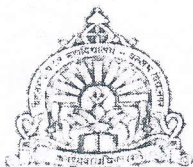


Exam Seat No: _____



A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE

(AUTONOMOUS) (Grant – in – Aid)

Affiliated to Sardar Patel University

VALLABH VIDYANAGAR – 388120



Bachelor of Science (Semester – II) External Examination – 2025

US02MAICH01: Process Calculation and Engineering Equipment Drawing

Date: 8th April, 2025

Time: 02:00 PM to 04:30 PM

Day: Tuesday

Total Marks: 50 Marks

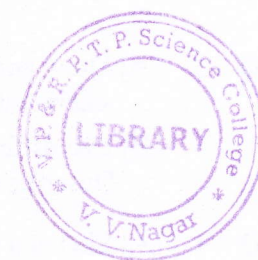
Note: The figure to the right indicates full marks of the questions.

(Atomic mass of N = 14 g/mol, O = 16 g/mol,)

Q – 1 Answer the following Multiple-Choice Questions. (All are compulsory)

[10]

1. A pressure of 2 atm is equal to _____ mm Hg.
(A) 1520 mm Hg (B) 1700 mm Hg
(C) 1400 mm Hg (D) 1620 mm Hg
2. Which of the following is unit of Volumetric flow rate?
(A) Cal (B) kcal/h
(C) kg/h (D) m³/h
3. The ideal gas equation is:
(A) $PV = nRT$ (B) $PV = RT$
(C) $P + V = nRT$ (D) $P/V = RT$
4. Which of the following is a fitting part in piping systems?
(A) Boiler (B) Heat Exchanger
(C) Elbow (D) Reactor
5. What is the function of a flange in pipe fittings?
(A) To connect pipes securely (B) To increase fluid speed
(C) To change the colour of a pipe (D) To measure pressure
6. What does a process flow diagram (PFD) show?
(A) A list of food recipes (B) A flow of chemical Processes
(C) A road Map (D) A television Program
7. Which of the following is an example of size reduction equipment?
(A) Shell & Tube heat exchanger (B) Roll crusher
(C) Fractionating column (D) Horizontal evaporator
8. Which of the following is not a natural source of water?
(A) River (B) Ocean
(C) Tap Water (D) Rain
9. Purest form of natural water is _____.
(A) Sea water (B) River water
(C) Lake water (D) Rain water
10. Temporary Hardness in water is caused by presence of _____.
(A) Calcium Carbonate (B) Calcium Bicarbonate
(C) Calcium chloride (D) Magnesium Carbonate



❖ Answer The Following Long Questions

Q – 2 [A] Explain in detail the dimensions and system of units. [05]

[B] A gas mixture contains 0.274 kmol of HCl, 0.337 kmol of N₂ and 0.089 kmol of O₂.
Then Calculate:

(a) Average molecular weight of gas mixture. [05]

(b) Volume occupied by this mixture at 405.3 kPa and 303 K.

OR

Q – 2 [A] State and explain Raoult's Law and Henry's Law for gas – liquid systems. [05]

[B] Elaborate on the Ideal Gas Law along with its applications. [05]

Q – 3 [A] Draw and label five standard symbols used in heat transfer equipment in chemical engineering processes. [05]

[B] Classify various unit operations in chemical engineering and include their respective equipment symbols. [05]

OR

Q – 3 [A] Draw and label five standard symbols representing different types of agitators used in chemical engineering operations. [05]

[B] List different types of valves used in chemical engineering systems. Sketch and Describe any three in detail. [05]

Q – 4 [A] Sketch a Fractionating column and label its components. [05]

[B] Sketch a Roll Crusher (size reduction equipment) and label its parts. [05]

OR

Q – 4 [A] Draw a Process Flow Diagram (PFD) for the production of Formaldehyde. [05]

[B] Draw a neat sketch of a Shell & Tube Heat Exchanger. [05]

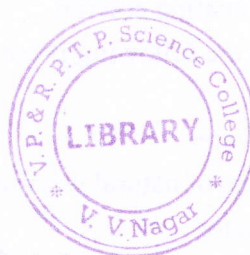
Q – 5 [A] Describe the disadvantages of hard water. [05]

[B] Explain the major problems in boilers due to hard water. [05]

OR

Q – 5 [A] List various methods for boiler water treatment. Explain any one method in detail. [05]

[B] Write a brief note on feed water conditioning. [05]



. . . All the Best . . .