NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23OE3201 **DISASTER MANAGEMENT**

Time: 3 hours (EEE, AIML,AI,DS,CY,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 are the main phases of the Disaster Management cycle?	K2	1	2M
	b	Define earthquake and landslide.	K2	1	2M
	c	What are man-made disasters? Give two examples.	K2	2	2M
	d	What is meant by post-disaster management?	K2	2	2M
	e	What is vulnerability in disaster management?	K2	3	2M
	f	What is meant by climate change risk?	K2	3	2M
	g	What is meant by infrastructure in disaster management?	K2	4	2M
	h	What is geospatial information in drought assessment?	K2	4	2M
	i	What is meant by climate change adaptation?	K2	5	2M
	j	What is meant by disaster resilience in a community?	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 five priorities for action in Disaster Management.	K2	1	5M
		ii) Discuss global warming and its impact on natural disasters.	K3	1	5M
		OR			
	b	i) Discuss the post-tsunami hazards along the Indian coast with suitable examples.	K2	1	5M
		ii) Discuss the interdisciplinary nature of Disaster Management.	K3	1	5M
3		Unit-II			
	a	i) Discuss the causes, effects, and management of fire hazards.	K2	2	5M
		ii) Discuss the importance and methods of solid waste management in disaster prevention.	K3	2	5M
		OR			
	b	i) Discuss the causes and safety measures related to rail and aircraft accidents.	K2	2	5M
		ii) Explain the environmental hazards caused by groundwater contamination and industrial activities.	K3	2	5M

4	Unit-III				
	a	i) Discuss the importance of building codes in reducing disaster risk.	K2	3	5M
		ii) Discuss the role of macro-economic management in disaster risk reduction.	K3	3	5M
	OR				
	b	i) Explain the role of land-use planning in disaster risk reduction.	K2	3	5M
		ii) Explain the financial management strategies used to reduce disaster-related losses.	K4	3	5M
5	Unit-IV				
	a	i) Discuss disaster mitigation measures for critical infrastructure such as treatment plants, electrical substations, roads, and bridges.	K4	4	5M
		ii) Discuss disaster management strategies for infrastructure protection.	K3	4	5M
	OR				
	b	i) Explain the role of Remote Sensing (RS) and Geographic Information System (GIS) in disaster management.	K2	4	5M
		ii) Explain the earthquake mitigation program with the help of a flowchart.	K3	4	5M
6	Unit-V				
	a	i) Explain exposure, health hazards, and environmental risks caused by disasters.	K2	5	5M
		ii) Discuss the role of the corporate sector in disaster risk reduction.	K3	5	5M
	OR				
	b	i) Discuss the role of forest management in disaster risk reduction.	K2	5	5M
		ii) Explain the importance of education in disaster risk reduction.	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23OE3202 FUNDAMENTALS OF ELECTRIC VEHICLES

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 tractive force in a vehicle.	K1	1	2M
	b	List the different types of Electric Vehicles.	K1	1	2M
	c	What are power converters? Why are they used in EVs?	K2	2	2M
	d	What is the role of a controller in an electric vehicle?	K1	2	2M
	e	What is the working principle of an induction motor used in EVs?	K2	3	2M
	f	What is a Switched Reluctance Motor (SRM)?	K3	3	2M
	g	List the different architectures of Hybrid Electric Vehicles.	K2	4	2M
	h	What is a range-extended hybrid electric vehicle (RE-HEV)?	K2	4	2M
	i	List the different types of batteries used in electric vehicles.	K1	5	2M
	j	What are ultracapacitors and why are they used in EVs?	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 major components of a conventional vehicle with a neat diagram.	K3	1	5M
		ii) Discuss the advantages and major applications of electric vehicles.	K4	1	5M
		OR			
	b	i) Explain the need for electric vehicles in the present transportation system.	K3	1	5M
		ii) Briefly explain the history and development of electric vehicles.	K4	1	5M
3		Unit-II			
	a	i) Describe the working principle of a bidirectional DC–DC converter in electric vehicles.	K2	2	5M
		ii) Explain the main components of an Electric Vehicle with a neat block diagram.	K4	2	5M
		OR			
	b	i) Explain the function and operation of a Voltage Source Inverter (VSI) used in EVs.	K3	2	5M
		ii) Explain Pulse Width Modulation (PWM) inverters and their role in electric vehicle motor control.	K4	2	5M

4	Unit-III				
	a	i) Describe the construction and operation of a Brushless DC (BLDC) motor used in electric vehicles.	K3	3	5M
		ii) Compare different types of motors used in electric and hybrid vehicles.	K4	3	5M
	OR				
	b	i) Explain the construction and working principle of a Permanent Magnet Synchronous Motor (PMSM).	K2	3	5M
		ii) Discuss the advantages and limitations of different electric motors used for EV traction applications.	K4	3	5M
5	Unit-IV				
	a	i) Describe the working principle of a Series Hybrid Electric Vehicle.	K3	4	5M
		ii) Explain the architecture and operation of a Complex Hybrid Electric Vehicle.	K4	4	5M
	OR				
	b	i) Explain the merits and demerits of Hybrid Electric Vehicles.	K3	4	5M
		ii) Explain the working and features of a Parallel Hybrid Electric Vehicle.	K5	4	5M
6	Unit-V				
	a	i) Compare Lithium-ion, Nickel-Metal Hydride, and Lead-Acid batteries used in EVs.	K3	5	5M
		ii) Explain the functions and importance of a Battery Management System (BMS).	K4	5	5M
	OR				
	b	i) Explain the working principle of a fuel cell used in electric vehicles.	K3	5	5M
		ii) Describe alternative energy storage devices used in EVs such as ultracapacitors, flywheels, and compressed air energy storage (CAES).	K4	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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III B.Tech II Semester Regular Examinations, April-2026 **R23**

Sub Code: R23OE3203 **OOPS THROUGH JAVA**

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 Platform Independence as a feature of Java.	K1	1	2M
	b	List the core principles of Object-Oriented Programming.	K1	1	2M
	c	What is the purpose of the 'this' keyword in Java?	K2	2	2M
	d	Define Constructor Overloading.	K1	2	2M
	e	What is an Abstract class?	K1	3	2M
	f	Explain the functionality of the 'finally' block in exception handling.	K2	3	2M
	g	What is a Thread in Java?	K1	4	2M
	h	Describe the use of the isAlive() method.	K2	4	2M
	i	Define the Event Delegation Model.	K2	5	2M
	j	Name any four components available in the java.awt package.	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)Differentiate between Procedural Programming and Object Oriented Programming with at least 5 points of comparison.	K2	1	5M
		ii) Explain the Java Virtual Machine (JVM) architecture and its role in achieving platform independence.	K3	1	5M
		OR			
	b	i)Discuss any 5 major features of Java that make it robust, secure, and suitable for modern application development.	K2	1	5M
		ii)Explain the different types of control structures in Java with suitable examples. Differentiate between entry-controlled loops and exit-controlled loops.	K3	1	5M
3		Unit-II			
	a	i) What is type conversion in Java? Differentiate between widening (implicit) and narrowing (explicit) conversion with suitable code examples.	K3	2	5M
		ii)What is method overloading in Java? Explain with a program	K4	2	5M

		that contains a class Calculator with overloaded methods for addition (adding two integers, three integers, and two double values).			
	OR				
	b	Explain the static keyword in Java with respect to variables, methods, and blocks. Write a program to demonstrate a static variable acting as a counter that increments every time an object is created.	K3	2	10 M
4	Unit-III				
	a	i) Explain the types of inheritance supported in Java with a diagram.	K4	3	5M
		ii)) Differentiate between abstract class and interface in Java	K4	3	5M
	OR				
	b	i) What is method overriding? Write a Java program with a base class Animal having a method sound() and derived classes Dog and Cat overriding the sound() method.	K3	3	5M
		ii) Explain Java's exception handling mechanism with a detailed program.	K3	3	5M
5	Unit-IV				
	a	i) Explain the thread life cycle in Java with a neat diagram.	K2	4	5M
		ii) Write a simple applet program that displays "Hello World" and explain when each method is called.	K3	4	5M
	OR				
	b	i) Write a Java program to demonstrate multithreading by creating two threads. One thread prints odd and other thread print even numbers from 1 to 20 respectively	K3	4	5M
		ii) Explain thread synchronization in Java with a program.	K3	4	5M
6	Unit-V				
	a	i) Explain the Event Delegation Model in Java with a neat diagram.	K2	5	5M
		ii) Differentiate Components and Containers in AWT. List any five AWT components and explain their purpose.	K2	5	5M
	OR				
	b	i) Explain any two Layout Managers in AWT with example	K2	5	5M
		ii) Write a program to demonstrate the use of WindowAdapter class	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23OE3205 **INTRODUCTION TO EMBEDDED SYSTEMS**

Time: 3 hours (CSE, 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	Define Embedded System.	K1	1	2M
	b	List any two application areas of embedded systems.	K2	1	2M
	c	What is ROM? Mention its use in embedded systems.	K3	2	2M
	d	Define ASIC.	K1	2	2M
	e	What is communication interface in embedded systems?	K2	3	2M
	f	Define embedded firmware.	K2	3	2M
	g	List any two characteristics of embedded systems.	K2	4	2M
	h	Give an example of an application-specific embedded system.	K2	4	2M
	i	What is RTOS?	K2	5	2M
	j	Define task synchronization.	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 classification of embedded systems.	K3	1	5M
		ii) Illustrate major application areas of embedded systems.	K3	1	5M
		OR			
	b	i) Compare embedded systems and general computing systems.	K4	1	5M
		ii) Explain the purpose of embedded systems.	K2	1	5M
3		**Unit-II**			
	a	i) Explain types of memory used in embedded systems.	K3	2	5M
		ii) Describe memory selection for embedded systems.	K3	2	5M
		OR			
	b	i) Classify general purpose and domain specific processors.	K4	2	5M
		ii) Explain Commercial Off-The-Shelf (COTS) components.	K2	2	5M
4		**Unit-III**			
	a	i) Explain onboard communication interfaces	K2	3	5M
		ii) Explain external communication interfaces.	K3	3	5M

	OR				
	b	i) Describe watchdog timer and RTC.	K2	3	5M
		ii) Explain passive components used in embedded systems.	K3	3	5M
5	**Unit-IV**				
	a	i) Explain characteristics of embedded systems.	K3	4	5M
		ii) Describe quality attributes of embedded systems.	K3	4	5M
	OR				
	b	i) Analyze washing machine as an embedded system.	K4	4	5M
		ii) Explain automotive embedded systems.	K2	4	5M
6	**Unit-V**				
	a	i)Explain types of operating systems.	K2	5	5M
		ii) Describe task scheduling in RTOS.	K3	5	5M
	OR				
	b	i) Explain task communication techniques.	K3	5	5M
		ii) Describe task synchronization techniques.	K2	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23OE3206 **INDUSTRIAL AUTOMATION**

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 PLC? List any two PLC input devices.	II	1	2M
	b	Lists the different types of programming equipment used in PLC.	I	1	2M
	c	Define a holding register.	I	2	2M
	d	Which registers store sensor data and control actuators in a PLC?	I	2	2M
	e	Differentiate timers and counters.	II	3	2M
	f	State the uses of timers in PLC.	II	3	2M
	g	Distinguish between MOVE and COPY instructions in PLC.	II	4	2M
	h	How are two-axis robots controlled using PLC?	II	4	2M
	i	Define an analogue input module.	I	5	2M
	j	Define the functions of Proportional (P) control.	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	Describe various hardware components of PLC with a neat diagram.	IV	1	10M
		OR			
	b	i) Draw a ladder diagram of a spray process system.	II	1	5M
		ii) Discuss the basic function of analog I/O modules involved in PLC.	II	1	5M
3		**Unit-II**			
	a	i) Explain the major characteristics of PLC registers.	II	2	5M
		ii) Explain briefly about module addressing.	II	2	5M
		OR			
	b	Explain in detail the function of any two types of PLC registers.	III	2	10M
4		**Unit-III**			
	a	Write a short note on timer functions used in PLC.	II	3	5M
		Discuss different counter instructions in PLC with suitable examples.	II	3	5M
		OR			
	b	Explain in detail the different Number conversion functions.	II	3	10M
5		**Unit-IV**			
	a	Describe in detail the operation of the SKIP and CLR functions.	IV	4	10M

		OR			
	b	Discuss the concept of Controlling of two axes and three-axis robots with PLC.	IV	4	10M
6		**Unit-V**			
	a	Describe in detail the typical PID functions.	IV	5	10M
		OR			
	b	How the analog inputs and outputs handled by PLC? Explain in detail?	III	5	10M

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

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3201 CRYPTOGRAPHY & NETWORK SECURITY

Time: 3 hours (IT, 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 are cryptographic attacks?	L1	1	2M
	b	What is the congruence of $\mathbf{x^2 \equiv 7 \bmod 13?}$	L1	1	2M
	c	Define symmetric key cryptography.	L1	2	2M
	d	Encrypt HELLO using Caesar cipher with key 3.	L3	2	2M
	e	What is RSA algorithm?	L1	3	2M
	f	What is meant by the Diffie-Hellman key exchange?	L2	3	2M
	g	What is message authentication?	L1	4	2M
	h	What is digital signature?	L1	4	2M
	i	What is SSL Record Protocol?	L1	5	2M
	j	What is PGP?	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) Differentiate between passive and active attacks with examples.	L4	1	5M
		ii) Explain security services and security mechanisms in network security.	L2	1	5M
		OR			
	b	i) Use Extended Euclidean Algorithm to find integers x and y such that 56x + 72y = gcd(56,72).	L3	1	5M
		ii) Define linear congruence and explain the method to solve it.	L3	1	5M
3		Unit-II			
	a	Explain symmetric key cryptography and its characteristics.	L2	2	5M
		Explain Caesar cipher encryption and decryption with example.	L2	2	5M
	b	Explain DES structure with a neat Sketch.	L2	2	7M
		Describe Playfair cipher algorithm with an example.	L2	2	3M

4	Unit-III				
	a	i) Explain asymmetric key cryptography and its advantages.	L3	3	5M
		ii) Using Diffie–Hellman Key Exchange, compute the shared secret key for q = 353, α = 3, XA = 45, XB = 50.	L3	3	5M
	OR				
	b	i) Explain Fermat's theorem with example.	L3	3	7M
		ii) Find the primitive root of the prime number 7.	L3	3	3M
5	Unit-IV				
	a	i) Illustrate the digital signature generation and verification process using RSA algorithm.	L3	4	5M
		ii) Explain message integrity and authentication in detail.	L2	4	5M
	OR				
	b	i) Explain SHA-512 algorithm and message digest generation.	L3	4	5M
		ii) Explain Kerberos authentication protocol.	L3	4	5M
6	Unit-V				
	a	i) Describe SSL architecture and its components.	L2	5	5M
		ii) Differentiate between packet filter, application gateway, and circuit-level gateway.	L2	5	5M
	OR				
	b	i) Explain Secure Electronic Transaction (SET) with diagram.	L2	5	7M
		ii) Write short note on S/MIME ?	L2	5	3M

