Code No: **R22D2110**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year II Semester Regular/Supplementary Examinations, August 2024
Thermal and Nuclear Power Plants
(TE)

Roll No										

Time: 3 hours   **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

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		PART-A (10 Marks) **(Write all answers of this part at one place)**	**BCLL**	**CO(s)**	**Marks**
1	A	How is dust collectors classified?	L1	CO-I	[1M]
	B	What is Volumetric analysis?	L1	CO-I	[1M]
	C	State the limitations of gas turbines.	L4	CO-II	[1M]
	D	Write a short note on fuels used for gas turbines.	L2	CO-II	[1M]
	E	What is a chain reaction?	L2	CO-III	[1M]
	F	Write a short note on 'Fertile materials'.	L2	CO-III	[1M]
	G	Define the Load factor.	L1	CO-IV	[1M]
	H	What do you mean by depreciation?	L3	CO-IV	[1M]
	I	How are instruments classified?	L1	CO-V	[1M]
	J	What is the difference between gauge pressure and absolute pressure?	L4	CO-V	[1M]

PART-B (50 Marks)
SECTION-I

			BCLL	**CO(s)**	**Marks**
2	A	Describe the general layout of a modern coal-fired steam power plant.	L2	CO-I	[5M]
	B	Explain the types of power plants.	L2	CO-I	[5M]
		OR			
3	A	Explain the role of high-pressure, intermediate-pressure, and low-pressure turbines.	L2	CO-I	[5M]
	B	Describe the function and types of cooling towers used in a steam power plant.	L2	CO-I	[5M]

SECTION-II

4	A	Explain the concept of an IGCC power plant.	L2	CO-II	[5M]
	B	Discuss its advantages over conventional power generation methods.	L3	CO-II	[5M]
		OR			
5	A	Discuss the importance of waste heat recovery in gas turbine power plants.	L3	CO-II	[5M]
	B	Describe the typical methods used for waste heat recovery and their benefits.	L3	CO-II	[5M]

SECTION-III

6	A	Explain the basic principles of nuclear physics that underlie nuclear power generation.	**L3**	**CO-III**	**[5M]**
	B	Describe the main components and working principle of a nuclear reactor.	**L3**	**CO-III**	**[5M]**

OR

7	A	Explain briefly the Prompt-fission gamma rays.	**L3**	**CO-III**	**[5M]**
	B	Explain briefly the Fission-product-decay gamma rays.	**L2**	**CO-III**	**[5M]**

SECTION-IV

8	A	Explain briefly the following :(*i*) Capital or fixed cost (*ii*) Operational cost.	**L2**	**CO-IV**	**[5M]**
	B	Explain the performance and operating characteristics of power plant.	**L3**	**CO-IV**	**[5M]**

OR

9	A	Explain briefly the following :(*i*) Load curve (*ii*) Load duration curve.	**L3**	**CO-IV**	**[5M]**
	B	List the factors which should be considered while designing a power plant.	**L2**	**CO-IV**	**[5M]**

SECTION-V

10	Explain briefly the following: (*i*) Bimetallic thermometers (*ii*) Liquid filled thermometers (*iii*) Gas-filled thermometers.	**L3**	**CO-V**	**[10M]**

OR

11	A	Describe briefly the following pressure gauges: (*i*) Bourdon tube pressure gauge (*ii*) Diaphragm gauge.	**L2**	**CO-V**	**[5M]**
	B	Describe the primary methods used to control the emissions of pollutants from combustion gases.	**L3**	**CO-V**	**[5M]**

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Code No: R22D2109

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year II Semester Regular/Supplementary Examinations, August 2024
Advanced Heat and Mass Transfer
(TE)

