

R23

III BTECH I SEM

END EXAMINATION QUESTION PAPERS

REGULAR

NOVEMBER 2025



NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23CC3101

COMPUTER NETWORKS

Time: 3 hours

CSE, IT, CSE (AI)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

R23

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Distinguish between OSI and TCP/IP models.	K4	1	2M
	b	Explain about different types of Network Topologies.	K2	1	2M
	c	State the function of the CRC and Checksum.	K2	2	2M
	d	Compare between error detecting and error correcting codes.	K3	2	2M
	e	Brief about the purpose of Media Access Control with advantages.	K2	3	2M
	f	Define IP Addressing and give an example.	K1	3	2M
	g	State the services offered by Network Layer.	K2	4	2M
	h	Mention the differences between IPv4 and IPv6.	K2	4	2M
	i	Explain the role of DNS in networking.	K2	5	2M
	j	Differentiate between TCP and UDP.	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) with neat sketch, Explain about the OSI Reference Model.	K2	1	5M
		ii) Describe a critique of OSI reference model.	K4	1	5M
	OR				
	b	i) Write a short note on the various types of Computer Networks.	K1	1	5M
		ii) State different types of Guided Media.	K2	1	5M
3	Unit-II				
	a	i) Explain about sliding window protocol with an example.	K2	2	5M
		ii) Discuss in detail about the services provided by Data link layer to Network Layer.	K2	2	5M
	OR				
	b	i) Describe the working of HDLC protocol.	K2	2	5M
		ii) Explain about Elementary Data Link Layer Protocols.	K2	2	5M
4	Unit-III				
	a	i) Distinguish between Pure ALOHA and Slotted ALOHA.	K4	3	5M
		ii) Mention the differences between CSMA and CDMA with appropriate diagrams.	K3	3	5M

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CC3102

OBJECT ORIENTED ANALYSIS & DESIGN

Time: 3 hours

(CSE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is the importance of modelling in software development?	K2	1	2M
	b	Define Object-Oriented Modelling.	K2	1	2M
	c	Define a class in object-oriented modelling.	K2	2	2M
	d	What are the different types of relationships in UML?	K1	2	2M
	e	What is the purpose of an object diagram in UML?	K2	3	2M
	f	Name any two modelling techniques for class diagrams.	K1	3	2M
	g	What is the purpose of a use case diagram in UML?	K2	4	2M
	h	What is an activity diagram used for?	K2	4	2M
	i	What is the difference between an event and a signal in UML?	K3	5	2M
	j	What does a deployment diagram represent?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No.		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the principles of modelling with suitable examples.	K3	1	5M
		ii) What is Object-Oriented Modelling (OOM)? Explain its concepts and advantages in software design.	K2	1	5M
	OR				
	b	i) Discuss the conceptual model and architecture of UML in detail.	K2	1	5M
		ii) Explain the Software Development Life Cycle (SDLC) and describe each phase with a neat diagram.	K2	1	5M
3	Unit-II				
	a	i) Discuss the various types of relationships between classes, such as association, aggregation, and inheritance, with examples.	K2	2	5M
		ii) Explain the common mechanisms of class diagrams and how they are used in modeling complex systems.	K2	2	5M

	OR				
	b	i) Using the Traffic Management Control System case study, develop class diagrams and explain the relationships between classes.	K4	2	5M
		ii) Describe the steps involved in creating class diagrams for a software system.	K2	2	5M
4	Unit-III				
	a	i) Explain advanced classes, advanced relationships, and interfaces in UML. Discuss their significance, types, and roles with suitable examples.	K2	3	5M
		ii) Explain the modelling techniques used for class diagrams in detail.	K2	3	5M
	OR				
	b	i) Create a class and object diagram for Library Management System and explain the relationships and attributes.	K3	3	5M
		ii) Create an object diagram for online banking System and explain the relationships and attributes.	K3	3	5M
5	Unit-IV				
	a	i) Describe the use case diagram, its elements, and significance in modelling system behaviour.	K2	4	5M
		ii) Compare and contrast sequence diagrams and collaboration diagrams in terms of usage and representation	K4	4	5M
	OR				
	b	i) Using the Web Application of Vacation Tracking System case study, draw the activity diagram and usecase diagram for the system and explain the interactions between its various components.	K3	4	10M
6	Unit-V				
	a	i) Describe state machines and state chart diagrams, including their elements, usage, and examples.	K2	5	5M
		ii) Explain processes and threads, and discuss how time and space considerations affect system modelling.	K2	5	5M
	OR				
	b	i) Using the Weather Forecasting System case study, create state chart diagram and component diagram. Explain the interactions and architecture of the system.	K3	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CC3103 AUTOMATA THEORY & COMPILER DESIGN

Time: 3 hours

IT, CSE (AI)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

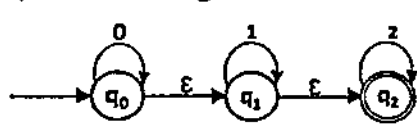
PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define ϵ - closure(q) with an example	K2	1	2M
	b	Implement a DFA for the language accepting strings ending with '00' over input alphabets $\Sigma = \{0, 1\}$	K4	1	2M
	c	Construct a CFG for the language of palindromes over the alphabet $\{0,1\}$.	K3	2	2M
	d	What are the components of PDA	K2	2	2M
	e	Differentiate between compiler and interpreter	K3	3	2M
	f	Define left factoring with an example	K2	3	2M
	g	Differentiate between SLR, LALR and CLR parsers	K3	4	2M
	h	What are the actions performed by Shift reduce parser?	K2	4	2M
	i	Define a quadruple and give an example	K2	5	2M
	j	What is the role of redundant code elimination in peephole optimization?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Design DFA for language over $\{0,1\}$ accepting strings with odd number of 1's and even number of 0's.	K3	1	5M
		ii) Convert the given NFA- ϵ to DFA 	K3	1	5M
	OR				
	b	i) Construct a NFA over $\{a,b\}$ which accepts string starts with 'a' and ends with 'b'.	K4	1	5M
		ii) Compare and contrast between NFA and DFA	K3	1	5M
3	Unit-II				
	a	i) For given grammar $E \rightarrow E+E \mid E * E \mid id$. Derive left most derivation & right most derivation and Draw parse tree for the string $w=id + id * id$.	K3	2	10M

	OR				
	b	i) Design a PDA to accept the following language $L = \{0^n 1^n \mid n > 0\}$	K3	2	5M
		ii) Construct a PDA for the following Context Free Grammar (CFG). $S \rightarrow CBAA, A \rightarrow 0A0 \mid 0, B \rightarrow 0B \mid 0, C \rightarrow 0C1 \mid 1C0 \mid \epsilon$	K4	2	5M
4	Unit-III				
	a	i) Apply predictive parsing (LL(1)) to construct the parsing table for the grammar: $E \rightarrow TE'$ $E' \rightarrow +TE' \mid \epsilon$ $T \rightarrow FT'$ $T' \rightarrow *FT' \mid \epsilon$ $F \rightarrow (E) \mid id.$	K3	3	10M
	OR				
	b	i) Describe the role of a lexical analyzer in compiler design	K2	3	5M
		ii) Differentiate between recursive descent parsing and predictive parsing	K3	3	5M
5	Unit-IV				
	a	i) What is syntax directed translation? Explain with an example.	K2	4	5M
		ii) Compare S-attributed and L-attributed definitions with suitable example		4	5M
	OR				
	b	Analyze the grammar $E \rightarrow E+T \mid T, T \rightarrow TF \mid F, F \rightarrow F^* \mid a \mid b$ by constructing its SLR parsing table, and examine how the input string $a * b + a$ is parsed using it.	K4	4	10M
6	Unit-V				
	a	Describe the issues in the design of code generator	K2	5	10M
	OR				
	b	i) Construct three-address code for the expression $a = b * -c + b * -c$	K3	5	5M
		ii) Explain the peephole optimization with example	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CC3105

ARTIFICIAL INTELLIGENCE

Time: 3 hours

(IT)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What are the major branches or areas of Artificial Intelligence?	2	1	2M
	b	Differentiate between a simple reflex agent and a goal-based agent.	3	1	2M
	c	What is a heuristic function? Give one example.	2	2	2M
	d	Define the term adversarial search and give a real-world example.	2	2	2M
	e	What is the role of predicate logic in knowledge representation?	2	3	2M
	f	Differentiate between semantic networks and frames.	3	3	2M
	g	Define inductive learning and mention its significance.	2	4	2M
	h	What is the difference between forward chaining and backward chaining?	2	4	2M
	i	What are the main components of an expert system?	2	5	2M
	j	What is meant by meta-knowledge in expert systems?	3	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the structure and characteristics of rational agents. Illustrate with examples from autonomous vehicle systems.	3	1	5M
		ii) Discuss the types of environments in which AI agents operate. How does the nature of environment affect the design of an agent?	4	1	5M
	OR				
	b	i) Design an intelligent agent for an automated customer service application, detailing its structure, environment and problem-solving approach.	4	1	5M
		ii) Define the history and evolution of AI intelligent agents.	2	1	5M
3	Unit-II				
	a	i) Describe the A* algorithm and explain how heuristic evaluation improves search performance. Provide a relevant example.	3	2	5M
		ii) Explain how the AO* algorithm can be applied to decision making in a task scheduling system with an example.	4	2	5M
	OR				
	b	i) Discuss the advantages and limitations of alpha-beta pruning in adversarial search.	4	2	5M
		ii) Compare uninformed search strategies with heuristic-based search methods.	3	2	5M

4	Unit-III				
	a	i) Discuss the importance of rule-based systems in knowledge representation and how rule-based deduction supports reasoning in AI.	4	3	5M
		ii) Explain Bayesian inference and Dempster-Shafer theory in the context of reasoning under uncertainty.	3	3	5M
	OR				
	b	i) Evaluate the advantages and limitations of using semantic nets, frames and inheritance for representing knowledge.	4	3	5M
		ii) Explain the structure and working of logic programming in AI.	2	3	5M
5	Unit-IV				
	a	i) Describe the process of inference in first-order logic. How does unification aid in reasoning?	3	4	5M
		ii) Explain the construction and working of decision trees in machine learning.	4	4	5M
	OR				
	b	i) Define the key components of reinforcement learning and explain their roles.	2	4	5M
		ii) Compare Decision Tree Learning and Reinforcement Learning with suitable examples.	4	4	5M
6	Unit-V				
	a	i) Describe the architecture of a typical expert system and explain how knowledge acquisition takes place.	3	5	5M
		ii) Explain the process of meta-knowledge and heuristics in expert system development.	4	5	5M
	OR				
	b	i) Analyze how MYCIN, DART and XCON have influenced expert system design and applications.	4	5	5M
		ii) Discuss the roles and components of expert system shells with examples.	3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23CC3107

DATA WAREHOUSING & DATA MINING

Time: 3 hours

(CSE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

R23

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Data Cube. Give an example.	1	1	2M
	b	What is a data warehouse? How is it differs from DBMS?	1	1	2M
	c	What is the use of histograms in data reduction?	1	2	2M
	d	What is discretization? Why is it needed?	1	2	2M
	e	What is the main goal of using random sampling in model evaluation?	1	3	2M
	f	What is information gain?	1	3	2M
	g	Define support and confidence in the context of association rules.	1	4	2M
	h	What is the purpose of the FP-tree?	1	4	2M
	i	Define Clustering?	1	5	2M
	j	How does Bi-secting K-means differ from standard K-means?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe 3-tier Architecture of Data Warehouse with a neat sketch	6	1	7M
		ii) What is a data warehouse? How is it differs from DBMS?	1	1	3M
	OR				
	b	i) Describe various OLAP operations performed on Multidimensional Data Model.	6	1	6M
		ii) Discuss the characteristics of fact table	2	1	4M
3	Unit-II				
	a	i) "Data preprocessing is necessary before data mining process". Justify your answer	5	2	5M
		ii) Explain Data Transformation strategies.	2	2	5M
	OR				
	b	i) Discuss about Data cleaning and Data Integration with appropriate examples.	2	2	10M
	Unit-III				
4	a	i) Describe how a decision tree works with the help of an example.	6	3	5M
		ii) Describe the Holdout Method for evaluating classifier performance. What are its advantages and limitations?	6	3	5M

	OR																														
	b	i) State Bayes' Theorem and explain how it is used in classification problems.	2	3	5M																										
		ii) What is the Bootstrap method for performance evaluation? How does it help in estimating model accuracy?	2	3	5M																										
5	Unit-IV																														
	a	Find the frequent itemsets and strong association rules for the following transactional database table using Apriori algorithm. Consider the thresholds as support = 30% and confidence = 40%.	3	4	10M																										
		<table><tr><td>TID</td><td>ITEM IDs</td></tr><tr><td>1</td><td>I1, I2, I3, I5</td></tr><tr><td>2</td><td>I2, I5, I7, I9</td></tr><tr><td>3</td><td>I1, I3, I5, I7</td></tr><tr><td>4</td><td>I2, I4, I6, I8</td></tr><tr><td>5</td><td>I1, I2, I3, I4</td></tr><tr><td>6</td><td>I2, I3, I4, I5</td></tr><tr><td>7</td><td>I3, I4, I5, I6</td></tr><tr><td>8</td><td>I4, I5, I6, I7</td></tr><tr><td>9</td><td>I5, I6, I7, I8</td></tr><tr><td>10</td><td>I9, I1, I2, I5</td></tr><tr><td>11</td><td>I8, I2, I9, I7</td></tr><tr><td>12</td><td>I5, I6, I3, I2</td></tr></table>				TID	ITEM IDs	1	I1, I2, I3, I5	2	I2, I5, I7, I9	3	I1, I3, I5, I7	4	I2, I4, I6, I8	5	I1, I2, I3, I4	6	I2, I3, I4, I5	7	I3, I4, I5, I6	8	I4, I5, I6, I7	9	I5, I6, I7, I8	10	I9, I1, I2, I5	11	I8, I2, I9, I7	12	I5, I6, I3, I2
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10	I9, I1, I2, I5																														
11	I8, I2, I9, I7																														
12	I5, I6, I3, I2																														
OR																															
b	i) Write an algorithm for finding frequent item-sets using candidate generation	2	4	6M																											
	ii) How to represent Frequent Itemset in compact format?	2	4	4M																											
6	Unit-V																														
	a	i) Explain DBSCAN algorithm with an example.	2	5	5M																										
		ii) Discuss about key issues in Hierarchical clustering	2	5	5M																										
	OR																														
	b	Consider five points {X ₁ , X ₂ , X ₃ , X ₄ , X ₅ } with the following coordinates as a two dimensional sample for clustering. X ₁ = (0.5, 2.5); X ₂ = (0, 0); X ₃ = (1.5, 1); X ₄ = (5, 1); X ₅ = (6, 2). Apply the K-means partitioning algorithms for the above data set.	3	5	10M																										

