

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(Deemed to be University under Section 3 of UGC Act, 1956)

MCA I Year II Semester (R25) Regular End Semester Examinations - June 2026**SOFTWARE ENGINEERING AND DESIGN PATTERNS**

Time: 3Hrs

Max Marks: 100

All parts of a question must be answered in one place only.

Answer one question from each of Units I to V

Q.No.	Question	Marks	CO	BL
UNIT-I				
Q.1.	Explain the Software Development Life Cycle (SDLC) models - Waterfall, Spiral and Incremental. Compare their advantages, disadvantages.	20 M	1	3
OR				
Q.2.	A Discuss Agile methodology and its key principles.	10 M	1	3
	B Describe the role of risk management in software projects.	10 M	1	3
UNIT-II				
Q.3.	Analyse the design concepts of Modularity, Abstraction, Cohesion, and Coupling with suitable examples.	20 M	2	5
OR				
Q.4.	Describe Component Diagram and Deployment Diagram and Illustrate their importance in software architecture design.	20 M	2	4
UNIT-III				
Q.5.	Explain the differences between Creational, Structural, and Behavioural Design Patterns with examples.	20 M	3	4
OR				
Q.6.	Discuss the importance of pattern catalogues in object-oriented software development and explain best practices for applying it.	20 M	3	4
UNIT-IV				
Q.7.	Explain the Adapter and Bridge Design Patterns with UML diagrams and practical examples.	20 M	4	3
OR				
Q.8.	Compare Structural Design Patterns of Composite, Decorator, Proxy and Facade with respect to purpose, structure, and usage.	20 M	4	5
UNIT-V				
Q.9.	Illustrate the Observer Design Pattern with UML diagram, implementation, advantages, and applications.	20 M	5	4
OR				
Q.10.	a. Describe the Command Design Pattern.	10 M	5	3
	b. Discuss the Strategy Design Pattern and its applications.	10 M	5	3

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ARTIFICIAL INTELLIGENCE

Time: 3Hrs**Max Marks: 100**

All parts of a question must be answered in one place only.

Answer one question from each of Units I to V

Q.No.	Question	Marks	CO	BL
<u>Unit-I</u>				
Q.1.	i Describe the concept of Artificial Intelligence and classify its various types.	10 M	1	2
	ii Compare and contrast Human Intelligence and Artificial Intelligence with suitable examples.	10 M	1	4
OR				
Q.2.	i Discuss in detail about evolution of AI with diagrams.	10 M	1	2
	ii Evaluate the characteristics, advantages, and limitations of Narrow AI, General AI, and Super AI.	10 M	1	2
<u>Unit-II</u>				
Q.3.	i Explain the architecture of Intelligent Agents and their interaction with environments using a neat diagram.	10 M	2	2
	ii Compare and evaluate Simple Reflex Agents, Model-Based Agents, Goal-Based Agents, and Utility-Based Agents based on their decision-making capabilities.	10 M	2	4
OR				
Q.4.	i Examine the relationship between agents and environments through real-world applications.	10 M	2	2
	ii Apply the PEAS representation to model real-world intelligent systems.	10 M	2	3
<u>Unit-III</u>				
Q.5.	Describe the Hill Climbing Search algorithm and assess its applications, advantages, and limitations.	20 M	3	3
OR				
Q.6.	Analyze the Minimax algorithm used in game-playing environments and illustrate its operation using a game tree.	20 M	3	4
<u>Unit-IV</u>				
Q.7.	i Differentiate between Forward Chaining and Backward Chaining mechanisms used in reasoning systems.	10 M	4	4
	ii Compare various knowledge representation techniques used in Artificial Intelligence.	10 M	4	4

OR

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|-------------|----|--|------|---|---|
| Q.8. | i | Describe the effectiveness of Semantic Networks and Frames in representing complex knowledge structures. | 10 M | 4 | 2 |
| | ii | Examine the architecture of Knowledge-Based Agents and analyze their working principles. | 10 M | 4 | 2 |

Unit-V

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|-------------|----|---|------|---|---|
| Q.9. | i | Describe the applications of Artificial Intelligence in healthcare, finance and education sector, . | 10 M | 5 | 3 |
| | ii | Explain the principles of Computer Vision and explain its significance in intelligent systems. | 10 M | 5 | 2 |

OR

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|--------------|----|---|------|---|---|
| Q.10. | i | Illustrate the process of Text Classification and discuss its practical applications. | 10 M | 5 | 2 |
| | ii | Differentiate between Object Detection and Object Recognition with suitable examples. | 10 M | 5 | 4 |

