DR-003-1016028 Seat No. _____

B. Sc. (Sem. VI) (CBCS) Examination

March / April - 2022

IC-603 : Fundamentals of Chemical Engineering

Faculty Code : 003

Subject Code : 1016028

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Question paper carries total 5 questions.
(2) All the questions have 14 marks each.
(3) Draw labeled diagram wherever necessary and Assume suitable data.

1 (a) Answer the following questions : **4**

(1) Define: Fluid.

(2) Which energy is not considered in Bernoulli's equations ?

(3) Reynold's number is dimensionless _____. True/False ?

(4) Technically fluid includes _____.

(b) Answer in brief : (any **one** out of two) **2**

(1) Define : (i) Turbulent flow (ii) Laminar flow.

(2) Write classification of fluid.

(c) Answer in detail : (any **one** out of two) **3**

(1) Explain in brief : Head loss due to sudden contraction.

(2) Write a short note on Newton's law of viscosity.

(d) Write a note on : (any **one** out of two) **5**

(1) Explain principle, construction and working of Pitot tubemeter.

(2) Derive Bernoulli's equation with suitable diagram.

2 (a) Answer the following questions : **4**

(1) Fourier's Law states that heat transfer is indirectly proportional to _____.

(2) Write unit of thermal conductivity.

(3) Reflux ratio R = _____.

(4) Conduction mainly takes place through _____. (Solid / Liquid)

(b) Answer in brief : (any **one** out of two) **2**

(1) Enlist types of convection.

(2) Explain fouling factor in brief.

(c) Answer in detail : (any **one** out of two) **3**

(1) Discuss mass and energy balance over crystallizer.

(2) Discuss mass and energy balance over evaporator.

(d) Write a note on : (any **one** out of two) **5**

(1) Define : Heat transfer. Explain various modes of heat transfer in detail.

(2) Describe heat flow through cylinder with diagram.

3 (a) Answer the following questions : **4**

(1) Refrigeration can be used in crystallization process. True / False ?

(2) The symbol of efficiency of heat engine is denoted by _____.

(3) Flammability of refrigerant should be _____. (High / low)

(4) What is refrigerant number of ammonia ?

(b) Answer in brief : (any **one** out of two) **2**

(1) Write various uses of refrigeration.

(2) Write a short note on brine used as refrigerant.

(c) Answer in detail : (any **one** out of two) **3**

(1) Discuss characteristics of good refrigerants.

(2) Write a brief note on air conditioning.

(d) Write a note on : (any **one** out of two) **5**

(1) Explain chemical properties of refrigerants in detail.

(2) Explain difference among heat engine, refrigerator and heat pump in detail.

4 (a) Answer the following questions : 4

(1) _____ means delay in response.

(2) Write full form of FCE.

(3) The difference between set point and measured variable is known as _____.

(4) The device used to increase strength of the signal is called _____.

(b) Answer in brief : (any **one** out of two) 2

(1) Define : (a) Amplifier (b) Out signal.

(2) Explain transfer function in brief.

(c) Answer in detail : (any **one** out of two) 3

(1) Explain ON-OFF control with example.

(2) Define : (a) Measured variable (b) Transducer.

(d) Write a note on : (any **one** out of two) 5

(1) Explain control valve with diagram.

(2) Give any five differentiate points between open loop and close loop control system.

5 (a) Answer the following questions : 4

(1) Write full form of TLV.

(2) Write full form of CSTR.

(3) Process research include library and _____.

(4) Yellow color indicates _____ hazards.

(b) Answer in brief : (any **one** out of two) 2

(1) Enlist various factors to be considered for safety.

(2) Enlist class of fire.

(c) Answer in detail : (any **one** out of two) 3

(1) Explain difference between standard and special designed equipments.

(2) Write a short note on classification of flow diagrams.

(d) Write a note on : (any **one** out of two) 5

(1) Discuss various reactors and reaction vessels with neat diagrams.

(2) Explain time schedule in chemical industries in detail.
