

R24

M.TECH III SEM

END EXAMINATION QUESTION PAPERS

REGULAR

NOV./DEC. 2025

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MSE302

STRUCTURAL HEALTH MONITORING

Time: 3 hours

(CE-SE)

Max. Marks: 60

R24

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) what is Structural Health Monitoring? Explain Scope of Structural Health Monitoring?	2	1	6M
		ii) What are the objectives of monitoring the health of a structure?	2	1	6M
	OR				
	b	i) Discuss the factors affecting Health of Structures	2	1	6M
		ii) Explain the causes of distress of a structure	2	1	6M
2	Unit-II				
	a	i) Explain the applications of Structural Health Monitoring in Engineering Structures	2	2	6M
		ii) Write about collapse and investigation of structure	2	2	6M
	OR				
	b	i) Write the Structural Health Monitoring Procedures	2	2	6M
		ii) Explain about the investigation management of a structure	2	2	6M
3	Unit-III				
	a	i) What is structural audit and explain purpose of structural audit in SHM	2	3	6M
		ii) Write the various Measures in Structural Health Monitoring	2	3	6M
	OR				
	b	i) Discuss about the assessment of Health of Structure	2	3	6M
		ii) Explain about Structural Safety	2	3	6M
4	Unit-IV				
	a	Write the types of Dynamic Field Test and discuss any two tests	2	4	12M
	OR				
	b	i) Discuss about Data Acquisition Systems	2	4	6M
		ii) Explain about Remote Structural Health Monitoring	2	4	6M
5	Unit-V				
	a	i) What are the crack repair techniques and discuss one technique with suitable example	2	5	6M
		ii) Explain about Piezo- electric materials	2	5	6M
	OR				
	b	i) Discuss about electro-mechanical impedance technique	2	5	6M
		ii) Explain about Rehabilitations of Structures	2	5	6M

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

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MPI302

HYBRID ELECTRIC VEHICLES

Time: 3 hours

(EEE-PID)

Max. Marks: 60

R24

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 functional block diagrams of the various HEV configurations	K3	1	6M
	ii) What is series hybrid electric drive train and explain with neat sketch.	K4	1	6M
	OR			
	b i) Discuss the History of hybrid and electric vehicles in detail.	K4	1	6M
	ii) Explain the different power flow control modes of a typical Series-parallel hybrid system with the help of block diagrams.	K4	1	6M
2	Unit-II			
	a i) What are the traction motor characteristics of electric vehicle and explain.	K3	2	6M
	ii) State and explain the dynamic equation of vehicle model.	K3	2	6M
	OR			
	b i) Compare the HEV and PHEV in brief.	K3	2	6M
	ii) Explain the Fuel Cell vehicles and its constituents.	K4	2	6M
3	Unit-III			
	a i) What are the main components of PHEV? Explain them in detail.	K3	3	6M
	ii) Explain the equivalent electric range of blended PHEVs.	K4	3	6M
	OR			
	b i) Briefly explain end-of-life battery for electric power grid support.	K3	3	6M
	ii) With a neat block diagram explain the vehicle to grid technology.	K4	3	6M
4	Unit-IV			
	a i) Explain the two-quadrant operation of chopper DC motor drive with suitable waveforms for electric vehicle.	K4	4	6M
	ii) Discuss the implementation of PWM rectifier in HEVs.	K4	4	6M
	OR			
	b i) Discuss the working of isolated DC to DC converter.	K3	4	6M
	ii) Discuss the approximate sizing of battery for a new design of electric vehicle.	K4	4	6M
5	Unit-V			
	a i) Explain the Super Capacitor based energy storage and Fuel Cell based energy storage.	K4	5	12M
	OR			
	b i) Explain the Pumped Hydroelectric Energy Storage.	K4	5	6M
	ii) Discuss the Energy Storage as an Economic Resource in brief.	K4	5	6M

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

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MMD301

ANALYSIS & SYNTHESIS OF MECHANISMS

Time: 3 hours

(MD)

Max. Marks: 60

R24

Note: Answer All FIVE Questions.

