R22

Code No: **R22DHS53**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year I Semester Supplementary Examinations, August 2023

Research Methodology

(MD, TE, VLSIES & 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.

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PART-A (10 MARKS)

Write all answers of this PART at one place)

1	A	What are the objectives of Research?	**[1M]**
	B	Discuss any four problems faced by researchers in India?	**[1M]**
	C	What is the difference between systematic and stratified sampling?	**[1M]**
	D	What are the primary data collection methods?	**[1M]**
	E	What is research design and need for research design?	**[1M]**
	F	What is the hypothesis in research?	**[1M]**
	G	What is the difference between ANOVA and Kruskal-Wallis test?	**[1M]**
	H	State the methodology of research.	**[1M]**
	I	List down the steps involved in writing a report?	**[1M]**
	J	What is plagiarism? How plagiarism can be avoided?	**[1M]**

PART-B (50 MARKS)

SECTION-I

2	A	Explain the terms Fundamental Research, Basic Research, Applied Research and Industrial Research with suitable examples.	**[5M]**
	B	Literature review helps in identifying a suitable research problem. Comment.	**[5M]**
		OR	
3	A	Elaborate on common errors committed by researchers in selecting the research problem.	**[5M]**
	B	What is a literature review? Explain the effective literature studies approach for a research problem.	**[5M]**

SECTION-II

4	A	What do you mean by "Sample Design"? Under what circumstances one should use a probability sample?	**[5M]**
	B	What is statistical data analysis in research methodology?	**[5M]**
		OR	
5	A	What is collection of data explain primary and secondary source to collect the data?	**[5M]**

B What is data processing and write about analysis methods? **[5M]**

SECTION-III

6 A How do you formulate a research hypothesis? What is the purpose of the formulation of hypothesis? **[5M]**

B What is difference between deductive and inductive research? **[5M]**

OR

7 A Write about various components of research design? **[5M]**

B Describe some of the important research designs used in experimental hypothesis-testing research study. **[5M]**

SECTION-IV

8 A Describe some of the important research designs used in experimental hypothesis-testing research study. **[5M]**

B In an experiment on the immunisation of goats from Anthrax, the following results were obtained. Derive your inference on the effectiveness of vaccine. **[5M]**

	Survived	Died	Total
Inoculated	15	2	17
Non inoculated	4	10	14
Total	19	12	31

OR

9 A What is Hypothesis-testing? **[5M]**

B Test whether the variances are significantly different in the following sample. **[5M]**

Sample I (X1)	45	46	49	25	17	18	13	56	58
Sample II (X2)	47	49	43	27	29	38	37		

SECTION-V

10 A Explain the factors considered for technical report writing. **[5M]**

B Write the procedure for plagiarism analysis. **[5M]**

OR

11 A Identify different formats of Research proposal writing. Outline and explain the format of experimental report writing. **[5M]**

B What is trademark? Describe role of trademark in business. **[5M]**

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R22

Code No: R22D1503

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year I Semester Supplementary Examinations, August 2023

Advanced Finite Element Analysis

(MD)

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	Explain Finite element methods	**[1M]**
	B	What are the properties of shape functions?	**[1M]**
	C	What do you mean by body force?	**[1M]**
	D	What do you mean by traction force?	**[1M]**
	E	What is a LST element	**[1M]**
	F	List any four two dimensional elements.	**[1M]**
	G	What is conduction.	**[1M]**
	H	Define fins or extended surfaces.	**[1M]**
	I	What is lumped mass matrix.	**[1M]**
	J	What is consistent mass matrix.	**[1M]**

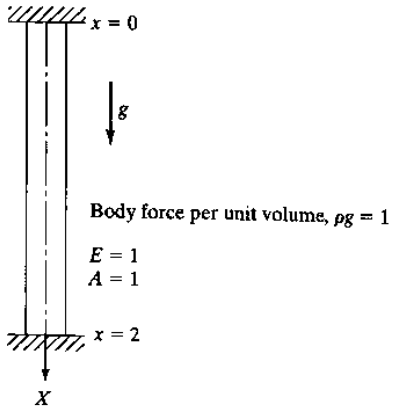
PART-B(50 MARKS)

SECTION-I

2	A	Derive material constitutive matrix for plane stress.	**[5M]**
	B	Explain the concept of FEM briefly. Outline the steps involved in FEM	**[5M]**