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CC3111

COMPUTER NETWORKS

Time: 3 hours

CSE (AIML), DS, AIML

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Explain why the OSI model is considered a theoretical framework.	2	1	2M
	b	Differentiate between LAN, MAN, and WAN with one example each.	3	1	2M
	c	Compare HDLC and PPP protocols in terms of frame structure, operation, and usage.	3	2	2M
	d	Differentiate between guided and unguided transmission media with one example each.	2	2	2M
	e	What is the difference between datagram and virtual circuit approaches?	2	3	2M
	f	List any four design issues of the network layer.	1	3	2M
	g	Define the term multiplexing and demultiplexing in the transport layer.	2	4	2M
	h	State four differences between UDP and TCP.	2	4	2M
	i	Write the full forms of FTP, SMTP, and TELNET and mention their uses.	3	5	2M
	j	Define the World Wide Web (WWW) and state its main components.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Illustrate how data flows through the OSI model during communication between two systems.	3	1	5M
		ii) Describe the evolution and history of the Internet from ARPANET to the modern Internet.	2	1	5M
	OR				
	b	i) Compare and contrast the OSI and TCP/IP reference models.	3	1	5M
		ii) Examine the role of protocol layering and encapsulation in both OSI and TCP/IP models with suitable examples.	4	1	5M
3	Unit-II				
	a	i) Analyze the effect of window size and sequence number range on the performance and reliability of sliding window protocols.	4	2	5M
		ii) In a Go-Back-N ARQ system, the sender window size is 4 and sequence numbers range from 0 to 7. Show the transmission sequence if frame 2 is lost. Indicate which frames are retransmitted and the acknowledgments received.	3	2	5M
		OR			

	b	i) Compare and analyze Ethernet, Fast Ethernet, and Gigabit Ethernet based on speed, topology, and transmission techniques.	4	2	5M
		ii) A data word is 1101 and the generator polynomial is $x^3 + 1$. Compute the CRC code and show the transmitted frame.	4	2	5M
4	Unit-III				
	a	i) Describe the distance vector routing algorithm with an example.	2	3	5M
		ii) Discuss the transition mechanisms from IPv4 to IPv6 such as dual stack and tunneling.	3	3	5M
	OR				
	b	i) Describe the structure and fields of the IPv4 header with a neat diagram.	4	3	5M
		ii) Consider a network with five routers (A, B, C, D, and E). The link costs between them are as follows: A-B = 4, A-C = 2, B-C = 1, B-D = 5, C-D = 8, and D-E = 6. Using Dijkstra's algorithm, compute the shortest path from router A to all other routers. Show the step-by-step computation.	3	3	5M
5	Unit-IV				
	a	i) Illustrate the concept of flow control and congestion control in TCP.	4	4	5M
		ii) A TCP connection is established between Host A and Host B. Host A sends data segments with sequence numbers 1001-2000, 2001-3000, and 3001-4000. Host B sends an ACK = 2001, then later ACK = 4001. Draw the sequence of events and explain how TCP uses sequence numbers and acknowledgments for reliable transmission.	3	4	5M
	OR				
	b	i) Explain the working principle of SCTP and its advantages over TCP.	2	4	5M
		ii) Compare and contrast TCP and UDP in terms of reliability, connection setup, and applications	4	4	5M
6	Unit-V				
	a	i) Explain the architecture and message flow of electronic mail using SMTP and POP3/IMAP protocols.	3	5	5M
		ii) Compare the working principles of HTTP/1.1 and HTTP/2.0 protocols.	4	5	5M
	OR				
	b	i) Describe the HTTP request and response message formats with suitable examples.		5	5M
		ii) Given a URL https://www.college.edu:8080/student/info.html , identify each component. Then explain step-by-step how DNS resolves this domain name to an IP address and how the HTTP request is processed.	4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CC3112

SOFTWARE ENGINEERING

Time: 3 hours

CS, DS, CSE (AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define software engineering. Why did it emerge as a discipline?	K1	1	2M
	b	List any two limitations of the Waterfall model.	K2	1	2M
	c	List any two responsibilities of a software project manager.	K2	2	2M
	d	What is risk management in software projects?	K1	2	2M
	e	What is a Data Flow Diagram (DFD)?	K1	3	2M
	f	What is the main idea behind the Agile process?	K2	3	2M
	g	Define software reliability.	K1	4	2M
	h	What is the purpose of a code review?	K2	4	2M
	i	What is software reverse engineering?	K1	5	2M
	j	Define software maintenance and mention its types.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the evolution of software development and the need for software engineering.	K3	1	5M
		ii) Describe the Spiral model in detail. What are its advantages and disadvantages?	K2	1	5M
	OR				
	b	i) Compare the Waterfall model, Rapid Application Development (RAD), and Agile model with suitable examples.	K4	1	5M
		ii) Explain the Agile Development Model in detail. Describe its principles, process, advantages, and limitations. Give suitable examples of Agile practices.	K3	1	5M
3	Unit-II				
	a	i) Explain the various complexities in software project management and the role of a software project manager.	K3	2	5M
		ii) Describe different software project estimation techniques and explain the COCOMO model in detail.	K2	2	5M

	OR				
	b	i) What is Software Requirements Specification (SRS)? Discuss its structure and characteristics with an example.	K3	2	5M
		ii) Explain different types of formal system specifications — axiomatic, algebraic, and executable — with examples.	K2	2	5M
4	Unit-III				
	a	i) Explain the software design process and describe how to characterize a good software design.	K3	3	5M
		ii) Discuss cohesion and coupling in detail with examples.	K2	3	5M
	OR				
	b	i) Explain the principles of user interface design. Describe different types of user interfaces and the fundamentals of component-based GUI development.	K3	3	5M
		ii) Explain Agility and the Cost of Change. How does agile development help in reducing the cost of software changes during the project life cycle?	K4	3	5M
5	Unit-IV				
	a	i) What is Integration Testing? Explain its purpose, different integration testing strategies (like top-down, bottom-up, and sandwich), and provide examples.	K2	4	5M
		ii) Explain Black-box testing technique in detail. Discuss their objectives, advantages, disadvantages, and give suitable examples.	K3	4	5M
	OR				
	b	i) Explain White-box testing techniques in detail. Discuss their objectives, advantages, disadvantages, and give suitable examples.	K3	4	5M
		ii) Describe software quality management systems and explain ISO 9000, SEI-CMM, and Six Sigma standards in detail.	K3	4	5M
6	Unit-V				
	a	i) Explain the concept of software reuse. Discuss the issues in reuse programs and how reuse can be implemented at the organization level.	K3	5	5M
		ii) Describe the software maintenance process models and explain how maintenance cost estimation is done.	K3	5	5M
	OR				
	b	i) Explain the scope and characteristics of CASE tools. Describe the architecture of a CASE environment.	K2	5	5M
		ii) What is software reverse engineering? Explain its process and importance in software maintenance.	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CC3113 AUTOMATA THEORY & COMPILER DESIGN

Time: 3 hours

(CS, DS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

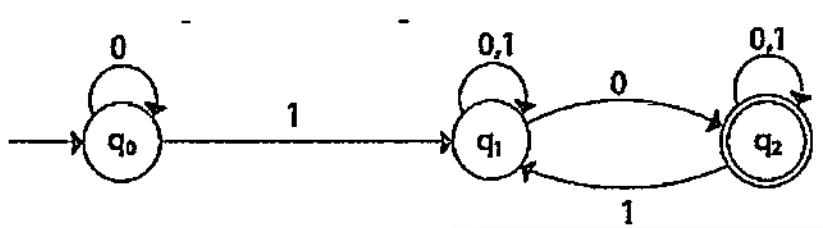
PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a Define Non Deterministic Finite Automata.	1	1	2M
	b Retrieve a DFA which accepts strings ending with 01 where the input is {0,1}	1	1	2M
	c Outline is a regular expression?	1	2	2M
	d Find Regular expressions for Strings over the alphabet {0, 1} that contain 1 in the 3rd position from right end.	1	2	2M
	e Define CFG. Give CFG for the language $L = \{a^n b^{2n} \mid n > 0\}$	1	3	2M
	f Define Turing Machine	1	3	2M
	g Define Lexeme and Token	1	4	2M
	h Memorize Top Down parsing	1	4	2M
	i Define Syntax Directed Translation	1	5	2M
	j Define Synthesized and Derived Attributes in SDT	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M
2	Unit-I			
	i) Sketch a DFA for the language $L = \{w \mid w \text{ contains an even number of 1s}\}$ over the alphabet {0,1}.	3	1	5M
	ii) Structure the given NFA to equivalent DFA.	4	1	5M
				
	OR			
b	i) Outline the transition diagram of a FA which accepts all strings of 0's and 1's in which the number of 0's are odd and 1's are odd.	1	1	5M
	ii) Distinguish between DFA and NFA and design DFA which accepts strings ending with 0 1 where the input alphabet is $\Sigma = \{0,1\}$	4	1	5M
3	Unit-II			
	i) Define Regular Expression. Sketch a NFA for regular expression $(a+b)^*abb$	3	2	5M
	ii) Define Ambiguous Grammar. Implement a derivation tree for the string aabb using the grammar $S \rightarrow aSb \mid \epsilon$	3	2	5M

OR					
b	i) Express Regular expression corresponding to the following finite automata.	2	2	5M	
	<pre> graph LR A((A)) -- a --> B((B)) A -- b --> C(((C))) B -- a --> C B -- b --> B C -- "a, b" --> C </pre>				
	ii) Memorize Pumping Lemma for Regular Languages, using Pumping lemma Determine the language $L = \{a^p p \text{ is prime}\}$ is not a Regular Language.	3	2	5M	
Unit-III					
4	a	i) Implement a PDA that accepts the language $L = \{WCW^R W \in (a+b)^*\}$	3	3	5M
		ii) Implement Turing machine for the language $L = \{0^n 1^n 2^n n \geq 1\}$	3	3	5M
	OR				
	b	i) Sketch a PDA for the language $L = \{a^n b^n n \geq 1\}$ by using the empty stack.	3	3	5M
	ii) Implement Turing machine for the language $L = \{a^n b^n n \geq 1\}$ with transition table	3	3	5M	
Unit-IV					
5	a	i) Summarize different phases of a compiler and the role of each phase.	2	4	5M
		ii) Experiment LL(1) parsing table for the grammar. $S \rightarrow Aa, A \rightarrow b c$	3	4	5M
	OR				
	b	i) Experiment a recursive descent parser with the following grammar. $E \rightarrow E+T T, T \rightarrow TF F, F \rightarrow F^* a b$	3	4	5M
	ii) Implement CLR(1) Parsing Table for the Grammar: $S \rightarrow AA$ and $A \rightarrow aA b$. Parse the input string "aabb" using the above generated Parse Table.	3	4	5M	
Unit-V					
6	a	i) Summarize about various Representations of Intermediate Code Generation	2	5	5M
		ii) Determine Syntax Directed Translation Schemes and role of Stack Allocation of Space	3	5	5M
	OR				
	b	i) Generate the intermediate code for the following expression. $a = b + c * d / e - d + g$	3	5	5M
	ii) Summarize Three Address Code, Types of Three Address statements and Various representations used for Three Address Code.	3	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CC3116

CLOUD COMPUTING

Time: 3 hours

CSE (CY)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a Define cloud computing and list its essential characteristics.	1	1	2M
	b Describe any four benefits of adopting cloud computing in organizations.	1	1	2M
	c Explain the concept of Service-Oriented Architecture (SOA) in cloud environments.	1	2	2M
	d Define virtualization and mention its role in cloud enablement.	1	2	2M
	e What are the building blocks of container technology?	1	3	2M
	f Compare virtual machines and containers in terms of isolation and performance.	1	3	2M
	g What is cloud interoperability, and why is it a challenge?	1	4	2M
	h What do you mean by energy efficiency in clouds?	1	4	2M
	i Explain the role of DevOps in cloud application deployment.	1	5	2M
	j Define serverless computing and its main benefits.	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M
2	Unit-I			
	a i) Explain the layers of cloud computing reference model.	2	1	5M
	ii) Explain characteristics, and benefits of cloud computing.	2	1	5M
	OR			
	b i) Explain the evolution of cloud computing.	2	1	5M
	ii) Explain major benefits of cloud computing over traditional computing paradigms.	2	1	5M
3	Unit-II			
	a i) Describe the role of virtualization as a cloud enabling technology.	2	2	5M
	ii) Explain how virtualization enable scalability in clouds.	2	2	5M
	OR			
	b i) Describe inter-process communication (IPC) mechanisms.	2	2	5M
	ii) Explain the significance of IPC in distributed cloud environments.	2	2	5M
4	Unit-III			
	a i) Describe the architecture of container orchestration platforms.	2	3	5M

		ii) Discuss the role of tools like Kubernetes.	2	3	5M
		OR			
		i) Compare virtualization-based and container-based deployment models in terms of scalability, performance, and isolation.	2	3	5M
	b	ii) Discuss the advantages and limitations of containers in modern cloud infrastructure management.	2	3	5M
5	Unit-IV				
	a	i) Discuss the fundamentals of cloud security architecture and its essential components.	2	4	5M
		ii) Analyze the key economic factors driving cloud computing adoption.	2	4	5M
	OR				
	b	i) Analyze the challenges of energy efficiency in cloud data centers and describe strategies to improve it.	2	4	5M
		ii) Discuss the importance of interoperability in achieving vendor-neutral cloud systems.	2	4	5M
6	Unit-V				
	a	i) Discuss the various layers in IoT architecture.	2	5	5M
		ii) Describe quantum cloud computing and discuss its potential applications.	2	5	5M
	OR				
	b	i) Discuss the principles, and benefits of edge and fog computing.	2	5	5M
		ii) Explain the challenges of edge and fog computing.	2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23CE3101

R23

DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer any ONE question from Part-A is compulsory (1 x 28M = 28M)

Use of IS: 456-2000 and design charts from SP-16 is allowed.