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3207 **NATURAL LANGUAGE PROCESSING**

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	List and explain the major challenges in NLP	II	1	2M
	b	How are spelling errors detected in NLP systems?	II	1	2M
	c	Define N-gram model.	I	2	2M
	d	State two issues in POS tagging.	II	2	2M
	e	Define treebank.	I	3	2M
	f	Explain Chomsky Normal Form (CNF).	II	3	2M
	g	Define First Order Logic (FOL).	I	4	2M
	h	Explain dictionary-based WSD method.	II	4	2M
	i	Define coherence in discourse.	I	5	2M
	j	Differentiate between stemming and lemmatization.	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) Describe the concept of Language Modeling and its role in NLP applications.	II	1	5M
		ii) Describe the techniques used to correct spelling errors automatically.	III	1	5M
		OR			
	b	i) Discuss the process of tokenization and its importance in NLP pipelines.	II	1	5M
		ii) Evaluate the importance of preprocessing techniques in NLP systems.	IV	1	5M
3		Unit-II			
	a	i) Explain different smoothing techniques used in N-gram models.	III	2	5M
		ii) Explain the process of Part-of-Speech tagging in NLP.	II	2	5M
		OR			
	b	i) Explain the Hidden Markov Model (HMM) used for POS tagging.	III	2	5M
		ii) Evaluate the role of word-level analysis in NLP applications.	IV	2	5M
4		Unit-III			
	a	i) Explain the concept and role of Treebanks in syntactic analysis.	II	3	10M
		OR			
	b	i) Describe the concept of shallow parsing (chunking) in NLP.	II	3	5M
		ii) Explain how CFG can be converted into Chomsky Normal Form.	III	3	5M

5	Unit-IV				
	a	i) Explain the requirements for semantic representation in NLP systems.	II	4	5M
		ii) Explain the Word Sense Disambiguation (WSD) problem.	II	4	5M
	OR				
	b	i) Describe the relations between word senses such as synonymy, antonymy, hyponymy, and meronymy.	III	4	5M
		ii) Compare supervised and dictionary-based WSD approaches.	IV	4	5M
6	Unit-V				
	a	i) Analyze the importance of lexical resources in NLP research.	IV	5	5M
		ii) Describe the lemmatization process used in NLP systems.	II	5	5M
	OR				
	b	i) Explain the structure and applications of WordNet.	III	5	5M
		ii) Explain the Porter stemming algorithm.	II	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3212 **SOFTWARE ENGINEERING**

Time: 3 hours (AI, 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 would you define Software Engineering?	K2	1	2M
	b	Write a short note on the Spiral Model.	K1	1	2M
	c	What are software project metrics?	K1	2	2M
	d	Define Halstead's Software Science.	K1	2	2M
	e	List any two types of user interfaces.	K2	3	2M
	f	What is meant by layered arrangement of modules in software design?	K1	3	2M
	g	Define smoke testing.	K2	4	2M
	h	What is the purpose of integration testing?	K1	4	2M
	i	State any two characteristics of software maintenance.	K1	5	2M
	j	Mention any two reasons for lack of software reuse.	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 evolution of software development.	K1	1	5M
		ii) Compare the Waterfall model and Agile model.	K3	1	5M
		OR			
	b	i) Describe the emergence of software engineering and the concept of the software crisis.	K1	1	5M
		ii) Illustrate the Rapid Application Development (RAD) model with suitable examples	K3	1	5M
3		Unit-II			
	a	i) Explain the complexities involved in software project management.	K1	2	5M
		ii) Discuss the structure and importance of Software Requirements Specification (SRS).	K2	2	5M
		OR			
	b	i) Describe the responsibilities of a software project manager.	K1	2	5M
		ii) Discuss the COCOMO model used to estimate software development effort and cost.	K2	2	5M
4		Unit-III			
	a	i) Summarize the layered arrangement of modules in software design with an example.	K1	3	5M

		ii) Discuss the impact of agility on the cost of change in software development.	K2	3	5M
	OR				
	b	i) Explain the Extreme Programming (XP) model and its key practices.	K1	3	5M
		ii) Outline the fundamentals involved in component-based GUI development.	K2	3	5M
5	Unit-IV				
	a	i) Distinguish between black-box testing and white-box testing.	K2	4	5M
		ii) Discuss the challenges associated with testing object-oriented programs.	K3	4	5M
	OR				
	b	i) Examine the importance of statistical testing in software reliability evaluation.	K3	4	5M
		ii) Illustrate how code review helps improve the quality of software.	K3	4	5M
6	Unit-V				
	a	i) Explain the characteristics of software maintenance.	K1	5	5M
		ii) Explain the CASE environment and its components.	K1	5	5M
	OR				
	b	i) Illustrate how CASE supports various stages of software development.	K2	5	5M
		ii) Discuss the approach to software reuse at the organizational level.	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April-2026

R23

Sub Code: R23CE3201 DESIGN & DRAWING OF STEEL STRUCTURES

Time: 3 hours (CE) Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B

Use of IS: 800-2007 AND IS 875 & STEEL TABLES IS ALLOWED

Q.No	Questions	KL	CO	Marks
	PART A			
1	Design a 20 m long plate girder has to support a UDL and concentrated loads at 1/3rd points. The uniform load consists of 18 KN/m Dead load and 30KN/m Live load. Each concentrated load consists of a 125 KN dead load and a225 KN live load. There is lateral support at the ends and at the points of con-centrated load. Using grade 410 steel. Determine the following. a) Design the cross section. b) Determine the location and size of intermediate stiffeners c) Design suitable bearing stiffeners at the supports and be-neath the loading points. d) Design welds for all the elements.	3	5	[28M]
	OR			
2	Design and draw a laced column 10m long to carry a factored axial load of 1100KN the column is restrained in position but not in direction at both ends. Provide single lacing system with bolted connection. a) Design the column with two channels back to back. b) Design the column with two channels placed toe to toe.	3	4	[28M]
	PART B			
3	Determine the safe load and the efficiency of a double cover butt joint. The main plates are 12 mm thick connected by 18 mm diameter rivets at a pitch of 100 mm. Design the cover plates also. What is the percentage reduction in the efficiency of the point if the plates are lap jointed?	3	1	[14M]
4	Design bending strength of ISLB 350at 486N/m considering the beam to be laterally unsupported. The design shear force is less than the design shear strength. The unsupported length of the beam is 3.0m. Assume steel of grade Fe410.	3	2	[14M]
5	Design a steel column to carry an axial load of 2000 kN. The length of the column is 5.0 m and effectively held in both ends	3	3	[14M]
6	Design a laced column for a load carrying capacity of 1000 kN. The effective length of the column is 5 m. Use channel sections. Design lacing system also.	3	4	[14M]
7	a) Explain the design principles of Gantry Girder.	2	5	[14M]

	b) What is the main function of providing horizontal stiffener in plate girder?			

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CY3201 CYBER CRIMES & DIGITAL FORENSICS

Time: 3 hours (CYS) 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 confidentiality with an example	1	1	2M
	b	Differentiate between data confidentiality and data integrity.	2	1	2M
	c	Explain the role of electronic evidence in cybercrime investigations.	2	2	2M
	d	Differentiate between copyright and trademark.	1	2	2M
	e	Explain vulnerability and give various vulnerabilities	1	3	2M
	f	What is reconnaissance in penetration testing?	2	3	2M
	g	What is CSRF (Cross-Site Request Forgery)?	2	4	2M
	h	State the importance of audit trails in web security.	2	4	2M
	i	What is Business Impact Analysis (BIA)?	1	5	2M
	j	Define CIA Triad.	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	Analyze types of information security threats and prevention methods	3	1	10M
		OR			
	b	Illustrate how secure communication protocols help protect sensitive information.	3	1	10M
3		Unit-II			
	a	Critically evaluate the balance between privacy and freedom of speech on the internet.	4	2	10M
		OR			
	b	Explain electronic evidence and its legal significance in Cyber Law.	2	2	10M
4		Unit-III			
	a	Analyze different types of vulnerabilities discovered during penetration testing.	3	3	10M
		OR			
	b	Evaluate client-server vulnerabilities in web applications.	4	3	10M
5		Unit-IV			
	a	Explain network forensics and surveillance techniques.	2	4	10M
		OR			
	b	Discuss web server security issues and audit trails.	4	4	10M
6		Unit-V			
	a	Describe Forensic investigation using FTK and EnCase tools.	3	5	10M
		OR			
	b	Explain the Cyber Incident Response Life Cycle.	2	5	10M

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23DS3201 **DEEP LEARNING**

Time: 3 hours (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	What is a McCulloch–Pitts neuron?	L1	1	2M
	b	Explain linear separability with an example.	L2	1	2M
	c	What is a multilayer perceptron (MLP)?	L1	2	2M
	d	Discuss the purpose of an autoencoder.	L2	2	2M
	e	Explain dropout in neural networks?	L2	3	2M
	f	What is the saddle point problem in neural networks?	L1	3	2M
	g	What is Backpropagation Through Time (BPTT)?	L1	4	2M
	h	What is the difference between LSTM and GRU?	L2	4	2M
	i	Explain Variational Autoencoder (VAE)?	L2	5	2M
	j	Explain Transformer model with its key advantages?	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 structure and functioning of a biological neuron and compare it with an artificial neuron.	L2	1	5M
		ii) Describe the Perceptron Learning Algorithm in detail with suitable steps.	L2	1	5M
		OR			
	b	i) Discuss thresholding logic in McCulloch–Pitts units and explain how logic gates can be implemented using it.	L3	1	5M
		ii) Explain the convergence theorem of the perceptron learning algorithm and state the condition under which convergence is guaranteed.	L2	1	5M
3		Unit-II			
	a	i) Explain the working of gradient descent in training feedforward neural networks.	L2	2	5M
		ii) Describe the back propagation algorithm with neat steps.	L2	2	5M
		OR			
	b	i) Discuss the difficulties involved in training deep neural networks.	L2	2	5M
		ii) Explain greedy layer-wise training and its role in deep network training.	L3	2	5M
4		Unit-III			
	a	i) Explain the working of Adam optimizer in neural network training.	L2	3	5M
		ii) Compare Adagrad, RMSProp, and Adadelta optimizers.	L2	3	5M

		OR			
	b	i) Discuss the importance of batch normalization in deep neural networks.	L2	3	5M
		ii) Explain different regularization methods used to improve neural network generalization.	L3	3	5M
5		Unit-IV			
	a	i) Explain the architecture and working of LSTM networks.	L2	4	5M
		ii) Describe bidirectional RNNs and bidirectional LSTMs with suitable examples.	L2	4	5M
		OR			
	b	i) Explain the architecture of AlexNet or LeNet in detail.	L3	4	5M
		ii) Discuss Restricted Boltzmann Machines and explain the role of Gibbs sampling in RBMs.	L2	4	5M
6		Unit-V			
	a	i) Explain the architecture and working principle of Transformers.	L2	5	5M
		ii) Discuss the difference between an auto encoder and a variational autoencoder.	L2	5	5M
		OR			
	b	i) Explain the architecture of GPT and its significance in modern AI applications.	L2	5	5M
		ii) Discuss the applications of GPT in Vision, NLP, and Speech domains.	L3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EC3201 **VLSI DESIGN**

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	Discuss the microelectronics evolution.	2	1	2M
	b	Write down the equations for Ids of an n-channel enhancement MOSFET operating in non-saturated region and saturated region	3	1	2M
	c	What is sheet resistance? Derive the Expression for RS?	1	2	2M
	d	What is the need of scaling in MOS circuits?	4	2	2M
	e	What is body bias effect?	5	3	2M
	f	Explain the different Regions of operation of MOSFET	6	3	2M
	g	What is Pass-Transistor Logic?	1	4	2M
	h	What are the Issues in Dynamic Design	2	4	2M
	i	List out the commercially available FPGAs	3	5	2M
	j	What are the different types of power consumption?	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 in detail the p-well process for CMOS fabrication indicating the masks used	3	1	5M
		ii) Draw a stick diagram and layout for two input CMOS NAND gate indicating all the regions and layers.	2	1	5M
		OR			
	b	i)Explain the concept of Latch-up in CMOS circuits along with circuit diagrams	2	1	5M
		ii)List out Comparison between CMOS and Bi-CMOS technology in detail	1	1	5M
3		Unit-II			
	a	i) How does depletion regions around source and drain are affected due to scaling down of device dimensions? Explain.	3	2	5M
		ii) What is inverter delay? How is delay calculated for multiple stages? Explain	1	2	5M
		OR			
	b	i) Explain the issues involved in driving large capacitor loads in VLSI circuit regions.	5	2	5M
		ii)Explain the terms Wiring Capacitances and Choice of layers.	5	2	5M
4		Unit-III			
	a	i)Draw the circuit diagram of Common Source amplifier and explain its operation	1	3	5M
		ii) write short notes on current sources and sinks.	1	3	5M

		OR			
	b	i)Draw the circuit diagram of single stage amplifier with resistive load and explain its operation	4	3	5M
		ii)write short notes on Common Gate amplifier	4	3	5M
5		Unit-IV			
	a	i) design of full adder circuit and explain its operation	3	4	5M
		ii)write short notes on Ripple carry adder in detail	3	4	5M
		OR			
	b	i)Explain the concept of SR Master Slave flip flop in detail	6	4	5M
		ii)write short notes on Cascading Dynamic Gates	6	4	5M
6		Unit-V			
	a	i) Draw and explain the basic architecture of FPGA.	1	5	5M
		ii) Give the steps in FPGA design flow with flow diagram and briefly discuss about each step	1	5	5M
		OR			
	b	i) List out the different configuration modes in FPGA. Briefly discuss about it	2	5	5M
		ii) How are the pass transistors used to connect wire segments for the purpose of FPGA programming? Explain.	2	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EE3201 ELECTRICAL MEASUREMENTS & INSTRUMENTATION

