

Roll No. & Sign:



A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE
(AUTONOMOUS) (Grant – in – Aid)
Affiliated to Sardar Patel University



Bachelor of Science (Semester – 6) Internal Theory Examination – 2026
US06MAICH02: Process Control and Mass Transfer Operations

Date: 7th March, 2026

Time: 10:45 AM to 12:15 PM

Day: Saturday

Total Marks: 30 Marks

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

[06]

1. Flow measuring instruments are classified based on:
(A) Colour (B) Temperature
(C) Principle of Operation (D) Size
2. Distillation is preferred over extraction when:
(A) Components form azeotropes (B) Relative volatility is high
(C) Feed is heat sensitive (D) Solvent selectivity is low
3. A triangular diagram is mainly used for:
(A) Gas absorption calculations (B) Two-component systems
(C) Three-component liquid–liquid equilibrium (D) Vapor-liquid equilibrium
4. Distillation is primarily based on:
(A) Difference in solubility (B) Difference in density
(C) Difference in volatility (D) Difference in viscosity
5. Evaporation is primarily used to:
(A) Separate immiscible liquids (B) Concentrate a solution by vaporizing solvent
(C) Remove dissolved gases (D) Reduce boiling point
6. The major advantage of multiple effect evaporation is:
(A) Lower capital cost (B) Lower steam economy
(C) Higher steam economy (D) Higher pressure drops



Q – 2 Explain ON–OFF control and discuss different types of lags.

[06]

OR

Q – 2 Explain Orifice meter with sketch and derive the flow equation.

[06]

Q – 3 Differentiate between Distillation and Liquid–Liquid Extraction.

[06]

OR

Q – 3 Explain Mixer–Settler battery for counter-current extraction with sketch.

[06]

Q – 4 Describe sieve, bubble cap and valve trays used in distillation column.

[06]

OR

Q – 4 Explain Batch Distillation unit with sketch.

[06]

Q – 5 Explain principle and working of Calendria and Long Tube Vertical evaporators.

[06]

OR

Q – 5 Classify methods of achieving supersaturation and explain Agitated Tank Crystallizer.

[06]

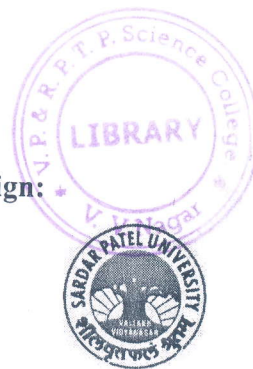
Supervisor Signature:

QUIZ TEST

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US06MAICH02: Process Control and Mass Transfer Operations

Date: 7th March, 2026

Time: 10:45 PM to 12:15 PM

Obtain Marks:

Day: Saturday

Total Marks: 15 Marks

Examiner Signature:

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

Q-1 Fill in the blanks with the appropriate answer given in the bracket

[8 Marks]

1. A control system maintains a process variable at a desired _____. (Set Point/End Point)
2. In _____ control, human intervention is required. (Manual / Automatic)
3. Liquid–liquid extraction is a _____ transfer operation. (Mass / Energy)
4. Distillation is based on difference in _____. (Boiling Point / Melting Point)
5. Vacuum distillation is used for _____ boiling substances. (High/Low)
6. The vertical vessel used in distillation is called _____ column. (Distillation/Crystallization)
7. Multiple effect evaporation is used to improve _____ economy. (Steam/Cold)
8. Supersaturation is necessary for _____ formation. (Crystal/Precipitation)

Q-2 State whether the following statement is true or false. [Write answer in the box]

[7 Marks]

1. Orifice meter is a differential pressure meter.
2. Mother liquor is the solid crystal obtained after separation.
3. Vapour formed during distillation is richer in the less volatile component.
4. Continuous crystallizer operates at steady state.
5. Forced circulation evaporator uses natural circulation.
6. Multiple effect evaporation improves steam economy.
7. Distribution coefficient is ratio of solute concentration in extract to raffinate.