

CBCS SCHEME

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21CS71

Seventh Semester B.E./B.Tech Degree Examination, Dec.2024/Jan.2025 Big Data Analytics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Discuss the evolution of Big Data. (06 Marks)
- b. Explain the characteristics of Big Data. (04 Marks)
- c. Explain Data Architecture Design, with a neat diagram. (10 Marks)

OR

- 2 a. Explain Analytics Scalability to Big Data and Massive parallel processing platforms. (12 Marks)
- b. Explain Big Data Analytics applications with one case study. (08 Marks)

Module-2

- 3 a. List and explain the core components of Hadoop. (10 Marks)
- b. Explain Hadoop Distributed File System. (10 Marks)

OR

- 4 a. Define MapReduce Frame work and its functions. (06 Marks)
- b. Explain steps on the request to MapReduce and the types of process in MapReduce. (10 Marks)
- c. Explain in brief on Flume Hadoop Tool. (04 Marks)

Module-3

- 5 a. Explain about No SQL datastore and its characteristics. (10 Marks)
- b. Describe the principle of working of the CAP theorem. (10 Marks)

OR

- 6 a. Demonstrate the working of key- value store with an example. (10 Marks)
- b. Describe the features of MongoDB, and its industrial application. (10 Marks)

Module-4

- 7 a. Explain the process in MapReduce when client submitting a job, with a neat diagram. (10 Marks)
- b. Explain Hive Integration and workflow steps involved with a diagram. (10 Marks)

OR

- 8 a. Using HiveQL for the following :
i) Create a table with partition
ii) Add, rename and drop a partition to a table. (10 Marks)
b. What is PIG in BigData? Explain the feature of PIG. (10 Marks)

Module-5

- 9 a. Explain linear and non-linear relationship with essential graphs in machine learning. (10 Marks)
b. Write the block diagram of text mining process and explain its phases. (10 Marks)

OR

- 10 a. With a neat diagram, write the steps in K-means clustering. (10 Marks)
b. Explain the purpose of web usage analytics and the significance of web graphs. (10 Marks)

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Cloud Computing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, explain cloud computing and its historical development. (10 Marks)
- b. List the characteristics and benefits of cloud computing. (10 Marks)

OR

- 2 a. Explain in brief the services provided by the following cloud service provider:
 - i) Amazon web service
 - ii) Microsoft azure
 - iii) Google AppEngine. (10 Marks)
- b. Write a note on challenges in cloud computing. (10 Marks)

Module-2

- 3 a. Define virtualization and explain hardware level virtualization with its advantages. (10 Marks)
- b. Discuss the taxonomy of virtualization techniques at different levels. (10 Marks)

OR

- 4 a. What are the characteristics of virtualized environment? (10 Marks)
- b. Explain with a neat diagram Type-I and Type-II hypervisor. (10 Marks)

Module-3

- 5 a. Explain the different types of cloud. (10 Marks)
- b. What is IaaS? Explain its reference implementation with a neat diagram. (10 Marks)

OR

- 6 a. Explain the economics of the cloud. (10 Marks)
- b. What does the acronym SaaS mean? How does it relate to cloud computing? (10 Marks)

Module-4

- 7 a. Analyze the various cloud security risks that organization face when utilizing cloud computing services. (10 Marks)
- b. Explain the security risks posed by a management OS. (10 Marks)

OR

- 8 a. Discuss the traditional concept of trust and trust necessary for online activities. (10 Marks)
- b. Explain in detail virtual machine security. (10 Marks)

Module-5

- 9 a. Describe Amazon EC2 and its basic features. (10 Marks)
- b. Analyze how cloud computing technology can be applied to support remote ECG monitoring. (10 Marks)

OR

- 10 a. What is a bucket? What type of storage does it provide? (10 Marks)
- b. Examine the core components of AppEngine. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Internet of Things

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. In the context of Evolution of IoT, with neat diagram, illustrate the sequence of technological developments leading to the shaping of the modern day IoT. (06 Marks)
 b. With diagram, explain enabling IoT and the complex Interdependence of technologies. (08 Marks)
 c. Differentiate between the following :
 (i) IoT versus M₂M.
 (ii) IoT versus CPS.
 (iii) IoT versus WoT. (06 Marks)

OR

- 2 a. With respect to the IoT networking components, define the following :
 (i) IoT NODE.
 (ii) IoT Router.
 (iii) IoT LAN
 (iv) IoT Gateway
 (v) IoT Proxy (10 Marks)
 b. Discuss the following addressing strategies in IoT:
 (i) Address Management Classes. (10 Marks)
 (ii) Addressing during node Mobility. (10 Marks)

