

I M.TECH I Semester Regular Examinations, January-2025

R24

Sub Code: R24MCC101
RESEARCH METHODOLOGY & IPR
Time: 3 hours
(MD,CSE, STRE, PID, DECS, VLSI&ES)
Max. Marks: 60
Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M			
Unit-I							
1	a	i) Explain Clearly the objectives of Research Problem			K2	1	6M
		ii) Interpret different sources of research problem by giving suitable examples			K2	1	6M
	OR						
	b	i) Explain clearly research design process and steps to be followed			K2	1	12M
Unit-II							
2	a	i) How do you design a research problem? Give an example to illustrate your answer			K2	2	6M
		ii) Discuss various issues involved in selecting a research problem. Also elaborate important features of a good research design.			K2	2	6M
	OR						
	b	i) Differentiate between qualitative research and quantitative research			K2	2	12M
Unit-III							
3	a	i) Explain the procedure to determine the size of sample and discuss on sampling size			K2	3	6M
		ii) Explain the Concepts of Statistical Population			K2	3	6M
	OR						
	b	Explain different types of sampling techniques			K2	3	12M
Unit-IV							
4	a	i) Explain new developments in Intellectual Property Rights.			K2	4	6M
		ii) Define intellectual property in research. Explain different types of intellectual property			K2	4	6M
	OR						
	b	i) Contrast the purpose and functions of trademarks			K2	4	6M
ii) Write notes on trade secrets, precautions and maintenance			K2	4	6M		
Unit-V							
5	a	i) Exemplify the basic criteria of patentability of industrial designs			K2	5	6M
		ii) Explain the fundamentals of copyright laws			K2	5	6M
	OR						
	b	i) Describe briefly how the online patent data is organized			K3	5	6M
ii) Describe the structure and content of a patent document in general.			K3	5	6M		

KL: Blooms Taxonomy Knowledge Level
CO: Course Outcome M: Marks

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Sub Code: R24MNC102

DISASTER MANAGEMENT

Time: 3 hours

(STRE, P&ID, MD, DECS, VLSI&ES and CSE)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No	Questions	KL	CO	M	
1	Unit-I				
	a	i) Describe types of disasters with examples.	K2&K3	C01	6M
		ii)) Explain About The Disaster Management Cycle	K2&K3	C01	6M
	OR				
	b	i) Explain how the Richter scale is used to measure the magnitude of an earthquake	K2&K3	C01	6M
		ii) Discuss various types of natural disasters in India and highlight their effects	K2&K3	C01	6M
2	Unit-II				
	a	Explain The causes of Floods and the effects of Floods in detail. Give one Case Study of The Floods.	K2&K3	C02	12M
	OR				
b	Explain The causes of earthquakes and effects of earthquakes in detail. Give one Case Study of The earthquake.	K2&K3	C02	12M	
3	Unit-III				
	a	i) Explain the Earthquake zones of India	K2&K3	C03	6M
		ii) explain assessing risk and vulnerability	K2&K3	C03	6M
	OR				
	b	What is drought? Explain the types of droughts. Explain drought mitigation with an integration of technology and people.	K2&K3	C03	12M
4	Unit-IV				
	a	i) what are the multimedia technologies of disaster risk management in remote sensing	K2&K3	C04	12M
	OR				
	b	i) what are the forewarning levels of disaster management	K2&K3	C04	6M
	ii) Explain About The Mass Media and disaster Management?	K2&K3	C04	6M	
5	Unit-V				
	a	i) what are the disaster management acts and policies in India	K2&K3	C05	6M
		ii) What are the steps for formulating a disaster risk reduction plan?	K2&K3	C05	6M
	OR				
	What are favourable conditions for cyclone formation? How do you estimate risk from cyclonic conditions and safety precautions to save lives?	K2&K3	C05	12M	

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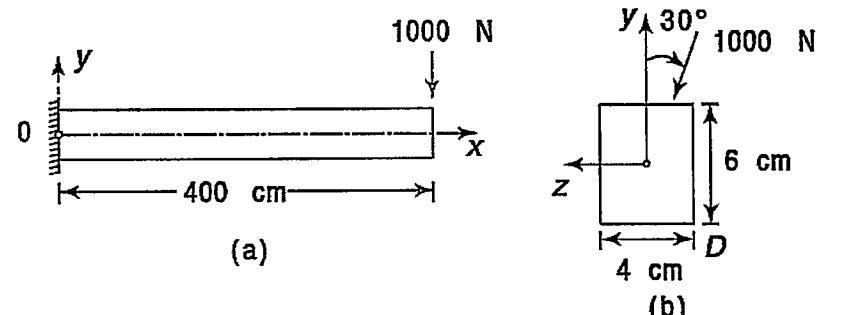
Sub Code: R24MMD102 **ADVANCED MECHANICS OF SOLIDS**