Q.No	Questions	KL	CO	M
1	Design a continuous RC slab for a hall 7m and 14m long. The slab is supported on RCC beams each 300mm wide which are monolithic. The ends of the slab are supported on walls. 300mm wide. Design the slab for a live load of 3 kN/m². Assume the weight of roof finishing equal to 1.0 kN/m². Use M20 concrete and Fe 415 steel. a) Draw the reinforcement of the slab in plan view. b) Draw cross section of the slab including beams with reinforcement details.	3	2	28M
OR				
2	Design an isolated square footing for a column 450mm x 450mm reinforced with 8- 25 mm diameter bars carrying a service load of 2000 kN The bearing capacity of soil is 250 kN/m² at a depth of 1.5m below ground. The footing is restricted to 2.0 m in one direction Assume M20 grade concrete and Fe 415 grade steel for the footing and M25 concrete and Fe 415 steel for the column. Draw to scale: a) Longitudinal section showing the reinforcement details. b) The plan showing reinforcement details.	3	3	28M

PART-B

Answer any THREE Questions from PART-B (3 x 14M = 42M)

Q.No	Questions	KL	CO	Marks
3	a) What are the assumptions for the design of a reinforced concrete section for limit state of collapse in bending? b) Show that the limiting depth of neutral axis for a rectangular cross section reinforced with FE415 grade steel in 0.48d.	3	CO1	[14M]

4	The flange of a T beam flange of the beam is 90 cm x 12cm and web below is 30cm x 40cm. It is reinforced with 4-25 mm plus 4-12mm Fe 415 steel bars in tension at an effective cover of 50mm. Determine the shear reinforcement needed for a shear force of 250kN (i) If the mix is M20 and (ii) if the mix is M25. Take load factor = 1.5.	3	CO2	[14M]
5	Design a square spread footing to carry a column of 1800kN from a 60 cm square tied column containing 25mm bars as the longitudinal reinforcement. The bearing capacity of soil is 180 kN/m ² . Consider base of footing as 1m below the ground level. The unit weight of earth is 20 kN/m ³ . Use $\sigma_y = 415$ N/mm ² and $\sigma_{ck} = 20$ N/mm ² .	3	CO3	[14M]
6	A column 230 mm x 350 mm is reinforced with 4 bars 20mm one at each corner effective cover of 50mm. It is loaded with characteristic load = 340 kN. Factored Moment in the direction of larger dimension $M_{ux} = 30$ kNm. Factored Moment in the direction of shorter dimension $M_{uy} = 18$ kNm. About Y axis bisecting the width. Assume concrete grade M 20 and steel grade Fe 415 steel. Check the safety of the column.	3	CO4	[14M]
7	Design a RCC slab subjected to a liveload of 3kN/m ² and effective span of 3.5m. Use M20 mix and Fe 415 grade steel.	3	CO5	[14M]

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CE3102

ENGINEERING HYDROLOGY

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a Define Probable Maximum Precipitation.	1	1	2M
	b Explain IDF curves.	2	1	2M
	c How can the evaporation of water be reduced?	2	2	2M
	d What are infiltration indices?	1	2	2M
	e What is a flow duration curve?	1	3	2M
	f Explain the synthetic unit hydrograph.	2	3	2M
	g Define SPF and MPF.	1	4	2M
	h Explain the different types of flood routing.	2	4	2M
	i Define transmissivity and storage coefficient.	1	5	2M
	j Give Dupuit's equation and explain its terms.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions										KL	CO	M																					
2	Unit-I																																	
	a	i) Briefly explain the qualitative representation of a hydrological cycle.										2	1	4M																				
		ii) Enlist different types of rain gauges and explain any one of the types of rain gauges with a suitable sketch in brief.										2	1	6M																				
	OR																																	
	b	i) Explain the different practical applications of hydrology.										2	1	5M																				
		ii) The average annual rainfall of 5 rain gauge stations in a basin is 89, 54, 45, 41 and 55 cm. If the error in the estimation of basin rainfall should not exceed 10%, how many additional rain gauges should be installed in the basin?										4	1	5M																				
3	Unit-II																																	
	a	Define infiltration. The rate of infiltration from the beginning of a storm is given below:										4	2	10M																				
		<table><tr><td>Time (min)</td><td>5</td><td>30</td><td>60</td><td>90</td><td>120</td><td>150</td><td>180</td><td>210</td><td>240</td></tr><tr><td>Rate of infiltration(mm)</td><td>600</td><td>54</td><td>22</td><td>20</td><td>16</td><td>14</td><td>12</td><td>08</td><td>08</td></tr></table>													Time (min)	5	30	60	90	120	150	180	210	240	Rate of infiltration(mm)	600	54	22	20	16	14	12	08	08
		Time (min)	5	30	60	90	120	150	180	210	240																							
Rate of infiltration(mm)	600	54	22	20	16	14	12	08	08																									
Fit an infiltration capacity curve of the exponential form.																																		

	OR														
b	i) With a neat sketch, explain how evaporation can be measured using an IS class A pan.											3	2	5M	
	ii) Explain evapotranspiration and the factors affecting evapotranspiration.											2	2	5M	
4	Unit-III														
	a	Define IUH. Derive 6 hr unit hydrograph for the catchment of 300 sq. km. for the given 3 hr unit hydrograph for the same catchment and plot the same.										4	3	10M	
		Time in hr	0	3	6	9	12	15	18	21	24				
		Ord. of UH (m ³ /sec)	0	1.5	4.5	8.6	12.0	9.4	4.6	2.3	0.8				
OR															
b	Given below are the monthly rainfall 'P' and the corresponding runoff 'R' values covering a period of 10 months for a catchment. Develop a correlation equation between R and P.										4	3	10M		
	Month	1	2	3	4	5	6	7	8	9				10	
	P in cm	6	34	41	31	15	10	5	32	37				30	
	R	0.6	9	14.8	7.4	3.1	3.2	0.1	12	15				8.2	
5	Unit-IV														
	a	The following field observations were obtained at two stations along the stream, separated by 350m.										3	4	10M	
			Area (m ²)		Perimeter (m)		Gauge reading (m)								
		U/s Section	68.1		42.3		61.38								
		Middle Section	72.3		45.7		-								
		D/s Section	75.4		48.6		60.99								
Determine the flood discharge assuming Manning's N = 0.033.															
OR															
b	What is flow routing? Explain the Muskingum method of flood routing. What are its applications?										2	4	10M		
6	Unit-V														
	a	What is groundwater recharge? With neat sketches, explain (i) the Basin method, (ii) the Pit method.										2	5	10M	
		OR													
	b	Write short notes on i) Groundwater recharge. ii) Confined aquifers. iii) Open well-recuperation test. iv) Specific yield.										2	5	10M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks***

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23CE3103

GEOTECHNICAL ENGINEERING-I

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define texture of a soil.	K1	1	2M
	b	Name different types of soil classifications.	K1	1	2M
	c	State the factors effecting permeability of soil.	K2	2	2M
	d	Write the formula to determine height of capillary rise in a soil and mention what each term of the formula stands for?	K2	2	2M
	e	What are differences between Boussinques's and Westergaard's theories?	K1	3	2M
	f	What is Pressure bulb?	K1	3	2M
	g	What is degree of consolidation ?	K1	4	2M
	h	Briefly explain e-p and e-log p curves.	K1	4	2M
	i	List the factors affecting shear strength?	K1	5	2M
	j	Define critical void ratio.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain in detail the Indian System of soil classification. When would you use dual symbols for soils?	K3	1	5M
		ii) Define and explain: Liquid limit; Plastic limit; shrinkage limit; and Plasticity index.	K2	1	5M
	OR				
	b	i) Describe the field identification tests to distinguish between clay and silt.	K2	1	5M
		ii) One cubic metre of wet soil weighs 19.80 kN. If the specific gravity of soil particles is 2.70 and water content is 11%, find the void ratio, dry density and degree of saturation.	K3	1	5M
3	Unit-II				
	a	i) What are the factors that affect permeability?	K2	2	5M
		ii) What is capillary rise in soil? In which soil will the capillary rise be maximum?	K2	2	5M

	OR				
	b	i) Derive the expression to determine the capillary rise in a soil deposit.	K2	2	5M
		ii) Derive an expression to determine coefficient of permeability of soil by laboratory falling head permeability test.	K2	2	5M
4	Unit-III				
	a	i) Derive the relation between the superficial velocities of flow to the seepage velocity of the flow.	K2	3	5M
		ii) Briefly explain the construction of Newmark's Influence Chart.	K3	3	5M
	OR				
	b	i) From the flow net diagram drawn for seepage flow through an earth dam the flowing data is obtained. Compute the seepage through the body of the dam per unit length. Number of flow lines = $N_f = 3.5$. Number of equipotential drops = 10. Coefficient of permeability = 1.25×10^{-5} cm/sec. head causing seepage flow, $h = 12.5$ m	K3	3	10 M
5	Unit-IV				
	a	i) Explain the Effect of compaction on soil properties.	K2	4	5M
		ii) What is compaction? Explain the Method of compaction in detail.	K2	4	5M
	OR				
	b	i) Describe briefly the procedure to compute the pre-consolidation pressure	K2	4	5M
		ii) A certain clay layer has a thickness of 5m. After one year when the clay was 50% consolidated 8cm of settlement had occurred. For a similar clay and loading conditions how much settlement would occur at the end of one year and 4 years, if the thickness of this new layer is 25m?	K3	4	5M
6	Unit-V				
	a	i) How do soils attain their shear strength? Explain soil strength envelope?	K2	5	5M
		ii) Explain the stress at a point by Mohr circle of stress?	K1	5	5M
	OR				
	b	i) Explain Coulomb's law for shearing strength of soils.	K2	5	5M
		ii) In an unconfined compression test a sample of clay 100mm long and 50mm in diameter fails under a load of 175KN at 12% strain. Calculate the shearing resistance into the account the effect of change in cross section of the sample?	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CE3106

CONSTRUCTION TECHNOLOGY & MANAGEMENT

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is a milestone chart?	K1	1	2M
	b	What is the role of a project manager in project coordination?	K3	1	2M
	c	What is the significance of float in a network diagram?	K3	2	2M
	d	Define project crashing.	K1	2	2M
	e	What do you mean by economic life of equipment?	K2	3	2M
	f	What is the function of rear dump truck?	K2	3	2M
	g	State the difference between weigh batching and volume batching	K2	4	2M
	h	What is the function of a paver in road construction?	K3	4	2M
	i	What is the purpose of form oil?	K1	5	2M
	j	What is a 3D BIM model?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions		KL	CO	M																																		
2	Unit-I																																						
	a	i) Explain the importance and relevance of construction project management in the construction industry.	K2	1	5M																																		
		ii) Draw a network for a house construction project. The sequence of activities with their predecessors are given in Table below:	K3	1	5M																																		
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Name of the activity</th><th>Starting and finishing event</th><th>Description of activity</th><th>Predecessor</th><th>Time duration (days)</th></tr> <tr> <td>A</td><td>(1,2)</td><td>Prepare the house plan</td><td>—</td><td>4</td></tr> <tr> <td>B</td><td>(2,3)</td><td>Construct the house</td><td>A</td><td>58</td></tr> <tr> <td>C</td><td>(3,4)</td><td>Fix the door / windows</td><td>B</td><td>2</td></tr> <tr> <td>D</td><td>(3,5)</td><td>Wiring the house</td><td>B</td><td>2</td></tr> <tr> <td>E</td><td>(4,6)</td><td>Paint the house</td><td>C</td><td>1</td></tr> <tr> <td>F</td><td>(5,6)</td><td>Polish the doors / windows</td><td>D</td><td>1</td></tr> </table>		Name of the activity		Starting and finishing event	Description of activity	Predecessor	Time duration (days)	A	(1,2)	Prepare the house plan	—	4	B	(2,3)	Construct the house	A	58	C	(3,4)	Fix the door / windows	B	2	D	(3,5)	Wiring the house	B	2	E	(4,6)	Paint the house	C	1	F	(5,6)	Polish the doors / windows	D	1
		Name of the activity		Starting and finishing event		Description of activity	Predecessor	Time duration (days)																															
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E	(4,6)	Paint the house	C	1																																			
F	(5,6)	Polish the doors / windows	D	1																																			
OR																																							
b	i) Construct a network for a project whose activities and their predecessor relationship are given in table below:	K3	1	5M																																			
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Activity</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th><th>H</th><th>I</th><th>J</th><th>K</th></tr> <tr> <th>Predecessor</th><td>.</td><td>.</td><td>.</td><td>A</td><td>B</td><td>B</td><td>C</td><td>D</td><td>E</td><td>H,I</td><td>E,G</td></tr> </table>	Activity	A	B	C	D	E	F	G	H	I	J	K	Predecessor	.	.	.	A	B	B	C	D	E	H,I	E,G														
Activity	A	B	C	D	E	F	G	H	I	J	K																												
Predecessor	.	.	.	A	B	B	C	D	E	H,I	E,G																												
	ii) Explain with neat sketches the Bar Chart (Gantt Chart) and its uses in project scheduling.	K2	1	5M																																			

3	Unit-II				
	a	i) Explain the steps involved in Project Evaluation and Review Technique (PERT).	K2	2	5M
		ii) Discuss the integration of PERT/CPM with Primavera for effective project control	K2	2	5M
	OR				
	b	i) Write short notes on: (a) Network updating (b) Optimum duration (c) Software-based project tracking	K2	2	5M
ii) Describe how project management tools like Primavera or MS Project assist in cost and time optimization.		K1	2	5M	
4	Unit-III				
	a	i) Discuss the functions and applications of different compaction rollers such as smooth wheel and pneumatic rollers.	K2	3	5M
		ii) Explain the functions and working of scrapers used in large earthmoving operations.	K2	3	5M
	OR				
	b	i) How does proper selection of compaction and hauling equipment contribute to cost efficiency in a project?	K2	3	5M
ii) Explain the uses and working principles of clamshell buckets in material handling.		K2	3	5M	
5	Unit-IV				
	a	i) Describe the automatic control system in modern batching plants and its advantages	K2	4	5M
		ii) Describe the functions and components of a mechanical paver.	K2	4	5M
	OR				
	b	i) Discuss the quality control measures adopted during concrete and asphalt mixing operations.	K2	4	10M
6	Unit-V				
	a	i) Discuss the role of inspection and testing in ensuring construction quality	K2	5	5M
		ii) Explain how formwork failures can be prevented through proper planning.	K2	5	5M
	OR				
	b	i) Describe how formwork and reinforcement details are modeled and checked using BIM	K2	5	5M
ii) Describe the safety measures to be followed during steel erection and welding operations.		K2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23EE3101

POWER ELECTRONICS

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a Why turn ON time is less than turn OFF time in SCR?	K2	1	2M
	b Draw the switching characteristics of power IGBT.	K1	1	2M
	c List the advantages of single-phase bridge converter over single-phase mid converter.	K2	2	2M
	d Why power factor of semi converter is better than full converter?	K2	2	2M
	e What are the advantages of converters?	K1	3	2M
	f What are the applications of Cyclo converters?	K2	3	2M
	g Explain duty cycle in step up chopper operation.	K1	4	2M
	h Discuss the time ratio control in a dc chopper.	K1	4	2M
	i What is the principle of operation of Inverter?	K1	5	2M
	j Why a PWM inverter is superior to a square wave Inverter?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M
2	Unit-I			
	a i) Explain the switching or dynamic characteristics of a thyristor during its turn-on and turn-off processes with a neat diagram.	K3	1	5M
	ii) Explain briefly Turn-on and Turn-off methods of SCR.	K2	1	5M
	OR			
	b i) With the help of neat structural diagram and suitable waveforms, explain the operation of IGBT.	K2	1	5M
	ii) Briefly discuss the gate drive design considerations of the MOSFET.	K3	1	5M
3	Unit-II			
	a i) Describe the working of single-phase fully controlled bridge converter in the Rectifying mode.	K2	2	5M
	ii) A single-phase half wave rectifier is used to supply power to a load of impedance 15Ω from 230 V, 50 Hz a.c. supply at the firing angle of 45° . Calculate the Average load voltage, Load current and Effective value.	K3	2	5M
	OR			
	b i) Explain the operation of single-phase, half-wave controlled bridge	K3	2	5M

		converter with resistive load and inductive load with the associated waveforms.			
		ii) Explain the operation of Dual converter with suitable sketches.	K3	2	5M
4	Unit-III				
	a	i) Describe the operation of three-phase full converter with RL load? Draw the waveforms by choosing firing angle such that output voltage has negative part.	K2	3	5M
		ii) A three-phase full converter is fed by 230 V, 50 Hz, three phase supply, the average load current is 20A and the load is highly inductive. For firing angle of 45° find average, rms and peak current through the SCR's.	K3	3	5M
	OR				
	b	i) Explain the operation of single-phase AC voltage controller with R load. Draw the necessary waveforms.	K2	3	5M
		ii) Discuss the working of a single-phase bridge type cycloconverter with R load. Sketch a neat circuit diagram and output rms voltage and current wave form for $f_o = (1/3) f_s$.	K3	3	5M
5	Unit-IV				
	a	i) Discuss the operation of Boost converter with the help of neat circuit diagram and waveforms.	K2	4	5M
		ii) With the help of a neat circuit diagram and associated waveforms, discuss the operation of Buck-Boost converter. List the advantages and disadvantages of this type of converter.	K3	4	5M
	OR				
	b	i) Explain the operation of buck-boost converter in the CCM mode and obtain the expression for amplitude of ripple current.	K2	4	5M
6		ii) A buck converter has the input voltage of 220 V and it operates at 1.5 kHz, when the average load current is 55 A, the load resistance is 5 Ω . Determine the value of inductance to limit the maximum peak to peak ripple current through inductor to 10% and find the value of inductance for maximum ripple current?	K3	4	5M
	Unit-V				
	a	i) How do you use PWM to inverters? Explain operation of single full bridge inverter with quasi-square wave pulse width modulation.	K3	5	5M
		ii) Explain the working of auto sequential commutated current source inverter?	K2	5	5M
	OR				
	b	i) What is the difference between half and full bridge inverters? Draw the circuit diagrams of 3-phase half bridge inverter and full bridge inverter. Explain about switching states of 3-phase inverter.	K3	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23EE3102

