

Code No: R20D2114

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R20

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year II Semester Regular Examinations, December 2021

Industrial Refrigeration Systems

(TE)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

- 1 Explain in brief about ASHRAE comfort chart? [14M]
OR
2 Explain the difference between comfort air-conditioning and industrial air conditioning [14M]

SECTION-II

- 3 Explain the working principle of screw compressor with neat sketch? [14M]
OR
4 Discuss the various cooling methods adopted in refrigeration system? [14M]

SECTION-III

- 5 Make a comparative study of flooded and non-flooded shell and tube type evaporators based on the capacity, condition of vapour leaving the evaporator, heat transfer effectiveness, construction and control. [14M]
OR
6 a. Give the comparison between air cooled and water cooled condenser. [6M]
b. Explain in detail an evaporative condenser. [8M]

SECTION-IV

- 7 Explain in brief about liquid and vapour separator? [14M]
OR
8 Explain the significance of thermos syphon receiver used in industrial refrigeration system? [14M]

SECTION-V

- 9 State and explain various heat loads to be considered for cooling load calculations of a typical building [14M]
OR
10 Explain various construction methods of refrigerated spaces [14M]

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M.Tech I Year II Semester Regular Examinations, December 2021

Advanced Heat and Mass Transfer

(TE)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

Note: Heat and mass transfer data books are permitted.

SECTION-I

- 1 An aluminum slab of 5 cm thick initially at a temperature of 400 °C. It is suddenly immersed in a water at 90 °C. Calculate the mid plane temperature after 1 minute and also calculate the temperature inside the plate at a distance of 10 mm from the plane. Take $h = 1800 \text{ W/m}^2\text{K}$. [14M]

OR

- 2 Derive the equation for heat transfer with variable thermal conductivity with temperature. [14M]

SECTION-II

- 3 An air stream at 0 °C is flowing along a heated plate at 90 °C at a speed of 75 m/s. The plate is 45 cm long and 60 cm wide. Assuming the transition of boundary layer to take place at $Re = 5 * 10^5$ calculate the average values of friction coefficient for the full length of the plate, hence calculate the rate of energy dissipation from the plate. [14M]

OR

- 4 Derive the expression for control volume for integral analysis. [14M]

SECTION-III

- 5 Air at 30 °C flows at 2.2 m/s over plate at 90 °C. Length and width of the plate are 900 mm and 450 mm. Calculate the heat transfer rate from
i) First half of the plate
ii) Full plate and
iii) Next half of the plate. [14M]

OR

- 6 In a long annulus (3.125 cm ID and 5 cm OD) the air is heated by maintaining the temperature of the outer surface of the inner tube at 50 °C. The air enters at 16 °C and leaves 32 °C. Its flow rate is 30 m/s. Estimate the heat transfer coefficient of air at the inner tube. [14M]

SECTION-IV

- 7 Air flow through a long rectangular of 300 mm height x 800 mm width air conditioning duct maintains the outer duct surface temperature at 20 °C. If the [14M]

duct is un-insulated and exposed to air at 40 °C. Calculate the heat gained by the duct. Assuming duct to be horizontal.

OR

- 8** A vertical flat plate in the form of fin is 500 mm in height and is exposed to steam at atmospheric pressure. If surface of the plate is maintained at 60 °C. calculate the film thickness at the trailing edge, overall heat transfer coefficient, heat transfer rate, condensate mass flow rate. Assume the laminar flow conditions and unit width of the plate. **[14M]**

SECTION-V

- 9** A gas mixture contains 20% CO₂ and 10% H₂O by volume. The total pressure is 2 atmosphere. The temperature of the gas is 927 °C. The mean beam length is 0.3 m. Calculate the emissivity of the mixture. **[14M]**

OR

- 10** Explain phenomenon of equimolar counter diffusion. Derive an expression for equimolar counter diffusion between two gases or liquids. **[14M]**

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M.Tech I Year II Semester Regular Examinations, December 2021

Energy Management

(TE)

Roll No										
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1 What are the steps you might consider in setting up an energy management program? [14M]

OR

2 Explain the principles of energy management in detail. [14M]

SECTION-II

3 List out the tools commonly needed for energy audits and explain in detail. [14M]

OR

4 What is the role of energy manager in manufacturing industry? Explain in detail. [14M]

SECTION-III

5 Briefly discuss about the budget considerations in economic analysis [14M]

OR

6 Explain the scope, characteristics of an investment project. [14M]

SECTION-IV

7 Describe in detail about project evaluation [14M]

OR

8 List out the advantages of Payback, Investor's rate of return and Present worth methods. [14M]

SECTION-V

9 Describe Solar energy with one example illustrating to save energy. [14M]

OR

10 Discuss briefly about Phase Change Materials in thermal storage system. With an example. [14M]

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Thermal and Nuclear Power Plants

(TE)

Roll No									
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Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

SECTION-I

1 Give the layout of a modern steam power plant and explain it briefly. [14M]

OR

2 Enumerate and explain various modern ash handling systems in power plants. [14M]

SECTION-II

3 Explain about Fluidized bed combustion systems and list out advantages and disadvantages. [14M]

OR

4 What are the reasons for promoting cogeneration in decentralized environment in detail? [14M]

SECTION-III

5 What are the factors to be considered while selection of site for a nuclear power plant? [14M]

OR

6 Discuss in detail about Bi-Product of nuclear power generation. [14M]

SECTION-IV

7 The peak load on a power station is 30 MW. The loads having maximum demands of 25 MW, 10MW, 5 MW and 7 MW are connected to the power station. The capacity of the power station is 40MW and annual load factor is 50 % , find: (i). Average load on the power station (ii). Energy supplied per year. (iii). Demand factor. (iv). Diversity factor [14M]

OR

8 Draw the load curve for the power requirement in India and discuss the methods to fulfil the part load conditions. [14M]

SECTION-V

9 Briefly discuss about different types of effluents from power plants. [14M]

OR

10 Explain how the NOx emissions can be reduced in the flue gases [14M]