*****End*****

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(Deemed to be University under Section 3 of UGC Act, 1956)**MCA I Year II Semester (R25) Regular End Semester Examinations - June 2026****ADVANCED WEB TECHNOLOGIES AND MERN STACK****Time: 3Hrs****Max Marks: 100**

All parts of a question must be answered in one place only.
Answer one question from each of Units I to V

Q.No.	Question	Marks	CO	BL
UNIT-I				
Q.1.	a What are Generators in JavaScript?	10 M	1	1
	b Discuss browser events and event delegation in detail.	10 M	1	2
OR				
Q.2.	Describe DOM tree in JavaScript with suitable examples.	20 M	1	2
UNIT-II				
Q.3.	a Differentiate functional and class components with an example.	10 M	2	2
	b Describe the React Render HTML.	10 M	2	2
OR				
Q.4.	Illustrate the procedure of Event Handling communicating from Child to Parent with an example.	20 M	2	2
UNIT-III				
Q.5.	a Define Node.js and explain its key features in detail.	10 M	2	2
	b Discuss in detail about EventEmitter in Node.js.	10 M	2	2
OR				
Q.6.	Describe Local Modules and Export Modules in Node.js with suitable examples.	20 M	3	2
UNIT-IV				
Q.7.	Explain CRUD operations in MongoDB with examples.	20 M	4	2
OR				
Q.8.	Discuss querying projections and sorting in MongoDB with appropriate examples.	20 M	4	3
UNIT-V				
Q.9.	Describe server-side rendering (SSR) in React in detail.	20 M	5	3
OR				
Q.10.	Describe Routing in React using React Router. Explain different routing components with examples.	20 M	5	2

*****End*****

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(Deemed to be University under Section 3 of UGC Act, 1956)**MCA I Year II Semester (R25) Regular End Semester Examinations - June 2026****DATA ANALYTICS AND VISUALIZATION****Time: 3Hrs****Max Marks: 100**

All parts of a question must be answered in one place only.

Answer one question from each of Units I to V

Q.No.	Question	Marks	CO	BL
UNIT-I				
Q.1.	a Define Data Analytics. Explain its scope and significance in modern organizations.	10 M	1	2
	b Describe the Data Analytics Lifecycle with a neat diagram.	10 M	1	2
OR				
Q.2.	Discuss the importance of Python libraries in Data Analytics and Analyse how they support data manipulation, visualization, and analysis.	20 M	1	4
UNIT-II				
Q.3.	Discuss data cleaning techniques with special reference to handling missing values, duplicates, and outliers.	20 M	2	2
OR				
Q.4.	a What is Data Transformation? Explain its significance in data preprocessing.	10 M	2	2
	b Differentiate between Feature Extraction and Feature Selection.	10M	2	4
UNIT-III				
Q.5.	Discuss the best practices and design considerations for creating effective and meaningful data visualizations.	20 M	3	2
OR				
Q.6.	Discuss different visualization techniques for univariate, bivariate, categorical, and multivariate data with examples.	20 M	3	L3
UNIT-IV				
Q.7.	Analyse the role of DAX (Data Analysis Expressions) in Power BI and evaluate its effectiveness in creating calculated measures and supporting business analytics.	20 M	4	4
OR				
Q.8.	a Compare and Analyse Tableau and Power BI with respect to architecture, features, visualization capabilities, and business applications.	10 M	4	4
	b Write short notes on Power Query and Data Modelling.	10 M	4	2
UNIT-V				
Q.9.	a Write a note on the ARIMA model.	10 M	5	2
	b Analyse how Time Series Analytics supports forecasting and trend analysis in real-world scenarios.	10 M	5	4
OR				
Q.10.	Analyse the role of Social Media Sentiment Analysis in business intelligence and evaluate its impact on organizational decision-making	20 M	5	4

*****End*****

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MCA I Year II Semester (R25) Regular End Semester Examinations - June 2026**CLOUD COMPUTING**

Time: 3Hrs

Max Marks: 100

All parts of a question must be answered in one place only.

