

SEAT No. _____

No. of Printed Pages : 2

[75]

SARDAR PATEL UNIVERSITY
EXTERNAL EXAMINATION
B.SC. INDUSTRIAL CHEMISTRY (V) (3RD SEMESTER)
US03CICV02: Fluid Mechanics and Heat Transfer
Monday, 4th January, 2021

Time: 2:00 pm to 4:00 pm

Total Marks: 70

Q-1 Answer the following multiple choice question.

[10]

1. Bernoulli's theorem includes _____.
 - a. Mass density
 - b. Weight density
 - c. Energy balance
 - d. Material balance
2. $N_{Re} = 1900$, then the type of flow is _____.
 - a. Transition
 - b. Turbulent
 - c. Laminar
 - d. Static
3. The continuity equation is based on the principle of _____.
 - a. Conservation of momentum
 - b. Conservation of energy
 - c. Conservation of mass
 - d. Conservation of force
4. A draft tube is not required for a _____.
 - a. Francis turbine
 - b. Kaplan turbine
 - c. Pelton wheel turbine
 - d. None of the above
5. Discharge of a centrifugal pump is _____.
 - a. Directly proportional to N
 - b. Directly proportional to N^2
 - c. Inversely proportional to N
 - d. Inversely proportional to N^2
6. Multi stage centrifugal pumps are used to _____.
 - a. Produce high heads
 - b. Pump viscous fluids
 - c. Give high discharge
 - d. All the above
7. Equation of Fourier's law of heat conduction is _____.
 - a. $Q = -kA [dT/dx]$
 - b. $Q = -kA [dx/dT]$
 - c. $Q = -kV [dT/dx]$
 - d. $Q = -kg [dx/dT]$
8. Heating of water in cooking pan is an example of _____ heat transfer.
 - a. Conduction
 - b. Radiation
 - c. Convection and Radiation
 - d. Convection
9. The metal pipe employed to extend the heat transfer surface is known as _____.
 - a. Heater
 - b. Surface area
 - c. Cooler
 - d. Fins
10. Heat exchanger equipment employed to meet latent heat requirement at the bottom of a distillation column is called _____.
 - a. Chiller
 - b. Cooler
 - c. Heater
 - d. Reboiler

[1]

[P.T.O.]

Q-2 Are the following statements true or false? (All are compulsory) [08]

1. Stress strain relationship for Newtonian fluid is linear.
2. Fluid which resist a small stress indefinite but flow linearly under the action of large shear stress is known as hydro dynamic fluid.
3. A Simplex pump is the one having only one cylinder.
4. Volute converts the potential energy of the liquid imparted by the impeller to pressure energy.
5. The materials having low thermal conductivity are known as good conductor.
6. The thermal conductivity of gases ranges from 0.0006 to 0.60 W/m.K.
7. Cooler removes sensible heat from the process fluid with the help of air or water.
8. The shorter distance between two tubes is called pitch.

Q-3 Answer the following short questions (Attempt any 10 out of 12) [20]

1. Enlist the classification of fluid.
2. What is surface tension?
3. Define the following term:
Incompressible fluid, Compressible fluid
4. Distinguish between the turbine and pump.
5. Why priming is essential before starting a centrifugal pump?
6. Define the term static head and manometric head.
7. What is optimum thickness of insulation?
8. Write the equation for heat transfer through a plane wall slab.
9. What is 2nd law of thermodynamics?
10. What is tube pitch? Enlist types of it.
11. What is the function of baffles in heat exchanger?
12. What is flooding head heat exchanger?

Q-4 Answer the following long questions (Attempt any 04 out of 08)

1. Discuss in detail differential manometer with neat sketch. [32]
2. What is Newtonian Fluid? Discuss and derive Bernoulli's equation.
3. What are valves? Enlist and discuss various types of valves used in chemical industries.
4. Write a detail note on reciprocating pump.
5. State Fourier's law of heat conduction. Discuss and derive the equation of heat flow through a composite wall.
6. What is thermal insulation? Discuss the various modes of heat transfer with suitable industrial examples.
7. Discuss construction, working and advantages of shell & tube heat exchanger with neat diagram.
8. Discuss double pipe heat exchanger in detail.

————— X —————

[2]