

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 – 4) External Examination – 2026

US04MIICH01: UNIT OPERATIONS

Date: 27th March 2026

Time: 01:45 P.M. TO 03:15 P.M.

Day: Friday

Total Marks: 25 Marks

Note: The figure to the right indicates the full marks for each question.

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

[05]

1. Heat transfer occurs due to:
(A) Temperature difference (B) Pressure difference
(C) Density difference (D) Velocity difference
2. Heat transfer by electromagnetic waves is called:
(A) Convection (B) Radiation
(C) Conduction (D) Diffusion
3. A double pipe heat exchanger consists of:
(A) Two concentric pipes (B) Three pipes
(C) Parallel plates (D) Multiple shells
4. In shell and tube heat exchangers, the other fluid flows through:
(A) Shell side (B) Pipe fittings
(C) Plates (D) Insulation
5. Plate heat exchangers are commonly used in:
(A) Dairy and food industries (B) Mining industry
(C) Textile industry (D) Cement industry



❖ **Answer The Following Long Questions**

- Q – 2 [A] Derive the equation for heat flow through a cylinder under steady-state conditions. [05]**
[B] Derive the equation for Heat flow through a sphere. [05]

OR

- Q – 2 [A] Derive the equation for Individual and Overall heat transfer coefficient for heat transfer through convection. [05]**
[B] Describe different flow arrangements in heat exchangers – parallel flow, counter flow and cross flow and compare their performance. [05]

- Q – 3 [A] Write a detailed note on Kettle type Reboiler with a neat sketch. [05]**
[B] Explain the design of shell and tube heat exchanger with a neat sketch, highlighting their different parts. [05]

OR

- Q – 3 [A] Write a note on Internal floating head heat exchanger. [05]**
[B] Describe Extended-surface (Finned) heat exchanger and explain how fins enhance heat transfer performance. [05]