NH2-111

December-2015

B.Sc., Sem.-III

CC-203 : Hydraulics & Pumps

Fire & Safety

Time : 3 Hours]   **[Max. Marks : 70**

1. (a) Explain the principle of venturimeter with neat sketch. Derive the expression for the rate of flow of fluid through it. **(07)**

    OR

    What is a pitot tube? How will you determine the velocity at any point with the help of pitot tube ?

    (b) Find the velocity of the flow of oil through a pipe, when the difference of mercury level in a differential U-tube manometer connected to the toppings of the Pitot tube is 100 mm. Take co-efficient of pitot-tube 0.98 and sp. Gr. Of oil = 0.8 **(07)**

    OR

    A pitot static tube placed in the Centre of a 300 mm pipe line has one orifice pointing upstream and other perpendicular to it.The mean velocity in the pipe is 0.80 of the central velocity. Find the discharge through the pipe if the pressure difference between the two orifices is 60 mm of water. Take the coefficient of pitot tube as Cv = 0.98.

2. (a) With a neat sketch explain the principle and working of a centrifugal pump. **(07)**

    OR

    With a neat sketch explain the principle and working of a Reciprocating pump.

    (b) A double acting reciprocating pump, running at 50 r.p.m., is discharging 900 litres of water per minute. The pump has stroke of 400 mm. The diameter of the piston is 250 mm. The delivery and suction head are 25 m and 4m respectively. Find the slip of the pump. **(07)**

    OR

    A single acting reciprocating pump running at 50 r.p.m, delivers 0.01 m³/s of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine: (i) Slip of the pump, (ii) The theoretical discharge of the pump

3. (a) Explain the phenomenon of water hammer. **(07)**

    OR

    A crude oil of kinematic viscosity 0.4 strokes is flowing through a pipe of diameter 300 mm at the rate of 300 litres per sec.Find the head lost due to friction for a length of 50 m of the pipe. Take the value of 'f' = 0.00591

(b) Calculate the discharge through pipe of diameter 200 mm when the difference of pressure head between the two ends of a pipe 500 m apart is 4 m of water. Take the value of 'f' = 0.009. **(07)**

OR

Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 litres/s.

4. (a) Explain with neat sketch, the working of "Fluid coupling". **(07)**

OR

Explain with neat sketch, the working of "Hydraulic lift".

(b) Explain with neat sketch, the working of "Hydraulic crane". **(07)**

OR

Find the force exerted by a jet of water of diameter 100 mm on a stationary flat plate, when the jet strikes the plate normally with velocity of 30 m/s.

5. (1) What is lifting speed of a modern lift ? **(14)**
   (2) For small discharge and high heads which pump is preferred
       (i) Centrifugal
       (ii) Reciprocating
       (iii) Propeller
       (iv) Mixed flow
   (3) The units of pressure are
       (i) N/m^2
       (ii) N/mm^2
       (iii) Pascal
       (iv) all of the above
   (4) Give the full name of "DI" in pipe.
   (5) Give the full name of "Cl" in pipe.
   (6) Give the use of "Air lift pump"
   (7) Define "Rotational flow".
   (8) Give any three types of casing.
   (9) The viscosity of water is ___than that of mercury.
       (i) Higher
       (ii) Lower
   (10) Give the main component of Venturimeter.
   (11) Give any four names of hand-operated pumps.
   (12) The lifting speed of a modern hydraulic crane may be about ___m per minute.
   (13) Give any two name of cavitations resistant material.
   (14) Define "Turbulent flow".

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