314310

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   Attempt any FIVE of the following :   **10**

a) Define ideal fluid and real fluid with example.

b) Give SI unit of viscosity and Reynold number.

c) List out four different flowmeter used in chemical industries.

d) Give application of Gear pump.

e) Define term NPSH.

f) Name any two equipment used for transportation of gases in Industry.

g) Define minimum fluidisation velocity.

Marks

2. **Attempt any THREE of the following :** 12

   a) Derive the equation of continuity.

   b) Derive the principal of Hydrostatic equilibrium.

   c) Differentiate a centrifugal pump and reciprocating pump on the following points _

     i)   Discharge type

     ii)   Efficiency

     iii) Priming

     iv) Construction

   d) Compare receprocating compressor and centrifugal compressor on the basis of following points –

     i)   Speed

     ii)   Rate of flow

3. **Attempt any THREE of the following :** 12

   a) Derive Euler's equation of motion.

   b) Draw the graph of shear stress v/s velocity gradient $\left(\dfrac{du}{dy}\right)$ and show various type of fluid on it.

   c) Write the purpose of –

     i)   Tee

     ii)   Bend

     iii) Cross

     iv) Plug

   d) Give industrial application of blower and compressor.

4. **Attempt any THREE of the following :** 12

a) Explain in briefly the procedure for calibrating a given rotameter.

b) Why triangular notches are prefered than rectangular notches.

c) Draw a neat labelled diagram of venturimeter.

d) Compare fan and compresses on basis of following points.

    i) Speed

    ii) Pressure Developed

e) Draw a neat sketch of Pitot tube and write its construction, working and application.

5. **Attempt any TWO of the following :** 12

a) Prove the following equation is dimensionally correct through dimensional analysis.

    i) Mass flow rate = Volumetric flow rate × Density.

    ii) Force = Mass × acceleration.

b) State and derive Berroulli's theorem.

c) Orificemeter is installed in pipe line for measurement of flow rate of water. Pressure drop across orificemeter is 11 cm of Hg. Calculate volumetric flow rate in m^3/s

    Date :

    i) Coefficient of orifice = 0.62

    ii) Diameter of orifice = 25 mm

    iii) Diameter of pipe = 50 mm

    iv) Density of mercury = 13,600 log/m^3

6. Attempt any <u>TWO</u> of the following :   **12**

a) Water is flowing through a 25 mm ID pipe at a rate of 1 Kg/s. Calculate pressure drop over a length of 100 m.

   Data :

   i) f = 0001

   ii) ρ water = 1000 Kg/m^3

   iii) μ of water = 8.0 × 10^{-4} Pa.S.

b) Draw with neat sketch working of a centrifugal pump.

c) Water is to be pumped at a rate of 8 m^3/hr from a large reserviour resting on a floor to the open top of an experimental adsorption tower through a 50 mm I.D. pipe. The point of discharge is 5 m above the floor and frictional losses in the entire flow system amount to 2.5 J/Kg. At what height in the reserviour the water be kept if the pump can develope a power of 94 W.

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