

AQ – 2741

First Semester M. Tech. F. T. (Membrane / Separation Tech.) Examination

ADVANCED ENERGY TECHNOLOGY

1 MST4

P. Pages : 2

Time : Three Hours]

[Max. Marks : 80

- Note :** (1) All questions carry marks as indicated.
(2) Answer any **six** questions.
(3) Assume suitable data wherever necessary.
(4) Diagrams and Chemical equations should be given wherever necessary.
(5) Illustrate your answer wherever necessary with the help of neat sketches.
(6) Use of slide rule, logarithmic tables, Steam tables, Mollier's Chart, Drawing instrument, Thermodynamic table for moist air, Psychrometric Charts and Refrigeration charts is permitted.
(7) Use pen of Blue/Black ink/refill only for writing the answer book.

1. What are Energy Intensive operations in chemical process industries? Discuss energy conservation opportunities (ECO) in cement plants. 13
2. What are various types of Energy Audits ? Discuss them in brief. 13
3. Explain the principle and application of pinch technology with suitable example. 13
4. What are various types of pollutant emissions from large scale chemical process industry ? How is the pollution controlled for these emissions ? 13
5. Explain the principle and working of
 - (i) Electrostatic precipitator.
 - (ii) SCR Reactor. 13

6. A composite furnace wall consists of 225 mm of firebricks, 115 mm of insulating brick. The individual heat transfer coefficients at the inside and outside walls are $60 \text{ W/m}^2\text{C}$ and $7 \text{ W/m}^2\text{C}$ respectively. The temperature of the gas within the furnace is 1300°C . The ambient air temperature outside the furnace is 40°C . The maximum temperature of insulating brick should not be more than 1095°C . Thermal conductivity of fire brick = 1.66 w/mC Thermal conductivity of insulating brick = 0.32 w/mC . Thermal conductivity of building brick = 0.69 w/mc . Calculate :—
- The heat transfer rate per unit area.
 - The temperature at the interface of each layer of brick.
 - The overall heat transfer coefficient. 13
7. Which sites are suitable for harnessing wind energy ? Explain the principles of wind energy conversion technology. 14
8. Explain in detail geothermal reservoir characteristics and geothermal applications. 14
9. How are solar radiations measured ? Explain the principle land operation of solar photo voltaic conversion to electricity system. 13
10. What do you understand by heat pipe ? Explain its salient features and applications. 13