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	For moving coil type instruments, give the expression for the deflecting torque	K2	1	2M
	b	Why is it preferable to have slightly under damped instrument?	K2	1	2M
	c	Write any two comparisons between LPF and UPF Wattmeter in different aspects.	K2	2	2M
	d	Describe the basic principle of operation of a d.c. potentiometer.	K2	2	2M
	e	Write a short note on loss of charge method for resistance measurement.	K2	3	2M
	f	List out the limitations of AC potentiometers.	K2	3	2M
	g	What is a Transducer? Give the classification of transducers.	K2	4	2M
	h	What is LVDT? Write its applications.	K2	4	2M
	i	Define resolution and Sensitivity of Digital voltmeter.	K2	5	2M
	j	Obtain an expression for series Q meter circuit.	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) Derive the torque equation of a moving iron instrument and further comment up on the nature of scale.	K3	1	10M
		OR			
	b	i) Derive the expressions for the ratio and phase angle errors of a current transformer with a neat phasor diagram.	K3	1	5M
		ii) The primary winding of a 1000/5A, 50 Hz current transformer has a single turn. Its secondary burden consists of a non – inductor impedance of 1.5 Ω. If the iron loss in the core is 1.5 W at full load and magnetizing mmf is 70 AT, calculate the a) flux in the core, b) Ratio error at full load. Neglect leakage reactance.	K3	1	5M
3		Unit-II			
	a	i) Explain with a neat circuit of Dynamometer type Wattmeter and derive the equation for deflection.	K3	2	5M
		ii) List the various types of errors in dynamometer type Wattmeter's.	K3	2	5M
		OR			
	b	i) Explain the working of Crompton Potentiometer with a neat diagram.	K3	2	10M

4	Unit-III				
	a	i) Explain the procedure of measuring a low resistance with the help of Kelvin's double bridge. Derive the necessary relation for finding the unknown resistance under balanced condition of the bridge.	K3	3	10M
	OR				
	b	i) Explain with a neat diagram for the measurement of Inductance using Hay bridge and also derive the relation for inductance under balanced condition using a neat phasor diagram.	K3	3	5M
		ii) Draw the Schearing's bridge and discuss the measurement of unknown capacitance.	K3	3	5M
5	Unit-IV				
	a	i) Derive the expression for gauge factor of a strain gauge. Also, explain about the thermocouples.	K3	4	5M
		ii) Describe the operation of Piezo-electric transducer with neat sketches	K3	4	5M
	OR				
	b	I) Explain the working principle of capcity transducer	K3	4	10M
6	Unit-V				
	a	i) Explain the working of Digital frequency meter with a neat block diagram.	K3	5	10M
	OR				
	b	i) Explain the working of Digital Tachometer with a neat block diagram.	K3	5	5M
		ii) Explain about Lissajious patterns in Cathode Ray Oscilloscope.	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23ME3201 **HEAT TRANSFER**

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	What are the three basic laws of heat transfer?	2	1	2M
	b	What is a fin? What are the applications of fins?	1	1	2M
	c	Define Biot number and Fourier number.	1	2	2M
	d	Explain the term dimensional homogeneity.	2	2	2M
	e	Differentiate between free and forced convection.	3	3	2M
	f	Draw thermal boundary layer for pipe flows.	3	3	2M
	g	Explain briefly the physical mechanism of boiling.	2	4	2M
	h	What is AMTD (Arithmetic mean temperature difference)? How is it different from LMTD?	2	4	2M
	i	Define emissive power and emissivity.	1	5	2M
	j	What do you understand from shape factor?	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)Derive the general conduction equation for 1D, steady state heat conduction through the slab.	3	1	4M
		ii) Aluminum fins of rectangular profile are attached on a plane wall with 5 mm spacing. The fins have thickness 1 mm and length 10mm and the k=200 W/mK. The wall is maintained at a temp of 200°C and the fins dissipate heat by convection in to the ambient air at 40°C with h=50 W/m^{2}K. Determine the heat loss and fin efficiency.	4	1	6M
		OR			
	b	i)Explain the concept of critical radius on insulation.	2	1	4M
		ii)A hollow sphere of 10 cm ID and 30 cm OD of a material having thermal conductivity 50 W/mK is used as a container for a liquid chemical mixture. Its inner and outer surface temperatures are 300°C and 100°C respectively. Determine heat flow rate through the sphere. Also estimate the temperature at a point a quarter of the way between the inner and outer surfaces.	4	1	6M
3		Unit-II			
	a	i) What are different non dimensional numbers? Write their significance.	1	2	5M
		ii)A 60 mm thick large steel plate (k=42.6 W/m°C, α=0.043 m^2/h) initially at 440°C is suddenly exposed on both sides to an environment with h=235 W/m^{2o}C	5	2	5M

		and temperature 50°C. Determine the center line temperature and temperature inside the plate 15 mm from the mid plane after 4.3 minute.			
		OR			
	b	i)Apply dimensional analysis for forced convection and derive a correlation for the Nusselt number. Such that N_u=f(Re, Pr)	3	2	10M
4		Unit-III			
	a	i)What is thermal boundary layer? Draw thermal and velocity boundary layer over a flat vertical plate.	3	3	5M
		ii)Find the convective heat loss from a radiator 0.6 m wide and 1.2 m high maintained at a temperature of 90°C in a room at 14°C. Consider the radiator a vertical plate.	5	3	5M
		OR			
	b	Atmospheric air at 275 K and free stream velocity 20 m/s flows over a 1.5 m long flat plate maintained at 325 K. Calculate the (a) average heat transfer coefficient over entire length of laminar boundary (b) average heat transfer coefficient over entire length of 1.5 m (c) Total heat transfer rate from the plate to the air over 1.5 m length and 1 m wide. Assume transition occurs at Reynolds number $2x10^5$.	5	3	10M
5		Unit-IV			
	a	i)Explain the Nusselt's theory of film condensation on a vertical plate.	3	4	5M
		ii) Classify heat exchangers.	2	4	5M
		OR			
	b	i)In a food processing plant a brine solution is heated from 6°C to 12°C in a double-pipe heat exchanger by water entering at 50°C and leaving at 40°C at the rate of 0.166 kg/s. If the overall heat transfer coefficient is 850 W/m^2 °C, what heat exchanger area is required for (a) parallel flow and (b) counter flow?	3	4	10M
6		Unit-V			
	a	i) Define shape factor. Calculate the shape factor of a cylindrical cavity of length L and diameter D with respect to itself. Assume cavity is perfectly insulated.	1	5	5M
		ii) Explain three laws of black body radiation.	2	5	5M
		OR			
	b	i) Write briefly about Irradiation and Monochromatic emissive power.	2	5	3M
		ii)Two circular discs of diameter 20 cm each are placed 2 m apart. Calculate the radiant exchange for these plates, if these are maintained at 800 and 300°C respectively and their corresponding emissivities are 0.3 and 0.5.	4	5	7M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23AM3202 **DEEP LEARNING**

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	Define the McCulloch–Pitts neuron model.	1	1	2M
	b	Describe the concept of linear separability in classification problems.	2	1	2M
	c	Summarize the concept of feedforward neural networks used in deep learning models.	2	2	2M
	d	Interpret the role of regularization techniques in controlling model complexity.	2	2	2M
	e	Define the saddle point problem in neural network training.	1	3	2M
	f	Interpret the role of batch normalization in stabilizing neural network training.	2	3	2M
	g	Outline the process of Backpropagation Through Time (BPTT) used for training recurrent neural networks.	2	4	2M
	h	Compare LeNet and AlexNet architectures in terms of depth and performance.	2	4	2M
	i	Summarize the concept of Variational Autoencoders (VAEs) used in generative modeling.	2	5	2M
	j	Interpret the role of attention mechanisms in Transformer-based models.	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) Explain the structure and functioning of a biological neuron and relate it to an artificial neuron model.	2	1	5M
		ii) Explain how weights and bias influence the output of a perceptron model.	2	1	5M
		OR			
	b	i) Apply the Perceptron Learning Algorithm to update weights for a simple binary classification dataset.	3	1	5M
		ii) Apply the convergence theorem concept to determine whether the perceptron algorithm will converge for a given dataset.	3	1	5M
3		Unit-II			
	a	i) Demonstrate how gradient descent can be applied to minimize a loss function in neural network training.	3	2	5M
		ii) Compare feedforward neural networks and deep neural networks in terms of learning capability and complexity.	4	2	5M
		OR			

	b	i) Demonstrate how an autoencoder can be used to learn compressed representations of input data.	3	2	5M
		ii) Differentiate overfitting and underfitting in neural network models and relate them to regularization techniques.	4	2	5M
4	Unit-III				
	a	i) Explain the role of optimization algorithms in improving neural network training performance.	2	3	5M
		ii) Analyze the role of batch normalization in stabilizing and accelerating neural network training.	4	3	5M
	OR				
	b	i) Describe the functioning of the RMSProp optimizer in gradient-based learning.	2	3	5M
		ii) Compare different regularization techniques used for improving neural network performance.	4	3	5M
5	Unit-IV				
	a	i) Differentiate Long Short-Term Memory (LSTM) networks and Gated Recurrent Units (GRUs) based on their architecture and gating mechanisms.	4	4	5M
		ii) Evaluate the impact of bidirectional architectures in improving sequence learning models.	5	4	5M
	OR				
	b	i) Examine the structure and functioning of Restricted Boltzmann Machines (RBMs) in generative modeling.	4	4	5M
		ii) Assess the role of Gibbs Sampling in training probabilistic generative models.	5	4	5M
6	Unit-V				
	a	i) Explain the architecture of Transformer models used in modern deep learning systems.	2	5	5M
		ii) Apply GPT-based models for sentiment analysis in natural language processing.	3	5	5M
	OR				
	b	i) Apply deep learning models to develop a speech recognition system for voice-based applications (Greedy – Layerwise training)	3	5	10M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23AM3221 **BIG DATA ANALYTICS**

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	Write a simple example of a generic class in Java.	3	1	2M
	b	What is Serialization in Java?	2	1	2M
	c	List the main XML configuration files used in Hadoop.	3	2	2M
	d	Define Big Data and explain the need for distributed storage systems	2	2	2M
	e	What is the role of Mapper in Hadoop MapReduce?	2	3	2M
	f	Write the basic structure of a MapReduce Driver program.	3	3	2M
	g	Explain the purpose of filtering streams in stream processing.	2	4	2M
	h	Define Stream Computing and its importance in Big Data processing.	2	4	2M
	i	List the components of Pig Architecture	2	5	2M
	j	Identify two Hive data types used for storing data.	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 Wrapper Classes in Java and describe their role in converting primitive types to objects.	2	1	5M
		ii)Analyze the differences between primitive data types and wrapper classes in Java.	4	1	5M
		OR			
	b	i)Write a Java program to implement Stack operations using the Stack class.	3	1	5M
		ii)Explain the concept of Sets and Maps in Java with examples.	2	1	5M
3		Unit-II			
	a	i)Demonstrate the process of configuring Hadoop in Pseudo-distributed mode.	3	2	5M
		ii)Explain how Hadoop clusters support large-scale data processing.	3	2	5M
		OR			
	b	i)Describe the functions of Secondary NameNode, Job Tracker, and Task Tracker.	2	2	5M
		ii)Analyze the differences between GFS and HDFS in terms of architecture and performance.	4	2	5M

4	Unit-III				
	a	i)Explain how MapReduce processes large datasets step-by-step.	3	3	5M
		ii) Analyze the differences between the old Hadoop MapReduce API and the new Hadoop MapReduce API	4	3	5M
	OR				
	b	i)Write a basic Hadoop MapReduce program showing Driver, Mapper, and Reducer classes.	3	3	5M
		ii)Demonstrate how a Combiner improves MapReduce performance with an example.	3	3	5M
5	Unit-IV				
	a	i)Demonstrate different RDD operations such as map, filter, and reduce with examples.	3	4	5M
		ii)Explain how filtering operations are applied to data streams with an example.	3	4	5M
	OR				
	b	i)Analyze the advantages of Spark over traditional Hadoop MapReduce.	4	4	5M
		ii)Demonstrate how sampling can be applied to a data stream using a simple example.	3	4	5M
6	Unit-V				
	a	i)Describe different Pig Script Interfaces used for executing Pig programs.	2	5	5M
		ii)Write Hive queries to perform aggregation operations such as COUNT and SUM.	3	5	5M
	OR				
	b	i)Demonstrate Hive Data Manipulation Language (DML) operations with examples.	3	5	5M
		ii)Explain the differences between Local mode and Distributed mode of running Pig scripts.	4	5	5M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3203 **CLOUD COMPUTING**

Time: 3 hours (CSE, IT, 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 cloud computing and list its key characteristics.	1	1	2M
	b	What are IaaS, PaaS, and SaaS? Give one example each.	1	1	2M
	c	What is parallel computing?	1	2	2M
	d	Define distributed computing	2	2	2M
	e	What is virtualization?	1	3	2M
	f	List any two container platforms.	1	3	2M
	g	What is cloud interoperability?	1	4	2M
	h	Define the layers cloud security architecture.	2	4	2M
	i	What is serverless computing?	1	5	2M
	j	What is edge computing?	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 cloud computing reference model with a neat diagram.	2	1	5M
		ii) Compare major cloud service providers such as AWS, Azure, and Google App Engine	4	1	5M
		OR			
	b	i) Describe cloud deployment models: public, private, and hybrid	4	1	10M
3		Unit-II			
	a	i) Explain the elements of parallel computing and classify hardware architectures (SISD, SIMD, MISD, MIMD)	2	2	10M
		OR			
	b	i) Analyze Service-Oriented Architecture (SOA) and its role in distributed systems.	4	2	5M
		ii) Differentiate between Web services and RPC with suitable examples.	2	2	5M
4		Unit-III			
	a	i) Explain virtualization and classify different virtualization techniques.	2	3	5M
		ii) Analyze the advantages and disadvantages of virtualization in cloud environments	4	3	5M
		OR			
	b	i) Explain the architecture and building blocks of containers.	2	3	5M
		ii) Evaluate Docker and Docker Swarm for container orchestration.	5	3	5M

5	Unit-IV				
	a	i) Explain cloud interoperability and standards with examples.	2	4	5M
		ii) Analyze scalability and fault tolerance mechanisms in cloud computing.	4	4	5M
	OR				
	b	i) Explain cloud security architecture and shared responsibility model.	2	4	5M
		ii) Evaluate federated clouds and green cloud computing architectures.	5	4	5M
6	Unit-V				
	a	i) Explain serverless computing architecture with suitable examples.	2	5	5M
		ii) Explain in detail about IoT applications	4	5	5M
	OR				
	b	i) Explain cloud-centric IoT architecture and its layers.	2	5	5M
		ii) Evaluate edge computing and fog computing with respect to latency and efficiency.	5	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3210 **GENERATIVE AI**