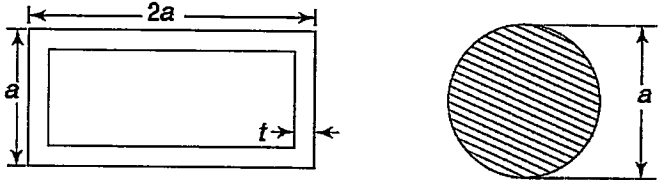
Time: 3 hours

(ME)

Max. Marks: 60

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M	
Unit-I					
1	a	i) Derive the differential equation of equilibrium in terms of displacement components for plane stress problem in the presence of body forces.	K4	1	6M
		ii) Explain plane stress and plane strain with examples.	K2	1	6M
	OR				
	b	A simply supported beam of length L is subjected to a uniform distributed load. Using the differential equations of motion for a deformable body, derive the deflection equation for the beam.	K4	1	12M
Unit-II					
2	a	<p>i) A cantilever beam of a rectangular section is subjected to a load of 1000 N which is inclined at an angle of 30° to the vertical as shown in Figure 1. (a-b). What is the stress due to bending at point D near the built-in end?</p> <div style="text-align: center;">  <p>Figure.1(a-b)</p> </div>	K4	2	6M
		ii) What is unsymmetrical bending? Give an example.	K2	2	6M
	OR				
	b	A beam is subjected to a point load P causing nonsymmetrical bending. Calculate the deflections at the midpoint of the beam.	K3	2	12M
Unit-III					
3	a	Explain Winkler – Bach theory and derive an expression for the stresses in a curved beam.	K3	3	6M
	OR				
	b	A ring is made of round steel bar 30 mm diameter and the mean radius of the ring is 180 mm. Calculate the maximum tensile and compressive stresses in the material of the ring if it is subjected to a pull of 12 kN.	K4	3	12M
Unit-IV					
4	a	A flat disc with a radius of 0.6 m is rotating at an angular velocity of 3500 RPM. Calculate the maximum circumferential (hoop) stress in the disc.	K4	4	12M

OR					
	b	A rotating cylinder with an inner radius of 0.2 m and an outer radius of 0.4 m is subjected to an angular velocity of 2000 RPM. Calculate the radial and hoop stresses at the inner and outer radii.	K4	4	12M
Unit-V					
5	a	<p>A thin-walled box section of dimensions $2a \times a \times t$ is to be compared with a solid section of diameter a (shown in Figure 2.). Find the thickness t so that the two sections have (a) the same maximum stress for the same torque and (b) the same stiffness.</p>  <p style="text-align: center;">Figure.2.</p>	K4	5	12M
	OR				
	b	Explain the effect of restrained ends on the stress distribution in thin-walled torsion members.	K3	5	12M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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Sub Code: R24MMD103

MECHANICAL VIBRATIONS

Time: 3 hours

(MD)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M	
1	Unit-I				
	a	i) Explain the major differences between free vibration and forced vibration.	K3	1	6M
		ii) Discuss the importance of study of Vibration in Engineering.	K3	1	6M
	OR				
	b	i) What is Damping and Explain the significance of critical damping.	K2	1	6M
	ii) Explain in brief about simple harmonic motion.	K3	1	6M	
2	Unit-II				
	a	Consider a pendulum of length 1 unit and mass m kg, is restricted to one plane only. Derive natural frequency by Newton's second law of motion and Energy method.	K4	2	12M
	OR				
b	A spring-mass system has a natural frequency of 10 Hz. When the spring constant is reduced by 800 N/m, the frequency is altered by 45 percent. Find the mass and spring constant of the original system.	K4	2	12M	
3	Unit-III				
	a	Derive the equation of motion of a system subjected to base excitation.	K4	3	12M
	OR				
b	A weight of 50 N is suspended from a spring of stiffness 4000 N/m and is subjected to a harmonic force of amplitude 60 N and frequency 6 Hz. Find the followings. (a) the extension of the spring due to the suspended weight, (b) the static displacement of the spring due to the maximum applied force, and (c) the amplitude of forced motion of the weight.	K5	3	12M	
4	Unit-IV				
	a	Analyse the principles of modes of vibrations for Two degrees of freedom system.	K4	4	12M
	OR				
b	Find the natural frequencies of the system shown in Figure 1. below, with $m_1 = m$, $m_2 = 2m$, $k_1 = k$, and $k_2 = 2k$. Determine the response of the system when $k = 1000$ N/m, $m = 20$ kg, and the initial values of the displacements	K5	4	12M	

of the masses m_1 and m_2 are 1 and -1 respectively.

