NC-116

November-2013

B.Sc., Sem.-III (Fire & Safety)

Hydraulics & Pumps

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

1. (a) Explain "Use of Hydraulics in Fire System Design Considerations".   **7**

    OR

    With a neat sketch, explain "U-tube Differential Manometer".

   (b) What do you mean by single column manometers ? How are they used for the measurement of pressure ?   **7**

    OR

    A sub-marine moves horizontally in sea and has its axis 15 m below the surface of water. A pitot-tube properly placed just in front of the sub-marine and along its axis is connected to the two limbs of a U-tube containing mercury. The difference of mercury level is found to be 170 mm. Find the speed of the submarine knowing that the sp.gr. of mercury is 13.6 and that of sea-water is 1.026 with respect of fresh water.

2. (a) Explain positive displacement pump.   **7**

    OR

    What is used of pump ?

   (b) What is NPSH ? State its importance.   **7**

    OR

    Explain with neat sketch the function of main components of centrifugal pump.

3. (a) What do you mean by "equivalent pipe" and "flow through parallel" pipes ?   **7**

    OR

    Derive Darcy-Weisbach formula for head loss due to friction in pipe flow.

   (b) Find the loss of head when a pipe of dia. 200 mm is suddenly enlarged to a dia. of 400 mm. The rate of flow of water through the pipe is 250 litres/s.   **7**

    OR

    Derive "Water Hammer". Give the necessary precautions against Water Hammer.

4. (a) Explain about various types of Valve.   **7**

    OR

    Determine the loss of head when a pipe of diameter 150 mm is suddenly enlarged to a diameter of 300 mm. The discharge through a pipe is 200 litres/sec.

(b) Derive an expression for the force exerted by a jet of water on a fixed inclined plate in the direction of jet.　　　**7**

OR

Explain with neat sketch, the working of Hydraulic Ram.

5. (1) For pipes arranged in series　　　**14**
    (a) The velocity must be the same in all pipes.
    (b) The volume flow rate is the same through each pipe.
    (c) The total flow is equal to the sum of the flow rate through each pipe.
    (d) The head loss be same in all pipes.

   (2) Give the use of "Jet Pump".

   (3) Define "Turbulent Flow".

   (4) Define "Hydraulics".

   (5) The most economical valve for use with large diameter pipes carrying water is
    (a) Butterfly valve　　　(b) Globe valve
    (c) Gate valve　　　(d) Check valve

   (6) Give the use of "Air lift pump".

   (7) In automobile, fluid torque converter work as
    (a) clutch　　　(b) gear box
    (c) accelerator　　　(d) none of these

   (8) For pipes arranged in series
    (a) The velocity must be the same in all pipes
    (b) The volume flow rate is the same through each pipe
    (c) The total flow is equal to the sum of the flow rate through each pipe
    (d) The head loss is same in all pipes.

   (9) What is priming ?

   (10) The velocity of particles passing through a point in any layer is if constant, it is known as _____

   (11) Erosion and pits formation on the impeller of a centrifugal pump may be due to
    (a) Cavitation
    (b) High speed of impeller
    (c) Over loading of pump
    (d) Off centering of pump with motor

   (12) Priming is needed in a
    (i) Reciprocating pump　　　(ii) Gear pump
    (iii) Centrifugal pump　　　(iv) All of the above

   (13) Which of the following type of energy is stored in an accumulator ?
    (i) Kinetic energy　　　(ii) Strain energy
    (iii) Pressure energy　　　(iv) Potential energy

   (14) Define "Compressible Flow".

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