30/11/2024   CHEMICAL   SEM-III C SCHEME   FFO   QP CODE: 10065140

Time: 3 HRS   Marks: 80

N. B.: (1) Question No. 1 is compulsory.
           (2) Attempt any three questions from remaining five questions.
           (3) Assume suitable data if necessary.

Q.1   **Answer any five questions**   [20]
   a)   Derive Newtons law of viscosity and write the units for viscosity.
   b)   Give the classification of pressure measuring devices.
   c)   Explain any two properties of fluid with units.
   d)   Write the difference between Orifice meter and Venturi meter?
   e)   Write the classifications of fluids with examples.
   f)   Derive equation of continuity.

Q.2
   a)   Water is flowing through a pipe having diameters 30 cm and 50 cm at the bottom   [10]
        and upper end respectively. The intensity of pressure at the bottom end is 3
        kgf/cm^2 and at the upper end is 1.5 kgf/cm^2. Determine the difference in datum
        head if the rate of flow through pipe is 50 lit/sec.

   b)   What is Mach no.? Explain and give its significance. What do you mean by sonic,   [10]
        subsonic and supersonic flow?

Q.3
   a)   A 40 cm diameter pipe, conveying water, branches into two pipes of diameter 30   [10]
        cm and 20 cm respectively. If the average velocity in the 40 cm diameter pipe is
        3 m/sec, find the discharge in this pipe. Also determine the velocity in 20 cm
        diameter pipe if the average velocity in 30 cm diameter pipe is 2 m/sec

   b)   Derive Euler's equation of motion; how will you obtain Bernoulli's equation   [10]
        from it; also state the assumptions made.

Q.4
   a)   An oil of specific gravity 0.7 is flowing through the pipe of diameter 300 mm at   [10]
        the rate of 500 lit/sec. Find the head lost due to friction and power required to
        maintain the flow for a length of 1000 m. Take kinematic viscosity as 0.29 stokes.

   b)   Explain the construction and working of centrifugal pump.   [10]

Q.5
   a)   Find the Mach number when an aeroplane is flying at 1100 km/hr through still   [10]
        air having a pressure of 7 N/cm^2 and temperature -5^0C, wind velocity may be
        taken as zero. Take R = 287.14 J/kg. K. Calculate the pressure temperature and
        density of air at stagnation point on the nose of the plane. Take $\gamma = 1.4$

   b)   Explain NPSH and how it can be calculated.   [10]

Q.6   Write short note on   [20]
   a)   Manometers
   b)   Types of valves
   c)   Venturimeter
   d)   Types of impeller

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