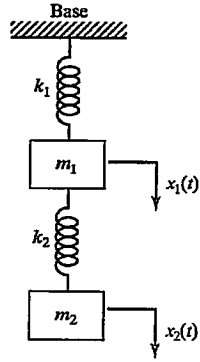


Figure.1.

Unit-V					
5	a	Determine the mode shapes of torsional vibration of three rotor system.	K4	5	12M
	OR				
	b	Prove that the critical speed of whirling speed for a rotating shaft is same as the frequency of natural transverse vibrations.	K3	5	12M

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Sub Code: R24MMD107 DESIGN FOR MANUFACTURING ASSEMBLY

Time: 3 hours

(MD)

Max. Marks: 60

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M
Unit-I				
1	a Discuss the strength and Mechanical factors involved during manufacturing.	K2	1	12M
	OR			
	b Enlist the steps to be followed for implementing DFMA concept in Design.	K2	1	12M
Unit-II				
2	a i) Differentiate Feature Tolerances and Geometric Tolerances with its importance in Design of product.	K2	2	6M
	ii) Discuss Design features to facilitate Drill.	K2	2	6M
	OR			
	b Explain in brief the Design for clampability and disassembly with respect to machining process.	K3	2	12M
Unit-III				
3	a Suggest the methods to minimize the core requirements in casting product.	K2	3	12M
	OR			
	b Suggest the design rules to produce cost effective casting components.	K2	3	12M
Unit-IV				
4	a Enlist the factors to be considered for good quality forged components.	K2	4	12M
	OR			
	Explain how form design effects the forging process.	K2	4	12M
Unit-V				
5	a Briefly explain the design guidelines for extruded sections with neat sketches.	K2	5	12M
	OR			
	b Write a brief note on the following a) Multi station assembly system b) Automated assembly system	K3	5	12M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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Sub Code: R24MMD110

MATERIAL TECHNOLOGY

Time: 3 hours

(ME)

Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12M = 60M)

Q.No	Questions	KL	CO	M	
1	Unit-I				
	a	i) Classify crystalline imperfections. Explain the difference between Frenkel and schottky defects with neat diagrams.	K2	1	6M
		ii) Define work hardening. Explain about the Grain boundary strengthening.	K2	1	6M
	OR				
	b	i) How do deformation of Metallic materials varies with temperature, strain and strain rate.	K3	1	6M
		ii) Discuss the phenomenon of work hardening and its effect on metals.	K3	1	6M
2	Unit-II				
	a	i) Explain the deformation of non crystalline materials.	K2	2	6M
		ii) What is the effect of temperature, strain, and strain rate on the behavior of plastic?	K2	2	6M
	OR				
	b	i) Explain quasicrystals, and compare them with traditional crystalline materials?	K3	2	8M
		ii) Explain super plasticity with suitable example.	K2	2	4M
3	Unit-III				
	a	i) What are maraging steels. Discuss the composition, heat treatment and applications of maraging steels	K2	3	6M
		ii) What are metallic glasses. Discuss the any one method of production of metallic glasses.	K2	3	6M
	OR				
	b	i) Explain the composition and application of TRIP and HSLA steels.	K2	3	6M
		ii) Write short notes on smart materials and shape memory alloys.	K2	3	6M
4	Unit-IV				
	a	i) Explain the production procedure for manufacturing of polymers in the form of a) Fibres and b) Foam.	K2	4	6M
		ii) What are metallic foams. Explain its important characteristics.	K2	4	6M
	OR				
	b	i) Explain the applications of Engineering polymers.	K2	4	6M
		ii) Compare the mechanical and thermal properties of thermoplastics and thermosets.	K2	4	6M
5	Unit-V				
	a	i) List out the properties and application of Al ₂ O ₃ and SiC.	K2	5	6M
		ii) Explain the method of processing CBN and WC for application in Metal cutting.	K2	5	6M
	OR				
	b	i) Discuss the effect of metallurgical parameters on fatigue.	K2	5	6M
		ii) Define composites and classify them. Explain polymer matrix composite and ceramic matrix composite.	K2	5	6M

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