DIGITAL CIRCUITS

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

R23

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Convert $(115)_{10}$ and $(235)_{10}$ into hexadecimal numbers	App	1	2M
	b	Write the truth table for XOR and NAND Gates.	Und	1	2M
	c	What is meant by combinational circuits?	Und	2	2M
	d	State the concept of parallel binary adder.	App	2	2M
	e	Identify the function of select inputs of a MUX.	Und	3	2M
	f	Compare the function of decoder and encoder.	Und	3	2M
	g	Define the term "state table"	Rem	4	2M
	h	How many flip-flops are required to build a binary counter that counts from 0 to 7?	Und	4	2M
	i	Write the differences between Mealy and Moore circuits	Und	5	2M
	j	Draw the state diagram of a T Flip Flop	Und	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	Explain the different types of codes and conversion with your own example.	Und	1	10M
	OR				
	b	i) Convert $(725.25)_8$ to its decimal, binary and Hexadecimal equivalent ii) Convert $(10110.110)_2$ to its decimal, Octal and Hexadecimal equivalent	App	1	5M
3	Unit-II				
	a	i) Simplify the function $F(A,B,C,D,E) = m(1,4,6,10,20,22,24,26) + d(0,11,16,27)$ using K-map method. Draw the circuit of the minimal expression using Basic gates. ii) Show how to connect NAND gates to get an AND gate and OR gate?	App	2	5M
	OR				
	b	i) Prepare Karnaugh Map for the following functions and draw the logic diagram using basic gates. $Y(A,B,C,D) = \Pi M(0,1,3,5,6,7,10,14,15)$ ii) How will you design a full adder using two half adders and an OR gate.	App	2	5M
			App	2	5M

4	Unit-III				
	a	Realize the function $F(w, x, y, z) = \Sigma (1,4,6,7,8,9,10,11,15)$ using 8 to 1 Multiplexer.	App	3	10M
	OR				
	b	Explain the concept of priority encoder with truth table, Boolean expression and logic diagram	Und	3	10M
5	Unit-IV				
	a	Determine the state table, characteristic table and an excitation table for D Flip Flop.	Und	4	10M
	OR				
	b	i) Explain universal shift register in detail	Und	4	5M
		ii) Write about buffer register.	Und	4	5M
6	Unit-V				
	a	i) Analyze state reduction if possible after designing a clocked synchronous sequential logic circuit using JK flip flops for the following state diagram. Use state reduction if possible.	App	5	10M
	OR				
	b	i) What is meant by state diagram? Define how state assignment is important in a sequential circuit design. Describe with suitable example	App	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23EE3103

POWER SYSTEMS-II

Time: 3 hours

(EEE)

Max. Marks: 70

R23

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is meant by GMR of transmission conductors?	1	1	2M
	b	Write short notes on the GMD of transmission conductors?	1	1	2M
	c	What is meant by a symmetrical transmission network?	1	2	2M
	d	State Ferranti effect?	1	2	2M
	e	Write the effects of transients in power system networks?	1	3	2M
	f	What is meant by the refraction coefficient in the power system networks?	1	3	2M
	g	Write about the corona existence in transmission lines?	1	4	2M
	h	Write the disadvantages of corona in transmission lines?	1	4	2M
	i	What is meant by the capacitance grading of insulators?	1	5	2M
	j	Write short notes on insulator string efficiency?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) List out and explain different types of transmission conductors?	2	1	5M
		ii) 3 conductors of a 3 phase line are arranged at the corners of a triangle of sides 1.8m, 2.3m and 4.2m. Find the inductance per kilo meter of the line when the conductors are regularly transposed? The diameter of each conductor is 1.32cm.	3	1	5M
	OR				
	b	i) Derive the capacitance of 3 wire system with relevant diagrams?	3	1	5M
		ii) The 3 conductors of a 3 phase transmission line are arranged in a horizontal plane and are 2.9m apart and the diameter of each conductor is 2.6cm. Calculate the inductance per kilo meter of each line?	3	1	5M
3	Unit-II				
	a	i) Analyze the nominal 'T' model of transmission line with circuit diagram?	3	2	5M
		ii) Explain the detailed classification of transmission lines?	2	2	5M
	OR				
	b	Describe the Rigorous solution of long transmission line with circuit diagram and necessary equations?	3	2	10M

4	Unit-III					
	a	i)	Prove the attenuation of travelling waves with necessary equations?	4	3	5M
		ii)	A surge of 102V is travelled by the line of surge impedance 486 ohms and reaches the junction of the line with 2 branch lines. The surge impedances of branch lines are 412 ohms and 47 ohms respectively. Calculate the transmitted voltage and currents? Also calculate the reflected voltage and current?	3	3	5M
	OR					
	b	i)	Prove the distortion of travelling waves with necessary equations?	3	3	5M
		ii)	The rectangular wave travels along a 512km long line terminated with a resistance of 1030 ohms. The line has a resistance of 0.2 ohms per kilo meter. The surge impedance is 385 ohms. The voltage at the termination point after 2 successive reflections is 186V. Determine the amplitude of the incoming surge?	4	3	5M
5	Unit-IV					
	a	i)	Analyze the critical disruptive voltage due to corona with necessary equations?	4	4	5M
		ii)	Derive the expression of electric stress related to the corona?	3	4	5M
	OR					
	b	i)	Explain and power loss due to corona with relevant expressions?	2	4	5M
		ii)	Summarize and explain the factors affecting the corona phenomenon in the transmission lines?	2	4	5M
6	Unit-V					
	a	i)	Explain the role and applications of sag template?	2	5	5M
		ii)	Explain different types of insulators with diagrams?	2	5	5M
	OR					
	b	i)	Derive the voltage distribution of suspension insulators?	3	5	5M
		ii)	Explain the effect of ice formation the sag calculations with necessary equations?	2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23EE3107

SPECIAL ELECTRICAL MACHINES

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	List any two permanent magnet materials used in electrical machines.	II	1	2M
	b	State any two mechanical properties required for permanent magnets.	II	1	2M
	c	Give a brief description of hysteresis motors.	II	2	2M
	d	State the meaning of step angle in a stepper motor.	II	2	2M
	e	Explain aligned and unaligned inductance.	II	3	2M
	f	What is a rotor position sensor used for?	II	3	2M
	g	Differentiate between surface-mounted and interior-mounted PM motors.	II	4	2M
	h	Define torque constant of BLDC motor.	II	4	2M
	i	Compare rotary and linear induction motors.	II	5	2M
	j	Write any two applications of LIM.	II	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the development of electronically commutated DC motor from a conventional DC motor.	III	1	10M
	OR				
	b	i) Explain reversible and irreversible losses in magnets and suggest methods to minimize them.	IV	1	10M
3	Unit-II				
	a	ii) Analyze the torque production mechanism in stepper motors.	IV	2	10M
	OR				
	b	i) Explain operation of hybrid stepper motor under open-loop and closed-loop modes.	IV	2	10M
4	Unit-III				
	a	i) Analyze the requirement of rotor position sensing in SRM.	IV	3	5M
		ii) Evaluate the performance of SRM for high-speed applications.	III	3	5M
	OR				
	b	i) Evaluate rotor position sensing techniques such as optical, Hall sensors, and sensorless.	III	3	10M

5	Unit-IV				
	a	i) Describe the torque–speed characteristics of PMSBLDC motors.	III	4	5M
		ii) Explain constructional features of BLDC motors.	III	4	5M
	OR				
	b	i) Derive torque and EMF equations for square-wave BLDC motor.	III	4	10M
6	Unit-V				
	a	i) Explain construction and operation of double-sided LIM with neat diagrams.	III	5	10M
	OR				
	b	i) Analyze the LIM drive used in traction systems.	IV	5	5M
		ii) Describe the equivalent circuit of LIM.	III	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23ME3101

MACHINE TOOLS & METROLOGY

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define machinability and list factors affecting it.	L1	1	2M
	b	Explain the types of chips formed in metal cutting.	L2	1	2M
	c	Name any four lathe attachments and their functions.	L1	2	2M
	d	Mention two applications of a planer and a shaper each.	L2	2	2M
	e	Define radial drilling machine and give its application.	L1	3	2M
	f	Distinguish between climb milling and conventional milling.	L2	3	2M
	g	What is selective assembly in limits and fits?	L1	4	2M
	h	List types of gauges used in linear measurement.	L2	4	2M
	i	What is an angle Dekkor and its application?	L1	5	2M
	j	State the uses of autocollimators in measurement.	L1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Discuss the mechanism of orthogonal cutting and its force analysis.	L3	1	5M
		ii) Explain Taylor's tool life equation and solve a numerical problem.	L3	1	5M
	OR				
	b	i) Describe built-up edge formation and its effect on cutting.	L3	1	5M
		ii) Explain the economics of machining with suitable examples.	L3	1	5M
3	Unit-II				
	a	i) Explain taper turning by compound rest method with diagram.	L3	2	5M
		ii) Describe thread cutting on a lathe using single-point threading tool.	L3	2	5M
	OR				
	b	i) Compare shaper, slotting, and planning machines in terms of stroke mechanism and workpiece capacity.	L3	2	5M
		ii) Calculate machining time for a planner given stroke length and number of strokes.	L3	2	5M
4	Unit-III				
	a	i) Explain simple, compound, and differential indexing in milling with neat diagrams.	L2	3	5M
		ii) Explain gang milling operation with example.	L2	3	5M

	OR				
	b	i) Compare grinding, honing, and lapping in terms of surface finish and accuracy.	L3	3	5M
		ii) Explain the selection of cutting speed, feed, and depth of cut for drilling operation.	L3	3	5M
5	Unit-IV				
	a	i) Explain unilateral and bilateral tolerance systems with sketches.	L4	4	5M
		ii) Design GO and NO-GO gauges for a given hole and shaft tolerance.	L4	4	5M
	OR				
	b	i) Compare Vernier caliper, micrometer, and dial gauge in terms of range, least count, and applications.	L3	4	5M
		ii) Discuss the calibration and use of slip gauges in workshop measurement.	L3	4	5M
6	Unit-V				
	a	i) Explain sine bar setup for measuring an angle of 30° with diagram.	L3	5	5M
		ii) Explain the construction and working principle of a tool maker's microscope.	L2	5	5M
	OR				
	b	i) Explain the use of optical projector in measurement of small components.	L2	5	5M
		ii) Describe profilograph/Talysurf and ISI symbols for surface roughness evaluation.	L3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23ME3102

THERMAL ENGINEERING

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Draw dual cycle on P-V and T-S planes	K2	1	2M
	b	Define exhaust blow down.	K1	1	2M
	c	What is the function of carburetor in S.I. engines? List different carburetors.	K2	2	2M
	d	List out different boiler mountings and accessories.	K1	2	2M
	e	What is the function of nozzle and write its applications.	K2	3	2M
	f	Define degree of reaction. What is the degree of reaction of Parson's reaction turbine?	K1	3	2M
	g	For high pressure ratios, what type of compressor you suggest and why?	K3	4	2M
	h	What are the applications of axial flow compressors?	K2	4	2M
	i	List out different components and its basic function of a gas turbine plant.	K1	5	2M
	j	What is the basic principle of rocket propulsion?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Compare otto, diesel and dual cycles for the same compression ratio and heat rejected.	K3	1	5M
		ii) Derive the expression for thermal efficiency of a Brayton cycle.	K4	1	5M
	b	i) An ideal diesel engine operates within the temperature limits of 1700 K and 300 K and C.R of 16. Determine the (a) pressure and temperature at each point in the cycle (b) thermal efficiency of a cycle (c) network (d) mean effective pressure.	K5	1	8M
		ii) Why do actual cycles deviate from ideal cycles?	K2	1	2M
3	Unit-II				
	a	i) Draw the actual valve timing diagram for a four-stroke petrol engine.	K2	2	5M
		ii) Explain the working principle of any high-pressure boiler with the help of a diagram.	K3	2	5M
	OR				
	b	i) Explain the fuel injection system of the C.I. engine.	K3	2	5M
		ii) What is draught? Differentiate between induced and forced draught.	K2	2	5M

4	Unit-III				
	a	i) Derive the condition for maximum discharge in case of steam nozzles.	K4	3	6M
		ii) Classify steam turbines.	K1	3	4M
	OR				
	b	i) In a DeLaval turbine, the steam issues from the nozzle with a velocity of 850 m/s, the nozzle angle is 20°. Mean blade velocity is 350 m/s, and the blades are equiangular. The mass flow rate is 1000 kg/min, friction factor is 0.8. Determine (i) blade angles (ii) axial thrust (iii) power developed (iv) blade efficiency.	K5	3	8M
ii) Draw velocity diagram for Parson's reaction turbine.		K3	3	2M	
5	Unit-IV				
	a	i) What is the function of the intercooler in a multi-stage compressor? Represent the intercooling process in the p-v diagram.	K2	4	5M
		ii) Explain the working of a centrifugal air compressor with the help of a neat sketch.	K3	4	5M
	OR				
	b	i) Differentiate between reciprocating and rotary air compressors.	K2	4	3M
ii) A single-acting, two-stage reciprocating air compressor with complete intercooling delivers 6 kg/min at 15 bar pressure. Assume intake condition of 1 bar and 15°C and the compression and expansion follow polytropic ($n=1.3$). Find (i) the power required, (ii) the isothermal efficiency.		K4	4	7M	
6	Unit-V				
	a	i) What are the different methods to improve gas turbine performance? Explain the regeneration method with the help of a schematic and T-s diagrams.	K3	5	7M
		ii) Draw p-v and T-s diagrams of a closed-cycle gas turbine plant.	K2	5	3M
	OR				
	b	i) Explain the working principle of a turbojet engine with the help of a neat diagram.	K3	5	6M
ii) What is a propellant? List out few liquid and solid propellants.		K2	5	4M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23ME3103

DESIGN OF MACHINE ELEMENTS

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define endurance limit and its significance in fatigue design.	L1	1	2M
	b	State any two theories of failure and mention their applications.	L2	1	2M
	c	What is preload in bolted joints and why is it necessary?	L2	2	2M
	d	List the advantages of welded joints over riveted joints.	L1	2	2M
	e	Define torsional rigidity and write the relation for torsional deflection of a shaft.	L1	3	2M
	f	Name any two types of couplings and state their applications.	L1	3	2M
	g	State the difference between uniform wear and uniform pressure theory in clutches.	L2	4	2M
	h	What is self-locking in brakes?	L2	4	2M
	i	Define bearing modulus and its importance.	L1	5	2M
	j	List the factors affecting the load-carrying capacity of rolling contact bearings.	L2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the various steps involved in the design process and discuss the role of standardization and material selection.	L2	1	5M
		ii) A steel shaft is subjected to a bending moment of 600 N-m and a torque of 800 N-m. Using maximum shear stress theory and yield strength of 300 MPa, determine the required shaft diameter with a factor of safety of 2.	L3	1	5M
	OR				
	b	i) Derive the Soderberg equation for fatigue failure and explain its use in design.	L3	1	5M
		ii) A machine member is subjected to a fluctuating bending stress varying from 50 MPa to 150 MPa. The ultimate stress is 600 MPa and yield stress is 400 MPa. Determine the factor of safety according to Goodman's criterion.	L4	1	5M
3	Unit-II				
	a	i) Explain the procedure for designing bolted joints subjected to eccentric loading.	L3	2	5M
		ii) A 4-bolt flange coupling is subjected to a torque of 600 N-m. The bolts are arranged on a 100 mm pitch circle. Determine the force acting on each bolt and the size of the bolt if the permissible shear stress is 50 MPa.	L3	2	5M