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

Q.No		Questions	KL	CO	M
1	Unit-I				
	a	Describe in detail about Kutzbach criteria's for plain mechanisms with the help of examples. Also state the applications.	K2	1	12M
	OR				
	b	Analyze about the displacement and velocity analysis of single slider crank mechanism?	K4	1	12M
2	Unit-II				
	a	Explain in detail Bobillier theorem and its construction to find the centre of curvature when instant centre, Tracer point and the inflection point are known.	K4	2	12M
	OR				
	b	Derive the Euler – Savary 1 st forms of equations.	K5	2	12M
3	Unit-III				
	a	Describe about the Chebyshev Spacing of accuracy points with an example.	K5	3	12M
	OR				
	b	Explain motion generation for three prescribed positions of a 4-bar mechanism using graphical method.	K5	3	12M
4	Unit-IV				
	a	Analyze the analytical synthesis by using complex numbers.	K4	4	12
	OR				
	b	Analyze the three prescribed positions for motion generation using dyad.	K4	4	12M
5	Unit-V				
	a	Estimate the Static equilibrium of two and three force members with examples.	K4	5	12M
	OR				
	b	Explain the dynamic force analysis of a four bar mechanism with a neat sketch.	K4	5	12M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MDE301

SYSTEM ON CHIP DESIGN

Time: 3 hours

(ECE-DECS)

Max. Marks: 60

R24

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 different types of ASICs. How are they classified based on design and application?	L2	1	6M
	ii) Explain their significance and impact on SoC design methodologies.	L2	1	6M
	OR			
	b i) Describe the concept of Application Specific Instruction Processor (ASIP).	L3	1	6M
	ii) Describe how ASIPs can be customized for specific applications and how they help in optimizing SoC performance.	L3	1	6M
2	Unit-II			
	a i) Explain the NISC control words methodology and its role in customizing processor operations.	L2	2	6M
	ii) Describe the purpose of Architecture Description Languages (ADL) in the design and verification of Application Specific Instruction set Processors (ASIP).	L3	2	6M
	OR			
	b i) Discuss how NISC approaches help in reducing hardware complexity and improving performance compared to traditional instruction set architectures.	L3	2	6M
	ii) Describe the process of verification of NISC-based processors using ADL.	L2	2	6M
3	Unit-III			
	a i) Discuss the process of designing verification vectors for digital circuits.	L3	3	6M
	ii) Describe reconfigurable systems and their significance in modern digital design	L3	3	6M

	OR				
	b	i) Explain methods to minimize the impact of interconnects in large-scale SoC designs.	L2	3	6M
		ii) Explain the role of switch-level and transistor-level simulation in validating low-level circuit behavior.	L2	3	6M
4	Unit-IV				
	a	i) Discuss the low-power system perspective in digital design.	L3	4	6M
		ii) Describe adaptive voltage scaling (AVS) and static voltage scaling. Compare their effectiveness in reducing power consumption.	L2	4	6M
	OR				
	b	i) Explain power-down techniques for individual functional blocks in SoC design.	L2	4	6M
		ii) Describe the process of power consumption verification in digital systems.	L3	4	6M
5	Unit-V				
	a	i) Explain the role and concept of graph theory in digital design.	L2	5	6M
		ii) Differentiate between technology-independent and technology-dependent approaches for synthesis.	L3	5	6M
	OR				
	b	i) Discuss how synthesis report analysis is used to evaluate single-core and multi-core systems.	L2	5	6M
		ii) Discuss the role of nodal and admittance graphs in automated synthesis tools.	L3	5	6M