Module-2

- 3 a. Define sensors and with diagram, outline the simple sensing operation. (04 Marks)
 b. Discuss Scalar and Vector sensors and draw the functional blocks of a typical sensor node in IoT. (06 Marks)
 c. With neat diagram, explain the different sensing types commonly encountered in IoT. (10 Marks)

OR

- 4 a. Define Actuator and with diagram, discuss the outline of a simple actuation mechanism. (04 Marks)
 b. Explain the various actuators classes any 5 in IoT. (10 Marks)
 c. Discuss actuator characteristics that define all actuators. (06 Marks)

Module-3

- 5 a. List and discuss common data types used in IoT applications. (06 Marks)
 b. Explain the various processing topologies in IoT with necessary diagrams. (08 Marks)
 c. Illustrate the importance of processing in IoT. (06 Marks)

OR

- 6 a. With neat diagram, explain the processing offloading paradigm for the development of IoT-based solutions. (10 Marks)
- b. Determine the importance of choosing the right processing topologies and associated considerations while designing IoT applications. (10 Marks)

Module-4

- 7 a. List common connectivity protocols in IoT. (04 Marks)
- b. Explain the salient features and application scope of any 5 connectivity protocols. (10 Marks)
- c. Differentiate between Wi-Fi and Bluetooth connectivity protocols in IoT. (06 Marks)

OR

- 8 a. With necessary diagrams, explain in detail any four connectivity protocols in IoT. (10 Marks)
- b. Determine the requirements associated with any of IoT connectivity protocols in real-world solutions. (10 Marks)

Module-5

- 9 a. Describe in detail, the various Infrastructure protocols in IoT-based communication technologies. (10 Marks)
- b. Explain the following discovery protocols : (10 Marks)
- (i) Physical Web
 - (ii) mDNS
 - (iii) Universal plug and play (UPnP).

OR

- 10 a. With neat diagram, discuss the illustration of the various facets of the Interoperability in IoT. (10 Marks)
- b. Discuss any four IoT Interoperability standards. (10 Marks)

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Software Architecture and Design Patterns

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is design pattern? Explain essential elements of design patterns. (06 Marks)
- b. Explain how the design pattern catalog is organized. (06 Marks)
- c. Construct and explain the sequence diagram for renewing books in Library system. (08 Marks)

OR

- 2 a. Illustrate how the design patterns and frameworks are different. (06 Marks)
- b. Discuss the step-by-step approach of applying a design pattern effectively with relevant examples. (06 Marks)
- c. Explain the common causes of redesign and its design patterns for addressing them. (08 Marks)

Module-2

- 3 a. Describe the intent, motivation and applicability of adapter design pattern. (08 Marks)
- b. Explain the intent, applicability, structure, participants and collaboration sections of proxy pattern. (12 Marks)

OR

- 4 a. Discuss the consequences and implementation issues of bridge pattern. (08 Marks)
- b. Give the structure of composite pattern. Explain the issues to be considered when implementing the composite design pattern. (12 Marks)

Module-3

- 5 a. Define behavioural patterns. Explain motivation applicability and structure of chain of responsibility. (10 Marks)
- b. Explain when to use momento, observer, state, command and mediator design patterns. (10 Marks)

OR

- 6 a. Discuss the implementation issues of observer pattern. (10 Marks)
- b. Explain motivation, structure and implementation of iterator design pattern. (10 Marks)

Module-4

- 7 a. With a neat diagram, explain MVC architecture and its alternative view. (08 Marks)
- b. What are the benefits of MVC architectural pattern? (06 Marks)
- c. Explain use case for drawing a line. (06 Marks)

OR

- 8 a. Illustrate the sequence of operations involved in drawing a line with a neat diagram. (08 Marks)
b. Explain implementing the undo operation. (06 Marks)
c. Explain the characteristics of architectural patterns in pattern based solutions. (06 Marks)

Module-5

- 9 a. With a neat diagram, explain the basic architecture of client / server systems. (08 Marks)
b. Write short notes on GET and POST methods. (06 Marks)
c. Explain the state transition diagram for issuing a book. (06 Marks)

OR

- 10 a. Describe how the library system can be deployed on the World Wide Web. (08 Marks)
b. Explain the different steps to setup remote object system. (08 Marks)
c. Draw and explain directory structure for Servlet. (04 Marks)

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 NOSQL Database

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Discuss the key difference between NOSQL and Relational databases. (10 Marks)
b. Provide strategies for optimizing data models to improve application performance. (10 Marks)

OR

- 2 a. Explain impendence mismatch problem in the context of data storage, and how does it affect application development. (10 Marks)
b. Describe the concept of schemaless databases and their benefits. (10 Marks)