Roll No										

Time: 3 hours   **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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		PART-A (10 Marks) **(Write all answers of this part at one place)**	BCLL	CO(s)	Marks
1	A	State Fourier's Law of conduction.?	L1	CO-I	[1M]
	B	How the heat transfer from surface is increased by using Fins?	L2	CO-I	[1M]
	C	How is thermal boundary layer thickness defined?	L2	CO-II	[1M]
	D	State the fundamental equation used in finite difference methods to solve steady-state 1D heat conduction problems.	L2	CO-II	[1M]
	E	What is meant by laminar flow and turbulent flow?	L2	CO-III	[1M]
	F	The properties of mercury at 300 K are: density = 13529 kg/m^3, specific heat at constant pressure = 0.1393 kJ/kg-K, dynamic viscosity = 0.1523 × 10-2 N.s/m^2 and thermal conductivity = 8.540 W/mK. The Prandtl number of the mercury at 300 K is:	L3	CO-III	[1M]
	G	What is the boundary layer thickness in natural convection? How does it vary with Rayleigh number?	L1	CO-IV	[1M]
	H	What is critical heat flux (CHF) in boiling? Explain its significance in heat transfer applications.	L1	CO-IV	[1M]
	I	What is black body and Gray body?	L1	CO-V	[1M]
	J	Briefly explain the Reynolds analogy between heat and mass transfer. What physical similarities does it exploit?	L1	CO-V	[1M]

PART-B (50 Marks)
SECTION-I

			BCLL	CO(s)	Marks
2		Derive the governing equation for heat conduction in cartesean co-ordinate system.	L2	CO-I	[10M]

OR

			BCLL	CO(s)	Marks
3	A	What is lumped capacity? Derive an expression for temperature as a function of time in a lumped heat capacity system.	L2	CO-I	[5M]
	B	An Aluminium sphere weighing 5.5kg and initially at a temperature of 290^{0}C is suddenly immersed in a fluid at 15^{0}C. The convective heat transfer coefficient is 58 W/m-K. Estimate the time required to cool the aluminium to 95^{0}C ,using the lumped capacity method of analysis.	L3	CO-I	[5M]

SECTION-II

4	A	Derive the finite difference equation for steady-state heat conduction in one dimension using central difference approximation.	**L2**	**CO-II**	**[5M]**
	B	Derive the continuity and momentum equations for incompressible fluid flow.	**L2**	**CO-II**	**[5M]**

OR

5	A	Solve the steady-state heat conduction equation in a rod of length L with boundary temperatures $T(0)=100^0$ C and $T(L)=50^0C$ using the finite difference method.	**L3**	**CO-II**	**[5M]**
	B	Derive the energy equation for forced convection		**CO-II**	**[5M]**

SECTION-III

6	A	Air at 20^0C is flowing along a heated plate at 134^0C at a velocity of 3 m/s. The plate is 2 m long and 1.5 m wide. Calculate the thickness of the hydrodynamic boundary layer and the skin friction coefficient at 40 cm from the leading edge of the plate. The kinematic viscosity of the air at 20^0C may be taken as 15.06 x 10^{-6} m^2/s.	**L3**	**CO-III**	**[5M]**
	B	A Horizontal plate of 800 mm long, 70mm wide is maintained at a temperature of 140°C in a large tank of full of water at 60°C. Determine the heat loss from the upper side of the plate.	**L3**	**CO-III**	**[5M]**

OR

|					
7	A	Explain the concept of velocity and thermal boundary layers for a flow over flat plate using neat sketches.	**L2**	**CO-III**	**[5M]**
	B	A vertical cylinder 1.6 m high and 180mm in diameter is maintained at 100°C in an atmosphere environment of 20°C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean temperature as ρ = 1.06 kg/m3 ,v = 18.97 x 10^{-6} m^2 /s, Cp = 1.004 kJ/kg°C and k = 0.1042kJ/m°C	**L3**	**CO-III**	**[5M]**

SECTION-IV

8	A	Compare film condensation correlations for different geometries (vertical plate, horizontal tube, inclined surfaces).	**L2**	**CO-IV**	**[5M]**
	B	A wire of 1.2mm diameter and 200 mm length is submerged horizontally in water at 7 bar. The wire carries a current of 135 A with an applied voltage of 2.18 V. If the surface of the wire is maintained at 200°C, calculate i) The heat flux ii) The boiling heat transfer coefficient	**L3**	**CO-IV**	**[5M]**

OR

9	A	Explain the Boussinesq approximation in the context of free convection. What are its assumptions and limitations?	**L2**	**CO-IV**	**[5M]**
	B	Water at atmospheric pressure is to be boiled in polished copper pan. The diameter of the pan is 350 mm and is kept at 115°C. Calculate the following i) Power of burner ii) Rate of evaporation in kg/h iii) Critical Heat flux	**L3**	**CO-IV**	**[5M]**

