

Code No: ME1505

GEC-R14

I B. Tech II Semester Supplementary Examinations, December 2015

FLUID MECHANICS AND HYDRAULIC MACHINES

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 60

Note: All Questions from **PART-A** are to be answered at one place.

Answer any **FOUR** questions from **Part-B**. All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. Explain the working principle of manometer.
2. How do you get the Bernoulli's equation from Euler's equation of fluid motion.
3. What types of losses incurred in the pipe line during the fluid flow.
4. What is meant by impact of jet on vanes.
5. Explain the geometric similarity of the hydraulic turbine.
6. Draw the indicator diagram of reciprocating pump.

PART – B

4 × 12 = 48 M

1. a) Derive the continuity equation for one dimensional fluid flow. (6M)
b) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of sp.gr. 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left limb from the centre of pipe is 15 cm above. (6M)
2. 250 lit/sec of water is flowing in a pipe having a diameter of 300 mm. If the pipe is bent by 135° (that is change from initial to final direction is 135°), find the magnitude and direction of the resultant force on the bend. The pressure of water flowing is 39.24 N/cm^2 . (12M)
3. a) Explain about the turbine flow meter with neat sketch. (6M)
b) Find the discharge of water flowing through a pipe 30 cm diameter placed in an inclined position where a venturimeter is inserted, having a throat diameter of 15 cm. The difference of pressure between the main and throat is measured by a liquid of sp.gr.0.6 in an inverted U-tube which gives a reading of 30 cm. The loss of head between the main and throat is 0.2 times the kinetic head of the pipe. (6M)

4. a) Derive an equation for force exerted by the jet of water on inclined fixed flat vertical plate. (6M)
- b) A jet of water having a velocity of 40 m/s strikes a curved vane, which is moving with a velocity of 20 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at angle of 90° to the direction of motion of vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vanes without shock. (6M)
5. a) Explain about the working of Governing of hydraulic turbine with neat sketches. (6M)
- b) A Pelton wheel is to be designed for a head of 60 m when running at 200 r.p.m. The Pelton wheel develops 95.6475 kW shaft power. The velocity of the buckets = 0.45 times the velocity of the jet, overall efficiency = 85% and coefficient of velocity is 0.98. (6M)
6. a) Explain working of single stage centrifugal pump with neat sketch. (6M)
- b) A double acting reciprocating pump, running at 40 r.p.m. is discharging 1 m^3 of water per minute. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery and suction head are 20 m and 5 m respectively. Find the slip of the pump and power required to drive the pump. (6M)
