Code No: **R22D2104**

R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHN(

(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year I Semester Supplementary Examinations, August 2024
Solar Energy Technology
(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)

1	A	What is solar constant	**[1M]**
	B	Define solar collector efficiency?	**[1M]**
	C	What is concentration ratio?	**[1M]**
	D	Importance of central receiving system	**[1M]**
	E	Functions of air heaters in energy storage	**[1M]**
	F	List the uses of solar ponds	**[1M]**
	G	What are different types of solar cells	**[1M]**
	H	What are the advantages of solar cells	**[1M]**
	I	What are the important costs in solar energy system	**[1M]**
	J	Importance of optimization in solar system	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	A	Describe the applications of solar energy	**[5M]**
	B	Write short notes on Beam radiation, diffuse radiation, Total radiation, Extra-terrestrial radiation, terrestrial radiation,	**[5M]**

OR

3	A	Explain flat plate collector with its merits and demerits	**[5M]**
	B	Enumerate the various non-conventional energy sources with their merits and demerits	**[5M]**

SECTION-II

4	Differentiate solar central receiving system and distributed receiving with exampls	**[10M]**

OR

5	Explain heliostats and receivers with sketches	**[10M]**

SECTION-III

6	Explain storage of energy in zero carbon system	**[10M]**

OR

7	What are the different mechanical energy storage systems and explain	**[10M]**

SECTION-IV

| 8 | | Explain solid state energy conversion systems with sketches | **[10M]** |

OR

| 9 | A | Compare the performance of solar cells | **[5M]** |
| | B | Explain modular construction in solar cells | **[5M]** |

SECTION-V

| 10 | | Describe life cycle costs in solar energy systems | **[10M]** |

OR

| 11 | | Explain discounted cash flow system in solar energy | **[10M]** |

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL(
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year I Semester Supplementary Examinations, August 2024
Advanced Fluid Mechanics
(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)

1	A	when the stream, path and streak lines do not coincide?	**[1M]**
	B	Distinguish between local and convective acceleration.	**[1M]**
	C	Write the relation between mean and maximum velocity for steady laminar flow of fluid in a circular pipe.	**[1M]**
	D	Write the expression for pressure drop due to friction for laminar flow of fluid between two parallel flat plates located at a distance 'B' apart.	**[1M]**
	E	Write the momentum boundary layer equation for a flat plate at angle of attack of zero incidence in 2-dimensional steady, incompressible flow without effects of gravity or other volumetric forces.	**[1M]**
	F	Define momentum and energy thickness of boundary layer.	**[1M]**
	G	Define time averaging of a flow quantity in a turbulent flow.	**[1M]**
	H	Write two methods to control the boundary layer separation.	**[1M]**
	I	Classify the compressible fluid flow with reference to Mach number.	**[1M]**
	J	What is the significance of the strength of shock wave?	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	A	Consider a two-dimensional flow field defined by u = x(1+2t) and v =y. Find the equation for streamline passing through the point (1, 1).	**[5M]**
	B	Stream function ψ is given by $8(x^2 + y^2)$. Prove that the flow is rotational and determine magnitude and direction of velocity at (2, 3).	**[5M]**

OR

3	A	Calculate the circulation for the flow field u = cy and v = 0 bounded by a closed contour described by $x^2 + y^2 - 2ay = 0$.	**[5M]**
	B	Derive three-dimensional continuity equation in cartesian co-ordinates.	**[5M]**

SECTION-II

4	A	What is plane Poiseuille flow? Show that the magnitude of the shear stress increases linearly from the center of the channel in plane Poiseuille flow.	**[5M]**
	B	Oil of viscosity 0.1 Pa-s and specific gravity 0.90, flows through a horizontal pipe of 25 mm diameter. If the pressure drop per metre	**[5M]**

length of the pipe is 12 kPa, determine (i) the rate of flow in N/min, (ii) the shear stress at the pipe wall, (iii) the Reynolds number of the flow and (iv) the power required per 50 m length of pipe to maintain the flow.