	OR				
	b	i)Derive the expression for the strength of a double fillet weld under transverse loading.	L4	2	5M
		ii) Design a welded joint to carry a load of 30 kN at an eccentricity of 50 mm from the weld centroid. Assume suitable data.	L5	2	5M
4	Unit-III				
	a	i)Explain the design procedure for a solid shaft subjected to combined bending and torsion.	L3	3	5M
		ii)Design a solid shaft to transmit 20 kW at 250 rpm. The shaft is subjected to a bending moment of 200 N-m. The maximum permissible shear stress is 40 MPa.	L3	3	5M
	OR				
	b	i) With neat sketches, explain the design features of flange and bushed pin type couplings.	L2	3	5M
		ii) Design a flange coupling to transmit 25 kW at 900 rpm. Take allowable shear stresses for shaft, key, and bolts as 40 MPa, 35 MPa, and 30 MPa respectively.	L4	3	5M
5	Unit-IV				
	a	i) Derive the expression for torque transmitted by a single plate clutch under uniform wear theory.	L3	4	5M
		ii)A band brake is used on a drum of 300 mm diameter. The angle of contact is 210°, and the coefficient of friction is 0.25. Calculate the ratio of tight side to slack side tension for both clockwise and anticlockwise rotation.	L4	4	5M
	OR				
	b	i)A helical compression spring carries a maximum load of 500 N. The wire diameter is 6 mm, and spring index is 8. Calculate the number of active coils and the free length for a deflection of 20 mm. Take G = 80 GPa.	L4	4	10M
6	Unit-V				
	a	i)Design a journal bearing has a diameter of 50 mm, length 100 mm, speed 1000 rpm, and load 1 kN. The viscosity of lubricant is 20 mPa-s.	L3	5	10M
	OR				
	b	i)Derive the Lewis equation for the beam strength of spur gears and list the assumptions made.	L4	5	5M
		ii)Design a pair of spur gears to transmit 15 kW at 600 rpm. Assume standard proportions and suitable materials.	L5	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23ME3107

NON-DESTRUCTIVE EVALUATION

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define radiographic testing	K1	1	2M
	b	List two industries where radiographic testing is widely used	K2	1	2M
	c	Define ultrasonic transducers	K1	2	2M
	d	List variables affecting ultrasonic test results	K2	2	2M
	e	State any two limitations of liquid penetrate testing	K1	3	2M
	f	Describe the principle of eddy current testing	K2	3	2M
	g	Define magnetization and demagnetization	K1	4	2M
	h	What types of materials are tested using magnetic particle testing?	K2	4	2M
	i	How is infrared radiation detected in inspections?	K2	5	2M
	j	Name any two aerospace applications of IR imaging.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Compare the sources of X-rays and Gamma rays for industrial radiography	K4	1	5M
		ii) Describe the applications of NDE in the aerospace industry	K3	1	5M
	OR				
	b	i) Explain any one Radiographic Technique with neat sketch	K2	1	5M
		ii) Discuss the scope and importance of NDT in automotive or chemical industries.	K5	1	5M
3	Unit-II				
	a	i) Illustrate the working of piezoelectric transducers	K3	2	5M
		ii) Evaluate ultrasonic testing for detecting internal defects	K5	2	5M
	OR				
	b	i) Explain the process of setting up ultrasonic equipment	K3	2	5M
		ii) Describe propagation phenomena in ultrasonic waves	K3	2	5M

4	Unit-III				
	a	i) Describe the eddy current test system with a diagram.	K3	3	5M
		ii) Compare advantages and disadvantages of DPI and FPI.	K4	3	5M
	OR				
	b	i) Explain stepwise liquid penetrate test procedure	K2	3	5M
		ii) Illustrate applications of liquid penetrate and eddy current tests	K3	3	5M
5	Unit-IV				
	a	i) Explain the process of magnetic particle test including equipment.	K2	4	5M
		ii) Discuss the importance of standardization in magnetic particle testing	K5	4	5M
	OR				
	b	i) Illustrate the procedure for magnetization and demagnetization	K3	4	5M
		ii) Describe calibration methods for MPT equipment	K2	4	5M
6	Unit-V				
	a	i) Illustrate the process of thermal inspection using liquid crystals	K3	5	5M
		ii) Discuss case studies on the application of infrared testing in electronics.	K5	5	5M
	OR				
	b	i) Evaluate the effectiveness of non-contact thermal inspection methods	K5	5	5M
		ii) Analyze thermomechanical behavior in IR testing of honeycomb structures	K4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23EC3101

ANALOG & DIGITAL IC APPLICATIONS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a List out the ideal characteristics of an Op-Amp.	K1	1	2M
	b What are the applications of comparators?	K2	1	2M
	c What are the applications of the 555 Timer?	K2	2	2M
	d What is the difference between an active filter and a passive filter?	K4	2	2M
	e Which is the fastest ADC? Why?	K2	3	2M
	f Write down different types of DACs.	K1	3	2M
	g Design an AND gate using universal gates.	K3	4	2M
	h Design a Half-Adder using universal gates.	K3	4	2M
	i State the difference between static RAM and dynamic RAM.	K2	5	2M
	j Write the truth table of the D flip-flop.	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Derive the gain for a non-inverting op-amp.	K4	1	5M
		ii) With a neat circuit diagram, explain the working of the Schmitt Trigger using an Op-Amp.	K4	1	5M
	OR				
	b	i)Develop output voltage equations for the Integrator with a proper diagram.	K4	1	5M
		ii)Explain in detail the DC characteristics of the OP-AMP.	K2	1	5M
3	Unit-II				
	a	i)Explain an Astable multivibrator using a 555 Timer, with a neat sketch.	K4	2	5M
		ii) Compare LPF and HPF Butterworth Filters with proper diagrams.	K2	2	5M
	OR				
	b	i)Derive the expression of the time delay of a monostable multivibrator.	K4	2	5M
		ii) Develop the voltage gain equations for 1st order LPF Butterworth Filters.	K3	2	5M
4	Unit-III				
	a	i)Explain the operation of the dual-slope ADC with a neat illustration.	K2	3	5M
		ii)For an ADC with 10-bit resolution and full-scale range ± 2.5 V, compute the quantization step Δ (LSB).	K3	3	5M

	OR				
	b	i) Explain the operation of the R-2R ladder DAC with a neat diagram.	K2	3	5M
		ii) Explain the following characteristics of ADC with examples: Resolution, accuracy, settling time, and linearity.	K2	3	5M
5	Unit-IV				
	a	i) Design a 3X8 decoder and explain its operation.	K3	4	5M
		ii) Design a Full Subtractor using universal gates.	K3	4	5M
	OR				
	b	i) Design a 16X1 multiplexer and explain its operation.	K3	4	5M
		ii) Compare CMOS, TTL, and ECL logics.	K2	4	5M
6	Unit-V				
	a	i) Write a short note on Bidirectional Shift Registers.	K2	5	5M
		ii) Construct a mod-8 counter and explain the operation with neat diagrams.	K3	5	5M
	OR				
	b	i) Compare the Counter and shift registers with proper diagrams.	K2	5	5M
		ii) Construct a Ripple counter and explain its working principle with proper diagrams.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks***

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23EC3102

DIGITAL COMMUNICATIONS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Compare PCM and DPCM.	K1	1	2M
	b	What is quantization? Give an example.	K2	1	2M
	c	Compare ASK and FSK.	K2	2	2M
	d	Sketch the signal space diagram for QPSK signals. Determine the distance between two signal points	K3	2	2M
	e	Mention the Nyquist criteria for distortionless baseband transmission	K2	3	2M
	f	Sketch the frequency response characteristics of an ideal Nyquist low-pass filter.	K3	3	2M
	g	Write the advantages of Cyclic Codes.	K2	4	2M
	h	What is Hamming Distance?	K1	4	2M
	i	Write down the significance of the Trellis Diagram.	K2	5	2M
	j	What are Convolutional Codes?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Find the signal-to-quantization noise ratio for linear quantization when the input of the PCM system is a sinusoidal signal.	K4	1	5M.
		ii) An analog signal having a 4 KHz bandwidth is sampled at 1.25 times the Nyquist rate, and each sample is quantized into one of 256 equally likely levels. Assume that the successive samples are statistically independent. What is the information rate of this source? Can the output of this source be transmitted without error over an AWGN channel with a bandwidth of 10 KHz and an SNR ratio of 20 dB?	K3	1	5M
	OR				
	b	i) Consider a sinusoidal signal given by $S(t) = 3\cos(100\pi t)$ (a) Find the signal-to-quantization noise ratio when the signal is quantized using 10-bit PCM. (b) Also find the minimum number of bits needed to achieve a signal-to-noise ratio of at least 40 dB.	K3	1	5M
		ii) With the help of neat block diagrams, explain the transmitter and receiver of the DPCM system.	K2	1	5M

3	Unit-II				
	a	i)With the help of neat block diagrams, explain the transmission and reception of an FSK system.	K2	2	5M
		ii)Draw the block diagram of the DPSK modulator and explain how the synchronization problem is avoided for its detection.	K3	2	5M
	OR				
	b	i)With the help of neat block diagrams, explain the transmission and reception of a QPSK system.	K2	2	5M
		ii)Derive the Probability of Error for the BPSK signal.	K4	2	5M
4	Unit-III				
	a	i)Derive the Probability of Error for the Matched Filter.	K1	3	5M
		ii)Prove that the output signal of a Matched filter is proportional to a shifted version of the autocorrelation function of the input signal to which the filter is matched.	K4	3	5M
	OR				
	b	i)Show that the matched filter and correlator are two distinct, independent techniques that yield the same result.	K4	3	5M
		ii) Derive the Probability of Error for the QPSK signal.	K1	3	5M
5	Unit-IV				
	a	i)What is code efficiency? Obtain the generator matrix for a systematic (7,4) cyclic code if $G(p)=p^3+p+1$.	K3	4	5M
		ii)Define the following terms: Code word, Block Length, Code Rate, Hamming Distance, Minimum Distance.	K2	4	5M
	OR				
	b	i)What are Hamming Codes? Write down the properties of Hamming Code.	K2	4	5M
		ii)The generator polynomial of a (7,4) cyclic code is $G(p)=p^3+p+1$. Obtain all the code vectors for the code in a systematic form.	K3	4	5M
6	Unit-V				
	a	i) A convolutional encoder has a single shift register with two stages, three modulo-2 addresses, and an output multiplexer. The generator sequence of the encoder is as under: $g^{(1)}=(1, 0, 1)$, $g^{(2)}=(1, 1, 0)$ and $g^{(3)}=(1, 1, 1)$ Draw the block diagram of the encoder.	K3	5	5M
		ii) With an example, explain the decoding using the Viterbi algorithm.	K2	5	5M
	OR				
	b	i)Compare Viterbi decoding and sequential decoding for convolutional codes.	K2	5	5M
		ii)Short Note: Turbo Code.	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23EC3103 ANTENNAS & WAVE PROPAGATION

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define antenna gain and directivity.	K1	1	2M
	b	What is the significance of polarization in antennas?	K2	1	2M
	c	Define radiation resistance.	K1	2	2M
	d	List applications of Loop antenna.	K4	2	2M
	e	What is pattern multiplication principle?	K1	3	2M
	f	What are the types of antenna arrays?	K1	3	2M
	g	What is the function of a horn antenna?	K1	4	2M
	h	List two advantages of microstrip patch antennas.	K3	4	2M
	i	Define critical frequency and maximum usable frequency (MUF).	K1	5	2M
	j	What are the main types of radio wave propagation?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the radiation mechanism for a single wire and two-wire transmission line with diagrams.	K2	1	5M
		ii) A resonant half-wavelength dipole is made of copper ($\sigma = 5.7 \times 10^7 \text{ S/m}$) wire. Determine the conduction-dielectric (radiation) efficiency 'e' of the dipole antenna, if the operating frequency is $f = 100 \text{ MHz}$, the radius of the wire 'b' is $3 \times 10^{-4} \lambda$, and the radiation resistance of the $\lambda/2$ dipole is $R_r = 73\Omega$.	K5	1	5M
	OR				
	b	i) Discuss various antenna parameters such as beam width, gain, and beam efficiency.	K2	1	5M
		ii) Explain the concept of antenna apertures, effective height, and aperture efficiency with examples.	K2	1	5M

3	Unit-II				
	a	i) Compare the field patterns of a quarter-wave monopole and half-wave dipole antenna.	K1	2	5M
		ii) A thin dipole antenna is $\lambda/15$ meter long. If its loss resistance is 1.5Ω . Evaluate radiation resistance and efficiency.	K5	2	5M
	OR				
	b	i) Discuss the field components of a small loop antenna and compare it with a short dipole.	K2	2	5M
		ii) Analyze the current distribution in Half wave dipole and Quarter wave monopole antennas.	K4	2	5M
4	Unit-III				
	a	i) Explain the principle of pattern multiplication with suitable diagrams.	K1	3	5M
		ii) Derive the expression for the array factor of a two-element array for equal amplitude and in-phase excitation.	K3	3	5M
	OR				
	b	i) Describe the construction and working of a Yagi-Uda antenna with neat diagram.	K2	3	5M
		ii) Explain the operation of End-fire array with increased directivity.	K2	3	5M
5	Unit-IV				
	a	i) Discuss the design and operation of a helical antenna in axial and normal modes.	K2	4	5M
		ii) Analyze the working of Horn antenna	K4	4	5M
	OR				
	b	i) Explain the structure and parameters of a rectangular microstrip patch antenna.	K4	4	5M
		ii) Design a rectangular microstrip patch antenna operating at 5 GHz with a dielectric constant $\epsilon_r = 4.4$. Find the patch length (L) and width (W).	K5	4	5M
6	Unit-V				
	a	i) Derive and explain the Friis free space equation for wave propagation.	K3	5	5M
		ii) Discuss the mechanism of sky-wave propagation and the formation of ionospheric layers.	K2	5	5M
	OR				
	b	ii) Explain space wave propagation and derive the expression for radio horizon.	K2	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks**

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23EC3106 ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Explain about basic DC Ammeter.	K2	1	2M
	b	Define sensitivity.	K2	1	2M
	c	List the applications of CRO.	K2	2	2M
	d	Discuss about important CRT features.	K2	2	2M
	e	List any two applications of schering bridge circuit.	K2	3	2M
	f	Distinguish between AC Bridges and DC bridges.	K2	3	2M
	g	Compare fixed vs variable AF oscillator.	K2	4	2M
	h	Write applications of function generator.	K2	4	2M
	i	Define piezoelectric effect.	K2	5	2M
	j	Define Self-Adaptive Sensors.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) What are the different types of errors in measurement? Explain briefly.	K2	1	5M
		ii) A D'Arsonval movement with a full scale deflection current of 50 μ A and internal resistance of 500 Ω is to be converted into a multirange voltmeter. Define the value of multiplier required for 0-20v, 0-50v, and 0-100v.	K3	1	5M
	OR				
	b	i) Explain the construction of multi-range voltmeter & Range extension DC voltmeter.	K2	1	5M
		ii) Calculate the sensitivity of a 200 μ A meter movement which is to be used as a dc voltmeter.	K3	1	5M
3	Unit-II				
	a	i) Draw the block diagram of a general purpose oscilloscope(CRO) and explain function of each block in detail.	K3	2	5M
		ii) Explain the major parts of CRT with a block diagram.	K2	2	5M
	OR				
	b	i) Compare dual trace oscilloscopes and dual beam CRO	K2	2	5M
		ii) Explain digital storage oscilloscopes.	K2	2	5M

