Code :9A01308

R9

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
FLUID MECHANICS & HYDRAULIC MACHINERY
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Differentiate between:
   i. Absolute and gauge pressure
   ii. Simple manometer and differential manometer
   iii. Piezometer and pressure gauge.
   (b) Calculate the pressure due to a column of 0.4m of (a) water, (b) an oil of specific gravity 0.9,and (c) mercury of specific gravity 13.6. Take density of water, $\rho = 1000\frac{kg}{m^3}$.
2. (a) Name the different forces present in a fluid flow. For the Euler's equation of motion, which forces are taken into consideration?
   (b) A conical tube of length 3.0 m is fixed vertically with its smaller end upwards the velocity of flow at the smaller end is 4 m/s while at the lower end it is 2 m/s. The pressure head at the smaller end is 2.0 m of liquid. The loss of head in the tube is $0.95(v_1 - v_2)^2/2g$, where v_1 is the velocity at the smaller end and v_2 at the lower end respectively. Determine the pressure head at the lower end. Flow takes place in downward direction.
3. (a) What do you understand by the terms: major energy loss and minor energy losses in pipes?
   (b) Find the velocity of an oil through a pipe, when the difference of mercury level in a differential U-tube manometer connected to the two tappings of the pitot-tube is 15 cm. Take specific gravity of oil = 0.8 and co-efficient of pitot- tube as 0.98.
4. A jet of water having a velocity of 40m/sec strikes a curved vane, which is moving with a velocity of 20m/sec. The jet makes an angle of 30^0 with the direction of motion of the vane at inlet and leaves at an angle of 90^0 to the direction of motion of the 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 vane without shock.
5. (a) Discuss the factors that should be considered while selecting the turbine for a particular power plant.
   (b) Where do you provide pumped storage plants? Explain the working of a pumped storage plant.
6. (a) How will you classify the turbines? Explain in detail.
   (b) A pelton wheel is to be designed for the following specifications. Power = 735.75 KW S.P, Head = 200m, Speed = 800 r.p.m., $\eta = 0.86$ and jet diameter is not to exceed one-tenth the wheel diameter. Determine:
   i. Wheel diameter
   ii. The number of jets required,and
   iii. Diameter of the jet. Take $C_v = 0.98$ and speed ratio = 0.45.
7. (a) What are the quantities? Define the unit quantities for a turbine. Why are they important?
   (b) A turbine is to operate under a head of 30m at 300 r.p.m. The discharge is $10m^3/s$. If the efficiency is 90% determine :
   i. Specific speed of the machine,
   ii. Power generated and
   iii. Type of the turbine.
8. (a) Define the terms:
   i. Priming
   ii. Manometric efficiency
   iii. Net positive suction head.
   (b) A centrifugal pump running at 1220 rpm delivers 0.25 m^3/s against a head of 20m. Calculate the discharge, head and power if the speed is increased to 1440 rpm.

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