Answer one question from each of Units I to V

Q.No.	Question	Marks	CO	BL
UNIT-I				
Q.1.	Discuss about Cloud Computing Architecture in detail with neat diagram	20 M	1	2
OR				
Q.2.	Explain about Distributed Computing and Grid Computing in detail. Analyse which computing paradigm is more suitable for real-time applications.	20 M	1	4
UNIT-II				
Q.3.	a. Discuss the process of discovering cloud services and tools. b. Explain the Concepts Google App Engine	10 M 10 M	2	3 2
OR				
Q.4.	Compare the different cloud service models. Recommend the most suitable service model for an organization	20 M	2	4
UNIT-III				
Q.5.	Discuss in detail about Cloud Deployment Models with architecture	20 M	3	3
OR				
Q.6.	a. Describe the importance of cloud-based collaboration tools in managing group projects and events. b. Explain the role of cloud applications in managing to-do lists and task tracking.	10 M 10 M	3	2 2
UNIT-IV				
Q.7.	Evaluate different cloud software environments and recommend the suitable platform for enterprise cloud deployment.	20 M	4	5
OR				
Q.8.	Discuss the Hadoop ecosystem and explain the role of Hadoop libraries in distributed data processing.	20 M	4	3
UNIT-V				
Q.9.	Evaluate different risk management approaches used in cloud security	20 M	5	5
OR				
Q.10.	Explain in detail about SaaS security.	20 M	5	2

End

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MCA I Year II Semester (R25) Regular End Semester Examinations - June 2026**MACHINE LEARNING****Time: 3Hrs****Max Marks: 100**

All parts of a question must be answered in one place only.

Answer one question from each of Units I to V

Q.No.	Question	Marks	CO	BL
UNIT-I				
Q.1.	Describe the various phases involved in a Machine Learning Project Lifecycle. Illustrate with a neat diagram and explain the purpose of each phase.	20 M	1	3
OR				
Q.2.	Discuss the major types of Machine Learning in detail. Illustrate their architecture, explain their working methodology, list important algorithms, and describe their practical applications.	20 M	1	3
UNIT-II				
Q.3.	Analyze the Linear Regression model by discussing its mathematical foundation, assumptions, optimization techniques, strengths, weaknesses, and applications. Demonstrate its predictive capability through a solved example.	20 M	2	3
OR				
Q.4.	Provide a comprehensive explanation of the Random Forest algorithm, including its architecture, ensemble learning mechanism, decision boundaries, advantages, limitations, and evaluation techniques.	20 M	2	2
UNIT-III				
Q.5.	Discuss Cluster analysis techniques, challenges and advantages and practical applications.	20 M	3	3
OR				
Q.6.	Describe Hierarchical Clustering in detail. Explain agglomerative and divisive approaches, illustrate dendrogram representation, and discuss its applications.	20 M	3	3
UNIT-IV				
Q.7.	Explain the Markov Decision Process (MDP) in detail. Describe states, transition probabilities, reward functions, and policy optimization methods.	20 M	4	2
OR				
Q.8.	Illustrate the SARSA algorithm with a flow diagram. Explain its working process, mathematical equations, and compare it with Q-Learning.	20 M	4	3
UNIT-V				
Q.9.	a Describe the concept of Feature Importance in Explainable AI and explain how it helps interpret machine learning models.	10 M	5	2
	b Explain the LIME and SHAP methods used in Explainable AI and describe how they work.	10 M	5	2
OR				
Q.10.	Explain AdaBoost algorithm in detail and describe its mathematical formulation, iterative learning process and real-world applications.	20 M	5	2

*****End*****

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MCA I Year II Semester (R25) Regular End Semester Examinations - June 2026**EDGE AND FOG COMPUTING**

Time: 3Hrs

Max Marks: 100

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Answer one question from each of Units I to V

Q.No.	Question	Marks	CO	BL
UNIT-I				
Q.1.	Explain the data lifecycle at the edge. Discuss how data is processed and managed in edge environments.	20 M	1	3
OR				
Q.2.	Analyze the roles of edge devices, gateways, MEC servers, and micro data centers in enabling efficient Edge Computing systems.	20 M	1	4
UNIT-II				
Q.3.	Explain K3s and Open Horizon. How are they used for edge orchestration?	20 M	2	3
OR				
Q.4.	Evaluate different Edge Computing platforms and frameworks. Discuss their suitability for IoT, industrial automation, and smart city applications.	20 M	2	4
UNIT-III				
Q.5.	Analyze the use of Edge Computing in autonomous vehicles and edge surveillance systems.	20 M	3	4
OR				
Q.6.	Discuss emerging trends and future research directions in Edge Computing. Explain how standardization efforts influence industrial adoption.	20 M	3	3
UNIT-IV				
Q.7.	Analyze how Fog Computing addresses the limitations of cloud computing in terms of latency, bandwidth utilization, scalability, and real-time processing.	20 M	4	4
OR				
Q.8.	Illustrate the application of Fog Computing characteristics in a smart healthcare or smart city environment.	20 M	4	3
UNIT-V				
Q.9.	Explain Fog Nodes and discuss their hardware and software components.	20 M	5	3
OR				
Q.10.	Explain the OpenFog reference architecture and evaluate its advantages in supporting large-scale IoT deployments.	20 M	5	4

End