Sample Question Paper-I

9054

Course Name : **Mechanical and Production Engineering, Production Technology**

Course Code : **ME/PT/PG/MH**

Semester : **Fourth**

Title of the Subject : **Fluid Mechanics & Machinery**

Max Marks : **80** **Time: 3 Hrs.**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat, labeled diagrams wherever necessary.
4. Assume required data, if not provided, stating your assumptions.

Q1 (a) Attempt any Four of the following. **08 Marks**

i) Specific gravity of oil is 0.76. Calculate its density in kg/m^3 and specific weight in N/m^3.

ii) Define the terms "pressure intensity" and "pressure head". Give the relation between them.

iii) Define "laminar flow" and "turbulent flow".

iv) Define "Kinematic viscosity" and state its SI unit.

v) With neat sketch, state different types of draft tubes for reaction turbines.

Q1 (b) Attempt any Two of the following. **08 Marks**

i) With the help a neat labeled sketch, describe in brief the functioning of "volute casing" of a centrifugal pump.

ii) Draw a detailed diagram of "inverted U-tube differential manometer". Under what pressure conditions it can be used?

iii) State the laws of fluid friction for laminar flow.

Q2 Attempt any Three of the following **12 Marks**

i) State any four reasons for the fault "no liquid delivered" in fault finding of centrifugal pump?

ii) A jet of water of 5 cm diameter Suggest probable remedies also with a velocity of 12 m/s strikes a fixed curved vane at an angle of 35° and the jet leaves the vane at an angle of 20°. If there no frictional losses, find the normal and tangential forces of the jet on the vane.

iii) Identify all losses of arrangement shown in the fig-1 and give their appropriate formulae.

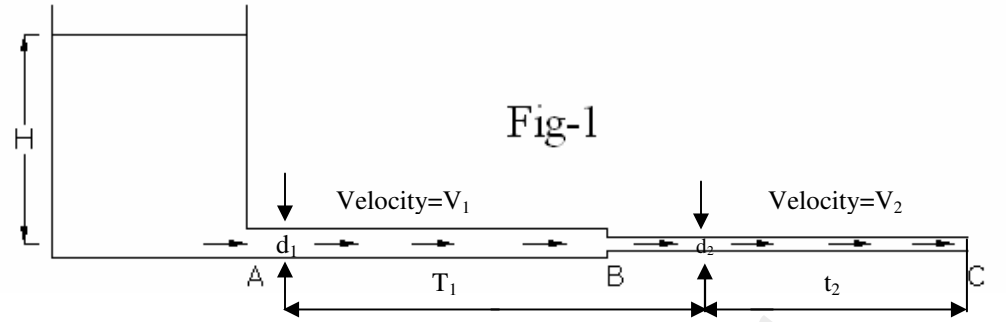

Fig-1

iv) What is priming? Why it is necessary for centrifugal pumps? What are its methods?

Q3 Attempt any Three of the following. 12 Marks

i) A pelton wheel working under head of 50 mdevelops 80 kw at 230 rpm. Calculate the diameter of jet if the overall efficiency is 78% Assume C_V=0.98

ii) Draw a neat sketch of venturimeter. State why the length of divergent cone is made longer?

iii) Distinguish between impulse turbine and reaction turbine on the basis of principle of working, pressure head and discharge.

iv) A jet of water of 0.05 m diameter with a velocity of 15 m/s impinges on a series of vanes moving with a velocity of 6 m/s.

Find
a) Force exerted by the jet,
b) Work done by the jet,
c) Kinetic energy of the jet and
d) Efficiency of the jet.

Q4 Attempt any Two of the following. 16 Marks

i) A pelton wheel operates under a head of 300 m with a speed ratio of 0.5. The buckets are bent backwards by 30°. Determine the power developed per unit weight of water flow.

ii) Draw the indicator diagram considering both acceleration head and friction head for reciprocating pump.

iii) Water at a head of 300 m is supplied to a pipe of diameter 40 cm and length 4m. Assume f = 0.009. Calculate the following.

a) Power transmitted when velocity is 1.5 m/s.
b) Maximum power transmitted.
c) Power transmitted when velocity is 3.2 m/s.
d) Draw the graph power transmitted v/s velocity.

Q5 Attempt any Two of the following. 12 Marks

i) Describe with a neat sketch the working of bourdons tube pressure gauge

ii) A 5m long tapered pipe is inclined at an angle of 15° with horizontal. Diameter of the pipe at top end is 0.24 m and that at bottom end is 0.08 m. find the pressure difference between the two ends if the velocity of water at bottom end is 2 m/s.

iii) State the procedure for drawing the inlet and outlet velocity triangles for moving curved vanes with usual notations.

Q6 Attempt any Two of the following. 12 Marks

i) Explain the principle of working of pitot tube with a neat sketch

ii) What is an air vessel? What are the functions of it?

iii) A centrifugal pump having impeller diameters 0.3 m and 0.6 m at inlet and outlet respectively is running at 1000 rpm. The vanes are curved back at an angle of 30° at outlet. If the velocity of flow through the impeller is 3 m/s constant.

Find 1) Vane angle at inlet and

2) Work done per kg of water on the wheel.