Module-2

- 3 a. Explain the concepts of Master – Slave and Peer- to – peer replication in distributed databases. (10 Marks)
b. Discuss the importance of version stamp in esuring consistency across multiple nodes in a distributed database. (10 Marks)

OR

- 4 a. Discuss the challenges associated with achieving update consistency in a distributed database system. (10 Marks)
b. Discuss read consistency in distributed databases, considering factors such as staleness and isolation levels. (10 Marks)

Module-3

- 5 a. Provide an example of composing Map-Reduce calculations to process and Analyze data. (10 Marks)
b. Discuss the scalability characteristics of key-value databases. (10 Marks)

OR

- 6 a. Discuss key features of key value stores and their advantages. (10 Marks)
b. Describe the basic structure of data in a key value databases. (10 Marks)

Module-4

- 7 a. Explain fundamental principles of document database. (10 Marks)
b. Discuss the importance of SEO (Search Engine Optimization) in the context of blogging platforms. (10 Marks)

OR

- 8 a. Provide examples of common query operations performed on document databases and explain their significance. (10 Marks)
b. Explain the importance of event logging in web applications with examples. (10 Marks)

Module-5

- 9 a. Discuss the key features of graph databases that make them suitable for handling connected data. (10 Marks)
- b. Identify scenarios where using a graph database may not be appropriate what are the limitations. (10 Marks)

OR

- 10 a. Describe how transactions are handled in graph database. What are the ACID properties are implemented. (10 Marks)
- b. Provide examples of complex queries that can be efficiently executed in graph database. (10 Marks)

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21CS752

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Introduction to AI and ML

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Artificial Intelligence. Explain the below approaches to Artificial Intelligence with respective definitions.
i) Acting Humanly ii) Thinking Humanly (10 Marks)
b. Define Agent. With a neat diagram, explain how agents interact with environment through sensors and actuators. (10 Marks)

OR

- 2 a. Explain the structure of an agent program with an example agent program. (10 Marks)
b. With a neat diagram and agent function, explain the following :
i) Simple Reflex Agents ii) Goal Based Agents (10 Marks)

Module-2

- 3 a. Illustrate with an example, the components of a Well-defined problem. (10 Marks)
b. What are Toy problems and Real-world problems? Explain the formulation of vacuum world problem with a neat diagram of its state space. (10 Marks)

OR

- 4 a. Explain Breadth-First search strategy with a pseudocode for BFS on a graph and simple binary tree. (10 Marks)
b. What is Heuristic search? Explain greedy best-first search with an example. (10 Marks)

Module-3

- 5 a. Discuss different types of Machine Learning with example. (10 Marks)
b. Explain Machine Learning process with a neat diagram. (10 Marks)

OR

- 6 a. Write a note on :
i) Elements of big data ii) Types of data (10 Marks)
b. Explain 4-layer architecture of big data analysis framework. (04 Marks)
c. Write a note on Data Preprocessing step of Big Data processing cycle. (06 Marks)

Module-4

- 7 a. Explain Bivariate data with an example. (03 Marks)
b. Define covariance and correlation. Find the covariance and correlation coefficient of data.
 $X = \{1, 2, 3, 4, 5\}$ and $Y = \{1, 4, 9, 16, 25\}$ (07 Marks)
c. Write the procedure for applying Gaussian elimination method. Solve the following set of equations using Gaussian elimination method:
$$\begin{aligned} 2x_1 + 4x_2 &= 6 \\ 4x_1 + 3x_2 &= 7 \end{aligned}$$
 (10 Marks)

OR

- 8 a. Write Find-S algorithm. Apply Find-S algorithm on the below dataset that contains details of the performance of students and their likelihood of getting a job offer or not in their final semester.

CGPA	Interactiveness	Practical Knowledge	Communication Skills
≥ 9	Yes	Excellent	Good
≥ 9	Yes	Good	Good
≥ 8	No	Good	Good
≥ 9	Yes	Good	Good
Logical Thinking	Interest	Job Offer	
Fast	Yes	Yes	
Fast	Yes	Yes	
Fast	No	No	
Slow	No	Yes	

- b. List the limitations of Find-S algorithm. (10 Marks)
 c. Write K-Nearest-Neighbors (K-NN) algorithm. (03 Marks)
 (07 Marks)

Module-5

- 9 a. What are artificial neurons? Describe the structure of a single neuron with a neat diagram. (04 Marks)
 b. Explain simple model of an artificial neuron. (08 Marks)
 c. Write and explain Perceptron algorithm. (08 Marks)

OR

- 10 a. Elaborate on the types of Artificial Neural Networks. (10 Marks)
 b. Write and explain the algorithm for Radial Basis Function Neural Network. (10 Marks)

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Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Introduction to Big Data