Time: 3 hours (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	Differentiate Generative Models and Discriminative Models with one example.	2	1	2M
	B	Illustrate how generative AI supports synthetic data generation.	2	1	2M
	C	Differentiate the Encoder and Decoder components in a Transformer model.	2	2	2M
	D	Summarize the concept of multimodal large language models.	2	2	2M
	E	Outline the basic idea of transformer-based image generation models.	2	3	2M
	F	Compare DALL-E models and diffusion-based image generation models.	2	3	2M
	G	Describe how CycleGAN can be used to generate paintings from photographs.	2	4	2M
	H	Describe the roles of actor and critic components in Actor–Critic models.	2	4	2M
	i	Explain the role of GPT4All in running large language models locally.	2	5	2M
	j	Describe the role of LangChain in building applications using large language models.	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) Demonstrate how a GAN model can be used to generate realistic human face images.	3	1	5M
		ii) Apply an autoregressive model to generate the next word in a sentence sequence.	3	1	5M
		OR			
	b	i) Apply GAN architecture to improve image quality in low-resolution datasets.	3	1	5M
		ii) Demonstrate how diffusion models can be applied to image restoration tasks.	3	1	5M
3		Unit-II			
	a	i) Summarize the role of attention mechanisms in capturing contextual relationships in language models.	2	2	5M
		ii) Apply the BERT model to perform a text classification task such as sentiment analysis.	3	2	5M
		OR			
	b	i) Discuss the challenges associated with hallucination in LLM systems and summarize possible mitigation approaches.	2	2	5M
		ii) Apply prompt design techniques to generate structured outputs such as tables or summaries from an LLM.	3	2	5M

4	Unit-III				
	a	i) Describe the architecture of Variational Autoencoders (VAEs) and explain how they generate images.	2	3	5M
		ii) Analyze how Vision Transformers (ViT) process image patches to learn visual representations.	4	3	5M
	OR				
	b	i) Describe the major challenges associated with image generation models such as stability issues and mode collapse.	2	3	5M
		ii) Analyze the relationship between CLIP and text-to-image models such as DALL-E.	4	3	5M
5	Unit-IV				
	a	i) Compare the role of convolutional neural networks in neural style transfer with GAN-based painting generation models.	4	4	5M
		ii) Evaluate the suitability of Recurrent Neural Networks (RNNs) for music generation tasks.	5	4	5M
	OR				
	B	i) Break down the working mechanism of the Deep Q-Learning algorithm in learning optimal actions.	4	4	5M
		ii) Evaluate the effectiveness of autonomous agents trained using reinforcement learning for complex environments.	5	4	5M
6	Unit-V				
	A	i) Apply transfer learning techniques to fine-tune a pretrained generative model for a domain-specific text generation task.	3	5	5M
		ii) Compare the capabilities of open-source language models such as LLaMA with proprietary language models.	4	5	5M
	OR				
	B	i) Demonstrate how Google Copilot can assist developers in writing AI-related code.	3	5	5M
		ii) Recommend appropriate open-source tools and frameworks fo2r training, fine-tuning, and deploying generative AI models.	5	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CE3202 **HIGHWAY ENGINEERING**

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 highway planning and list the objectives of highway development in India.	K1	1	2M
	b	Classify the different types of roads in India and outline the major road network patterns used in highway planning.	K2	1	2M
	c	State the importance of geometric design in highway engineering.	K1	2	2M
	d	Summarize the elements of highway cross section used in road design.	K2	2	2M
	e	Define traffic volume and identify its units of measurement.	K1	3	2M
	f	Outline the concept of Level of Service (LOS) in traffic engineering.	K2	3	2M
	g	List the desirable properties of road aggregates used in highways.	K1	4	2M
	h	Summarize the significance of California Bearing Ratio in pavement design.	K2	4	2M
	i	Define flexible pavement and rigid pavement.	K1	5	2M
	j	Outline the functions of different layers in pavement structure.	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	Elucidate the necessity for highway planning and enumerate the features of various road development plans in India.	K2	1	10M
		OR			
	b	Illustrate the factors affecting highway alignment and elaborate the stages involved in engineering surveys for highway location.	K2	1	10M
3		Unit-II			
	a	A two-lane highway is designed for a speed of 80 km/h. The perception–reaction time is 2.5 s and coefficient of friction is 0.35. Determine the Stopping Sight Distance on a level road.	K3	2	10M
		OR			
	b	A circular horizontal curve has a radius of 250 m and the design speed of vehicles is 80 km/h. The maximum superelevation is limited to 7%. Determine the required superelevation and extra widening for the curve.	K3	2	10M
4		Unit-III			
	a	Enumerate the various traffic studies carried out in traffic engineering and elucidate their importance in highway planning.	K2	3	10M

		OR			
	b	Illustrate the causes of road accidents and elaborate the preventive measures adopted to improve road safety.	K2	3	10M
5		Unit-IV			
	a	Elucidate the classification of subgrade soils and enumerate the tests used to determine subgrade soil strength.	K2	4	10M
		OR			
	b	Illustrate the properties of bituminous materials and elaborate the laboratory tests conducted on bitumen.	K2	4	10M
6		Unit-V			
	a	Elucidate the design factors involved in flexible pavement design and enumerate the different methods used for flexible pavement design.	K2	5	10M
		O5			
	b	Illustrate the design considerations of rigid pavements and elaborate the different types of stresses developed in cement concrete pavements.	K2	5	10M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CY3202 CRYPTOGRAPHY & NETWORK SECURITY

Time: 3 hours (CYS) 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 security attack	1	1	2M
	b	List the limitations of steganography	1	1	2M
	c	Define the terms Ring and Group	1	2	2M
	d	What is Eulers Totient function? Find it for 37 and 21.	1	2	2M
	e	What are the different modes of operation in DES?	1	3	2M
	f	What is an avalanche effect?	1	3	2M
	g	What is message authentication?	1	4	2M
	h	What is meant by one-way property in hash function?	1	4	2M
	i	What are the requirements of web security?	1	5	2M
	j	List the transfer encodings used by S/MIME.	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) Encrypt the following using play fair cipher using the keyword MONARCHY . " SWARAJ IS MY BIRTH RIGHT". Use X as blank space	3	1	10M
		OR			
	b	i) Explain the model for network security	2	1	5M
		ii) Describe the various security mechanisms	2	1	5M
3		Unit-II			
	a	i) Find GCD using Euler's Theorem. Find GCD of 1070and 1066 using Euclid algorithm.	3	2	5M
		ii) Use discrete logarithm properties to solve the following equation x5=11 mod 17. Using quadratic residues solve x2=5 mod 11.	3	2	5M
		OR			
	b	i) State and Describe Fermat's theorem	2	2	5M
		ii) Explain the chinese remainder theorem in detail	3	2	5M
4		Unit-III			
	a	i)Explain the detailed description of key generation and encryption of IDEA algorithm	2	3	5M
		ii) Explain various substitution and permutation operations used in AES algorithm	2	3	5M
		OR			

	b	i) Users A and B use the Diffie Hellman key exchange technique, a common prime q=11 and a primitive root alpha=7. (a) What is the shared secret key? Also write the algorithm. (b) How man in middle attack can be performed in Diffie Hellman Algorithm	3	3	10M
5	Unit-IV				
	a	i) Give the structure of SHA-512 compression function. Explain the structure of each round.	2	4	5M
		ii) Explain the requirements of cryptographic hash functions?	2	4	5M
	OR				
	b	i) Explain the usage of digital signature algorithm (DSA) to perform signing and verifying operations	2	4	10M
6	Unit-V				
	a	i) Briefly explain IP Authentication Header with neat diagram	2	5	5M
		ii) How are security associations combined? Explain	2	5	5M
	OR				
	b	i) How does PGP provide authentication and confidentiality for email services and for file transfer applications?	2	5	5M
		ii) Analyze the Cryptographic algorithms used in S/MIME and Explain S/MIME certification processing.	4	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EC3202 MICRO PROCESSORS & MICRO CONTROLLERS

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 microcontroller.	1	1	2M
	b	What is Von Neumann architecture?	2	1	2M
	c	What is flag register? Mention any two flags.	1	2	2M
	d	Define instruction cycle.	2	2	2M
	e	What is an assembler?	1	3	2M
	f	Define memory-mapped I/O.	2	3	2M
	g	What is the function of ALE signal in 8086?	2	4	2M
	h	What is stack pointer in 8051?	1	4	2M
	i	What is bit-banding in ARM?	2	5	2M
	j	Define RISC architecture.	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) Discuss instruction queue and pipelining in 8086.	2	1	5M
		ii) Summarize the evolution of microprocessors from 8086 to modern processors.	2	1	5M
		OR			
	b	i) Describe the segmentation concept in 8086 and its advantages.	2	1	5M
		ii) Illustrate the register organization of 8086 and state their functions.	3	1	5M
3		Unit-II			
	a	i) Classify different types of interrupts in 8086.	3	2	5M
		ii)Write an ALP to reverse an array of numbers.	3	2	5M
		OR			
	b	i) Demonstrate assembler directives with suitable examples.	2	2	5M
		ii) Write an ALP to multiply two 8-bit numbers using 8086.	3	2	5M
4		Unit-III			
	a	i) Explain architecture and working of 8237 DMA controller.	3	3	5M
		ii) Interfacing D/A converter with 8086.	2	3	5M

		OR			
	b	i) Discuss the need and working of 8259 interrupt controller.	3	3	5M
		ii) Outline the operation of USART (8251).	2	3	5M
5		Unit-IV			
	a	i) Describe I/O ports of 8051 and their functions.	2	4	5M
		ii) Explain serial communication in 8051.	2	4	5M
		OR			
	b	i) Explain interrupt structure of 8051.	2	4	5M
		ii) Write an ALP to interface LCD with 8051.	3	4	5M
6		Unit-V			
	a	i) Explain ARM architecture features and advantages over CISC.	2	5	5M
		ii) Describe ARM instruction set and addressing modes.	3	5	5M
		OR			
	b	i) Explain stack and subroutine concept in ARM Cortex-M3.	2	5	5M
		ii) Write an ARM program to perform addition of two numbers.	3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EE3203 **POWER SYSTEM ANALYSIS**

Time: 3 hours (EEE) Max. Marks: 70

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

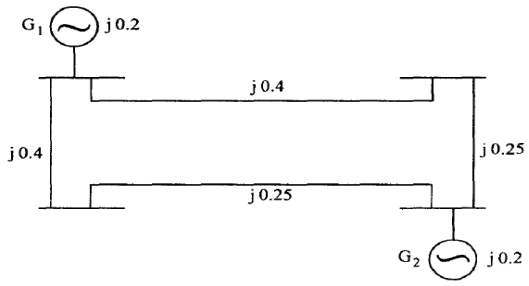
PART-A

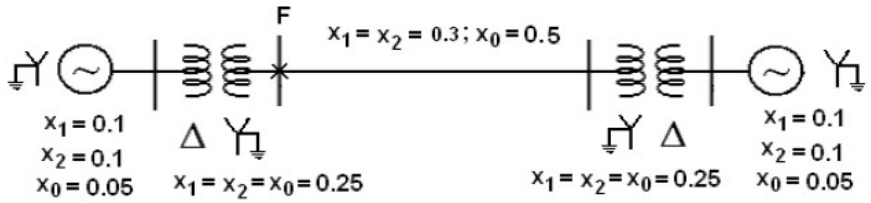
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define node and branch	K1	1	2M
	b	List advantages of per unit representation	K1	1	2M
	c	Why do we go for iterative methods to solve load flow problems?	K1	2	2M
	d	State the advantages of Newton Raphson method	K1	2	2M
	e	What are the properties of Zbus matrix	K1	3	2M
	f	What is subtransient reactance?	K1	3	2M
	g	What is the significance of symmetrical components?	K1	4	2M
	h	How are the faults classified?	K1	4	2M
	i	Define steady state stability limit and transient stability limit?	K1	5	2M
	j	Define critical clearing angle and critical clearing time	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) Define the following and explain with suitable examples. (A) Oriented graph. (B) Tree. (C) Link. (D) Loop. (E) Cut set	K1	1	5M
		ii) Form the Y_{BUS} by using singular transformation for the network shown in Figure. 	K2	1	5M
		OR			
	b	i) Define per unit system? Write the expressions for per unit values of Voltage and KVA	K1	1	10M

3		Unit-II			
	a	i) (i)Write step by step algorithm of Gauss-Seidel method for load flow solution including PV buses	K2	2	10M
		OR			
	b	i) Explain the assumptions consider for decoupled method and fast decoupled method.	K3	2	10M
4		Unit-III			
	a	i) Write an algorithm for the Modification of Zbus Matrix for different cases.	K3	3	10M
		OR			
	b	i) Derive the expression for short circuit current in a synchronous generator	K3	3	10M
5		Unit-IV			
	a	i) What are symmetrical components? Explain the symmetrical component transformation	K2	4	5M
		ii) What is meant by sequence impedance? Explain the sequence network of an unloaded generator.	K2	4	5M
		OR			
	b	i) Derive an expression for the fault current for a line-to-line fault at an unloaded generator	K2	4	5M
		ii) For the system shown in figure. A LLG fault occurs at point F. Find fault current.  	K2	4	5M
6		Unit-V			
	a	i) Derive the swing equation for a single machine connected to infinite bus system. State the assumptions if any and state the usefulness of this equation. Neglect the damping.	K2	5	5M
		ii) A two pole, three phase, 50 MVA, 11 kV generator is supplying rated power at 0.8 lagging power factor to an 11 kV bus. Due to a fault the generator output is reduced to 40%. Compute: (A) acceleration power and (B) acceleration at the time of fault. Assume that the KE stored in the moving parts of the generator is 175 MJ.	K2	5	5M
		OR			
	b	i)How do you explain equal area criterion for determining the stability of the system for sudden change in mechanical input?	K2	5	5M
		ii) Discuss the various factors affecting the transient stability of the system	K2	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23ME3202 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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 Intelligent Agent.	K1	CO1	2M
	b	What is the concept of rationality in AI?	K2	CO1	2M
	c	What is over fitting and under fitting in Machine Learning?	K2	CO2	2M
	d	Differentiate between linear regression and logistic regression.	K2	CO2	2M
	e	What is K-means clustering?	K1	CO3	2M
	f	Explain Naïve Bayes Classifier.	K2	CO3	2M
	g	What is a Perceptron?	K1	CO4	2M
	h	Define Recurrent Neural Network (RNN).	K1	CO4	2M
	i	What are Ensemble Methods in Machine Learning?	K2	CO5	2M
	j	Mention any two applications of Deep Generative Models.	K2	CO5	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 of Intelligent Agents with a neat diagram.	K2	1	5M
		ii) Discuss Knowledge-based agents and Inference in First-Order Logic.	K3	1	5M
		OR			
	b	i) Explain different types of environments in AI with suitable examples.	K2	1	5M
		ii) Discuss the patterns in propositional logic	K3	1	5M
3		Unit-II			
	a	i) Explain Linear Regression and Logistic Regression with suitable examples.	K3	2	5M
		ii) Describe the working of Support Vector Machines (SVM) with its advantages and limitations.	K3	2	5M
		OR			
	b	Describe Decision Trees and explain entropy and information gain with examples.	K2	2	10M
4		Unit-III			
	a	i) Explain the K-means clustering algorithm with steps and its limitations.	K2	3	10M
		OR			
	b	i) Explain dimensionality reduction method	K3	3	5M
		ii) Explain Gaussian Naïve Bayes classifier with a suitable example.	K2	3	5M
5		Unit-IV			
	a	i) Explain Multilayer Neural Networks and the Back propagation algorithm with a diagram.	K2	4	5M
		ii) Discuss Genetic Algorithms and how they help in avoiding local optima in neural network training.	K2	4	5M
		OR			
	b	i) Explain gradient descent algorithm and its variants (Batch, Stochastic, Mini-batch).	K2	4	5M

		ii) Describe Convolutional Neural Networks (CNNs) and their applications.	K3	4	5M
6	Unit-V				
	a	i) Explain Deep Auto-encoders and Deep Boltzmann Machines with their applications.	K3	5	5M
		ii) Describe Bagging and Boosting techniques. Compare them with Random Forests.	K3	5	5M
	OR				
	b	i) Explain evaluation procedures of ML.	K3	5	5M
		ii) Compare Boosting and Stacking with suitable examples.	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3206 **MACHINE LEARNING**

