PVP 14

Code: ME3T3, AE3T3

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2016

FLUID MECHANICS AND HYDRAULIC MACHINES
(Common for ME, AE)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks
11x 2 = 22 M

1.
a) Define surface tension.
b) What do you mean by vacuum pressure?
c) What do you mean by pipes in series and pipes in parallel?
d) Give the expression used to find out the head loss due to sudden contraction in pipe flow.
e) Define the co-efficient of velocity and co-efficient of contraction.
f) Give the expression for work done per second on a curved vane by the jet.
g) What are the types of draft-tubes ?
h) What are the types of characteristic curves of turbines?
i) Define unit speed, unit head, and unit discharge.
j) Give the classification of centrifugal pumps.
k) What is Indicator diagram?

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2.

a) Find the Kinematic viscosity of an oil having density 981 kg/m^3. The shear stress at a point in oil is 0.2452 N/m^2 and velocity gradient at that point is 0.2 per second. 8 M

b) Explain the types of flows. 8 M

3.

a) Derive the momentum equation to calculate the force exerted by water on the pipe bend. 8 M

b) A 30cm diameter pipe, conveying water, branches into two pipes of diameters 20cm and 15cm respectively. If the average velocity in the 30cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also, determine the velocity in 15cm pipe if the average velocity in 20cm diameter pipe is 2m/s. 8 M

4.

a) An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm and throat diameter 10cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take C_d= 0.98. 8 M

b) A jet of water of diameter 10 cm strikes a flat plate normally with a velocity of 15 m/s. The plate is moving with a velocity of 6 m/s in the direction of the jet and away from the jet. Find: 8 M
i) the force exerted by the jet on the plate.
ii) work done by the jet on the plate per second.

5.

a) What is geometric similarity? Explain the governing of turbines with neat sketch. 8 M

b) A water turbine has a velocity of 6m/s at the entrance to the draft-tube and a velocity of 1.2 m/s at the exit. For friction losses of 0.1 m and tail water 5 m below the entrance to the draft-tube, find the pressure head at the entrance. 8 M

6.

a) Briefly explain what are the different types of heads and efficiencies associated with pumps? 8 M

b) A single acting reciprocating pump, running at 50 rpm, delivers $0.01m^3/s$ of water. The diameter of the piston is 200 mm and stroke length 400mm. determine:
i) the theoretical discharge of the pump,
ii) co-efficient of discharge, and
iii) slip and the percentage of slip of the pump.
8 M