MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
M.Tech I Year I Semester Regular/Supplementary Examinations, June 2022
Research Methodology
(MD, TE, CSE, VLSIES & ASP)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.
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1	A	Define Research process and Explain various steps in research process	**[7M]**
	B	Describe the different types of research. Distinguish between an experiment and a survey	**[7M]**

2	A	Write a Short notes on
		   a) Objectives of Research
		   b) Criteria of a good research
			[7M]

	B	Distinguish between Research Methods and Research Methodology.	**[7M]**
3	A	Explain the Process of identification of Research problem.	**[7M]**
	B	How do you carry Literature Review? What are the advantages of the same?	**[7M]**
4	A	Define Research Problem and explain the techniques involved in defining a Research Problem.	**[7M]**
	B	Explain different sources of Research problem by giving suitable examples.	**[7M]**
5	A	Define Research Design? Explain the need and features of a good design.	**[7M]**
	B	Explain various types of Research Design.	**[7M]**
6	A	Distinguish between Primary Data and Secondary Data	**[7M]**
	B	Explain the classification of data with suitable examples.	**[7M]**
7	A	Explain the basic concept of sampling. How do you determine the sample size of a research study.	**[7M]**
	B	Discuss the probability sampling with merits and demerits?	**[7M]**
8	A	Define Research report and Explain various components of Research report.	**[7M]**
	B	Lucidly present the stages for preparation of a research report.	**[7M]**

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Code No: **R20D2102**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
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M.Tech I Year I Semester Regular/Supplementary Examinations, June 2022
Advanced Fluid Mechanics
(TE)

Roll No										

R20

Time: 3 hours   Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.
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1	A	Derive the momentum equation for the steady incompressible fluid flow.	**[7M]**
	B	From the consideration of vorticity and rotation show that in case of ideal fluids the flow is irrotational.	**[7M]**
2	A	In the two-dimensional incompressible flow field the velocity components are expressed as $U = 2x - x^2 y + y^3/3$ and $v = -2y + xy^2 - x^3/3$ (i) Determine the velocity and acceleration at point P (x=1m, y=3m). (ii) Is the flow physically possible? If so obtain an expression for the stream function. (iii) What is the discharge between the streamlines passing through (1, 3) and (2, 3)?	**[7M]**
	B	What is an Irrotational flow? Explain the significance of a potential function.	**[7M]**
3	A	Derive an expression for the velocity distribution for viscous flow through a circular pipe. Also sketch the distribution of velocity and shear stress across a section of the pipe.	**[7M]**
	B	Two horizontal plates are 2 cm apart and one plate moves horizontally at 1 m/s. The space between the plates is filled with an oil of viscosity 1.5 poise. The pressure difference is 12.5 kPa per 10 m length. Sketch the velocity and shear stress distribution.	**[7M]**
4	A	In a generalized Couette flow, is it possible to have a non-zero shear stress between the plates? Under what conditions is it possible?	**[7M]**
	B	Two parallel plates are placed horizontally 10 mm apart. The bottom plate is fixed and the top plate is moved at a uniform speed of 0.25 m/s. The fluid between them has a dynamic viscosity μ equal to 1.472 N.s/m². Determine the pressure gradient which corresponds to the condition of zero discharge between the plates and the shearing stress at each plate.	**[7M]**
5	A	How are the thickness of boundary layer, shear stress and the drag force along the flat plate determined by Von Karman momentum equation?	**[7M]**

	B	A plate of size 600mm length and 400 mm wide is immersed in a fluid of sp.gr. 0.9 and kinematic viscosity v=10^{-4} m^2/s.The fluid is moving with a velocity of 6 m/s. Determine (i)Shear stress at the end of the plate and (ii) Drag force on one side of the plate.	[7M]
6	A	Derive the formula for the Boundary shear stress and friction drag of a smooth parallel flat plate covered by a laminar boundary layer.	[7M]
	B	Explain the concept of boundary layer theory.	[7M]
7	A	Obtain an expression for velocity distribution in terms of average velocity for (a) Smooth pipes and (b) Rough pipes.	[7M]
	B	Find the terminal velocity of fall of a thin square plate of mass 300 grams and side 0.2 m when it is dropped in water vertically (with opposite sides vertical). Assume that the boundary layer is turbulent from the leading edge of the plate.	[7M]
8	A	Derive the continuity equation for one dimensional compressible flow in differential form.	[7M]
	B	Calculate the Mach number at a point on a jet propelled air craft which is flying at 900 km/hr at sea level where air temperature is 15^0C. Take k = 1.4 and R = 287 J/kgK.	[7M]