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

5   A   Derive an expression for shear stress distribution in Couette flow between two parallel flat plates. Also draw the shear stress distribution. **[5M]**

       B   Two parallel plates kept 0.1 m apart have laminar flow of oil between them with a maximum velocity of 1.5 m/s. Calculate the discharge per metre width, the shear stress at the plates, the difference in pressure in pascals between two points 20 m apart, the velocity gradient at the plates and velocity at 0.02 m from the plate. Take viscosity of oil to be 2.453 Pa-s. **[5M]**

<div align="center">**SECTION-III**</div>

6   A   Calculate the displacement and momentum thickness for the velocity profile within boundary layer is $u/u_\infty = (y/\delta)^{1/7}$, where 'u' is the velocity of flow at a height 'y' above the surface, δ is boundary layer thickness and 'u_∞' is the free-stream velocity. **[5M]**

       B   A smooth flat plate 2.4 m long and 0.9 m wide moves lengthwise at 6 m/s through still atmospheric air of density 1.226 kg/m^3 and kinematic viscosity 1.49 x 10^{-5} m^2/s. Assuming the boundary layer to be entirely laminar, calculate the boundary layer thickness at the trailing edge of the plate, the shear stress half-way along the plate and the power required to move the plate. **[5M]**

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

7   A   Derive the expressions for shear stress and the drag force along the flat plate by Von-Karman momentum integral method. **[5M]**

       B   Calculate the friction drag on a flat plate 15cm wide and 45cm long placed longitudinally in a stream of oil of relative density 0.925 and kinematic viscosity 0.9 stoke, flowing with a free stream velocity of 6.0 m/s. Also, find the shear stress at the trailing edge. **[5M]**

<div align="center">**SECTION-IV**</div>

8   A   Explain the concept of Prandtl's mixing length theory for turbulent boundary layer flows. **[5M]**

       B   Differentiate between form and surface drag. Discuss the measures to be taken to reduce form drag on bodies. **[5M]**

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

9   A   Derive the expression for velocity distribution in a hydrodynamically rough pipe. **[5M]**

       B   A pipeline of diameter 0.3 m carries oil at the rate of 540 litres/s. If the specific gravity of the oil is 0.80 and its kinematic viscosity is equal to 0.023 stokes, determine (i) the maximum permissible height of the protrusions up to which the pipe acts as smooth pipe, (ii) the height of the protrusions beyond which the pipe would become rough **[5M]**

<div align="center">**SECTION-V**</div>

10   A   Air at an absolute pressure of 100 kN/m^2 and 15°C expands in isentropic process from an initial Mach number of 0.5 to a final Mach number of 1.0. Calculate, (i) the final pressure, (ii) the final density, and **[5M]**

(iii) the temperature. Take R = 287 J/kg-K

B   Air flows isentropically in a variable area duct. The velocity, pressure and temperature at inlet are 64 km/hour, 100 kN/m^2 and 22^0C respectively. If the outlet pressure is 68.7 kN/m^2, determine (i) the velocity and temperature at outlet and (ii) the area ratio of inlet and outlet sections. Take R = 287 J/ kg K.   **[5M]**

OR

11   A   Establish from first principles the Fanno equation and sketch on T-s plane, characteristic "Fanno line' for a duct of constant area section. Mark the subsonic and supersonic parts and the sonic point.   **[5M]**

    B   A tank fitted with a convergent nozzle contains air at a temperature of 30ºC. The diameter at the outlet of the nozzle is 30 mm. Assuming adiabatic flow, find the mass rate of flow of air through the nozzle to the atmosphere when the absolute pressure in the tank is 150 kN/m^2 and 300 kN/m^2.   **[5M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year I Semester Supplementary Examinations, August 2024
Advanced I.C. Engines
(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)

1	A	Write the classifications of I.C Engines.	[1M]
	B	What are the factors responsible for computer modeling?	[1M]
	C	Write the importance of Mean velocity?	[1M]
	D	Why is turbulence important in the CI engine?	[1M]
	E	Define Normal Combustion & Abnormal Combustion.	[1M]
	F	What are the requirements of IC engine fuels	[1M]
	G	What are the different types of pollutants formed in SI engines?	[1M]
	H	What is the effect of UHC on environment?	[1M]
	I	Write short notes on engine energy balance.	[1M]
	J	What are the limitations of the HCCI engine?	[1M]