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

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MVL301

HARDWARE SOFTWARE CO-DESIGN

Time: 3 hours

(ECE-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
1	Unit-I				
	a	i) List out the different Issues in Hardware software co-design and explain each issue in detail	2	1	6M
		ii) Explain the concept of Generic co-design methodology with one example	2	1	6M
	OR				
	b	Define Synthesis? List out the different Co-synthesis algorithms used in Hardware software co-design and explain any two algorithms in detail.	3	1	12M
2	Unit-II				
	a	i) List out the different techniques in Prototyping and Emulation of co-design and explain each technique in detail	3	2	6M
		ii) Draw the internal architecture of Dominated system of 8051 controller and explain its operation in detail	2	2	6M
	OR				
	b	i) Describe the Aptix prototyping system along with diagram	1	2	6M
		ii) Explain the concept of different Target architectures of co-design in detail	1	2	6M
3	Unit-III				
	a	i) What are the different Compilation techniques of Embedded processor and explain each technique in detail	2	3	6M
		ii) Identify the Optimizations for embedded processors and explain.	2	3	6M
	OR				
	b	i) Explain the different Data dominated systems in Target architecture with examples	4	3	6M
		ii) What is compiler validation? Explain.	4	3	6M
4	Unit-IV				
	a	i) Explain blocking versus non blocking operations in detail	4	4	6M
		ii) Draw the circuit diagram of co-design computational model and explain its operation	4	4	6M
	OR				
	b	i) What are the different verification tools used in co-design and explain its importance in detail	5	4	6M
		ii) Explain the concept of Physical Realization of State Variable in detail	5	4	6M

5	Unit-V				
	a	i) Discuss the system level specification languages.	4	5	6M
		ii) What are the different system level specification languages used in system level and explain each specification in detail	5	5	6M
	OR				
	b	i) write short notes on Lycos system.	1	5	6M
		ii) Write short notes on multi language co-simulation of a system level design	1	5	6M

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

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MCS303

HUMAN COMPUTER INTERACTION

Time: 3 hours

(CSE)

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) Highlight the benefits of graphical user interfaces in terms of usability and design principles as compared to early command-line interfaces.	L1,L 4	1	6M
	ii) With the help of illustrative examples, explain need of good user interface design for both software developers and end users.	L2	1	6M
	OR			
	b i) Write in brief about the evolution of screen design and its significance in modern computing environments.	L1	1	6M
	ii) Justify the role of user interface (UI) design in determining the overall success or failure of a software product with suitable examples.	L5	1	6M
2	Unit-II			
	a i) What is the impact of graphics on modern web interface design and explain how designers can balance visual appeal with functional efficiency?	L1	2	6M
	ii) What are the characteristics that make graphical user interfaces popular among users? Explain.	L1	2	6M
	OR			
	b i) Write short note on the principles of user interface design and their impact on web-based applications.	L1	2	6M
	ii) Elaborate the concept of direct manipulation and briefly discuss about its impact on user experience.	L2	2	6M
3	Unit-III			
	a i) With an example use case, analyze impact of human characteristics on the computer interface design choices.	L4	3	6M
	ii) "Human interaction speeds influence the design of efficient user interfaces" – Justify this statement with suitable justification.	L5	3	6M
	OR			
	b i) Assume that you are building a Text - to -Voice assistant. Discuss about the human considerations related to text input and voice output that must be considered.	L3	3	6M
	ii) What are the consequences of neglecting human physical and cognitive characteristics in designing interactive computer systems? Explain.	L1	3	6M

4	Unit-IV				
	a	i) "Well-structured navigation flow and a visually attractive layout are vital for effective interface design"- Justify this statement with supporting discussion.	L5	4	6M
		ii) Analyse the need of combining statistical graphics with online information retrieval to facilitate complex data easier to understand without confusing the viewers.	L4	4	6M
	OR				
	b	i) While creating effective visual compositions, how can the designers balance aesthetic appeal without missing the clarity and functional efficiency? Briefly discuss.	L4	4	6M
		ii) Critically examine how effective screen planning and design decisions help in maintaining the usability and aesthetics of an interface.	L5	4	6M
5	Unit-V				
	a	i) How can designers balance among text messages, icons and images to enhance communication between the application and the users?	L2	5	6M
		ii) Explain the features of different window navigation schemes and their impact on user experience.	L1	5	6M
	OR				
	b	i) List the key challenges of adding multimedia and colour in interface design for diverse group of users(ex: colour blindness) and how the problem of slow multimedia loading can be addressed?	L1	5	6M
		ii) Analyze the pros and cons of device-based controls compared to screen-based controls in modern user interfaces.	L4	5	6M

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

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MCC310

BUSINESS ANALYTICS

Time: 3 hours

(CE, EEE, ECE & CSE)

Max. Marks: 60

R24

Note: Answer All FIVE Questions.