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R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNO|
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M.Tech I Year I Semester Regular/Supplementary Examinations, June 2022
Solar Energy Technology
(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 about beam and diffuse radiation.	**[6M]**
	B	How can we measure the diffuse radiation by using the Pyranometer?	**[8M]**
2		Explain any two types of concentrating collectors with neat diagram.	**[14M]**
3		Draw a neat diagram of domestic solar water heating system and explain its working. Which parameters are important in designing of this system?	**[14M]**
4		Explain about solar distributed receiver system? What are its advantages and disadvantages?	**[14M]**
5		Explain the difference between passive and active solar heating system with the help of neat diagrams.	**[14M]**
6		Describe house heating system when water is used as a heat carrier from solar collector. What are its advantages and disadvantages?	**[14M]**
7		Clearly explain about any two types of solar cells.	**[14M]**
8		Explain the cost benefit analysis of solar photovoltaic cell.	**[14M]**

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R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)

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

Advanced I.C. Engines

(TE)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.
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1	A	Outline major components of an internal combustion engine and explain the functions of each.	**[7M]**
	B	With neat sketches explain the working principle of four- stroke spark ignition engine.	**[7M]**
2	A	Discuss briefly the design performance data of an internal combustion engine.	**[7M]**
	B	Explain differences and factors responsible for computer modelling.	**[7M]**
3	A	Describe briefly super charging and turbo charging.	**[7M]**
	B	Explain mean velocity and turbulent characteristics.	**[7M]**
4	A	Discuss pre chamber engine flows with suitable sketch.	**[7M]**
	B	Explain exhaust gas flow rate and temperature variation in internal combustion engine.	**[7M]**
5	A	Explain thermodynamic analysis of spark ignition engine combustion.	**[7M]**
	B	Describe flame structure and speed in spark ignition engine combustion.	**[7M]**
6	A	In detail explain fuel spray behaviour in compression-ignition engines.	**[7M]**
	B	With a neat sketch explain the working of common rail fuel injection system used in diesel engines.	**[7M]**
7	A	How does an internal combustion engine contribute towards pollution of the atmosphere? Explain.	**[7M]**
	B	Describe the working two-way catalytic convertor is used to convert the pollutant in the engine exhaust into harmless constituents.	**[7M]**
8	A	Describe different type of fuel supply systems used for CNG and Hydrogen engines.	**[7M]**
	B	Explain operating variables that affect spark-ignition engine performance and emissions.	**[7M]**

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R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNO
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M.Tech I Year I Semester Regular/Supplementary Examinations, June 2022
Advanced Thermodynamics
(TE)

Roll No									

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

Answer Any **Five** Questions
All Questions carries equal marks.
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1   a) Derive an expression for the change in entropy of the universe.   **[7M]**

b) A domestic food refrigerator maintains a temperature of -12^0 C. The ambient air temperature is 35^0 C. If heat leaks into the freezer at continuous rate of 2 kJ/s, determine the least power necessary to pump this heat out continuously.   **[7M]**

2   a) Derive an expression for availability in non-flow systems.   **[4M]**

b) Describe Maxwell relations and explain their importance in thermodynamics.   **[10M]**

3   a) In brief write a note on Vander Waals equation.   **[5M]**

b) The volume of a high altitude chamber is 40 m^3. It is put into operation by reducing pressure from 1 bar to 0.4 bars and temperature from 25^0 C to 5^0 C. How many kg of air must be removed from the chamber during process? Express this mass as a volume measured at 1 bar and 25^0 C. Take R = 287 J/kg K for air.   **[9M]**

4   a) Explain the terms (i) Cooling and dehumidification and (ii) Heating and humidification.   **[7M]**

b)The air supplied to a room of building in winter is to be at temperature 17^0 C and have a relative humidity of 60%. If the barometric pressure is 1.01325 bars, find (i) The specific humidity and (ii) The dew point under these conditions.   **[7M]**

5   a) Discuss chemical thermodynamics.   **[5M]**

b) Illustrate the methods by which air-fuel ratio can be calculated when analysis of combustion products is known.   **[9M]**

6   a) In detail explain Gibbs phase rule.   **[4M]**

b) Derive and explain relations for internal energy and enthalpy of reaction.   **[10M]**

7   a) With a neat sketch explain the binary vapour cycle.   **[7M]**

b) Discuss topping and bottoming cycles with a neat sketch.   **[7M]**

8   a)   Explain the principle of solar photovoltaic power generation?   **[4M]**

b)   Discuss a Magneto hydrodynamic open cycle system.   **[10M]**
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