4	Unit-III				
	a	i) A Maxwell bridge is used to measure an inductive impedance the bridge constants at balance are $C1=0.01 \mu F$, $R1=470K\Omega$, $R2=5.1 K\Omega$ and $R3=100 K\Omega$. Find the series equivalent of the unknown impedance.	K3	3	5M
		ii) Explain the Schering bridge circuit.	K2	3	5M
	OR				
	b	i) Describe the operation of the Wheatstone bridge and derive the expression for DC resistance.	K3	3	5M
		ii) Draw the Anderson's bridge circuit and derive necessary equations & explain it	K2	3	5M
5	Unit-IV				
	a	i) With a neat diagram discuss the operation of a square and pulse generator.	K2	4	10M
	OR				
	b	i) Explain the working of sweep frequency generator with diagram.	K2	4	5M
6		ii) Describe about fixed AF oscillator and variable AF oscillator.	K3	4	5M
	Unit-V				
	a	i) Explain the operation of LVDT with neat sketch.	K3	5	5M
		ii) Explain any two types of transducers.	K3	5	5M
	OR				
	b	i) Explain about smart and cogent sensors.	K3	5	5M
		ii) Explain about self-adaptive and self-validating sensors.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CS3104

FORMAL LANGUAGES & AUTOMATA THEORY

Time: 3 hours

(CSE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

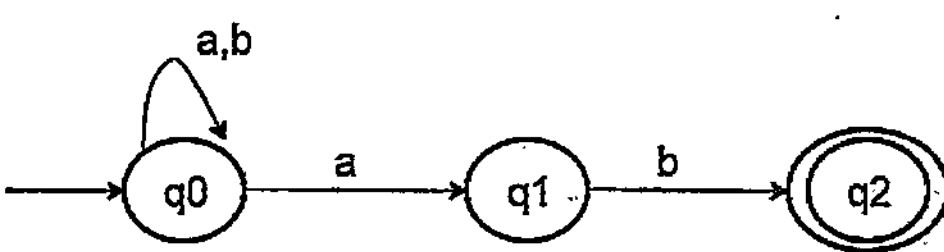
PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a What is the main difference between DFA and NFA?	2	1	2M
	b What is the difference between accepting and rejecting a string in Finite Automata?	2	1	2M
	c What are practical applications of regular expressions in computing?	3	2	2M
	d How is the concatenation of two REs represented?	3	2	2M
	e Can all regular languages be considered context-free? Explain.	4	3	2M
	f How can you detect ambiguity in a grammar?	1	3	2M
	g How does a PDA differ from a finite automaton?	2	4	2M
	h What is the significance of stack operations in PDA transitions?	4	4	2M
	i Define the components of a Turing Machine.	1	5	2M
	j Give an example of a language recognized by a TM.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M
2	Unit-I			
	i) Convert the following NFA to its equivalent DFA. 	3	1	10M
	OR			
	b Citing an example, Explain the model, 5-tuple representation and transition diagram representation of Finite Automata.	2	1	10M
3	Unit-II			
	a i) Construct NFA for the regular expression that accepts all strings ending with 00 or 11 over an alphabet {0,1}.	3	2	10M

	OR				
	b	Prove that the following language $L = \{ a^n b^n \mid n \geq 1 \}$ is not a regular. Also classify the grammars	3	2	10M
4	Unit-III				
	a	i) What is an ambiguous grammar? Show that the following grammar is ambiguous, where E is the start symbol. $E \rightarrow E + E \mid E - E \mid E * E \mid E / E \mid (E) \mid a$	4	3	6M
		ii) Citing an example, explain the following i. Context Free Grammar ii. Left Linear Grammar	2	3	4M
	OR				
	b	When a grammar is said to be in CNF(Chomsky Normal Form)? Convert the following CFG to CNF. $S \rightarrow ASB \mid \epsilon$ $A \rightarrow aAS \mid a$ $B \rightarrow SbS \mid A \mid bb$	4	3	10M
	Unit-IV				
5	a	i) Explain applications of Push Down Automata over Finite Automata.	2	4	5M
		ii) Construct PDA for the language $L = \{ a^m b^n c^p d^m \mid m, n \geq 1 \}$	3	4	5M
	OR				
	b	Construct the CFG for the PDA $M = (\{q_0, q_1\}, \{0, 1\}, \{R, Z_0\}, \delta, q_0, Z_0, \Phi)$ and δ is given by $\delta(q_0, 1, Z_0) = (q_0, RZ_0)$ $\delta(q_0, 1, R) = (q_0, RR)$ $\delta(q_0, 0, R) = (q_1, R)$ $\delta(q_1, 0, Z_0) = (q_0, Z_0)$ $\delta(q_0, \epsilon, Z_0) = (q_0, \epsilon)$ $\delta(q_1, 1, R) = (q_1, \epsilon)$	3	4	10M
6	Unit-V				
	a	i) Citing an Example, explain the model and 7-tuple representation of the Turing Machine.	2	5	5M
		ii) Explain applications of Turing machine over Push Down Automata.	3	5	5M
	OR				
	b	Design a TM to recognize the language $L = \{ 0^n 1^n 0^n \mid n \geq 1 \}$	5	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23IT3108

ADVANCED JAVA

Time: 3 hours

(IT)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What are the different types of statements in JDBC?	K2	1	2M
	b	List the different types of JDBC drivers?	K1	1	2M
	c	In your own words, explain what a web container does	K2	2	2M
	d	Define HTTP request and response cycle	K1	2	2M
	e	Which package contains the Servlet API?	K1	3	2M
	f	Define RequestDispatcher interface	K1	3	2M
	g	Explain what happens in the JSP life cycle after the translation phase	K2	4	2M
	h	Explain the purpose of implicit objects in JSP.	K2	4	2M
	i	Define BeanFactory	K1	5	2M
	j	What is the application of @Autowired annotation?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Illustrate the difference between Statement, PreparedStatement, and CallableStatement with examples.	K2	1	5M
		ii) Develop a simple JDBC program to connect to a database and display records from a table	K3	1	5M
	OR				
	b	i) Explain the architecture of JDBC with the help of a neat diagram.	K2	1	5M
		ii) Use PreparedStatement to insert a record into a table with parameters	K3	1	5M
3	Unit-II				
	a	i) List the types of J2EE containers and write a short note on each	K1	2	5M
		ii) Describe the request processing flow in a web application	K2	2	5M
	OR				
	b	i) Illustrate the role of HTTP protocols and APIs in J2EE web applications.	K2	2	5M
		ii) Demonstrate how a simple HTTP request is processed by a web	K3	2	5M

		container in a J2EE application.			
4	Unit-III				
	a	i) Explain the servlet life cycle with a neat diagram	K2	3	5M
		ii) Explain different session tracking mechanisms in servlets and their advantages.	K2	3	5M
	OR				
	b	i) Describe the use of filters in servlets and the purpose of the Filter API.	K2	3	5M
		ii) Develop a servlet program to redirect a client request to another servlet or JSP page	K3	3	5M
5	Unit-IV				
	a	i) Compare JSP with Servlets in terms of execution and use.	K2	4	5M
		ii) Illustrate the use of Expression Language (EL) in JSP with examples.	K2	4	5M
	OR				
	b	i) Develop a JSP page using implicit objects to display user information	K3	4	5M
		ii) State the different types of directives and action tags in JSP	K1	4	5M
6	Unit-V				
	a	i) State the purpose of the Data Access Object (DAO) pattern in Spring.	K1	5	5M
		ii) Illustrate how dependency injection works in Spring with an example.	K2	5	5M
	OR				
	b	i) Explain how database transaction management is handled in Spring	K2	5	5M
		ii) Describe the role of different Spring MVC modules in building web applications	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23DS3101

MACHINE LEARNING

Time: 3 hours

CSE (DS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	List and briefly describe the types of data used in Machine Learning.	I	1	2M
	b	What are the main stages in the Machine Learning process?	I	1	2M
	c	Define proximity measures and explain their importance in machine learning.	I	2	2M
	d	List any three metrics used to evaluate the performance of regression algorithms.	I	2	2M
	e	What is regression based on decision trees?	I	3	2M
	f	State Bayes' Rule and explain its significance in classification.	I	3	2M
	g	Define a Support Vector Machine.	I	4	2M
	h	Define Linear Regression and mention its applications.	I	4	2M
	i	Define matrix factorization and its role in clustering.	I	5	2M
	j	Define Fuzzy C-Means clustering.	I	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the importance of Data Acquisition and Feature Engineering in building accurate ML models.	II	1	5M
		ii) Illustrate the process of Model Evaluation using appropriate metrics for regression and classification tasks.	III	1	5M
	OR				
	b	i) Compare and contrast Model Selection, Model Learning, and Model Evaluation stages with suitable examples.	II	1	5M
		ii) List and explain different types of data used in Machine Learning, along with examples for each.	I	1	5M
3	Unit-II				
	a	i) Explain the difference between distance measures and similarity functions with suitable examples.	II	2	5M
		ii) Consider a small dataset of points. Illustrate how the KNN classifier assigns a class to a new sample.	III	2	5M

	OR				
	b	i) Explain how KNN regression predicts continuous values.	II	2	5M
		ii) Analyze the impact of different distance metrics (Euclidean, Manhattan, Minkowski) on classification results.	IV	2	5M
4	Unit-III				
	a	i) Explain the process of Decision Tree construction for classification with a neat diagram.	II	3	5M
		ii) Evaluate the effect of overfitting and underfitting in decision tree-based models and suggest remedies.	IV	3	5M
	OR				
	b	i) Consider a simple dataset and apply the Naive Bayes Classifier and explain the step-by-step calculation of probabilities.	III	3	5M
		ii) Analyze how impurity measures (Gini Index, Entropy, Misclassification Error) affect the structure of decision trees.	IV	3	5M
5	Unit-IV				
	a	i) Explain the concept of Linear Discriminants.	II	4	5M
		ii) Discuss the difference between Linear SVM and Non-linear SVM.	III	4	5M
	OR				
	b	Apply the concept of the Linear Regression model and obtain the best-fit line, with suitable dataset.	III	4	10M
6	Unit-V				
	a	i) Explain the K-Means clustering algorithm with a step-by-step procedure.	II	5	5M
		ii) Apply the Expectation Maximization algorithm to cluster a small dataset.	III	5	5M
	OR				
	b	i) Describe the concept of soft clustering and how it differs from hard clustering.	II	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23AI3104

DEEP LEARNING

Time: 3 hours

CSE (AI)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define the McCulloch-Pitts neuron model. What is thresholding logic?	L1	1	2M
	b	What is linear separability? Give an example.	L1	1	2M
	c	State the chain rule of calculus. How is it used in backpropagation?	L1	2	2M
	d	What is the purpose of an autoencoder?	L1	2	2M
	e	List any two optimization algorithms used in deep learning.	L1	3	2M
	f	What is the saddle point problem in neural networks?	L1	3	2M
	g	How do LSTM networks address the vanishing gradient problem?	L2	4	2M
	h	Name two key architectures in convolutional neural networks.	L1	4	2M
	i	What is a Variational Autoencoder (VAE)?	L1	5	2M
	j	Mention one application of Transformers in NLP.	L1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Compare Biological Neurons and Artificial Neurons with a diagram. Explain the computational aspects of each.	L2	1	5M
		ii) Explain the Perceptron Learning Algorithm with a suitable example. What are its limitations?	L2	1	5M
	OR				
	b	i) Describe the McCulloch-Pitts model with its mathematical formulation. How does it perform logical operations?	L2	1	5M
		ii) What is linear separability? Explain with examples. Can a single-layer perceptron solve the XOR problem? Justify	L3	1	5M
3	Unit-II				
	a	i) Derive the backpropagation algorithm for a multilayer perceptron with one hidden layer.	L3	2	5M
		ii) What is Empirical Risk Minimization? Discuss its relationship with	L3	2	5M

	overfitting and regularization.					
	OR					
	b	i) Explain the working of gradient descent in training neural networks. Compare batch, stochastic, and mini-batch gradient descent.	L3	2	5M	
ii) What are autoencoders? Explain their architecture and any one practical application.		L2	2	5M		
4	Unit-III					
	a	i) Compare the Adam and RMSprop optimization algorithms. Why are they preferred over vanilla gradient descent?	L4	3	5M	
		ii) Explain the batch normalization technique. How does it help in faster convergence and regularization?	L3	3	5M	
	OR					
	b	i) What is the saddle point problem? How does it affect neural network training, and which methods help to address it?	L4	3	5M	
		ii) Describe the dropout regularization method. How does it prevent overfitting?	L2	3	5M	
	5	Unit-IV				
a		i) Explain the architecture of LSTM with a diagram. How do forget, input, and output gates work?	L3	4	5M	
		ii) Compare LeNet and AlexNet architectures in terms of layers, activation functions, and applications.	L4	4	5M	
OR						
b		i) Describe the training process of Restricted Boltzmann Machines (RBMs) using Gibbs sampling and contrastive divergence.	L4	4	5M	
		ii) What are Bidirectional LSTMs? Explain their significance in sequence modeling tasks.	L3	4	5M	
6	Unit-V					
	a	i) Explain the encoder-decoder structure of a Variational Autoencoder (VAE). How does it differ from a standard autoencoder?	L3	5	5M	
		ii) Discuss the self-attention mechanism in Transformers. Why is it effective for long-range dependencies?	L4	5	5M	
	OR					
	b	i) Describe the GPT architecture and its pre-training process. Give one use case in NLP.	L3	5	5M	
		ii) Compare CNNs and RNNs in terms of structure, applications, and limitations.	L4	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks



NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23CY3101 INTRODUCTION TO CYBER SECURITY

Time: 3 hours

CSE (CY)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Information Security and list its primary goals.	1	1	2M
	b	Explain how poor communication security can lead to data breaches.	1	1	2M
	c	What do you mean by Cybercrime? Give two examples of common cybercrimes.	1	2	2M
	d	Discuss why maintaining Professional Ethics is crucial for cybersecurity professionals handling sensitive user data.	1	2	2M
	e	Describe the phases involved in defining a web application test scope and process.	1	3	2M
	f	Define Penetration Testing and state its main objective.	1	3	2M
	g	What is Cross-Site Request Forgery (CSRF)? Give a simple example.	1	4	2M
	h	How do surveillance and reconnaissance assist in network assurance?	1	4	2M
	i	What is the CIA Triad? Briefly explain each component.	1	5	2M
	j	What is Business Impact Analysis (BIA) and why is it important in risk management?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the concept of secure communications.	2	1	5M
		ii) Discuss how cryptographic mechanisms ensure confidentiality and integrity.	2	1	5M
	OR				
	b	i) How can compromised computers affect organizational security?	2	1	5M
		ii) What measures help identify and mitigate them?	2	1	5M
3	Unit-II				
	a	i) Explain the concept of Privacy and Intellectual Property in the context of Cyber Security.	2	2	5M
		ii) Discuss the importance of protecting personal data and respecting digital ownership rights.	2	2	5M
	OR				
	b	i) Explain the concept of Electronic Evidence in Cybercrime Investigation.	2	2	5M
		ii) Discuss how it is collected, preserved, and presented in court with one practical example.	2	2	5M