PART-B (50 MARKS)
SECTION-I

2	A	Why the real cycle efficiency is much lower than the ideal cycle efficiency?	[4M]
	B	List the major losses and differences in actual engines and air-standard cycles.	[6M]

OR

3	A	Explain the models used for predicting thermodynamic properties of fuel mixtures of IC engines.	[5M]
	B	What are the design and operating parameters of C.I. Engines? Explain?	[5M]

SECTION-II

4	A	Explain the working of Supercharging and Write the advantages and disadvantages of supercharging over turbocharging.	[5M]
	B	How variation in volumetric efficiency of an engine affects the overall efficiency of an engine. Explain?	[5M]

OR

5		Explain with a figure the various types of indirect injection combustion chambers used in CI engines.	[10M]

<div align="center">**SECTION-III**</div>

6   Explain the effect of the following on CI Engine combustion   and efficiency   **[10M]**

         I.   Spray behavior
         II.   Ignition delay
         III.   Mixing formation

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

7   A   Explain various factors that influence the flame speed   **[5M]**

      B   Explain the MPFI system with the help of a line diagram   **[5M]**

<div align="center">**SECTION-IV**</div>

8   A   what are the main constituents of particulates from SI and CI engines?   **[3M]**

      B   Explain the difference between particulates and soot.   **[2M]**

      C   Explain the working of the flame ionization detector to measure unburned HC from engine emissions.   **[5M]**

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

9   Briefly discuss the selective catalytic reduction process with a suitable sketch   **[10M]**

<div align="center">**SECTION-V**</div>

10   A   Explain the working of the rotary engine with the help of a line diagram   **[5M]**

       B   What modifications can be made in the IC engine suit biofuels? Explain   **[5M]**

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

11   Explain briefly the engine heat transfer. Develop the necessary equation for the rate of heat transfer   **[10M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNO
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year I Semester Supplementary Examinations, August 2024
Advanced Thermodynamics
(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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Note: Steam Tables are permitted.
PART-A (10 MARKS)
(Write all answers of this part at one place)

1	A	State Clausius theorem.	**[1M]**
	B	Write any one of the cause of entropy increase.	**[1M]**
	C	What is a pure substance?	**[1M]**
	D	Define a normal boiling point.	**[1M]**
	E	What is chemical thermodynamics?	**[1M]**
	F	List any two important primary fuels.	**[1M]**
	G	What is mean by non-cyclic heat engine?	**[1M]**
	H	Define refrigeration.	**[1M]**
	I	List any two secondary energy sources.	**[1M]**
	J	What is Magneto hydrodynamics explain in brief.	**[1M]**

PART-B (50 MARKS)
SECTION-I

2	A	How is the entropy change of a revesible process estimated?	**[3M]**
	B	Will it be different for any irreversible process between the same end states?	**[2M]**
	C	A domestic food freezer maintains a temperature of -15^0 C. The ambient air temperature is 30^0 C. If heat leaks into the freezer at the continuous rate of 1.75 kJ/s, What is the least power necessary to pump this heat out continuously?	**[5M]**

OR

3	A	Describe the characteristics of entropy.	**[5M]**
	B	A system at 500 K receives 7200 kJ/min from a source at 1000 K. The temperature of atmosphere is 300 K. Assuming that the temperature of system and source remain constant during heat transfer find out: (i) The entropy produced during heat transfer and (ii) The decrease in available energy after heat transfer	**[5M]**

SECTION-II

4	A	What is a P-V-T surface? Draw a portion of such a surface.	**[5M]**
	B	The tyre of an automobile contains a certain volume of air at a gauge	**[5M]**

pressure of 2 bar and 20^0 C. The barometer reads 75 cm of Hg The temperature of air in the tyre rises to 80^0 C due to running of automobile for two hours. Find the new pressure in the tyre. Assuming that the air is an ideal gas and tyre does not stretch due to heating.