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is HDFS? Explain the components of HDFS (Hadoop Distributed File System). (10 Marks)
- b. Explain the basic commands in HDFS with example. (10 Marks)

OR

- 2 a. Describe the steps of Mapreduce parallel data flow, with a neat diagram. (10 Marks)
- b. Explain the following roles in HDFS deployment with neat diagram: (10 Marks)
 - (i) High availability
 - (ii) Name Node Federation

Module-2

- 3 a. Write a short note on: (10 Marks)
 - (i) Apache pig
 - (ii) Apache HIVE
- b. Explain Apache Sqoop to acquire relational data. (10 Marks)

OR

- 4 a. What is Apache flume? Describe the features, components and working of Apache flume. (10 Marks)
- b. Describe Apache HBase. Describe the important features and with an example. Explain the commands to create the database in Apache HBase. (10 Marks)

Module-3

- 5 a. Explain Data Warehouse architecture with a neat diagram. (10 Marks)
- b. List and explain requirements for a good Data Warehouse. (10 Marks)

OR

- 6 a. Explain different ways for cleaning and preparing the data. (10 Marks)
- b. Explain various Data Mining techniques. (10 Marks)

Module-4

- 7 a. Explain the different steps for constructing the Decision Tree for the data set and predict the outcome for the given question.

Outlook	Temperature	Humidity	Windy	Play
Sunny	Hot	High	False	No
Sunny	Hot	High	True	No
Overcast	Hot	High	False	Yes
Rainy	Mild	High	False	Yes
Rainy	Cool	Normal	False	Yes
Rainy	Cool	Normal	True	No
Overcast	Cool	Normal	True	Yes
Sunny	Mild	High	False	No
Sunny	Cool	Normal	False	Yes
Rainy	Mild	Normal	False	Yes
Sunny	Mild	Normal	True	Yes
Overcast	Mild	High	True	Yes
Overcast	Hot	Normal	False	Yes
Rainy	Mild	High	True	No
Sunny	Hot	Normal	True	??

(10 Marks)

- b. Write the Decision Tree Algorithm and the observations about how the trees are constructed. (10 Marks)

OR

- 8 a. Explain the advantages and disadvantages of Regression model. (10 Marks)
- b. Write a note on:
- (i) Correlations and relationships.
 - (ii) Logistic Regression. (10 Marks)

Module-5

- 9 a. What is text mining? Describe the applications of text mining in different fields. (10 Marks)
- b. Explain the text mining process and architecture. (10 Marks)

OR

- 10 a. Describe the differences between text mining and data mining. (10 Marks)
- b. What is Web mining? Explain different types of web mining. (10 Marks)

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21CS754

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025 Introduction to Data Science

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. List the benefits of Data Science. (05 Marks)
- b. Explain the categories of data used in data science. (07 Marks)
- c. Write a note on NoSQL Databases. (08 Marks)

OR

- 2 a. Define Big data and Data science. List the characteristics of Big data. (04 Marks)
- b. Briefly explain the six steps of data science process. (12 Marks)
- c. Write a short note on Machine learning framework. (04 Marks)

Module-2

- 3 a. How do you set up a research goal and create a project charter. (08 Marks)
- b. Explain the process of Data Cleansing. (12 Marks)

OR

- 4 a. Explain the different ways of combining data. (08 Marks)
- b. How do you transform data suitable for data modeling? (08 Marks)
- c. Mention and show four different types of graphs used in exploratory analysis. (04 Marks)

Module-3

- 5 a. What is Machine learning? Mention its applications. (04 Marks)
- b. Briefly explain the four steps of Modeling Process. (08 Marks)
- c. Why is validation important? Explain three validation strategies. (08 Marks)

OR

- 6 a. List the python libraries to work with data in memory. (06 Marks)
- b. Mention the two common error measures in machine learning. Explain them with an example. (06 Marks)
- c. What do you mean by confusion matrix? Explain with an example. (08 Marks)

Module-4

- 7 a. Explain the different ways of delivering a new insight to end user by data scientists. (06 Marks)
- b. Explain the Javascript libraries available to work on visualization tools. (08 Marks)
- c. What are the reasons against developing your own application? (06 Marks)

OR

- 8 a. State the reasons for creating own custom reports instead of opting company tools. (06 Marks)
- b. Mention the ingredients of a dc.js application and three files created. (08 Marks)
- c. Explain three important reduce functions to write MapReduce logic. (06 Marks)

Module-5

- 9 a. Explain the components of Hadoop framework. (10 Marks)
b. Explain how Hadoop achieves parallelism with an example. (10 Marks)

OR

- 10 a. What is Spark? How does Spark solve the problem of MapReduce. (10 Marks)
b. Explain the components of Spark Framework. (10 Marks)

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