4	Unit-III				
	a	i) Describe the Web Architecture from a penetration tester's perspective.	2	3	5M
		ii) Explain the roles of web servers, application servers, databases, and clients, and how understanding each component aids in identifying potential security weaknesses.	2	3	5M
	OR				
	b	i) What are the common types of vulnerabilities found in web applications?	2	3	5M
ii) Explain at least five examples along with their possible impacts.		2	3	5M	
5	Unit-IV				
	a	i) Define Password Vulnerabilities and Session Hijacking in web applications.	2	4	5M
		ii) How do weak authentication mechanisms and poor session management compromise system security? Provide examples and countermeasures.	2	4	5M
	OR				
	b	i) Examine the role of audit trails and server logs in detecting and preventing web attacks.	2	4	5M
ii) Discuss how real-time monitoring, log correlation, and incident response tools enhance web application assurance.		2	4	5M	
6	Unit-V				
	a	i) Discuss how Business Continuity Planning (BCP) integrates with information risk management.	2	5	5M
		ii) Provide an example of how BCP ensures continuity during IT disruptions or cyber incidents.	2	5	5M
	OR				
	b	i) Explain the concept of Information Risk Management.	2	5	5M
ii) Discuss the key steps and their significance in organizational security.		2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23AM3101 INFORMATION RETRIEVAL SYSTEMS

Time: 3 hours

CSE (AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is precision in IR evaluation?	K1	1	2M
	b	List two data structures used in IR systems.	K2	1	2M
	c	Define a posting list in an inverted index.	K1	2	2M
	d	Define a bit string signature.	K1	2	2M
	e	What is the purpose of using stop lists in IR systems?	K2	3	2M
	f	Define the term <i>PATRICIA Tree</i> .	K1	3	2M
	g	What type of data structure is commonly used in thesaurus construction?	K1	4	2M
	h	List two features of Thesauri.	K2	4	2M
	i	What is a string searching algorithm	K1	5	2M
	j	Write one feature of the Shift-Or algorithm.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the differences between Information Retrieval (IR) systems and Database Management Systems (DBMS) with suitable examples.	K2	1	5M
		ii) Explain the concepts of precision and recall with examples.	K2	1	5M
	OR				
	b	i) Explain how an inverted index is built and used in IR systems.	K4	1	5M
		ii) Explain the working of the Vector Space Model algorithm for document retrieval.	K1	1	5M
3	Unit-II				
	a	i) Illustrate with an example how a term-document matrix is transformed into an inverted index.	K3	2	5M
		ii) Discuss the role of compression and hashing in optimizing inverted file structures.	K2	2	5M
	OR				
	b	i) Describe various compression techniques used in signature files to save space.	K2	2	5M
		ii) Explain the concept of vertical partitioning in signature files with a neat diagram.	K2	2	5M

4	Unit-III				
	a	i) Explain the concept of lexical analysis and its role in text indexing.	K2	3	5M
		ii) Explain the process of building a PAT tree as a PATRICIA tree.	K2	3	5M
	OR				
	b	i) Explain the advantages and disadvantages of using PAT arrays in Information Retrieval.	K2	3	5M
		ii) Describe the structure and working of a PAT tree with a neat diagram.	K2	3	5M
5	Unit-IV				
	a	i) Describe the working of the stemming algorithm with examples.	K3	4	10M
	OR				
	b	i) Compare domain-specific and general-purpose thesauri.	K4	4	5M
		ii) Discuss the importance of semantic relationships in thesaurus design.	K2	4	5M
6	Unit-V				
	a	i) Describe the working of the Naive string matching algorithm with an example.	K3	5	5M
		ii) Explain the pre-processing steps involved in the KMP algorithm.		5	5M
	OR				
	b	i) Describe the basic principles behind the Boyer-Moore algorithm.	K2	5	5M
		ii) Describe the Shift-Or algorithm and explain how it differs from other matching algorithms.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23AM3102

DEEP LEARNING

Time: 3 hours

(AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Compare biological and artificial neurons.	K2	1	2M
	b	Define linear separability with one example.	K1	1	2M
	c	What is a multilayer perceptron (MLP)?	K1	2	2M
	d	What is empirical risk minimization (ERM)?	K1	2	2M
	e	List any two optimizers used in deep networks.	K1	3	2M
	f	What is the purpose of batch normalization?	K2	3	2M
	g	Explain the concept of Backpropagation Through Time (BPTT).	K2	4	2M
	h	What is the difference between RNN and CNN?	K2	4	2M
	i	Define a Variational Autoencoder (VAE).	K1	5	2M
	j	What is a Transformer model in deep learning?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	Compare biological and artificial neurons highlighting their computational similarities.	K2	1	5M
		Prove the convergence theorem of the Perceptron and justify its significance in learning linearly separable data.	K4	1	5M
	OR				
	b	Illustrate the Perceptron Learning Algorithm with a worked example.	K3	1	5M
		Explain the McCulloch–Pitts model and demonstrate threshold logic using a schematic diagram.	K3	1	5M
3	Unit-II				
	a	Demonstrate how Gradient Descent optimizes weights in a multilayer perceptron.	K3	2	5M
		Analyze how regularization mitigates overfitting; compare L1 and L2 regularization.	K4	2	5M
	OR				
	b	Construct the step-by-step working of the Backpropagation algorithm and evaluate its limitations.	K4	2	5M
		Interpret Empirical Risk Minimization and summarize its role in generalization performance.	K2	2	5M

4	Unit-III		
	a	Compare Adagrad, Adadelata, RMSProp, and Adam optimizers; infer which suits sparse gradients.	K4 3 5M
		Explain the Saddle Point problem and propose strategies to overcome it.	K5 3 5M
	OR		
	b	Discuss second-order optimization approaches and appraise their computational trade-offs.	K5 3 5M
5		Demonstrate how Dropout and Batch Normalization improve convergence and enhance model stability.	K3 3 5M
	Unit-IV		
	a	Illustrate Backpropagation Through Time (BPTT) using a simple unfolded RNN example.	K3 4 5M
		Differentiate LSTM and GRU architectures and analyze their gating mechanisms.	K4 4 5M
	OR		
6	b	Compare CNN architectures – LeNet and AlexNet – in terms of depth, parameters, and feature extraction ability.	K4 4 5M
		Explain Gibbs Sampling and illustrate its application in Restricted Boltzmann Machines.	K3 4 5M
	Unit-V		
	a	Design a Variational Autoencoder (VAE) framework and illustrate its generative learning process.	K6 5 5M
		Examine the Transformer architecture and evaluate its advantages over recurrent models.	K5 5 5M
6	OR		
	b	Construct the architecture of a Generative Pre-Trained Transformer (GPT) and analyze its training pipeline.	K5 5 5M
		Discuss and assess major applications of deep learning in Vision, NLP, and Speech processing.	K5 5 5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23AM3103

NATURAL LANGUAGE PROCESSING

Time: 3 hours

(AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is Natural Language Processing?	K1	1	2M
	b	List any two challenges in developing NLP systems.	K1	1	2M
	c	Define N-gram model and its use in text processing.	K2	2	2M
	d	What is the role of smoothing in Language Models?	K2	2	2M
	e	What is a Context-Free Grammar (CFG)?	K2	3	2M
	f	Explain the concept of dependency parsing.	K2	3	2M
	g	What is Word Sense Disambiguation (WSD)?	K2	4	2M
	h	Define synonymy and antonymy with examples.	K2	4	2M
	i	What is anaphora in discourse analysis?	K2	5	2M
	j	Differentiate between stemming and lemmatization.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the origins and challenges of NLP.	K2	1	5M
		ii) Explain the working of a statistical language model with an example.	K3	1	5M
	OR				
	b	i) Explain the process of tokenization and its importance in preprocessing.	K2	1	5M
		ii) Illustrate the working of a finite-state automaton for English morphology.	K3	1	5M
3	Unit-II				
	a	i) Explain unsmoothed N-gram models and discuss how they are evaluated.	K3	2	5M
		ii) Compare Add-one, Good-Turing, and Kneser-Ney smoothing methods.	K4	2	5M
	OR				
	b	i) Discuss Part-of-Speech tagging approaches: rule-based, stochastic, and transformation-based.	K3	2	5M
		ii) Describe the Hidden Markov Model (HMM) and its application in PoS tagging.	K3	2	5M

4	Unit-III					
	a	i)	Explain top-down and bottom-up parsing strategies with examples.	K3	3	5M
		ii)	Demonstrate how a CFG can be converted into Chomsky Normal Form.	K3	3	5M
	OR					
	b	i)	Describe ambiguity in syntactic parsing and methods to handle it.	K4	3	5M
ii)		Apply a given CFG to recognize noun phrases in English.	K3	3	5M	
5	Unit-IV					
	a	i)	Explain how First-Order Logic represents sentence meaning in NLP.	K3	4	5M
		ii)	Define and illustrate semantic relations—synonymy, hyponymy, meronymy—with examples.	K2	4	5M
	OR					
	b	i)	Describe supervised and unsupervised approaches to Word Sense Disambiguation.	K4	4	5M
ii)		Explain the concept of Description Logics and compare them with FOL.	K4	4	5M	
6	Unit-V					
	a	i)	Explain anaphora and coreference resolution with suitable examples.	K2	5	5M
		ii)	Describe the Hobbs algorithm for anaphora resolution.	K3	5	5M
	OR					
	b		Discuss how annotated corpora like Penn Treebank aid statistical NLP applications.	K3	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23OE3103

CLIMATE CHANGE IMPACT ON ECO SYSTEM

Time: 3 hours

CSE (AIML, DS, CS), AIML

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	How do the laws of radiation help in explaining the temperature distribution on Earth's surface?	K2	1	2M
	b	Explain how temporal variations in air temperature can affect soil temperature.	K1	1	2M
	c	What are the main processes involved in the hydrologic cycle, and how do they maintain the global water balance?	K1	2	2M
	d	How does a simple water balance model help in assessing the availability of water resources on land?	K3	2	2M
	e	Differentiate between evaporation and transpiration, and mention their role in the hydrologic cycle	K3	3	2M
	f	How do global wind circulation patterns affect the monsoon in India?	K1	3	2M
	g	Which climate extreme (flood or heat wave) do you think causes more disruption in your area? Give a short reason.	K1	4	2M
	h	Suggest one way to use drought indicators to help farmers plan better	K1	4	2M
	i	Define climate change	K1	5	2M
	j	What are the main causes of climate change?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the role of radiation in determining Earth's surface temperature.	K2	1	5M
		ii) Describe how the laws of radiation apply to the Earth-atmosphere system.	K3	1	5M
	OR				
	b	i) Discuss the concept of thermal time and its importance in environmental studies.	K2	1	5M
		ii) Give an example of how temperature extremes can affect ecosystems.	K3	1	5M

3	Unit-II					
	a	i)	Explain the concept of a simple water balance model.	K1	2	5M
		ii)	Analyze the factors that influence surface runoff and infiltration on land	K4	2	5M
	OR					
	b	i)	Examine the role of evaporation and transpiration in the hydrologic cycle	K2	2	5M
		ii)	Give an example of how disruption in this cycle can impact agriculture	K3	2	5M
4	Unit-III					
	a	i)	Examine how surface runoff and streamflow are affected by land use changes.	K4	3	5M
		ii)	Describe the processes occurring in the vadose zone and their importance for groundwater recharge	K1	3	5M
	OR					
	b	i)	Analyze how monsoon winds affect seasonal rainfall patterns in India.	K2	3	5M
		ii)	Propose a strategy to improve rainfall prediction using knowledge of wind patterns and atmospheric stability.	K2	3	5M
5	Unit-IV					
	a	i)	Explain the main causes of floods and droughts.	K2	4	5M
		ii)	Examine the role of early warning systems in mitigating the impacts of extreme events.	K4	4	5M
	OR					
	b	i)	Suggest simple measures to reduce the impacts of heat waves on urban populations.	K2	4	5M
		ii)	Propose a community-level strategy to adapt to climate extremes effectively	K2	4	5M
6	Unit-V					
	a	i)	Explain the main causes of climate change	K2	5	5M
		ii)	Explain the concept of downscaling in climate modeling	K2	5	5M
	OR					
	b	i)	Describe the main scenarios outlined by the IPCC for future climate change.	K1	5	5M
		ii)	Discuss the significance of climate modeling for policy and decision-making	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23OE3104

RENEWABLE ENERGY SOURCES

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What are conventional and non-conventional energy sources?	2	1	2M
	b	Mention any two advantages of solar water heating systems.	2	1	2M
	c	What are the advantages of horizontal axis wind turbines?	2	2	2M
	d	Define tip-speed ratio.	2	2	2M
	e	What is meant by a low-head plant?	2	3	2M
	f	What is a binary cycle power plant?	2	3	2M
	g	What is the temperature difference required for OTEC operation?	2	4	2M
	h	State the basic principle of tidal power generation.	2	4	2M
	i	Write two differences between a fuel cell and a battery.	2	5	2M
	j	What is the working fluid used in MHD generators?	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Discuss the working and applications of flat plate solar collectors.	3	1	5M
		ii) Describe different methods of solar energy storage and their practical uses.	3	1	5M
	OR				
	b	i) Describe the equivalent circuit of a Photovoltaic (PV) cell and its I-V characteristics.	4	1	5M
		ii) Explain the design and working of a solar pond and its energy applications.	3	1	5M
3	Unit-II				
	a	i) Describe the major components of a Wind Energy Conversion System (WECS).	3	2	5M
		ii) Differentiate between horizontal-axis and vertical-axis wind turbines.	3	2	5M

	OR				
	b	i) Discuss the applications and limitations of wind energy systems.	3	2	5M
		ii) Describe the major components of a Wind Energy Conversion System (WECS).	3	2	5M
4	Unit-III				
	a	i) Compare the construction and working of fixed-dome and floating-dome biogas plants.	3	3	5M
		ii) Classify hydel power plants based on head and discuss their main components.	4	3	5M
	OR				
	b	i) Explain the working principle of dry steam and binary cycle geothermal power plants.	4	3	5M
		ii) Summarize the process of biomass conversion through anaerobic digestion.	3	3	5M
5	Unit-IV				
	a	i) Compare open cycle, closed cycle, and hybrid cycle OTEC systems with neat sketches.	3	4	5M
		ii) Describe the main components and operation of a tidal power plant.	3	4	5M
	OR				
	b	i) Discuss the prospects and challenges of Ocean Thermal Energy Conversion (OTEC) in India.	3	4	5M
		ii) Describe various wave energy conversion devices and compare their performance.	3	4	5M
6	Unit-V				
	a	i) Discuss the construction, operation, and applications of different types of fuel cells.	3	5	5M
		ii) Discuss hydrogen storage techniques and their applications in power generation.	4	5	5M
	OR				
	b	i) Differentiate between open-cycle and closed-cycle MHD systems.	3	5	5M
		ii) Illustrate the different methods of hydrogen production.	4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23OE3112