10	A	Determine the view factors F_{13} and F_{31} between the surfaces 1 and 3 as shown below	L3	CO-V	[5M]
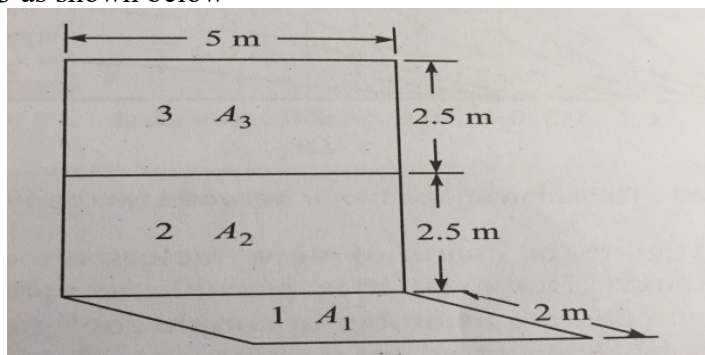
	B	Explain the Reynolds analogy for heat and mass transfer. How can it be used to estimate the mass transfer coefficient from the heat transfer coefficient?	L2	CO-V	[5M]

OR

11	A	Distinguish briefly between	L2	CO-V	
		i) A black body and gray body			[3M]
		ii) Specular and diffuse surface			[3M]
	B	Two discs of dia 200 mm each are arranged in two parallel planes 400 mm apart. The temperature of the first disc is 500^0C and that of the second one is 300^0C. Determine the radiating heat transfer between them, if they are i) black ii) gray with emissivities 0.3 and 0.5 respectively.	L3	CO-V	[4M]

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Code No: **R22D2111**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year II Semester Regular/Supplementary Examinations, August 2024
Energy Management
(TE)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

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		PART-A (10 Marks) (Write all answers of this part at one place)	**BCLL**	**CO(s)**	**Marks**
1	A	What are the functional areas in a process industry?	L1	CO-I	[1M]
	B	What is organizing in energy management?	L1	CO-I	[1M]
	C	What is an energy audit?	L1	CO-II	[1M]
	D	What are energy flow networks?	L1	CO-II	[1M]
	E	What are budget considerations?	L1	CO-III	[1M]
	F	What is a risk matrix?	L1	CO-III	[1M]
	G	What is present worth in project evaluation?	L1	CO-IV	[1M]
	H	Who uses the investor's rate of return?	L1	CO-IV	[1M]
	I	What is the purpose of thermal storage systems?	L1	CO-V	[1M]
	J	How does a wind turbine work?	L2	CO-V	[1M]

PART-B (50 Marks)
SECTION-I

2		What are the fundamental principles of energy management, and how do they impact the overall performance of an organization in terms of cost savings, environmental sustainability, and operational efficiency?	L4	CO-I	[10M]

OR

3	A	What is the initiating phase of energy management, and how does it involve setting goals, identifying opportunities, and developing a roadmap for energy management initiatives?	L2	CO-I	[5M]
	B	What are the long-term goals and objectives of an energy management program, and how do they contribute to the achievement of organizational sustainability and energy efficiency?	L4	CO-I	[5M]

SECTION-II

4	A	What are the basic energy concepts that underlie energy auditing, including energy units, energy conversion, and energy efficiency, and how do they inform the energy auditing process?	L2	CO-II	[5M]
	B	What are the technologies for energy conservation,	L2	CO-II	[5M]

including energy-efficient lighting, HVAC systems, and insulation, and how do they contribute to reducing energy consumption and greenhouse gas emissions?

OR

5		How does design for conservation of energy materials involve the selection and specification of materials that minimize energy consumption and waste, and what are the key considerations in this process?	L4	CO-II	[10M]

SECTION-III

6	A	What is the scope of economic analysis in the context of investment decision-making, and how does it help in evaluating the feasibility of a project?	L4	CO-III	[5M]
	B	What are the different types of depreciation methods, including straight-line, declining balance, and units-of-production, and how do they impact the financial performance of a project?	L2	CO-III	[5M]

OR

7		What is the difference between budgeting and forecasting in economic analysis, and how do they influence investment decisions, including the preparation of a budget and a forecast?	L4	CO-III	[10M]

SECTION-IV

8		What are the underlying principles and assumptions of the payback method of evaluating projects, and how does it differ from other methods of evaluation in terms of its approach to calculating the viability of a project?	L4	CO-IV	[10M]