Time: 3 hours CSE (CSE, IT, 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 Least Mean Squares (LMS) rule	1	1	2M
	b	Differentiate Supervised Learning and unsupervised learning	1	1	2M
	c	Define K-Nearest Neighbor Classifier.	1	2	2M
	d	How is proximity between binary patterns measured?	1	2	2M
	e	What type of problems are best suited for decision tree learning?	1	3	2M
	f	What is Linearly Non-Separable Case?	1	3	2M
	g	Compare Linear SVM, non-linear SVM.	1	4	2M
	h	What are the Hard and soft margins? Give examples.	1	4	2M
	i	What is EM-Based Clustering?	1	5	2M
	j	Distinguish between classification and Clustering.	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 the Stages in Machine Learning.	2	1	5M
		ii) Explain various learning techniques involved in supervised learning.	2	1	5M
		OR			
	b	i) What do you mean by a well –posed learning problem? Explain the important features that are required to well –define a learning problem.	2	1	5M
		ii) Explain the various Data Acquisition approaches with suitable examples.	2	1	5M
3		Unit-II			
	a	i) Explain different Distance Measures used in ML.	2	2	5M
		ii) Explain Radius Distance Nearest Neighbor Algorithm.	2	2	5M
		OR			
	b	i) Explain about linear regression and derive the Individual error & Minimization functions.	2	2	5M
		ii) Explain CART (Classification and Regression tree) algorithm with example.	2	2	5M

<table>
<tr><td rowspan="11">4</td><td colspan="6">Unit-III</td></tr>
<tr><td rowspan="2">a</td><td>i)</td><td>Explain about Naïve Bayes algorithm for continuous attributes with examples.</td><td>2</td><td>3</td><td>5M</td></tr>
<tr><td>ii)</td><td>Consider the training dataset given in the following table. Use Weighted k-NN and determine the class. Test instance (7.6, 60, 8) and K=3.
<table>
<tr><th>S.No.</th><th>CGPA</th><th>Assessment</th><th>Project Submitted</th><th>Result</th></tr>
<tr><td>1</td><td>9.2</td><td>85</td><td>8</td><td>Pass</td></tr>
<tr><td>2</td><td>8</td><td>80</td><td>7</td><td>Pass</td></tr>
<tr><td>3</td><td>8.5</td><td>81</td><td>8</td><td>Pass</td></tr>
<tr><td>4</td><td>6</td><td>45</td><td>5</td><td>Fail</td></tr>
<tr><td>5</td><td>6.5</td><td>50</td><td>4</td><td>Fail</td></tr>
<tr><td>6</td><td>8.2</td><td>72</td><td>7</td><td>Pass</td></tr>
<tr><td>7</td><td>5.8</td><td>38</td><td>5</td><td>Fail</td></tr>
<tr><td>8</td><td>8.9</td><td>91</td><td>9</td><td>Pass</td></tr>
</table></td><td>3</td><td>3</td><td>5M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">b</td><td>i)</td><td>Discuss various impurity measures used in Decision Trees.</td><td>2</td><td>3</td><td>5M</td></tr>
<tr><td>ii)</td><td>What is Bias–Variance Trade-off? Explain with illustration.</td><td>2</td><td>3</td><td>5M</td></tr>
<tr><td rowspan="5">5</td><td colspan="6">Unit-IV</td></tr>
<tr><td rowspan="2">a</td><td>i)</td><td>Explain Linear Discriminants for classification with example equation.</td><td>2</td><td>4</td><td>5M</td></tr>
<tr><td>ii)</td><td>What is Multi-Layer Perceptron? Explain structure and working of it.</td><td>2</td><td>4</td><td>5M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">b</td><td>i)</td><td>Explain Backpropagation algorithm for training an MLP.</td><td>2</td><td>4</td><td>5M</td></tr>
<tr><td>ii)</td><td>Provide a comparative description of Perceptron, SVM and Logistic Regression.</td><td>2</td><td>4</td><td>5M</td></tr>
<tr><td rowspan="5">6</td><td colspan="6">Unit-V</td></tr>
<tr><td rowspan="2">a</td><td>i)</td><td>Explain about Hierarchical clustering algorithm.</td><td>2</td><td>5</td><td>5M</td></tr>
<tr><td>ii)</td><td>What is Rough K-Means Clustering? Explain with algorithm.</td><td>2</td><td>5</td><td>5M</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">b</td><td>i)</td><td>Describe the Matrix Factorisation with an example.</td><td>2</td><td>5</td><td>5M</td></tr>
<tr><td>ii)</td><td>Cluster the following set of data using k-means algorithm with initial value of objects 2 and 5 with the coordinate values (4,6) and (12,4) as initial seeds.
<table>
<tr><th>Objects</th><th>X-coordinate</th><th>Y-coordinate</th></tr>
<tr><td>1</td><td>2</td><td>4</td></tr>
<tr><td>2</td><td>4</td><td>6</td></tr>
<tr><td>3</td><td>6</td><td>8</td></tr>
<tr><td>4</td><td>10</td><td>4</td></tr>
<tr><td>5</td><td>12</td><td>4</td></tr>
</table></td><td>3</td><td>5</td><td>5M</td></tr>
</table>

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3211 **DATA VISUALIZATION**

Time: 3 hours (CSE (AIML), AI, 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	What are Gestalt principles?	2	1	2M
	b	Mention any two applications of visualization.	2	1	2M
	c	What is visual mapping	2	2	2M
	d	What is meant by interactive visualization?	2	2	2M
	e	Define multi-dimensional data.	2	3	2M
	f	What are misleading visualizations	2	3	2M
	g	Define network visualization.	2	4	2M
	h	What is metaphorical visualization?	2	4	2M
	i	What is volumetric data visualization?	2	5	2M
	j	Define vector field visualization.	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 various Gestalt principles with examples.	3	1	5M
		ii) Discuss challenges in designing perception-based visualization systems.	3	1	5M
		OR			
	b	i) Analyze the impact of information overload on visualization systems.	4	1	5M
		ii) Describe the visualization process in detail.	3	1	5M
3		Unit-II			
	a	i) Discuss principles for designing effective visualization applications.	3	2	5M
		ii) Compare static vs interactive visualization systems.	4	2	5M
		OR			
	b	Discuss the concept of visual mapping and its importance.	3	2	10M
4		Unit-III			
	a	i)Discuss challenges in visualizing multi dimensional data.	4	3	10M
		OR			
	b	i) Evaluate effectiveness of different visualization systems	3	3	10M
5		Unit-IV			
	a	i) Explain cluster visualization and its importance in data analysis.	3	4	5M
		ii) Describe visualization techniques for networks.	3	4	5M

		OR			
	b	i) Discuss metaphorical visualization with examples.	3	4	5M
		ii) Compare tree, graph, and network visualization methods	4	4	5M
6		Unit-V			
	a	i)Explain methods for evaluating visualization systems.	3	5	5M
		ii) Discuss perception-based visualization techniques.	3	5	5M
		OR			
	b	i) Analyze recent trends in visualization techniques	4	5	5M
		ii) Explain data structures used in visualization systems.	3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CE3203 **ENVIRONMENTAL ENGINEERING**

Time: 3 hours 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 per capita water demand	K1	1	2M
	b	List methods of population forecasting.	K1	1	2M
	c	Define potable water.	K2	2	2M
	d	List types of water distribution systems.	K2	2	2M
	e	Define coagulation in water treatment.	K3	3	2M
	f	Define sedimentation.	K3	3	2M
	g	Define sewage.	K4	4	2M
	h	What is self-cleansing velocity?	K4	4	2M
	i	Define activated sludge process.	K4	4	2M
	j	Define oxygen sag curve.	K4	4	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 factors affecting per capita demand of water	K2	1	5M
		ii) Estimate population using arithmetic increase method	K3	1	5M
		OR			
	b	i) Explain types of water demand and their variations. *(K2, CO1, 5M)*	K2	1	5M
		ii)Describe sources of water and compare surface and groundwater sources	K3	1	5M
3		Unit-II			
	a	i) Explain physical, chemical and biological characteristics of water.	K2	2	5M
		ii) Explain layouts of water distribution systems with neat sketches	K3	2	5M
		OR			
	b	i) Explain pipe appurtenances in water supply system.	K2	2	5M
		ii)Explain Hardy Cross method for pipe network analysis	K3	2	5M
4		Unit-III			
	a	i) Explain unit operations and processes in water treatment.	K4	3	5M
		ii) Calculate settling velocity of particle using Stoke's law (assume suitable data)	K3	3	5M

		OR			
	b	i) Explain chlorination and its types.	K4	3	5M
		ii) Compare slow sand filter and rapid sand filter.	K4	3	5M
5		Unit-IV			
	a	i) Explain components and working of septic tank with neat sketch	K3	4	5M
		ii) Explain methods of sewage disposal.	K3	4	5M
		OR			
	b	i) Explain hydraulics of flow in sewers.	K2	4	5M
		ii) ii) Explain plumbing systems in buildings with neat sketch.	K3	4	5M
6		Unit-V			
	a	i) Explain Activated Sludge Process with flow diagram.	K3	5	5M
		ii) Explain self-purification of rivers and oxygen sag curve.	K3	5	5M
		OR			
	b	i) Explain waste stabilization ponds and their classification.	K2	5	5M
		ii) Discuss environmental impacts of sewage disposal methods.	K2	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EC3203 **DIGITAL SIGNAL PROCESSING**

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 stable and causal systems	1	1	2M
	b	What are the properties of frequency response of an LTI system	2	1	2M
	c	Define ROC of z-transform	1	2	2M
	d	Compute DFT of $x(n)=\delta(n-n_0)$	4	2	2M
	e	In DIF-FFT, if the sequence length is 64, find the number of complex multiplications and additions?	3	3	2M
	f	Draw the signal flow graph for the IIR system described by the difference equation: y(n)=0.5y(n−1)+x(n)	1	3	2M
	g	Compare IIR filters with FIR filters	1	4	2M
	h	What is window and why it is necessary	2	4	2M
	i	**List** the functional units present in the TMS320C54XX processor?	1	5	2M
	j	What are memory-mapped registers in the TMS320C5x architecture?	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) Determine the frequency response for the system and plot magnitude response and phase response $y(n)+0.25\,y(n-1)=x(n)-x(n-1)$	4	1	5M
		ii) Find system function, impulse response and frequency response of the system described by the difference equation $y(n)-3/4\,y(n-1)+1/8\,y(n-2) = x(n)-x(n-1)$	3	1	5M
		OR			
	b	i) List and prove any three properties discrete time Fourier transforms (DTFT).	2	1	5M
		ii) Calculate the frequency response for the LTI stems $h(n)= (0.9)^n\ (e^{j\pi/2})^n\ u(n)$	3	1	5M
3		Unit-II			
	a	i)State and prove any two properties of z-transform	1	2	5M
		ii) State and prove any two properties of DFT	1	2	5M

		OR			
	b	Find the DFT of the sequence if $x(n)=1 \quad 0\le n\le 3$ $=0 \quad 4\le n\le 7$	3	2	10M
4		Unit-III			
	a	i) Find 8 point DFT of the sequence x(n)={1, 2, 2, 1, 1, 2, 2, 1}using DIT-FFT algorithm	3	3	10M
		OR			
	b	i) List the Structures for FIR Systems and explain any one with example	1	3	5M
		ii) Obtain the cascade realization structure for the IIR system $H(z)=\frac{(1+0.25z^{-1})}{(1+0.5z^{-1})(1+0.5z^{-1}+0.25z^{-2})}$	4	3	5M
5		Unit-IV			
	a	Design an FIR filter of the system that has the frequency response given by $H_d(e^{jw})= e^{-j3w} \quad \frac{-\pi}{4}\le w\le\frac{\pi}{4}$ $=0 \quad \frac{\pi}{4}\le w\le\pi$ Using a rectangular window with N=7.	4	4	10M
		OR			
	b	i) An analog filter has a transfer function $H(s)=\frac{1}{s^2+6s+9}$ Design a digital filter using bilinear transformation method	4	4	5M
		ii) An analog filter has a transfer function $H(s)=\frac{s+3}{s^2+6s+25}$ Design a digital filter equivalent to his using Impulse invariant method for T=1sec.	4	4	5M
6		Unit-V			
	a	i) Explain the classification of instructions of TMS320C5X	3	5	5M
		ii) What is on on- chip memory and how it is different from a memory?	2	5	5M
		OR			
	b	Compare the Architecture of TMS320C5X with 8086 microprocessor	4	5	10M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EE3202 MICROPROCESSORS & MICROCONTROLLERS

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 the role of the Instruction Queue in the 8086 architecture.	2	1	2M
	b	Explain the significance of the "Ready" pin in the 8086 microprocessor hardware interface.	2	1	2M
	c	Identify the machine cycles required for an **I/O Read** operation.	2	2	2M
	d	If the AL register contains 55H, what will be the result in AL after executing XOR AL, FFH?	3	2	2M
	e	Determine the control word for 8255 PPI to set Port A as input, Port B as output, and Port C (Lower) as output in Mode 0.	4	3	2M
	f	Briefly explain the cycle stealing in DMA data transfer.	2	3	2M
	g	How does the 8051 distinguish between internal and external program memory using the $\overline{EA}$ pin?	4	4	2M
	h	Describe the "Register Bank" concept in 8051 and state how many banks are available.	2	4	2M
	i	What is the purpose of the "Literal" field in PIC 18 instructions?	2	5	2M
	j	Distinguish between Harvard and Von Neumann architectures in the context of PIC microcontrollers.	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) Describe how pipelining works in the 8086.	2	1	5M
		ii) An 8086 system has a code segment starting at A000H. Calculate the lower and upper range of the physical addresses for this segment. Also, find the physical address for an offset of 0500H.	3	1	5M
		OR			
	b	i) Analyze the 8086 architecture by explaining the functional parts of the Execution Unit (EU).	2	1	5M
		ii) Discuss the 8086 Interrupt Vector Table (IVT). How many bytes are allocated for each interrupt, and what information do they store?	2	1	5M
3		Unit-II			
	a	i) Write an 8086 assembly program to calculate the sum of a series of ten 16-bit numbers stored in memory starting at offset 2000H. Store the 32-bit result in DX:AX.	4	2	5M
		ii) Explain the following addressing modes with one example each: Based Indexed, Relative Base Indexed, and Register Indirect.	2	2	5M

