Code No: R20D2110

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year II Semester Regular/Supplementary Examinations,November2022

Thermal and Nuclear Power Plants

(TE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
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Note: Steam tables and Molliar charts are permitted.

1	Discuss various methods of compounding in steam turbine	**[14M]**
2	The net power output of a regenerative – reheat cycle power plant is 80MW. Steam enters the high pressure turbine at 80 bar, 500 °C and expands to a pressure P_2 and emerges as dry vapour. Some of the steam goes to an open feed water heater and the balance is reheated at 400 °C at constant pressure P_2 and then expanded in the low pressure turbine to 0.05 bar. Determine (i) the reheat pressure P_2, (ii) the mass of bled steam per kg boiler steam, (iii) the steam flow rate in HP turbine, (iv) cycle η. Neglect pump work. Sketch the relevant lines on h-s diagram. Assume expansion in the turbines as isentropic.	**[14M]**
3	Explain briefly about combined gas turbine cycles with neat sketch.	**[14M]**
4	Discuss in detail about waste heat recovery used in gas turbine plant.	**[14M]**
5	What are the different moderators used in a nuclear power plant. What properties make them suitable as moderators.	**[14M]**
6	What are nuclear wastes and how it can be handled?	**[14M]**
7	Discuss briefly on criteria for optimum loading of power plants.	**[14M]**
8	Describe briefly about gaseous pollutants discharged by thermal power plants.	**[14M]**

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Code No: R20D2109

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year II Semester Regular/Supplementary Examinations, November2022

Advanced Heat and Mass Transfer

(TE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.
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Noe: Heat and Mass Transfer data books are permitted

1	***A***	Explain the importance of Heisier charts in solving the transient heat conduction problems.	**[7M]**
	B	A slab of Aluminum 10 cm thick is originally at a temperature of 500^0 C. It is suddenly immersed in a liquid at 1000^0 C resulting it a heat transfer coefficient of 1200 W/m^2 k. Determine the temperature at the centerline and the surface 1 min after the immersion. Also the total thermal energy removal per unit area slab during this period. The properties of aluminum for the given condition are: $\alpha = 8.4 \times 10^{-5}$ m^2 /s, K=215 W/mK, ρ = 2700 kg/m^3, Cp= 0.9 kJ/kg.	**[7M]**
2	***A***	Derive the expression for temperature as a function of time 't' in lumped heat capacity system	**[7M]**
	B	A long rod whose one end is inserted into a furnace and the other end is exposed to surroundings at 25^0C. Under steady state condition at two points on the rod 100mm apart, the temperatures were found to be 120^0C and 100^0C respectively. If the diameter of the rod is 20mm and the convective heat transfer coefficient with the surroundings is 5 W/m^2 K determine the thermal conductivity of the rod.	**[7M]**
3	***A***	Using dimensional analysis show that in forced convection Nusselt number is a function of Reynolds and Prandtl number.	**[7M]**
	B	A long fin of 10mm diameter made of steel (thermal conductivity, k=43 W/m K) is attached to a plate at 200^0C and extends to surroundings at 30^0C with a convective heat transfer coefficient of 20 W/m^2 K. Find the heat flow rate through the fin.	**[7M]**
4	***A***	Explain in detail, the differences between implicit and explicit methods.	**[7M]**
	B	A horizontal pipe of 6 cm diameter is located in a room. The temperature of air is 20^0C. The surface temperature of the pipe is 150^0C. Calculate the free convection heat loss per meter length of the pipe.	**[7M]**
5	***A***	What is the criterion for transition from laminar to turbulent boundary layer in free convection on a vertical plate?	**[7M]**
	B	Estimate power required to maintain a vertical heater surface at 130^0 C in ambient air at 20^0 C. The plate is 15 cm high and 10 cm wide. Consider equivalent radiation heat transfer coefficient as 8.5 W/m^2 K.	**[7M]**
6	***A***	Explain laminar and turbulent flows and its applications	**[4M]**
	B	Engine oil flows through a 50 mm diameter tube at an average temperature	**[10M]**

of 147^0C. The flow velocity is 80 cm/s. Calculate the average heat transfer coefficient if the tube wall is maintained at a temperature of 200^0C and it is 2 m long.