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

5	A	Describe briefly (i) Sensible heating and Sensible cooling and (ii) Heating and humidification..	**[5M]**
	B	The atmospheric conditions are30^0 C and specific humidity of 0.0215 kg/kg of air. If atmospheric pressure is 756 mm of Hg, Determine: (i) Partial pressure (ii) Relative humidity and (ii) Dew point temperature	**[5M]**

<div align="center">

SECTION-III

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6	A	Discuss in detail a note on chemical equilibrium.	**[5M]**
	B	Explain the effect of non-reacting gases equilibrium in multiple reactions	**[5M]**

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

7	A	What do you mean by stoichiometric air fuel (A/F) ratio?	**[5M]**
	B	How is analysis of exhaust and flue gas carried out?	**[5M]**

<div align="center">

SECTION-IV

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8	A	Describe second law analysis of cycles.	**[5M]**
	B	Explain co-generation and combined cycles.	**[5M]**

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

9	A	Explain different types of thermos-electric circuits.	**[5M]**
	B	Differentiate clearly between open and closed air refrigeration systems.	**[5M]**

<div align="center">

SECTION-V

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10	A	Explain the principle of Magneto hydrodynamic generation.	**[5M]**
	B	What are the merits and demerits of Magneto hydrodynamic generation?	**[5M]**

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

11	A	Discuss various merits and demerits of a fuel cell.	**[5M]**
	B	What are the advantages and disadvantages of photovoltaic solar energy conversion?	**[5M]**

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R22

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year I Semester Supplementary Examinations, August 2024
Research Methodology
(TE, CSE & ASP)

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)

1	A	What are the Objectives of research?	**[1M]**
	B	What is the Criteria of good research?	**[1M]**
	C	Define Experience survey.	**[1M]**
	D	Write about the Rephrasing the research problem	**[1M]**
	E	What do you mean by Holtzman Inkblot Test	**[1M]**
	F	Write about need for research design.	**[1M]**
	G	Distinguish between Statistics of attributes and statistics of variables	**[1M]**
	H	What is a Central limit theorem?	**[1M]**
	I	What is a hypothesis?	**[1M]**
	J	Define ANOVA.	**[1M]**

PART-B (50 MARKS)
SECTION-I

2	A	"Research is much concerned with proper fact finding, analysis and evaluation." Do you agree with this statement? Give reasons in support of your answer.	**[5M]**
	B	What are the possible motives for doing research?	**[5M]**

OR

3	A	Describe the order concerning various steps provides a useful procedural guideline regarding the research process .	**[5M]**
	B	How does one go about developing working hypotheses?	**[5M]**

SECTION-II

4	A	What is the necessity of defining a research problem? Explain.	**[5M]**
	B	Write a comprehensive note on the "Task of defining a research problem"	**[5M]**

OR

5		What is research problem? Define the main issues which should receive the attention of the researcher in formulating the research problem. Give suitable examples to elucidate your points	**[10M]**

SECTION-III

6	A	Clearly explain the difference between collection of data through questionnaires and schedules.	**[5M]**

	B	What is research design? Discuss the basis of stratification to be employed in sampling public opinion on inflation	**[5M]**
		OR	
7	A	. Explain the meaning of the following in context of Research design(a) Experimental and Control groups;(b) Informal experimental designs	**[5M]**
	B	Give your understanding of a good research design. Is single research design suitable in all research studies? If not, why?	**[5M]**

SECTION-IV

8	A	Describe the important statistical measures often used to summarise the survey/research data	**[5M]**
	B	"Processing of data implies editing, coding, classification and tabulation". Describe in brief these four operations pointing out the significance of each in context of research study	**[5M]**
		OR	
9	A	Write a brief essay on statistical estimation.	**[5M]**
	B	Discriminate use of average is very essential for sound statistical analysis". Why? Answer giving examples	**[5M]**

SECTION-V

10	A	Briefly describe the important parametric tests used in context of testing hypotheses. How such tests differ from non-parametric tests? Explain	**[5M]**
	B	Discuss about the basic principles of ANOVA.	**[5M]**
		OR	
11	A	What is Chi-square text? Explain its significance in statistical analysis	**[5M]**
	B	Describe the Basic principles and techniques of writing a Research Proposal.	**[5M]**

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