		OR			
	b	i) Illustrate the timing diagram for a "Memory Write" cycle in 8086 Minimum Mode and explain the status of ALE, $\overline{WR}$ and $DT / \overline{R}$ signals.	4	2	5M
		ii) Differentiate between "Near" and "Far" procedure calls in 8086 assembly language.	2	2	5M
4		Unit-III			
	a	i) Calculate the step angle of a stepper motor if it has 200 steps per revolution. Write a sequence of hex codes to rotate this motor in a clockwise direction using 4-step sequence.	4	3	5M
		ii) Explain the internal architecture of the 8257 DMA Controller and the function of the "Terminal Count" register.	2	3	5M
		OR			
	b	i) Design an interfacing circuit to connect an 8-bit Analog-to-Digital Converter (ADC 0808) with 8086 using 8255.	4	3	5M
		ii) Discuss the "Strobed Input" (Mode 1) operation of 8255 PPI with necessary signal descriptions.	2	3	5M
5		Unit-IV			
	a	i) Write an 8051 assembly program to generate a delay of 10ms using Timer 0 in Mode 1. Assume the crystal frequency is 11.0592 MHz.	4	4	5M
		ii) Explain the Memory Mapping of the 8051 Microcontroller, specifically detailing the Bit-Addressable RAM area.	2	4	5M
		OR			
	b	i) Elaborate on the Power-Down and Idle modes of the 8051. How are they triggered and exited?	2	4	5M
		ii) Describe the structure of the Timer/Counter Control (TCON) and Timer Mode (TMOD) registers in 8051.	2	4	5M
6		Unit-V			
	a	i) Write a program for the PIC 18 to toggle all bits of Port B continuously with a small software delay.	4	5	5M
		ii) Discuss the "Data Conversion" techniques in PIC 18 programming, specifically focusing on Packed BCD to ASCII conversion.	2	5	5M
		OR			
	b	i) Explain the I/O port programming in PIC 18. Describe the role of the TRIS and PORT registers.	2	5	5M
		ii) Analyze the logical operations (AND, OR, EX-OR, NOT) in PIC 18 programming with relevant code snippets.	4	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23ME3203 **FINITE ELEMENT METHODS**

Time: 3 hours (ME) Max. Marks: 70

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

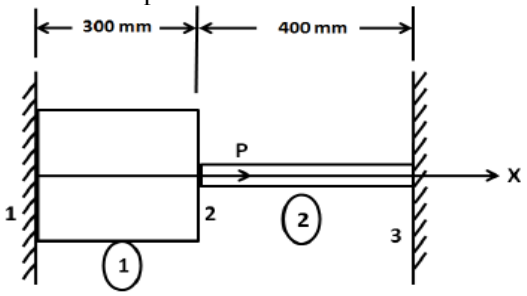
PART-A

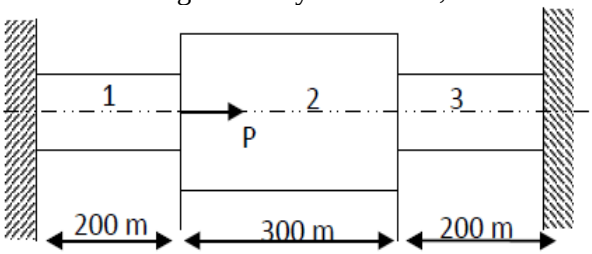
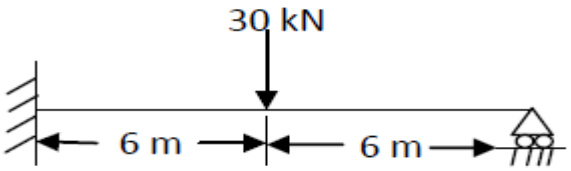
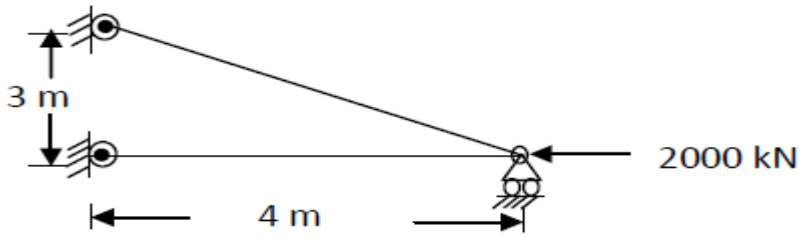
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Indicate the need of finite element analysis	1	1	2M
	b	Define the term weak formulation in FEM	1	1	2M
	c	List out the stiffness matrix properties	1	2	2M
	d	State the assumptions used in the solving the truss problems	1	2	2M
	e	Define 2D vector variable problems.	1	3	2M
	f	List any two elasticity equations.	1	3	2M
	g	Illustrate the purpose of Isoparametric element	1	4	2M
	h	Write the basic equation of heat transfer.	1	4	2M
	i	What is consistent mass matrix?	1	5	2M
	j	What is meant by Eigen Vectors?	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) Discuss the concept of minimum potential energy	2	1	5M
		ii) Draw a typical three-dimensional element and indicate state of internal stresses in their positive senses	3	1	5M
		OR			
	b	i) Discuss stress-strain relations for 2D and 3D elastic problems	2	1	5M
		ii) Explain in detail the finite element modelling of one – dimensional bar element	2	1	5M
3		Unit-II			
	a	Consider the bar element as shown in the Fig. An axial load P = $200x10^3$N is applied as shown. Using the penalty approach for handling boundary conditions do the following: i. Determine the nodal displacements  Fig.1 $A_1 = 2400mm^2$, $A_2 = 600mm^2$, $E_1 = 70\times10^9 N/m^2$, $E_2 = 200\times10^9 N/m^2$	3	2	10 M

		OR			
	b	An axial load P = $200x10^3$ N is applied on a bar shown. Using the penalty approach for handling boundary conditions, determine nodal displacements.  (1) $A_1 = 2400\ mm^2$ $E_1 = 70 \times 10^9\ N/m^2$ (2) $A_2 = 600\ mm^2$ $E_2 = 200x10^9\ N/m^2$	3	2	10 M
4		Unit-III			
	a	Calculate the: (i) deflection under load (ii) shear force and bending moment at mid span and (iii) reactions at supports for the beam shown in figure. Take E = 200 GPa and I= 24 x 10^{-6} m^4. 	3	3	10 M
		OR			
	b	Determine the nodal displacement, element stresses and support reactions for the two-bar truss shown in figure. Take E = 210 GPa and A = 600 mm^2 for each element. 	3	3	10 M
5		Unit-IV			
	a	Determine the shape functions for a constant strain triangular (CST) element.	3	4	10 M
		OR			
	b	Derive the element stiffness matrix for a 4-noded iso-parametric quadrilateral element.	3	4	10 M
6		Unit-V			
	a	A composite slab consists of three materials of different conductivities is 20 W/mk, 30 W/mk and 50 W/mk of thickness 0.3m, 0.15m and 0.15m respectively. The outer surface is 20^0C and the inner surface is exposed to the convective heat transfer coefficient of 25 W/m^2k at 300^0C. Determine the temperature distribution within the wall.	3	5	10 M
		OR			
	b	Discuss the methodology to solve the Eigen value problem for the estimation of natural frequencies of a stepped bar.	2	5	10 M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3209 **DEVOPS**

Time: 3 hours (IT, CSE (AIML), AI, 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	List any four features of DevOps.	1	1	2M
	b	Differentiate between Scrum and Kanban.	1	1	2M
	c	What are the basic components of Junit.	1	2	2M
	d	Write any four commonly used Git commands.	1	2	2M
	e	Why is CI required in DevOps?	1	3	2M
	f	Define Jenkins pipeline.	1	3	2M
	g	What is a Docker Container?	1	4	2M
	h	Discuss about Selenium testing tool.	1	4	2M
	i	What is Configuration Management?	1	5	2M
	j	Define Kubernetes.	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) Draw and explain the phases of SDLC with a neat diagram.	2	1	5M
		ii) Draw and explain the DevOps lifecycle in detail.	2	1	5M
		OR			
	b	i) Discuss the principles and workflow of DevOps.	2	1	5M
		ii) Explain the DevOps delivery pipeline with a suitable example.	2	1	5M
3		Unit-II			
	a	i) Discuss the process of Git installation and configuration.	2	2	5M
		ii) Explain Git branching and merging techniques.	2	2	5M
		OR			
	b	i) Explain how SonarQube performs code quality analysis.	2	2	5M
		ii) Summarize the role of staging in Git version control.	2	2	5M

4		Unit-III			
	a	i) Discuss the importance of Continuous Integration.	2	3	5M
		ii) Explain Build Automation in DevOps.	2	3	5M
		OR			
	b	i) Summarize Jenkins master-slave architecture in detail.	2	3	5M
		ii) Interpret the process of creating and managing builds in Jenkins.	2	3	5M
5		Unit-IV			
	a	i) Discuss publishing Docker images to DockerHub.	3	4	5M
		ii) Analyze how containerization improves deployment efficiency.	4	4	5M
		OR			
	b	i) Describe Docker architecture.	3	4	5M
		ii) Explain Docker installation and basic commands.	2	4	5M
6		Unit-V			
	a	i) Illustrate the architecture of Ansible.	2	5	5M
		ii) Explain Jinja2 templating in Ansible.	2	5	5M
		OR			
	b	i) Illustrate deploying applications using Kubernetes pods.	2	5	5M
		ii) Analyze how CI/CD works with OpenShift (BC, DC, ConfigMaps).	4	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CE3204 GROUND IMPROVEMENT TECHNIQUES

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	Give the methods of in situ densification of granular soils	K2	1	2M
	b	What are geo drains	K1	1	2M
	c	What are interceptor ditches	K1	2	2M
	d	What is a well point system	K1	2	2M
	e	How is stabilization of soil achieved by cement?	K1	3	2M
	f	Give methods of grouting.	K2	3	2M
	g	In what conditions reinforced soil is used?	K1	4	2M
	h	What is meant by hydraulic fracturing in soils	K2	4	2M
	i	Write a brief note on geotextile application	K2	5	2M
	j	How does the use of a geosynthetic as a filter differ from that of Drainage?	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 situ densification of granular soils.	K2	1	5M
		ii) Explain various conditions which require, ground improvement elaborating on benefits of ground improvement.	K3	1	5M
		OR			
	b	What are the in situ conditions which seek ground improvement in cohesive? Discuss the stone column, ground improvement methods with clear mechanisms	K2	1	10 M
			K2	1	5M
3		**Unit-II**			
	a	i) Explain in detail open sumps, single and multi-well point system of dewatering with neat sketches	K2	2	5M
		ii) Explain benefits of dewatering techniques and applications.	K2	2	5M
		OR			
	b	i) Explain the criteria for selection of fill material around drains.	K2	2	5M
		ii) With neat sketch explain the dewatering by electro osmosis.	K2	2	5M
4		**Unit-III**			
	a	i) Explain cement stabilization of soil with their mechanism, suitability and applications	K2	3	5M
		ii) Write a note on use of industrial wastes like fly ash and granulated blast	K2	3	5M

		furnace slag for soil stabilization.			
	OR				
	b	i) Discuss the objectives and applications of grouting.	K3	3	5M
		ii) Explain how liquefaction effects civil engineering structures. Discuss its effects and mitigation measures.	K2	3	5M
5	**Unit-IV**				
	a	i) Explain the various applications of soil nailing for ground improvement.	K2	4	5M
		ii) Explain design principles of reinforced earth walls.	K2	4	5M
	OR				
	b	i) Explain principle mechanism of soil nailing in detail	K3	4	5M
		ii) Explain stability checks of reinforced earth walls.	K2	4	5M
6	**Unit-V**				
	a	i) Explain the purpose of geo textiles.	K2	5	5M
		ii) Explain various types of geosynthetics highlighting their applications	K2	5	5M
	OR				
	b	i) Write a short notes on Geomembranes. Use sketches to explain.	K2	5	5M
		ii) Explain the properties of gabions. Use sketches to explain.	K2	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CS3202 **COMPILER 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 role of lexical analyzer?	2	1	2M
	b	Define context-free grammar.	1	1	2M
	c	Define backtracking in parsing.	1	2	2M
	d	What is predictive parsing?	2	2	2M
	e	Define synthesized attribute.	1	3	2M
	f	What is intermediate code?	1	3	2M
	g	What is code optimization?	1	4	2M
	h	Define data-flow analysis.	1	4	2M
	i	Define display in runtime environment.	2	5	2M
	j	What is stack allocation?	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) Describe the role of the lexical analyzer and explain token specification with examples.	3	1	5M
		ii) Eliminate left recursion from the following grammar: E → E + T | T T → T * F | F F → (E) | id	4	1	5M
		OR			
	b	i) Construct DFA for the regular expression *(a|b)abb and explain.	4	1	5M
		ii) Perform left factoring on the following grammar: S → iEtS | iEtSeS | a	4	1	5M
3		Unit-II			
	a	i) Explain LL(1) grammar conditions.	2	2	5M
		ii) Explain construction of CLR(1) parsing table with example.	5	2	5M
		OR			
	b	i) Differentiate between LL and LR parsers.	4	2	5M

		ii) Consider the grammar: E → E+E E → E*E E → id Perform shift reduce parsing of the input string “id1+id2+id3”.	4	2	5M
4	Unit-III				
	a	i) Explain implementation of L-attributed SDDs.	4	3	5M
		ii) Write the quadruple, triple, indirect triple for the expression (a*b) + (c+d)-(a+b+c+d)	3	3	5M
	OR				
	b	i) Explain translation of expressions into intermediate code.	4	3	5M
		ii) Illustrate how the SDT scheme is used for assignment statements to generate the intermediate code.	3	3	5M
5	Unit-IV				
	a	i) Explain the principal sources of optimization.	2	4	5M
		ii) What is code optimization? Compare machine dependent and independent code optimization techniques	3	4	5M
	OR				
	b	i)What is peephole optimization? How can it be performed? Give its role in code generation.	3	4	5M
		ii) Describe data-flow analysis in detail.	4	4	5M
6	Unit-V				
	a	i) Explain storage organization in runtime environment with neat diagram.	2	5	5M
		ii) Compare different storage allocation methods and justify their usage.	5	5	5M
	OR				
	b	i) Discuss issues in the design of a code generator in detail.	4	5	5M
		ii) Explain register allocation and assignment techniques in detail.	5	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23DS3202 **OPERATING SYSTEMS**