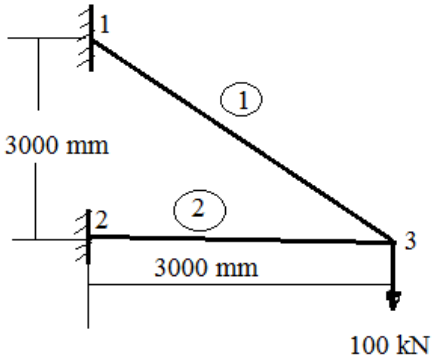
OR

3		Use the Rayleigh Ritz method to find the mid point of the rod shown in Fig.1 E=1 N/m$^{2;}$ A= 1 m^2.	**[10 M]**



SECTION-II

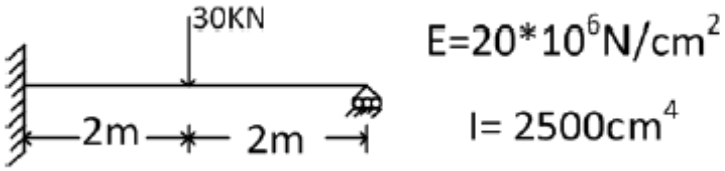
4 For the two-bar truss shown in figure, determine the displacements and stress. A_1=500mm^2, A_2=1200mm^2, E=2x10^5 N/mm^2. **[10 M]**



OR

5 A What is a beam? Write the hermite shape functions for beam element? **[5M]**

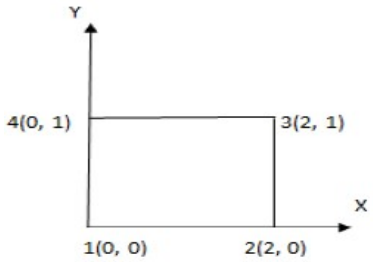
B For the beam shown in figure calculate the deflection under the load for the beam. **[5M]**



SECTION-III

6 A Explain iso parametric, sub para metric and super parametric elements. **[5M]**

B A four noded rectangular element is shown in Fig. Determine (i) Jacobian matrix (ii) Strain displacement matrix.Take e = 2 x 10^{5}N/mm^2, υ=0.25, ξ = η = 0, U =[0,0, 0.003, 0.004, 0.006, 0.004,0,0]^T. Assume Plane Stress Conditions. **[5M]**



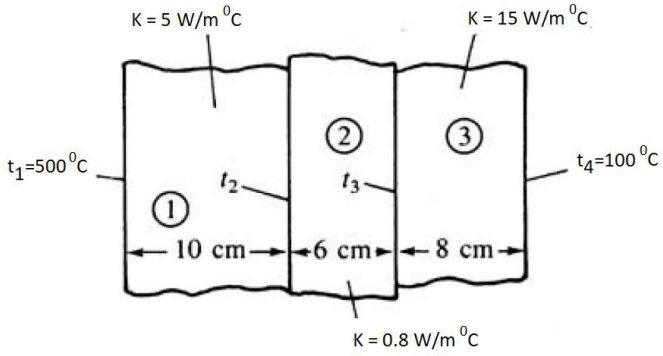
OR

7 A Derive the strain displacement matrix for triangular element. **[5M]**

B Evaluate the integral $I = \int_{-1}^{1}(3e^x + x^2 + \frac{1}{x+2})\,dx$ by one point, two point, and three point gauss quadrature method. **[5M]**

SECTION-IV

8 For the composite wall shown in Fig. , determine the interface Temperatures considering three elements. **[10 M]**



OR

9 Determine the temperature distribution through the composite wall shown in Fig. when convective heat loss occurs on the left surface. Assume unit area. Thickness t_1 = 4cm, t_2 = 2cm, K_1=0.5W/cm.K, K_2 = 0.05W/cm.K, T_α = -5^{0}C, h = 0.1 W/cm^2 K.[5M] **[10 M]**

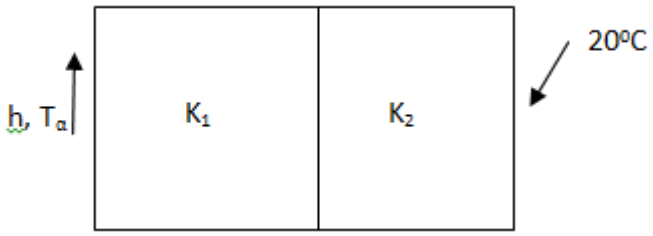


Fig.

