Registration No:

Total Number of Pages :2

B.TECH. DEGREE EXAMINATION-Nov-Dec.2018
End Semester Examination-III Semester
BCHPC3010-Fluid Dynamics
(Regulations 2017)(Chemical Engineering)

Time : 3 Hours   Maximum : 100 Marks   Question Code:151412
Answer ALL Questions
PART-A (10 X 2=20 Marks)

1.(a) The mass of an object is 10 kg. The gravitational acceleration at a location is 5 m/s^2.   [CO1] [PO2]
   The specific weight is
     (a) 2 N (b) 15 N (c) 5 N (d) 50 N

 (b) Two capillary tubes of different diameter are dipped in water. The rise of water is   [CO1] [PO1]
    (a) greater in the tube of smaller diameter (b) greater in the tube of larger diameter
    (c) same in both tubes (d) zero in both tubes

 (c) A pitot tube is used to measure :   [CO2][PO1]
    (a) Velocity of flow (b) flow rate (c) pressure of flow (d) total energy

 (d) Which of the following is not a dimension-less parameter?   [CO2] [PO1]
    (a) Specific gravity (b) fanning friction factor (c) Euler number (d) none of these

 (e) In dimensional analysis the Buckingham's pi theorem is widely used and   [CO3] [PO1]
    expressed the resulting equation in term of:
    (a) The repeating variable (b) geometric, kinematic, dynamic variable (c) (n-m)
    dimensionless parameters (d) n dimensionless parameters

 (f) The minimum fluidization velocity for a specific system depends upon (a) Particle size   [CO3] [PO1]
    (b) fluid viscosity (c) density of both particle and fluid (d) all of above

 (g) When larger particles are subjected to fluidization, the corresponding bed produced   [CO3] [PO1]
    is............. bed.
    (a) Spouted (b) sluggish (c) boiling (d) teeter

 (h) Pump transfers the mechanical energy of a motor or of an engine into........... of a fluid.   [CO3] [PO1]
    a. pressure energy b. kinetic energy c. either pressure energy or kinetic energy
    d. pressure energy, kinetic energy or both

 (i) .... Valve is used for controlling flow.   [CO4] [PO1]
    (a) ball (b) globe (c) Check (d) pneumatic control valve

 (j) ....Pump is used for handling corrosive liquid.   [CO4] [PO1]
    (a) piston (b) plunger (c) diaphragm (d) rotary

PART-B (10 X 2=20 Marks)

2. (a) State Newton's Law of viscosity.   [CO1][PO1]
   (b) What is Vena Contract? How Cc, Cd Cv are related?   [CO2] [PO1]
   (c) Why Rota meter is an area meter?   [CO1][PO1]
   (d) Define 'Form drag' and 'Skin drag'.   [CO2] [PO1]
   (e) Define the term 'Mach number'   [CO2] [PO1]
   (f) Define 'Minimum fluidization velocity'.   [CO3] [PO1]
   (g) Write the Kozeny-Carman equation.   [CO3] [PO1]
   (h) Define spigot joint.   [CO4] [PO1]
   (i) Differentiate between fan and blower.   [CO4] [PO1]
   (j) Define Priming in pump and why it is necessary?   [CO4] [PO1]

PART-C (4 X 15=60 Marks)

3.(a) (i) Derive hydrostatic law.   [5][CO1][PO2]

   (ii) A vertical cylinder of diameter 180mm rotates concentrically inside another   [10][CO1] [PO2]
   cylinder of diameter181.2mm. Both the cylinders are 300mm high. The space between
   the cylinders is filled with a liquid. Determine the viscosity of the liquid if a torque of
   20Nm is required to rotate the inner cylinder at 120 rpm.

(or)

 (b) (i) State and derive Pascal's law.   [5][CO1] [PO2]

   (ii) A square metal plate of 1.8m side and 1.8mm thick weighing 60N is to be shifted   [10][CO1] [PO2]
   through a vertical gap of 30mm of infinite extent. The oil in the gap has specific
   gravity of 0.95 and viscosity of $3Ns/m^2$. If the plate is to be lifted at a constant speed
   of 0.12m/s, find the force and power required.

4. (a) (i) Discuss the friction loss from sudden expansion of cross section with neat sketch.   [5] [CO2][PO1]

   (ii) A kite of $0.64m^2$ weighing 3.924N assumes an angle of 120 deg to the horizontal.
   The string attached to the kite makes an angle of 450 deg to the horizontal. The pull on   [10][CO3] [PO2]
   the string is 24.525Nwhen the wind is flowing at a speed of 30km/hr. Find the drag
   and lift co-efficient. Density of air is $1.25kg/m^3$.

(or)

(b) (i) Explain the terminal velocity of a sphere.   [5][CO3] [PO1]

  (ii) A spherical steel ball of diameter 40mm and density $8500kg/m^3$ is dropped in large
   mass of water. The co-efficient of drag of the ball in water is 0.45. Find the terminal   [10][CO3][PO2]
   velocity of the ball in water. If the ball is dropped in air, find the increase in terminal
   velocity of ball. Take density of air is $1.25 kg/m^3$and CD is 0:1:

5. (a) (i) Write the advantages and disadvantages of fluidization.   [5] [CO2] [PO1]

   (ii) Derive the Ergun's equation for the flow of fluid through the bed of solid.   [10][CO2] [PO2]

(or)

 (b) (i) Explain the continuous fluidization in details.

   (ii) A bed of ion exchange beads 8ft deep is to be backwashed with water to remove   [5][CO3] [PO1]
   dirt. The particles have a density of $1:24gm/cm^3$ and an average size of 1.1mm.   [10][CO3] [PO2]
   What is the minimum fluidization velocity using water at 200 deg C and what
   velocity is required to expand the bed by 25%? The beads are assumed to be
   spherical and e is taken as 0.4.

6. (a) (i) Explain about types of blowers and compressors.   [5][CO4] [PO1]

   (ii) Explain the construction and working principle of rotameter with neat sketch.   [10][CO4] [PO2]

(or)

 (b) (i) What is NPSH of a centrifugal pump? Why it is necessary to maintain NPSH?   [5][CO4] [PO1]

   (ii) Explain the classification of pumps in details.   [10][CO4] [PO1]

==0==