7	***A***	Draw the boiling curve for pool boiling of water and explain flow regimes.	**[7M]**
	B	Saturated steam at a temperature of 65^0C condenses on a vertical surface at 55^0C.Determine the thickness of the condensate film at locations 0.2 m and 1.0 m from the top. Also calculate condensate flow rate at these locations.	**[7M]**
8	***A***	Obtain an expression for mass transfer through steady state diffusion through a plane membrane.	**[7M]**
	B	Explain Fick's law of diffusion and Write the applications of mass transfer	**[7M]**

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Code No: R20D2114

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year II Semester Regular/Supplementary Examinations,November2022

Industrial Refrigeration Systems

(TE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

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1	***A***	Discuss the areas where refrigeration systems required in industries.	**[7M]**
	B	Explain the difference between comfort air-conditioning and industrial air-conditioning.	**[7M]**
2	***A***	Explain various applications of refrigeration systems used in industries.	**[7M]**
	B	What are the basic requirements of air conditioning system used in industries?	**[7M]**
3	***A***	Explain the working principle of rotary compressor with neat sketch.	**[7M]**
	B	In detail explain oil injection and refrigeration injection systems.	**[7M]**
4	***A***	What is the different type of compressors? Mention the fields for the use of each in refrigeration system giving reasons.	**[7M]**
	B	Distinguish between reciprocating and screw compressors.	**[7M]**
5	***A***	Explain different type of Condensers used in refrigeration systems.	**[7M]**
	B	List the advantages and disadvantages of air cooled condensers over water cooled condensers.	**[7M]**
6	***A***	Describe different type of Evaporators used in refrigeration systems.	**[7M]**
	B	What problems does lubricating oil cause in evaporator?	**[7M]**
7	***A***	Discuss Low pressure receivers and thermos syphon receiver.	**[7M]**
	B	In detail explain surge drum and surge line accumulator.	**[7M]**
8	***A***	Name and describe different types of insulating materials used for air-conditioning system.	**[7M]**
	B	What are the different methods of ice manufacturing ?	**[7M]**

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Code No: R20D2111

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year II Semester Regular/Supplementary Examinations, November 2022

Energy Management

(TE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Answer Any **Five** Questions
All Questions carries equal marks.

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1	***A***	Explain the principles of energy management in detail.	**[7M]**
	B	Discuss the various qualities and functions of Energy Manager.	**[7M]**
2	***A***	What is the role of energy manager in manufacturing industry? Discuss.	**[7M]**
	B	What are the steps you might consider in setting up an energy management program?	**[7M]**
3	***A***	What is energy audit? Discuss types of energy audit briefly.	**[7M]**
	B	Explain the methodology for detailed Energy Audit Process.	**[7M]**
4		Explain in detail the various Energy conservation schemes.	**[14M]**
5	***A***	What do you understand by investment project? Explain.	**[7M]**
	B	Briefly discuss about the budget considerations in economic analysis.	**[7M]**
6	***A***	Explain in detail about the Time value of money concept in payback analysis.	**[7M]**
	B	Explain the different types of depreciation.	**[7M]**
7	***A***	Indicate the limitations of present worth and internal rate of return methods.	**[7M]**
	B	Calculate Net Present Value of a Project whose capital cost is Rs. 30000 and gives annual saving of 6000 each year for a period of 10 years. The annual discount rate is 8%.	**[7M]**
8	***A***	Explain the Rotor blade motions and their causes in wind turbines.	**[7M]**
	B	Describe Solar energy with one example illustrating to save energy	**[7M]**

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