ENTREPRENEURSHIP

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define entrepreneurship and explain its basic concept.	K2	1	2M
	b	List any two characteristics of a successful entrepreneur.	K3	1	2M
	c	State two key aspects of the entrepreneurial environment.	K2	2	2M
	d	Describe the role of woman in promoting entrepreneurship.	K2	2	2M
	e	Define industrial regulation and state its significance.	K2	3	2M
	f	List the main objectives of industrial policy in India.	K3	3	2M
	g	List any two criteria for the selection of a product for a new business.	K3	4	2M
	h	Define ownership structure in entrepreneurship.	K2	4	2M
	i	Write about IT strategy	K2	5	2M
	j	List any two sources of finance for small business startups.	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	Explain nature and characteristics of an entrepreneur	K2	1	10M
		OR			
3	b	Discuss the ethics and social responsibilities of entrepreneurs and how they benefit society and business.	K2	1	10M
		Unit-II			
	a	Explain the key aspects and importance of the entrepreneurial environment for new ventures.	K2	2	10M
4		OR			
	b	Analyse the influence of family and society on entrepreneurial growth and success.	K4	2	10M
		Unit-III			
4	a	Explain the key objectives and features of India's recent industrial policies and their impact on economic growth.	K2	3	10M
		OR			
	b	Discuss various opportunities available for Indian entrepreneurs in global markets and the challenges	K2	3	10M

5	Unit-IV				
	a	Explain the key components and importance of a business plan in entrepreneurship.	K2	4	10M
	OR				
	b	Describe the steps involved in preparing a project profile and its role in securing business financing.	K2	4	10M
6	Unit-V				
	a	Define and Classify MSME and list its objectives	K4	5	10M
	OR				
	b	Describe the steps involved in product launching and market selection for a new business.	K2	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23OE3117

MOBILE COMPUTING

Time: 3 hours

CSE, IT, CSE (AI)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	State the purpose and advantages of mobile computing.	K2	1	2M
	b	List the applications of mobile computing.	K2	1	2M
	c	How Medium Access Control (MAC) is useful	K1	2	2M
	d	Compare Near and Far terminals of MAC.	K2	2	2M
	e	Compare Agent solicitation and Agent discovery	K3	3	2M
	f	Define COA	K3	3	2M
	g	Brief about Selective retransmission on Mobile Network Layer.	K2	4	2M
	h	In what way Transmission /time-out freezing are useful in Mobile Transport Layer.	K2	4	2M
	i	Distinguish the MANETs from cellular mobile networks.	K4	5	2M
	j	Describe the purpose of Hybrid routing algorithms with examples.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	With neat sketch, explain the architecture of mobile computing.	K4	1	10M
	OR				
	b	i) Describe about protocols of GSM. ii) Illustrate about Services of GSM.	K2 K4	1 1	5M 5M
3	Unit-II				
	a	i) Brief about motivation for a specialized MAC.	K2	2	10M
	OR				
	b	Distinguish between SDMA, FDMA, TDMA and CDMA with examples, advantages and disadvantages.	K4	2	10M
4	Unit-III				
	a	i) Explain the mechanism for IP packet delivery using mobile IP concept.	K2	3	5M
		ii) Discuss in detail about IP-in-IP encapsulation with advantages and disadvantages.	K2	3	5M
	OR				
	b	i) State the purpose of tunnelling and encapsulation in mobile network layer.	K2	3	5M
		ii) Explain in detail about Dynamic Host Configuration Protocol (DHCP).	K2	3	5M

5	Unit-IV				
	a	Compare Traditional TCP , Snooping TCP and Mobile TCP with advantages, disadvantages and applications	K3	4	10M
	OR				
	b	i) Explain about Fast retransmit/fast recovery in Mobile Transport Layer. ii) Discuss in detail about generic routing encapsulation in mobile computing.	K2 K2	4 4	5M 5M
6	Unit-V				
	a	i) State the purpose, characteristics and advantages of MANETs. ii) Explain in detail about DSDV routing algorithm for MANETS with an example.	K2 K2	5 5	5M 5M
	OR				
	b	Explain about Dynamic source routing protocols in MANETs.	K2	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23OE3118

PRINCIPLES OF DATABASE MANAGEMENT SYSTEMS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Database system and differentiate it from File system.	K1	1	2M
	b	List and explain the advantages of Database systems.	K1	1	2M
	c	Define entity and attribute with suitable examples.	K1	2	2M
	d	Explain key constraints in ER Model.	K2	2	2M
	e	Write a SQL query to display names from STUDENT table.	K2	3	2M
	f	Explain any two SQL functions with examples.	K3	3	2M
	g	Define Functional Dependency.	K1	4	2M
	h	What is Normalization	K3	4	2M
	i	List ACID properties of a transaction.	K2	5	2M
	j	What are the types of indexes in databases?	K4	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain three-tier architecture of a database with neat diagram.	K3	1	5M
		ii) Differentiate between centralized and client-server architecture	K2	1	5M
	OR				
	b	i) Compare hierarchical, network, and relational models.	K4	1	5M
		ii) Explain database environment and its components	K3	1	5M
3	Unit-II				
	a	i) Draw ER diagram for Library Management System.	K3	2	5M
		ii) Explain generalization and specialization with example.	K3	2	5M
	OR				
	b	i) Explain key and participation constraints in ER model.	K3	2	5M
		ii) Describe domain and referential integrity constraints.	K4	2	5M
4	Unit-III				
	a	i) Write SQL queries to create tables with key constraints.	K3	3	5M
		ii) Explain nested queries with an example.	K4	3	5M

	OR				
	b	i) Explain aggregate functions and GROUP BY with example	K3	3	5M
		ii) Write about different types of JOIN with example	K3	3	5M
5	Unit-IV				
	a	i) Define functional dependency and explain its properties.	K3	4	5M
		ii) Explain about 1NF, 2NF and 3NF with examples.	K3	4	5M
	OR				
	b	i) What are problems caused by redundancy?	K2	4	5M
		ii) Explain decomposition and lossless join.	K4	4	5M
6	Unit-V				
	a	i) What is a schedule in transactions? Explain serial and non-serial schedules with examples.	K2	5	5M
		ii) Explain transaction states and serializability.	K4	5	5M
	OR				
	b	i) Discuss different types of indexes with examples.	K3	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23OE3121 ENTREPRENEURSHIP DEVELOPMENT & VENTURE CREATION

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define entrepreneurship. List the success attributes of entrepreneurship.	K1	1	2M
	b	Write about the role of entrepreneurship in economic development of the nation.	K3	1	2M
	c	Outline the phases of design thinking process.	K4	2	2M
	d	Write about creating customer personas.	K6	2	2M
	e	List the key aspects of prototyping. Give examples of prototyping.	K1	3	2M
	f	Define value proposition. List its key characteristics.	K1	3	2M
	g	Define financial planning. Describe its purpose in brief.	K1	4	2M
	h	Write about customer acquisition strategy.	K3	4	2M
	i	Identify the key elements of persuasive story telling. State the rules for persuasive story telling.	K1	5	2M
	j	Plan for venture idea assessment.	K6	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the common traits and key differences between mindset of entrepreneurial and intrapreneurial leadership.	K1	1	5M
		ii) Explain the process of developing entrepreneurial mindset.	K2	1	5M
	OR				
	b	i) Identify entrepreneurial skills. Explain the importance of entrepreneurial skills for entrepreneurial success	K1	1	5M
		ii) Construct an entrepreneurial network on campus	K6	1	5M
3	Unit-II				
	a	i) Discuss the importance of understanding and analyzing macro-problems in entrepreneurship.	K2	2	5M
		ii) Define customer segmentation. Explain the process of customer segmentation.	K2	2	5M
	OR				
	b	i) Summarize identifying and defining problem using Design thinking principles.	K4	2	5M
		ii) Write down key steps in analyzing and validating a problem	K3	2	5M

4	Unit-III				
	a	i) Prepare a plan of action to assess relative market position via competition analysis	K6	3	5M
		ii) Describe the process of crafting an innovative solution design that maps to customer needs.	K3	3	5M
	OR				
	b	i) Write the stages of the iterative problem-solution fit process	K6	3	5M
		ii) Develop a feasibility prototype with differentiating value in entrepreneurship.	K6	3	5M
5	Unit-IV				
	a	i) Identify the components of business plan. Write the process of developing a sales plan.	K1	4	5M
		ii) Preparing a financial plan for profitability using financial template.	K6	4	5M
	OR				
	b	i) Define marketing channel. Write the steps for preparing a right channel.	K1	4	5M
		ii) Explain business models with examples.		4	5M
6	Unit-V				
	a	i) Define venture pitch? List the essential elements of a VC-ready pitch deck	K1	5	5M
		ii) Explain how to build an investor ready pitch deck.		5	5M
	OR				
	b	i) List common venturing activities? Describe the scope of venture activity.	K1	5	5M
		ii) Compile key components of scale outlook.	K6	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

R23

III B.Tech I Semester Regular Examinations, November-2025

Sub Code: R23C3115/22A3105

OPERATING SYSTEMS

CSE (AIML), CSE (AI), AIML

Max. Marks: 70

Time: 3 hours

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
a	What is dual mode operation and what is the need of it?	K1	1	2M
b	List the basic functions and services of an operating system.	K2	1	2M
c	Define the actions taken by a kernel to context switch: a. Among threads b. Among processes	K1	2	2M
d	Draw the Queueing -diagram representing process scheduling.	K2	2	2M
e	Trace the difference between semaphores and mutex locks in terms of their use in managing access to shared resources.	K4	3	2M
f	Given a system with multiple resources, how can you represent it using a resource allocation graph?	K2	3	2M
g	Mention one advantage of an inverted page table.	K2	4	2M
h	List the deadlock conditions?	K1	4	2M
i	Mention the components involved in the moving head disk mechanism	K2	5	2M
j	Define Domain Switching.	K2	5	2M

PART-B

Answer either 'a' or 'b' for each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M
Unit-I				
a	i) Explain different types of computing environments in detail ii) Operating System act as a resource manager. Justify it with relevant scenarios.	K2	1	5M
OR				
b	i) Analyse the differences between linkers and loaders in an operating system. Illustrate their roles with appropriate examples. ii) Propose an optimized data structure for managing system resources in a multitasking environment.	K4	1	5M
Unit-II				
i	Consider 4 processes P1 to P4 with its burst time, and arrival time. Find the average waiting time and average turnaround time using FCFS Scheduling Algorithm (Preemptive scheduling).	K4	2	5M
a	Process ID Arrival Time Burst Time P1 0 7 P2 2 4 P3 4 1 P4 5 5			
ii	In Shortest Job First (SJF) - Non-Preemptive, the process with the smallest burst time executes first. Compute average Waiting Time and for the given processes.	K4	2	5M

	Process	Arrival Time (ms)	Burst Time (ms)																													
	P1	0	6																													
	P2	2	4																													
	P3	4	2																													
	P4	5	8																													
	OR																															
b	i) Illustrate the lifecycle of a process using a state transition diagram																															
	ii) Identify the key components involved in message passing-based IPC.																															
	Unit-III																															
a	i) Illustrate how atomic operations ensure synchronization in hardware-level solutions.																															
	ii) Describe the Dining Philosophers Problem and suggest a solution using semaphores.																															
	OR																															
4	i) Consider the following snapshot of a system																															
	<table border="1"> <thead> <tr> <th>Allocation</th> <th>Max</th> <th>Available</th> </tr> </thead> <tbody> <tr> <td>ABCD</td> <td>ABCD</td> <td>ABCD</td> </tr> <tr> <td>P0</td> <td>3 1 4 1</td> <td>6 4 7 3</td> <td>2 2 2 4</td> </tr> <tr> <td>P1</td> <td>2 1 0 2</td> <td>4 2 3 2</td> <td></td> </tr> <tr> <td>P2</td> <td>2 4 1 3</td> <td>2 5 3 3</td> <td></td> </tr> <tr> <td>P3</td> <td>4 1 1 0</td> <td>6 3 3 2</td> <td></td> </tr> <tr> <td>P4</td> <td>2 2 2 1</td> <td>5 6 7 5</td> <td></td> </tr> </tbody> </table>						Allocation	Max	Available	ABCD	ABCD	ABCD	P0	3 1 4 1	6 4 7 3	2 2 2 4	P1	2 1 0 2	4 2 3 2		P2	2 4 1 3	2 5 3 3		P3	4 1 1 0	6 3 3 2		P4	2 2 2 1	5 6 7 5	
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P2	2 4 1 3	2 5 3 3																														
P3	4 1 1 0	6 3 3 2																														
P4	2 2 2 1	5 6 7 5																														
Illustrate that the system is in a safe state by demonstrating an order on which the processes may complete.																																
b	ii) Consider the following snapshot of a system:																															
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Allocation	Max	Available																														
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P2	2 1 0 3	2 3 1 6																														
P3	1 3 1 2	1 4 2 4																														
P4	1 4 3 2	3 6 6 5																														
Answer the following question using the banker's algorithm: If a request from process P1 arrives for (1, 1, 0, 0), can the request be granted immediately?																																
	Unit-IV																															
a	i) Demonstrate the paging technique and how it eliminates external fragmentation.																															
	ii) Evaluate the concept of swapping in memory management and assess its impact on system performance.																															
	OR																															
5	i) Given the reference string A, B, C, D, A, B, E, A, B, C, D, E and 3 page frames, apply the FIFO (First-In-First-Out) Page Replacement Algorithm and calculate the number of page faults.																															
	ii) Consider a virtual memory system with 4-page frames. The reference string is 2, 5, 1, 2, 4, 5, 3, 2, 5, 1, 3, 4, 2, 5, 1, 4. Compute the page faults using LRU and Optimal page replacement algorithms and explain why the Optimal algorithm gives the best performance.																															
	Unit-V																															
a	i) Illustrate the structure of a directory and explain different directory organization schemes.																															
	ii) Compare sequential, direct, and indexed file access methods with examples.																															
	OR																															
6	i) A disk has 200 tracks numbered from 0 to 199. The request queue is: 55, 58, 39, 18, 90, 160, 150, 38, 184. The initial head position is 50 and the head moves in the right direction. Apply SCAN scheduling and determine the total head movements.																															
	ii) Construct an access matrix for a system with three users and three files with different access rights.																															

III B.Tech I Semester Regular Examinations, November-2025

R23

Sub Code: R23OE3103

CLIMATE CHANGE IMPACT ON ECO SYSTEM

Time: 3 hours

CSE (AIML, DS, CS), AIML

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	How do the laws of radiation help in explaining the temperature distribution on Earth's surface?	K2	1	2M
	b	Explain how temporal variations in air temperature can affect soil temperature.	K1	1	2M
	c	What are the main processes involved in the hydrologic cycle, and how do they maintain the global water balance?	K1	2	2M
	d	How does a simple water balance model help in assessing the availability of water resources on land?	K3	2	2M
	e	Differentiate between evaporation and transpiration, and mention their role in the hydrologic cycle	K3	3	2M
	f	How do global wind circulation patterns affect the monsoon in India?	K1	3	2M
	g	Which climate extreme (flood or heat wave) do you think causes more disruption in your area? Give a short reason.	K1	4	2M
	h	Suggest one way to use drought indicators to help farmers plan better	K1	4	2M
	i	Define climate change	K1	5	2M
	j	What are the main causes of climate change?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the role of radiation in determining Earth's surface temperature.	K2	1	5M
		ii) Describe how the laws of radiation apply to the Earth-atmosphere system.	K3	1	5M
	OR				
	b	i) Discuss the concept of thermal time and its importance in environmental studies.	K2	1	5M
		ii) Give an example of how temperature extremes can affect ecosystems.	K3	1	5M