Time: 3 hours (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	What is a Free and Open-Source Operating System (FOSS)? Give two examples.	L1	1	2M
	b	What is the role of the kernel in an operating system?	L1	1	2M
	c	What is a process? List any two states in the process state model.	L1	2	2M
	d	Define CPU scheduling. Why is it required in an operating system?	L2	2	2M
	e	What is the critical section problem? State its three requirements.	L1	3	2M
	f	Define a deadlock in operating systems.	L2	3	2M
	g	Explain contiguous memory allocation?	L2	4	2M
	h	Define demand paging in virtual memory management.	L2	4	2M
	i	What is a file in an operating system? Mention any two file attributes.	L1	5	2M
	j	What is file system mounting?	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) Explain the major functions of an operating system and discuss how these functions contribute to efficient management of system resources such as CPU, memory, and I/O devices.	2	1	5M
		ii) Describe the different services provided by an operating system to users and application programs. Explain how these services improve system usability and efficiency.	2	1	5M
		OR			
	b	i) Define system calls and explain their role in operating systems. Classify the different types of system calls and illustrate them with suitable examples.	3	1	5M
		ii) Discuss the key issues involved in operating system design and implementation. Explain the factors that influence the design choices in modern operating systems.	4	1	5M
3		Unit-II			
	a	i) Explain the process concept and process scheduling. Describe the different states in the process life cycle.	L2	2	5M

		ii) Discuss the mechanisms of inter-process communication (IPC). Explain message passing and shared memory models.	L3	2	5M
	OR				
	b	i) Explain multithreading models used in operating systems. Compare user-level threads and kernel-level threads.	L3	2	5M
		ii) Discuss CPU scheduling algorithms such as FCFS, SJF, and Round Robin, and explain the scheduling criteria used to evaluate them.	L4	2	5M
4	Unit-III				
	a	i) Explain Peterson's solution for the critical section problem. Discuss how it ensures mutual exclusion between two processes.	L2	3	5M
		ii) Describe synchronization tools used in operating systems. Explain the working of mutex locks, semaphores, and monitors.	L3	3	5M
	OR				
	b	i) Explain the four necessary conditions for deadlock occurrence. Illustrate them with suitable examples.	L3	3	5M
		ii) Discuss different methods for handling deadlocks including prevention, avoidance, detection, and recovery.	L4	3	5M
5	Unit-IV				
	a	i) Explain paging as a memory management technique. Describe the structure and working of a page table.	L2	4	5M
		ii) Discuss the concept of swapping and explain how it helps in memory management.	L2	4	5M
	OR				
	b	i) Explain demand paging and copy-on-write mechanisms used in virtual memory systems.	L3	4	5M
		ii) Describe page replacement algorithms and allocation of frames used in virtual memory management.	L4	4	5M
6	Unit-V				
	a	i) Explain different file access methods used in operating systems with suitable examples.	L2	5	5M
		ii) Describe various directory structures used in file systems and discuss their advantages.	L3	5	5M
	OR				
	b	i) Explain file allocation methods such as contiguous allocation, linked allocation, and indexed allocation.	L3	5	5M
		ii) Discuss the goals and principles of protection in operating systems. Explain the concept of protection rings.	L3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EC3204 **MACHINE LEARNING**

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	What is the difference between Traditional Programming and Machine Learning?	3	1	2M
	b	Mention two challenges in Machine Learning.	1	1	2M
	c	What is Multivariate analysis?	2	2	2M
	d	Define One-Hot Encoding.	1	2	2M
	e	What is Polynomial Regression?	2	3	2M
	f	Define Gradient Boosting.	1	3	2M
	g	What is distance measure in clustering?	2	4	2M
	h	List our various applications of clustering.	1	4	2M
	i	Define Normalized Mutual Information (NMI).	1	5	2M
	j	What is Stratified K-Fold Cross Validation?	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) Describe the different Machine Learning paradigms.	2	1	5M
		ii) Discuss the major challenges in Machine Learning systems.	3	1	5M
		OR			
	b	i) Discuss the history and evolution of Machine Learning.	2	1	5M
		ii) Explain the different types of data used in Machine Learning.	2	1	5M
3		Unit-II			
	a	i) Describe Univariate, Bivariate and Multivariate analysis with examples.	2	2	5M
		ii) Explain feature scaling and transformation techniques.	3	2	5M
		OR			
	b	i) Discuss various methods for handling missing values.	4	2	5M
		ii) Explain Exploratory Data Analysis and its importance.	2	2	5M
4		Unit-III			
	a	i) Explain the architecture of Supervised Machine Learning.	2	3	5M
		ii) Differentiate Classification and Regression problems.	3	3	5M
		OR			
	b	i) Explain Ensemble learning techniques: Voting, Bagging, and Pasting.	2	3	5M
		ii) Explain the K-Nearest Neighbor classification algorithm.	4	3	5M

5	Unit-IV				
	a	i) Describe the K-Means clustering algorithm.	2	4	5M
		ii) Differentiate soft clustering and hard clustering.	3	4	5M
	OR				
	b	i) Discuss the challenges in Unsupervised Machine Learning.	3	4	5M
		ii) Explain the architecture of Unsupervised Machine Learning.	2	4	5M
6	Unit-V				
	a	i) Describe Accuracy, Precision, Recall and F1-Score.	3	5	5M
		ii) Discuss evaluation metrics for regression models.	2	5	5M
	OR				
	b	i) Explain evaluation metrics for clustering algorithms.	4	5	5M
		ii) Explain the Confusion Matrix and classification evaluation metrics.	3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EE3204 **SWITCHGEAR & PROTECTION**

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 Restriking Voltage and Recovery Voltage.	K1	1	2M
	b	What is "Current Chopping"? In which type of circuit breaker is it more prominent?	K2	1	2M
	c	Differentiate between Instantaneous (DMT) and Inverse Time Minimum (IDMT) overcurrent relays.	K2	2	2M
	d	Define the term "Reach" in the context of distance protection relays.	K1	2	2M
	e	What is the function of a Buchholz relay? Where is it installed?	K1	3	2M
	f	Why is Percentage Differential Protection preferred over simple differential protection for power transformers?	K1	3	2M
	g	Define Plug Setting Multiplier (PSM).	K2	4	2M
	h	What is the main purpose of using a Carrier Signal in Carrier-Aided Protection schemes?	K2	4	2M
	i	Draw the basic block diagram of a static relay and label its three main stages (Input, Processing, Output).	K2	5	2M
	j	What is "Check Zone" protection in busbar schemes?	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 phenomenon of arc extinction in a circuit breaker. Discuss the theories of arc interruption.	2	1	5M
		ii) Derive the expression for the average Rate of Rise of Restriking Voltage (RRRV).	3	1	5M
		OR			
	b	i) Explain the concept of "Current Chopping" in circuit breakers. Why is it more severe in vacuum circuit breakers?	2	1	5M
		ii) Describe the working principle of a SF6 circuit breaker. Why is SF6 gas preferred for high voltage applications?	3	1	5M
3		Unit-II			
	a	i) Draw the constructional diagram and explain the working principle of an Attracted Armature Relay.	2	2	5M
		ii) Derive the torque equation for an induction disc type relay. Explain the concept of inverse time characteristic.	3	2	5M
		OR			
	b	i) Describe the construction and operation of an Induction Cup Relay. Compare its torque production with an induction disc relay.	3	2	5M

		ii) Explain the working principle of a Percentage Differential Relay. How does it prevent mal-operation during through faults?	2	2	5M
4	Unit-III				
	a	Explain the protection scheme for a generator against stator earth faults using a neutral grounding resistor.	2	3	10M
	OR				
	b	i) Explain the protection of a synchronous generator against rotor earth faults.	2	3	5M
		ii) A 3-phase transformer is rated 11 kV/400 V. Determine the CT ratios for the primary and secondary sides for implementing a Merz-Price protection scheme.	3	3	5M
5	Unit-IV				
		i) Explain the operation of static relay.	3	4	10M
	OR				
	b	i) Describe the construction and working principle of a Buchholz relay. Where is it used and for what faults?	3	4	10M
6	Unit-V				
	a	i) Explain the operating principle of an Impedance Relay with a neat diagram. Draw its R-X characteristics.	2	5	5M
		ii) Describe the three-zone distance protection scheme for a transmission line with a single-line diagram	2	5	5M
	OR				
	b	i) Draw the block diagram of a static relay and explain the function of each block (Input, Rectifier, Comparator, etc.).	2	5	5M
		ii) Describe the Phase Comparator circuit used in static distance relays. How is the phase difference converted into a DC output?	3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23ME3204 ADVANCED MANUFACTURING PROCESSES

(ME)

Time: 3 hours Max. Marks: 70

PART-A

Note: Answer All Questions.
All Questions Carry Equal Marks (10X2=20M)

Q. No		Questions	KL	CO	Marks
1	a	What is AMP process ?	K1	CO1	[2 M]
	b	Explain the material removal mechanism in EBM process	K2	CO1	[2 M]
	c	What is Stereo Lithography process (SLA) ?	K1	CO2	[2 M]
	d	Which additive manufacturing process sheets are used as raw material?	K2	CO2	[2 M]
	e	List some inorganic materials for coating	K2	CO3	[2 M]
	f	Define ceramics and mention any two key characteristics of ceramic materials.	K1	CO3	[2 M]
	g	Define composite materials and give one example	K1	CO4	[2 M]
	h	What is nanotechnology? Give one application in manufacturing.	K1	CO4	[2 M]
	i	Define e-manufacturing and mention one of its key advantages in modern industries.	K2	CO5	[2 M]
	j	Define lithography in the context of microelectronics.	K1	CO5	[2 M]

PART-B

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5X10=50M)

Q. No		Questions	KL	CO	Marks
2		**Unit - I**			
	a	Discus the need of advanced manufacturing process and list advantages over conventional manufacturing process	K2	CO1	[10M]
		OR			
	b	Illustrate the Electro Chemical Machining (ECM) – principle, process parameters and applications with a neat sketch	K2	CO1	[10M]
3		Unit - II			
	a	Discuss advantages of additive manufacturing process over subtractive manufacturing process and list various additive manufacturing processes.	K2	CO2	[10M]
		OR			
	b	Illustrate Fused Deposition Method with a neat sketch and mention various materials used in FDM process	K3	CO2	[10M]

4 4	Unit - III				
	a	Discuss the importance of surface treatment in view of engineering aspects and list a few surface treatment methods.	K3	CO3	[10M]
	OR				
	b	Explain applications and characterstics of Ceramics.	K5	CO3	[10M]
5	Unit - IV				
	a	Compare Top-Down and Bottom-Up approaches for nanomaterial synthesis	K2	CO4	[10M]
	OR				
	b	Differentiate between particulate-reinforced and fiber-reinforced composites.	K2	CO4	[10M]
6	Unit - V				
	a	Explain about printed circuit boards (PCB) with neat sketch	K2	CO5	[10M]
	OR				
	b	Explain the steps involved in wafer preparation after crystal growth.	K2	CO5	[10M]

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23AM3220 **REINFORCEMENT 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	List the main elements of a Reinforcement Learning system.	K1	1	2M
	b	What is the difference between supervised and reinforcement learning?	K1	1	2M
	c	Define estimated value Q(a).	K1	2	2M
	d	What are contextual bandits?	K1	2	2M
	e	Define state and action in MDP.	K1	3	2M
	f	What is an action-value function	K1	3	2M
	g	What is first-visit Monte Carlo method?	K1	4	2M
	h	Define behavior policy and target policy.	K1	4	2M
	i	Mention any two real-world applications of Reinforcement Learning.	K1	5	2M
	j	What is the role of RL in game playing?	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)Discuss the fundamental elements of reinforcement learning.	K2	1	5M
		ii) Explain model based and model free reinforcement learning with suitable example.	K2	1	5M
		OR			
	b	i) Explain how Tic-Tac-Toe can be modelled as a Reinforcement Learning problem.	K2	1	5M
		ii)Explain the scope and limitations of reinforcement learning.	K2	1	5M
3		Unit-II			
	a	i)Describe the key components of Associative search in reinforcement learning.	K2	2	5M
		ii)Demonstrate n-armed bandit problem with an example.	K3	2	5M
		OR			
	b	i) Derive and explain incremental implementation of action-value methods.	K3	2	5M
		ii) Describe Upper Confidence Bound (UCB) action selection.	K2	2	5M
4		Unit-III			
	a	i) Explain the Agent–Environment Interface in Reinforcement Learning and its components.	K2	3	5M
		ii) Explain optimal value functions and optimal policy with equations.	K2	3	5M

		OR			
	b	i) Describe unified notation for episodic and continuing tasks.	K2	3	5M
		ii) How does the Markov Property simplify the representation of state transitions in Reinforcement Learning?	K2	3	5M
5		Unit-IV			
	a	i)Explain the Monte Carlo Prediction in reinforcement learning.	K2	4	5M
		ii) Differentiate on-policy and off-policy learning.	K4	4	5M
		OR			
	b	i) Describe Monte Carlo control with exploring starts.	K2	4	5M
		ii) Differentiate between Monte Carlo methods and Temporal Difference learning for estimating action values.	K4	4	5M
6		Unit-V			
	a	i) Describe Samuel's Checkers Player and its contribution to RL.	K2	5	5M
		ii) Explain TD-Gammon and its importance in Reinforcement Learning.	K2	5	5M
		OR			
	b	i) Explain TD-Gammon in detail and discuss its learning approach.	K2	5	5M
		ii) Discuss job-shop scheduling using RL techniques.	K2	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CC3207 **NATURAL LANGUAGE PROCESSING**

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	List out the major challenges in NLP?	K1	1	2M
	b	Explain the term probability of a sentence in statistical LM?	K2	1	2M
	c	What is meant by data sparsity in N-gram models?	K1	2	2M
	d	State the difference between interpolation and backoff.	K2	2	2M
	e	Define a Treebank? And explain the purpose of it?	K2	3	2M
	f	Define Dependency Grammar?	K1	3	2M
	g	Mention the purpose of description logics in knowledge representation?	K2	4	2M
	h	Define word similarity? Give 2 examples?	K1	4	2M
	i	Define Coherence and segmentation in discourse?	K1	5	2M
	j	Define coreference resolution? Give an example of coreference in a sentence.	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) Describe how Regular Expressions are used for text processing in NLP.	K2	1	5M
		ii) Explain Finite State Automata with diagram and example.	K2	1	5M
		OR			
	b	i) Differentiate inflectional and derivational morphology with examples.	K2	1	5M
		ii) Explain Finite State Transducers and their role in morphological analysis.	K2	1	5M
3		Unit-II			
	a	i) How do you evaluate the performance of N-gram models?	K5	2	5M
		ii) Compare and contrast Add-one, Good-Turing, and Kneser-Ney smoothing?	K3	2	5M
		OR			
	b	i) Explain the process of Part-of-Speech tagging with examples.	K2	2	5M
		ii) Describe the working of HMM in NLP tagging systems.	K2	2	5M
4		Unit-III			
	a	i) Explain dynamic programming parsing in NLP with an example.	K2	3	5M
		ii) Explain Probabilistic Context-Free Grammar (PCFG) and its role in parsing.	K3	3	5M

