DR-003-2016028 Seat No. _____

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

April - 2022

BS-IC-603 : Fundamentals of Chemical Engineering

Faculty Code : 003

Subject Code : 2016028

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

Instructions : (1) Question paper carries total 5 questions.
(2) All the questions are compulsory and carry 14 marks each.
(3) Draw labelled diagram wherever necessary.
(4) Assume suitable data.

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

(1) The branch of engineering that deals with behavior of fluid under motion is called _____. (Fluid mechanics/ Fluid static) ?

(2) Crude is the type of Non-Newtonian fluid. True/ False ?

(3) What is the range of Reynolds's number for laminar flow ?

(4) The range of C_d for venturimeter is _____ to _____.

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

(1) Define: Fluid with example.

(2) Draw only diagram of nozzle meter.

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

(1) Explain rotameter with diagram in brief.

(2) Measurement of pressure at base and top of mountain are 74 cm and 60 cm of mercury respectively. Work out the height of mountain if air has density 1.22 kg/m^3 and mercury has density 13.6 kg/m^3.

(d) Answer any **one** out of two : **5**

(1) Discuss Reynolds's experiment with neat and clean diagram.

(2) Explain principle, construction and working of Pitot tube meter.

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

(1) Define : Heat Transfer.

(2) What is the unit of thermal conductivity ?

(3) Conduction, mode of heat transfer mainly takes place through solid. True/False ?

(4) _____ Scientist's law is used to explain Radiation heat transfer phenomena ?

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

(1) State Fourier's law with formula.

(2) Enlist limitations of McCabe-Thiele method.

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

(1) Write a short note on various'modes of heat transfer.

(2) Discuss compound resistance in parallel with diagram in brief.

(d) Answer any **one** out of two : **5**

(1) Explain heat flow through cylinder with diagram.

(2) Derive an equation of rectifying column with its distillation column diagram.

3 (a) Answer any **one** out of two : **4**

(1) Give full form of COP.

(2) Air is an example of _____ refrigerant. (Natural / Artificial)

(3) Write full form of ASHRAE.

(4) Refrigerant number of Freon-12 is _____.

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

(1) What is tone of refrigeration ?

(2) Enlist various types of refrigerants.

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

(1) Write a detailed note on receiver used in refrigeration.

(2) Write a short note on compressor.

(d) Answer any **one** out of two : **5**

(1) Discuss thermodynamic properties of refrigerant in detail.

(2) Write a detailed note on difference among heat engine, refrigerant and heat pump.

4 (a) Answer the following questions : 4

(1) The process variable which is measured by measuring element is called _____. (Measured variable / Manipulated Variable)

(2) Define: Amplifier.

(3) What is the full form of DCS ?

(4) Transducer is electro-mechanical device. (True / False)

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

(1) What is dead time ?

(2) Define:

(a) Steady state design

(b) Unsteady state design

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

(1) Explain transfer function in brief.

(2) Write a brief note on capacitance.

(d) Answer any **one** out of two : 5

(1) Discuss various modes of control in detail.

(2) Explain component of control system with block diagram.

5 (a) Answer the following questions : 4

(1) Give full form of CSTR.

(2) Define: Specific gravity.

(3) Safety means to prevent any accident. True/False ?

(4) Red color indicates _____ in color code for safety. (Fire hazard / Physical hazard)

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

(1) What is lost time injury ?

(2) Define :

(a) Brittleness

(b) Weldability

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

(1) Discuss standard and specially designed equipments.

(2) Write a brief note on control of diseases due to chemical effects.

(d) Answer any **one** out of two : 5

(1) Write a detailed note on Research evaluation and Process development.

(2) Explain engineering control of chemical plant hazards.
