the fixed vane in direction of jet, if the vane is symmetrical and smooth. What will be the resultant force per Newton of water?

e. Define Kinematic viscosity and Dynamic viscosity.

f. A left limb of a simple 'U' tube mercury manometer is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The centre of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm.

4. Attempt any TWO of the following: (16 Marks)

a. Explain the working of Francis turbine with a neat sketch

b. A centrifugal pump delivers 30 litres of water per second to a height of 18 meters through a pipe 90 m long and 100 mm diameter . If the overall efficiency of the pump is 75%. Find the power required to drive the pump. Take f=0.012

c. Explain the construction and working of jet pump with a neat diagram

5. Attempt any FOUR of the following: (16 Marks)

a. Define Manometric Head and Manometric Efficiency.

b. Define

 i) Negative Slip

 ii) State the working principle of single acting reciprocating pump

c. Describe separation and cavitation in pumps?

d. Explain Laws of fluid friction?

e. Explain the working of orifice meter with a neat sketch?

f. Write Darcy's equation for flow through pipe and explain all the terms with units.

6. Attempt any TWO of the following: **(16 Marks)**

a. i) Derive an expression for Force exerted by a jet of diameter 'd' strike on a flat plate moving with a velocity 'v'

   ii) Draw s neat sketch of Pelton wheel and label its part.

b. A horizontal Venturimeter with inlet and throat diameter 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential Manometer connected to the inlet and throat is 20 cm of Hg. Determine the rate of flow. Take cd=0.98

c. Draw and explain indicator diagram for a single acting reciprocating pump with effect of acceleration head and frictional head.