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

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Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Discuss the meaning and process of Business analytics	2	1	6M
	ii) explain any two statistical methods related to Business analytics	2	1	6M
	OR			
	b i) Illustrate non probability sampling techniques which can be implemented in Business analytics	2	1	6M
	ii) describe different types of descriptive statistics	2	1	6M
2	Unit-II			
	a i) explain the key personnel and resources to support business analytics	2	2	6M
	ii) Discuss the technologies which support Business analytics	2	2	6M
	OR			
	b i) Justify the data collection and storage systems that enable data exploration	2	2	6M
	ii) Describe the data exploration and cleaning tools that support data analysis	2	2	6M
3	Unit-III			
	a i) Discuss the role of team management and its impact on decision making in a software company.	2	3	6M
	ii) Explain the concept of Data Governance and discuss the core components of data Governance policies	2	3	6M
	OR			
	b i) Justify outsourcing in Business analytics and discuss key steps in managing outsourcing business analytics projects	2	3	6M
	ii) Describe major types of optimization techniques in Business analytics	2	3	6M
4	Unit-IV			
	a i) Describe time series and casual forecasting methods with their merits and demerits in predicting trends of business	2	4	6M
	ii) Give explanation of Monte Carlo simulation techniques applied to business problems	2	4	6M
	OR			
	b i) Explain New product development model and news vendor model with their merits and demerits	2	4	6M
	ii) Differentiate between overbooking model and cash budget model as a stimulators of risk analysis	2	4	6M
5	Unit-V			
	a i) Explain utility theory and its application to rational decisions	2	5	6M
	ii) Describe story telling with data and how is it useful in decision making frameworks	2	5	6M
	OR			
	b i) Explain data journalism and discuss the application of it to Business analytics problems	2	5	6M
	ii) Describe the concept of Collaborative Business Intelligence and the components of it	2	5	6M

II M.TECH I Semester Regular Examinations, November-2025

Sub Code: R24MCC311

PYTHON PROGRAMMING

Time: 3 hours

(MD)

Max. Marks: 60

R24

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 indentation in Python and its importance.	2	1	6M
		ii) Explain variables, data types, and expressions in Python with suitable examples.	2	1	6M
	OR				
	b	i) Explain looping statements in Python	2	1	6M
		ii) Explain the features of Python programming language.	2	1	6M
2	Unit-II				
	a	i) Explain different types of function parameters in Python	2	2	6M
		ii) Explain Turtle graphics in Python.	2	2	6M
	OR				
	b	i) Explain lambda (anonymous) functions in Python	2	2	6M
		ii) Explain key press and mouse events in Python with examples.	2	2	6M
3	Unit-III				
	a	i) Explain any six list methods or functions	2	3	6M
		ii) Explain the advantages and uses of tuples in Python programming	2	3	6M
	OR				
	b	i) Write and explain a Python program to perform different list operations	3	3	6M
		ii) Explain set methods and functions	2	3	6M
4	Unit-IV				
	a	i) Differentiate between class variables and instance variables with examples	3	4	6M
		ii) Explain constructors in Python with syntax and examples	2	4	6M
	OR				
	b	i) Write and explain a Python program to create a class and access its attributes and methods	3	4	6M
		ii) Explain exception handling in Python.	2	4	6M
5	Unit-V				
	a	i) Explain the concept of Regular Expressions in Python and their importance in pattern matching.	2	5	6M
		ii) Explain the difference between match() and search() functions in the re module with examples.	2	5	6M
	OR				
	b	i) Explain character classes and sequences used in regex patterns	2	5	6M
		ii) Write a Python program to extract all numbers or all capital letters from a given text using regex.	3	5	6M

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