OR

9	A	How do the different methods of evaluation account for the time value of money, and what are the implications of ignoring this concept in project evaluation?	L5	CO-IV	[5M]
	B	What are the limitations of using a single method of evaluation, and how can project managers and investors use a combination of methods to get a more comprehensive view of a project's viability?	L5	CO-IV	[5M]

SECTION-V

10		What are the different types of devices used for solar energy collection, and how do they vary in terms of their efficiency, cost, and application in different environments and industries?	L2	CO-V	[10M]

OR

11	A	Discuss the factors that influence the availability of wind energy in a particular location. How do geographical and meteorological factors affect wind energy potential?	L5	CO-V	[5M]
	B	Compare and contrast the different types of wind energy devices What are the primary considerations when choosing a type of wind turbine for a specific application?	L5	CO-V	[5M]

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Code No: R22D2114
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year II Semester Regular/Supplementary Examinations, August 2024
Industrial Refrigeration Systems
(TE)

Roll No										

Time: 3 hours   **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

		PART-A (10 Marks) **(Write all answers of this part at one place)**	BCLL	CO(s)	Marks
1	A	What is refrigeration?	L1	CO-I	[1M]
	B	Differentiate between C.O.P. and efficiency.	L3	CO-I	[1M]
	C	Where is the reciprocating compressor mostly suitable?	L4	CO-II	[1M]
	D	Define a screw compressor.	L2	CO-II	[1M]
	E	What is the function of condenser used in refrigeration system?	L1	CO-III	[1M]
	F	What are the advantages of evaporators used in refrigeration system?	L2	CO-III	[1M]
	G	List out two type of vessels commonly used in refrigeration system.	L1	CO-IV	[1M]
	H	What is the purpose of thermos-syphon receiver in a refrigeration system?	L3	CO-IV	[1M]
	I	Name the different type of energy sources.	L1	CO-V	[1M]
	J	What kind of insulation is used in refrigerators?	L4	CO-V	[1M]

PART-B (50 Marks)
SECTION-I

			BCLL	CO(s)	Marks
2	A	Explain various applications of refrigeration systems used in industries.	L3	CO-I	[5M]
	B	Distinguish between comfort air-conditioning and industrial air-conditioning.	L2	CO-I	[5M]

OR

			BCLL	CO(s)	Marks
3	A	Discuss the areas where refrigeration systems required in industries.	L1	CO-I	[5M]
	B	What are the basic requirements of air conditioning system used in industries?	L2	CO-I	[5M]

SECTION-II

			BCLL	CO(s)	Marks
4	A	Illustrate different type of compressors. Mention the fields for the use of each in refrigeration system.	L2	CO-II	[5M]
	B	Differentiate between reciprocating and screw	L1	CO-II	[5M]

compressors.

<div align="center">OR</div>

5	A	Explain the working of reciprocating compressors.	**L3**	**CO-II**	**[5M]**
	B	Briefly explain oil injection and refrigeration injection systems.	**L2**	**CO-II**	**[5M]**

<div align="center">

SECTION-III

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6	A	Discuss various type of Condensers used in refrigeration systems.	**L2**	**CO-III**	**[5M]**
	B	What are the merits and demerits of air cooled condensers over water cooled condensers.	**L3**	**CO-III**	**[5M]**

<div align="center">OR</div>

7	A	Describe different type of Evaporators used in refrigeration systems.	**L4**	**CO-III**	**[5M]**
	B	What problems does lubricating oil cause in evaporator?	**L2**	**CO-III**	**[5M]**

<div align="center">

SECTION-IV

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8	A	Explain Low pressure receivers and thermos syphon receiver.	**L4**	**CO-IV**	**[5M]**
	B	Briefly discuss surge drum and surge line accumulator.	**L1**	**CO-IV**	**[5M]**

<div align="center">OR</div>

9	A	Write a note on High pressure receivers.	**L2**	**CO-IV**	**[5M]**
	B	Discuss flash tank and liquid separator.	**L3**	**CO-IV**	**[5M]**

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SECTION-V

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10	A	List out and explain various type of insulating materials used for air-conditioning system.	**L2**	**CO-V**	**[5M]**
	B	Explain insulation cost and energy cost used in refrigeration systems.	**L5**	**CO-V**	**[5M]**

<div align="center">OR</div>

11	A	Describe the construction methods of refrigerated spaces.	**L2**	**CO-V**	**[5M]**
	B	Explain different methods of ice manufacturing methods.	**L3**	**CO-V**	**[5M]**

<div align="center">***</div>