

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2018****Subject Code:2140503****Date:10/12/2018****Subject Name:Process Heat Transfer****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define: i) emissivity, ii) black body, iii) grey body. **03**  
(b) What are the advantages of square pitch arrangement over the triangular pitch in case of heat exchanger tubes? **04**  
(c) Explain Fourier's law for heat of conduction. **07**
- Q.2** (a) Define capacity and economy of evaporator. **03**  
(b) Give the physical significance of (i) Nusselt Number (ii) Prandtl Number. **04**  
(c) Explain Boiling Point Elevation (BPE). **07**
- OR**
- (c) Write short notes on Natural Convection. **07**
- Q.3** (a) What is black body? Give applications where this concept is used in heat transfer. **03**  
(b) Differentiate between filmwise and dropwise condensation. **04**  
(c) Discuss with the help of diagram various regimes of pool boiling. What is the use of finding critical flux and critical temperature drop? **07**
- OR**
- Q.3** (a) Discuss Planck's law of radiation. **03**  
(b) Discuss about concurrent and counter current flow arrangement in heat exchangers. **04**  
(c) Derive the expression for critical radius of insulated pipe. Explain its significance. **07**
- Q.4** (a) Enlist different types of fins with neat sketch. **03**  
(b) Discuss the effect of non-condensable gases on condensation. **04**  
(c) Discuss construction and working of Plate type heat exchanger. **07**
- OR**
- Q.4** (a) What do you mean by fouling of heat exchangers? **03**  
(b) Define convection and write down difference between free and forced convection. **04**  
(c) With neat diagram explain construction and working of Box type furnace. **07**
- Q.5** (a) Explain the significance of LMTD correction factor. **03**  
(b) Explain the terms absorptivity, emissivity, transmissivity and reflectivity for heat transfer by radiation. **04**  
(c) What is importance of LMTD? Derive the equation for parallel flow arrangement. **07**
- OR**
- Q.5** (a) Draw the sketch of various methods of feeding the multiple effect evaporators. **03**  
(b) Write Dittus-Boeltier equation and Sieder-Tate equation explaining each term and highlight the difference. **04**  
(c) Explain in details with neat sketch: Shell & Tube heat exchanger. **07**

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