		OR			
	b	i) Construct a parse tree for a simple English sentence using CFG rules.	K4	3	5M
		ii) Explain Chomsky Normal Form and Greibach Normal Form with examples.	K3	3	5M
5		Unit-IV			
	a	i) Convert the following statements into First-Order Logic representations: • All humans are mortal. • John is a human. • Therefore John is mortal.	K3	4	5M
		ii) Explain how synonymy, antonymy, and hyponymy help in understanding word meaning in NLP systems.	K2	4	5M
		OR			
	b	i) Explain how Word Sense Disambiguation (WSD) resolves ambiguity in the following sentence: *"He sat on the bank of the river."*	K2	4	5M
		ii) Given the following sentence, identify the thematic roles: *"The teacher gave the student a book."*	K3	4	5M
6		Unit-V			
	a	i) Analyze the following text and identify reference phenomena: *"Anita met Riya at the library. She borrowed a book."*	K4	5	5M
		ii) Describe how lexical resources such as WordNet, FrameNet, and Prop-Bank help semantic understanding in NLP.	K2	5	5M
		OR			
	b	i) Describe the Hobbs algorithm for anaphora resolution in detail.	K2	5	5M
		ii) Describe the British National Corpus (BNC) and its importance.	K2	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CE3205 WATER RESOURCES ENGINEERING

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 duty and delta.	K1	1	2M
	b	Give the standards of water quality for irrigation.	K1	1	2M
	c	What are the different types of canals?	K1	2	2M
	d	Write about balancing the depth of cutting.	K2	2	2M
	e	Define a canal outlet. Discuss any one type.	K1	3	2M
	f	What are the objectives of river training?	K1	3	2M
	g	Sketch the layout of diversion headworks.	K1	4	2M
	h	What are the main causes of failures of weirs on permeable foundations?	K2	4	2M
	i	What are the main causes of failures of weirs on permeable foundations?	K2	5	2M
	j	What is a spillway? What are its essential requirements?	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	Name any two methods used for estimating consumptive use of water for a particular crop at a particular place. Explain in detail the one that is most widely used in your region and the reason for preferring that particular method.	K5	1	10M
		OR			
	b	Compute the depth and frequency of irrigation required for a certain crop with data given below: Root zone depth = 100 cm; Field capacity = 22 %; Wilting point = 12 %; Dry density of soil = 1.5 g/cc; Consumptive use = 25 mm/day; Efficiency of irrigation = 50%.	K4	1	10M
3		Unit-II			
	a	i) Discuss the design principle of a channel using Lacey’s method.	K3	2	10M
		OR			
	b	Design an irrigation channel to carry 35 cumecs of discharge, with B/D, i.e., base width to depth ratio as 2.25. The critical velocity ratio is 1.0, and Kutter’s rugosity coefficient is 0.022; use Kennedy’s method.	K4	2	10M

4	Unit-III				
	a	i) How are the cross-drainage works classified? Discuss them with neat diagrams.	K3	3	5M
		ii) Write in detail about the Sarada-type fall and the straight glacis fall.	K2	3	5M
	OR				
	b	i) Bring out the features of a river training work.	K3	3	5M
		ii) Explain the following outlets: (i) Kennedy's gauge outlet and (ii) Gibb's outlet.	K3	3	5M
5	Unit-IV				
	a	i) What is meant by "Afflux"? How does it affect the design of weirs and barrages?	K4	4	5M
		ii) Discuss the causes of failures of weirs on permeable foundations and suggest suitable control measures for each type of failure.	K4	4	5M
	OR				
	b	i) What is the exit gradient? How does it affect the design of a weir?	K4	4	5M
		ii) Explain Bligh's theory of the design of weirs on permeable foundations.	K3	4	5M
6	Unit-V				
	a	i) Explain how the storage capacity of a reservoir is fixed?	K3	5	5M
		ii) Discuss the criteria for safe design of earth dams.	K3	5	5M
	OR				
	b	i) Classify various types of dams. Discuss the factors that affect the selection of the type of dam.	K3	5	5M
		ii) Explain how energy dissipation arrangements are made below a spillway.	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23CS3204 **SOFTWARE PROJECT MANAGEMENT**

Time: 3 hours (CSE, CSE (AIML), AI, DS, CS) 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 Waterfall model in conventional software management.	K1	1	2M
	b	List any two problems of conventional software management performance.	K2	1	2M
	c	What are process artifacts in software engineering?	K1	2	2M
	d	State the purpose of the construction phase in software development.	K2	2	2M
	e	Define model-based software architecture.	K1	3	2M
	f	What are major milestones in the software development process?	K2	3	2M
	g	Define process automation in software engineering.	K1	4	2M
	h	What are core metrics in project control?	K1	4	2M
	i	What is meant by orchestration in DevOps?	K2	5	2M
	j	State the purpose of Scrum in Agile software development.	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) Describe the Waterfall model and its role in conventional software management.	K1	1	5M
		ii) Compare the principles of conventional software engineering and modern software management.	K2	1	5M
		OR			
	b	i) Discuss the performance issues associated with conventional software management.	K2	1	5M
		ii) Explain the concept of software economics and its importance in software development.	K2	1	5M
3		Unit-II			
	a	i) Describe the engineering and production stages of the software life cycle	K1	2	5M
		ii) Explain the importance of the elaboration phase in risk reduction and system architecture.	K2	2	5M
		OR			
	b	i) Discuss the transition phase and its significance in software deployment.	K2	2	5M
		ii) Explain the different artifact sets in the software development process.	K1	2	5M
4		Unit-III			
	a	i) Explain model-based software architecture from a management perspective and technical perspective.	K1	3	5M

		ii) Illustrate how iteration workflows contribute to iterative software development.	K2	3	5M
	OR				
	b	i) Discuss the importance of periodic status assessments in project monitoring.	K2	3	5M
		ii) Explain iterative process planning with reference to work breakdown structures and planning guidelines.	K1	3	5M
5	Unit-IV				
	a	i) Describe the structure and responsibilities of line-of-business organizations in software projects.	K1	4	5M
		ii) Discuss the evolution of organizations in software project management.	K2	4	5M
	OR				
	b	i) Describe the automation building blocks used in software process automation.	K1	4	5M
		ii) Explain the project environment and its role in supporting software development activities.	K3	4	5M
6	Unit-V				
	a	i) Explain the principles of Agile methodology in software development.	K1	5	5M
		ii) Discuss the patterns used for adopting Scrum in organizations.	K3	5	5M
	OR				
	b	i) Discuss the DevOps delivery pipeline and its importance in continuous delivery.	K2	5	5M
		ii) Explain the technology aspects and agile capabilities involved in DevOps adoption in projects.	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23EC3205 **MICRO WAVE ENGINEERING**

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 dominant mode in a rectangular waveguide.	1	1	2M
	b	State the definition of phase velocity in a waveguide.	1	1	2M
	c	What is velocity modulation in microwave devices?	1	2	2M
	d	List the limitations of conventional vacuum tubes at microwave frequencies.	1	2	2M
	e	What is a slow wave structure?	1	3	2M
	f	Define π-mode operation in magnetron.	1	3	2M
	g	Define waveguide discontinuity.	1	4	2M
	h	Give the definition of a directional coupler used in microwave measurements.	1	4	2M
	i	Define RWH theory.	1	5	2M
	j	What is a slotted line?	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 microwave spectrum and its applications.	2	1	5M
		ii) Derive the expression for cut-off frequency of a rectangular waveguide.	3	1	5M
		OR			
	b	i) Describe the relationship between guide wavelength, phase velocity, and group velocity in a waveguide.	2	1	5M
		ii) Discuss the structure and characteristics of microstrip transmission lines	2	1	5M
3		Unit-II			
	a	i) Explain the limitations of conventional vacuum tubes at microwave frequencies.	2	2	5M
		ii) Describe the velocity modulation process using Applegate diagram.	2	2	5M
		OR			
	b	i) Illustrate the bunching process in a klystron amplifier using the Applegate diagram.	3	2	5M
		ii) Discuss oscillating modes and output characteristics of the reflex klystron	2	2	5M
4		Unit-III			
	a	i) Analyze the amplification process in a helix travelling wave tube.	4	3	5M
		ii) Explain slow wave structures and their significance in microwave tubes.	2	3	5M

	OR				
	b	i) Examine the electron interaction with RF fields during π-mode operation in a magnetron.	4	3	5M
		ii) Describe the structure and working of cavity magnetron.	3	3	5M
5	Unit-IV				
	a	i) Explain the different waveguide coupling mechanisms.	2	4	5M
		ii) Demonstrate how attenuation is achieved in a waveguide attenuator.	3	4	5M
	OR				
	b	i) Determine the S-matrix of a two-port microwave network.	3	4	5M
		ii) Describe the working principle of directional couplers	2	4	5M
6	Unit-V				
	a	i) Explain the classification and applications of microwave solid-state devices.	2	5	5M
		ii) Explain the principle and operation of the Gunn diode.	3	5	5M
	OR				
	b	i) Using a suitable diagram, explain the bolometer method for microwave power measurement.	3	5	5M
		ii) Show the steps involved in measuring VSWR using a slotted line arrangement.	3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations,April-2026

Sub Code: R23EE3208 **ELECTRIC DRIVES**

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	State essential parts of electrical drives. What are functions of a power modulator	K2	1	2M
	b	Differentiate Dynamic Braking and Plugging.	K2	1	2M
	c	What are the advantages of three phase drives over single-phase drives?	K2	2	2M
	d	Draw the circuit model of a 3-phase Dual converter fed DC motor drive.	K2	2	2M
	e	Explain the first quadrant chopper control DC motor	K2	3	2M
	f	Draw the circuit model of a four quadrant DC-DC converter fed self-excited DC motor.	K2	3	2M
	g	What is a stator voltage control?	K2	4	2M
	h	What is meant by Variable Voltage Variable Frequency control of induction motor?	K2	4	2M
	i	How is a synchronous motor controlled?	K2	5	2M
	j	Draw the block diagram of closed loop synchronous drive fed from VSI.	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) State essential parts of electrical drives.	K2	1	5M
		ii) How are the load torques classified? Give an example for each type of load torque.	K3	1	5M
		OR			
	b	Describe the relative merits and demerits of the following types of braking for DC motors, plugging type braking, dynamic braking and regenerative braking with neat diagram.	K2	1	10M
3		Unit-II			
	a	i) Draw the power circuit diagram and explain the operation of a three-phase full converter fed separately excited dc motor.	K3	2	5M
		ii) Explain the operation of three phase-controlled rectifier fed de series motor drives.	K3	2	5M
		OR			
	b	i) Draw the power circuit diagram and explain the operation of a three-phase half-controlled converter fed separately excited de motor.	K3	2	5M
		ii) What is a dual converter? Explain the principle of operation of a dual	K3	2	5M

		converter in a circulating current mode.			
4		Unit-III			
	a	i) Explain the different types of control strategies of DC choppers	K2	3	5M
		ii) Explain the operation of the single quadrant chopper fed dc series motor drive system.	K3	3	5M
		OR			
	b	i) Explain the operation of a four-quadrant chopper fed to the D.C series motor and also draw the current and voltage wave forms for continuous current operation.	K2	3	5M
		ii) Discuss closed loop control of DC motor drive.	K3	3	5M
5		Unit-IV			
	a	i) Why stator voltage control is suitable for speed control of induction motors in fan and pump drives? Explain in detail.	K3	4	5M
		ii) Explain about the closed loop operation of V/F fed induction motor drive with a neat sketch.	K3	4	5M
		OR			
	b	i) Explain the static rotor resistance control with neat sketch. Why the rotor resistance control is preferred in low power crane drives.	K3	4	5M
		ii) Explain about the static Kramer drive with neat sketch. Why it has a low range of speed control.	K3	4	5M
6		Unit-V			
	a	i) Describe self-controlled and load-commutated inverter controlled synchronous motor drives in detail.	K3	5	5M
		ii) Draw the block diagram of closed loop synchronous drive fed from VSI and explain its operation.	K3	5	5M
		OR			
	b	i) What are the advantages of the self-control scheme of synchronous motor? Explain.	K2	5	5M
		ii) Explain the basic operation of PMSM with neat diagram.	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

III B.Tech II Semester Regular Examinations, April-2026

Sub Code: R23ME3205 **INDUSTRIAL ROBOTICS**

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 industrial robot	K1	1	2M
	b	List any four applications of robots	K1	1	2M
	c	What are pneumatic actuators?	K1	2	2M
	d	Define position sensor in robotics	K1	2	2M
	e	What is inverse kinematics?	K1	3	2M
	f	Define homogeneous transformation	K1	3	2M
	g	What is joint interpolated motion?	K1	4	2M
	h	List types of robot programming languages	K1	4	2M
	i	What is sensing function in machine vision?	K1	5	2M
	j	Define image preprocessing.	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 classification a robots by coordinate system	K2	1	5M
		ii) Describe the main components of a robotic system	K3	1	5M
		OR			
	b	i) Describe the design considerations for grippers in robotic systems	K3	1	5M
		ii) Classify end effectors and discuss the challenges of end effectors	K4	1	5M
3		Unit-II			
	a	i) Compare electric and hydraulic actuators used in robots	K3	2	5M
		ii) Explain functions of velocity sensors in robotics with examples	K4	2	5M
		OR			
	b	i) Describe the working of hydraulic actuator with a neat sketch	K2	2	5M
		ii) Explain position sensors with applications	K4	2	5M
4		Unit-III			
	a	i) A point P(1,2,3) undergoes rotation of 90° about the X-axis followed by translation (4,0,5). Find a new position using transformation matrices	K3	3	5M
		ii)Derive the D-H notation matrix of articulated arm robot	K3	3	5M
		OR			
	b	i) Derive the forward kinematics for a 2R planar manipulator	K3	3	5M
		ii) What is Jacobian matrix in robotics and explain how it is used to calculate the velocity of a robot.	K3	3	5M

5	Unit-IV				
	a	i) Describe obstacle avoidance in path generation	K2	4	5M
		ii) Discuss robot programming languages like VAL and their path description capabilities	K4	4	5M
	OR				
	b	i) Differentiate Point to point (PTP) and continuous path (CP) motion in robotics	K2	4	5M
		ii) Explain trajectory planning in robot path generation	K2	4	5M
6	Unit-V				
	a	i) Describe the components of a machine vision system with a block diagram	K2	5	5M
		ii) Explain digitizing functions in machine vision	K3	5	5M
	OR				
	b	i) List image preprocessing techniques in machine vision	K2	5	5M
		ii) Explain training parameters in machine vision	K3	5	5M

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

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