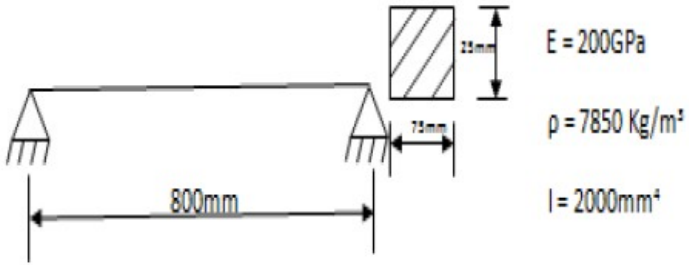
SECTION-V

10 A Derive mass matrix for 1 D bar element. **[5M]**

B Derive mass matrix for 1D truss element. **[5M]**

OR

11 Determine all natutal frequencies of the simply supported beam shown in fig. **[10 M]**



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R22

Code No: R22D1501

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year I Semester Supplementary Examinations, August 2023

Advanced Mechanical Engineering Design

(MD)

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	Define Reliability.	**[1M]**
	B	Name any two creative techniques.	**[1M]**
	C	Write about concept testing.	**[1M]**
	D	Mention the need of DFM.	**[1M]**
	E	What is yielding?	**[1M]**
	F	State the need of fluctuating stresses.	**[1M]**
	G	Name any two surface fatigue failures.	**[1M]**
	H	Write about surface geometry.	**[1M]**
	I	Define Value Engineering.	**[1M]**
	J	Name any two economic factors influencing design.	**[1M]**

PART-B(50 MARKS)

SECTION-I

2	A	Explain the need analysis by stating its significance	**[5M]**
	B	Bring out the differences between design for safety and design for reliability	**[5M]**
		OR	
3	A	Explain the various phases of the design process with the help of a Flow chart.	**[5M]**
	B	Define Creativity. Explain the various creative techniques.	**[5M]**

SECTION-II

4	A	What are the important points to be considered while designing with glass parts? Explain	**[5M]**
	B	Write a note on the aesthetic and ergonomic considerations in product design.	**[5M]**
		OR	
5	A	Explain the mathematical modeling similitude relations in product design.	**[5M]**
	B	Explain the following terms: Product specification; Product planning; Product strategies.	**[5M]**

SECTION-III

6	A	Discuss the (i) Miner's rule, and the (ii) Manson's rule for computing the fatigue damage caused by overstressing of a component.	**[5M]**
	B	Explain the Fracture Mechanics theory with suitable examples	**[5M]**
		OR	
7		The force acting on a bolt consists of two components, an axial pull of 12 kN, and a transverse shear force of 6 kN. The bolt is made of steel FeE 310 (S_{yt} = 310 N/mm^2), and the factor of safety is 2.5. Determine the diameter of the bolt using the maximum shear stress theory of failure.	**[10M]**

SECTION-IV

8	A	Distinguish between adhesive wear, abrasive wear, and corrosion wear by giving suitable examples.	**[5M]**
	B	List the reasons for surface fatigue failures.	**[5M]**
		OR	
9	A	What is Surface Fatigue Strength, and how is it determined? Explain.	**[5M]**
	B	What are the different types of oil films that can exist between two mating surfaces? Discuss their effects on the surface failure.	**[5M]**

SECTION-V

10	A	Write a note on the material and process selection in value engineering	**[5M]**
	B	Define Ergonomics. And explain various human engineering considerations with reference to the design process.	**[5M]**
		OR	
11	A	Write a short note on Economic analysis.	**[5M]**
	B	Mention the significance of modern approaches in design.	**[5M]**

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R22

Code No: R22D1506

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year I Semester Supplementary Examinations, August 2023

Advanced Mechanics of Composite Materials

(MD)

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(10MARKS)

(Write all answers of this PART at one place)

1	A	What are natural composites?	**[1M]**
	B	What are the aerospace applications of composites?	**[1M]**
	C	What is unidirectional fiber-reinforced composites?	**[1M]**
	D	What are the major constituents in composite materials?	**[1M]**
	E	What is Hooke's law?	**[1M]**
	F	In which direction the strength of unidirectional lamina is usually much larger?	**[1M]**
	G	What is micro mechanics?	**[1M]**
	H	What are different modes of failure in composite laminates?	**[1M]**
	I	What is plate theory method?	**[1M]**
	J	What is the difference between thin plate and thick plate.?	**[1M]**

PART-B(50 MARKS)

SECTION-I

2	A	Explain the classification of composites based on reinforcement with suitable examples.	**[5M]**
	B	Explain the properties and applications of Particulate composites	**[5M]**
		OR	
3	A	Explain the properties and applications of carbon, boron, silicon carbide, and born carbide fibers as fiber reinforcements.	**[5M]**
	B	Explain the properties and applications of ceramic matrix composites	**[5M]**

SECTION-II

4	A	Explain the man layup process with suitable examples.	**[5M]**
	B	What are the advantages of man lay-up process?	**[5M]**
		OR	
5	A	Explain the pultrusion method with neat sketch.	**[5M]**
	B	Explain the advantages of RTM method.	**[5M]**

SECTION-III

6	A	Explain the concept of transformation of stress and strain with neat diagram.	**[5M]**
	B	What are constitutive relations of material? Explain.	**[5M]**

OR

7	A	Explain the graphic interpretation of stress-strain relations Off–axis.	**[5M]**
	B	What is laminate analysis?How do you analyze composite materials?	**[5M]**

SECTION-IV

8		Explain various failure mechanisms in laminates.	**[10M]**

OR

9	A	Explain the concept of an orthotropic lamina and how to calculate the strength of orthotropic lamina.	**[5M]**
	B	How do you calculate first ply failure?	**[5M]**

SECTION-V

10	A	What is the difference between angle-ply and cross-ply laminates?	**[5M]**
	B	What are the features of angle-ply laminate?	**[5M]**

OR

11		With the help of a neat diagram explain the force resultants acting on a two dimensional plate element.	**[10M]**

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R22

Code No: R22D1502

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

M.Tech I Year I Semester Supplementary Examinations, August 2023

Mechanical Behaviour of Materials

(MD)

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	Define Elasticity of material.	**[1M]**
	B	What is solid solution hardening?	**[1M]**
	C	Define fracture toughness.	**[1M]**
	D	Distinguish between fail safe and safe life designs.	**[1M]**
	E	Suggest any two materials suitable for brake pads. Justify your selection.	**[1M]**
	F	Define Creep.	**[1M]**
	G	What do you understand by dual phase steels?	**[1M]**
	H	What is Metallic glass?	**[1M]**
	I	State how polymer structures are formed?	**[1M]**
	J	Name different production techniques of fibres.	**[1M]**

PART-B (50 Marks)

SECTION-I

2	A	Explain Griffith's theory on brittle materials.	**[5M]**
	B	Discuss grain boundary strengthening mechanism.	**[5M]**
		OR	
3	A	Discuss the effect of temperature on the plastic behavior of engineering materials.	**[5M]**
	B	Discuss the creep curve of a ductile material.	**[5M]**

SECTION-II

4	A	Discuss low and high cycle fatigue test.	**[5M]**
	B	What is Paris law? Explain.	**[5M]**
		OR	
5	A	Discuss stress life and strain life design approaches.	**[5M]**
	B	Discuss fracture mechanism of non-metallic materials.	**[5M]**

SECTION-III

6	A	Discuss the role of computers in material selection.	**[5M]**
	B	Suggest the suitable material with appropriate justification for the	**[5M]**

application of Landing gear of an air craft.

OR

7	A	Suggest the suitable material with appropriate justification for the Marine applications.	**[5M]**
	B	Enlist the characteristics of the material for wear resistance	**[5M]**

SECTION-IV

8	A	What are the characteristics and applications of TRIP steels?	**[5M]**
	B	Write a shot note on shape memory alloy.	**[5M]**

OR

9	A	Discuss about nano crystalline materials.	**[5M]**
	B	Discuss about Metallic glasses.	**[5M]**

SECTION-V

10	A	What are the production techniques of foams?	**[5M]**
	B	What are the properties and application of WC?	**[5M]**

OR

11	A	What are structural ceramics? List different types and explain any two in detail.	**[5M]**
	B	What are production techniques of adhesives?	**[5M]**

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