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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 MapRedeuce 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)**

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.

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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21CS72

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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21CS733

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Cryptography and Network Security

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain the simplified model of symmetric encryption. **(06 Marks)**
b. Write a note on types of attack on encrypted message. **(04 Marks)**
c. Explain Feistel encryption and decryption algorithm with neat diagram. **(10 Marks)**

OR

2 a. Using Hill cipher, perform encryption and decryption for plain text = "SAFE MESSAGES" using key = "CIPHERING" **(10 Marks)**
b. Explain with neat diagram the working of DES encryption algorithm. **(10 Marks)**

Module-2

3 a. Explain RSA algorithm. Using RSA algorithm perform encryption and decryption for p = 5, q = 11, e = 3, M = 9. **(10 Marks)**
b. Explain the public key crypto system with neat diagram. **(10 Marks)**

OR

4 a. With a neat diagram, explain the man-in-middle attack. **(10 Marks)**
b. Explain Elgamal cryptosystem. Perform encryption and decryption using :
$q = 19$, $\alpha = 10$, $K = 6$, $M = 17$, $X_A = 5$, $Y_A = 3$ **(10 Marks)**

Module-3

5 a. With relevant diagram, explain the key distribution scenario. **(08 Marks)**
b. Explain with a neat diagram the control vector encryption and decryption. **(06 Marks)**
c. Write a note on exchange of public key certificate. **(06 Marks)**

OR

6 a. Explain the various techniques used for distribution of public key. **(10 Marks)**
b. Write notes on:
(i) Decentralized key distribution (ii) Public key distribution of secret key **(10 Marks)**

Module-4

7 a. Explain X.509 certificate format. **(10 Marks)**
b. Illustrate the block diagram of PKIX architectural model. **(10 Marks)**

OR

8 a. Describe the certification path for forward and reverse certificates of X.509. **(10 Marks)**
b. Explain with a suitable diagram the overview of Kerberos. **(10 Marks)**

Module-5

9 a. Explain confidentiality and authentication for S/MIME functional flow. **(10 Marks)**
b. With a neat diagram, explain ESP packet format. **(10 Marks)**

OR

10 a. Write a note on IKE formats. **(10 Marks)**
b. Explain the architecture of IP/Sec architecture. **(10 Marks)**

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21CS735

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 M_2M.
(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.
(ii) Adressing 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 :
   (i) Physical Web
   (ii) mDNS
   (iii) Universal plug and play (UPnP). **(10 Marks)**

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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21CS743

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

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain the concept of tasks(T), Performance (P) and Experience (E). Describe the following with respect to tasks performance and experience.
i) Checker learning problem
ii) Handwriting recognition learning problem **(12 Marks)**

b. Explain the concept of supervised and unsupervised learning with example. **(08 Marks)**

OR

2 a. Explain the historical trends in deep learning. **(10 Marks)**

b. Define supervised and unsupervised learning algorithm. Describe KNN and K means algorithm. **(10 Marks)**

Module-2

3 a. Explain about gradient based learning. **(10 Marks)**

b. Explain the concept of Back propagation and how it helps in a Neural network. **(10 Marks)**

OR

4 a. Define Regularization. Describe L^1 and L^2 regularization. **(10 Marks)**

b. Given $W = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, $C = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$, $W = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ and $b = 0$ draw feed forward network and evaluate XOR function. **(10 Marks)**

Module-3

5 a. What are the challenges in neural network optimization? **(10 Marks)**

b. Explain the following algorithms
i) RMSProp
ii) RMSProp with momentum. **(10 Marks)**

OR

6 a. Explain stochastic gradient descent and momentum algorithms **(10 Marks)**

b. Give the list of adaptive learning rates algorithms. Write the Ada Grad algorithm. **(10 Marks)**

Module-4

7 a. Explain the following with suitable diagram.
i) Sparse interactions ii) Parameter sharing. **(10 Marks)**

b. Explain briefly variant of the CNN models. **(10 Marks)**

OR

8 a. Differentiate locally connected layers, tiled convolution and standard convolution with suitable example and diagram. **(10 Marks)**

b. Explain the different layers in CNN models and its function with a neat diagram. **(10 Marks)**

Module-5

9 a. Discuss about Bidirectional Recurrent neural networks. **(10 Marks)**

b. What is speech recognition? Explain the different types of speech recognition systems. **(10 Marks)**

OR

10 a. Explain Long Short-Team Memory (LSTM) working principles along with all the equations. **(10 Marks)**

b. What is Natural language processing? Explain different steps involved in NLP. **(10 Marks)**

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21CS745

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 efficiency executed in graph database. **(10 Marks)**

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21CS751

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

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain computer Hardware architecture with neat diagram. **(06 Marks)**

b. Summarize the python terminology interpreter and compiler. **(07 Marks)**

c. What is a program? Illustrate the building blocks of programs. **(07 Marks)**

OR

2 a. Develop a python program which prompts the user for a Celsius temperature, convert the temperature to fahrenheit and print out the converted temperature. **(07 Marks)**

b. Demonstrate the python functions int( ), float( ) and str( ) with example. **(06 Marks)**

c. List and explain the significant features of python programming language. **(07 Marks)**

Module-2

3 a. Explain the different comparison and Boolean operators, along with examples. **(08 Marks)**

b. Summarize syntax and example of using if-else ladder in python. **(06 Marks)**

c. Develop a python program to check whether the given number is odd (or) even. **(06 Marks)**

OR

4 a. Experiment with iteration: while and for, give appropriate examples also for the same. **(08 Marks)**

b. Explain the following with python programme:
i) break ii) Continue. **(08 Marks)**

c. Write a program to find the factorial of a number. **(04 Marks)**

Module-3

5 a. Define function. Explain function calls in python programming with an example. **(08 Marks)**

b. Explain the local and global scope of the variable with a suitable example. **(06 Marks)**

c. Analyze following code and write the output of the following code with relevant explanation.

```
def fred( ):
    print("Zap")
def jane( ):
    print("ABC")
jane( )
fred( )
jane( )
```

(06 Marks)

OR

6 a. Define String. Explain getting the length of a string using len. **(06 Marks)**
   b. Analyze the following with examples:
      i) String slicer
      ii) Strings are immutable. **(10 Marks)**
   c. Summarize string comparison with example. **(04 Marks)**

Module-4

7 a. Explain various list operations with an example. **(08 Marks)**
   b. Explain the following with examples:
      i) Lists and functions
      ii) Lists and strings. **(08 Marks)**
   c. Explain tuples are immutable with an example. **(04 Marks)**

OR

8 a. Explain Dictionaries operations and methods. **(10 Marks)**
   b. Explain the following:
      i) Tuple or return value
      ii) Tuple comprehension. **(10 Marks)**

Module-5

9 a. Explain the following with examples:
      i) Character matching in regular expressions.
      ii) Extracting data using regular expressions. **(12 Marks)**
   b. Illustrate the Escape character. **(08 Marks)**

OR

10 a. Explain the concept of file handling. Also explain reading and writing process with suitable example. **(10 Marks)**
   b. Explain the following:
      i) Errors and Exceptions
      ii) Handling Exceptions. **(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:

$$2x_1 + 4x_2 = 6$$
$$4x_1 + 3x_2 = 7$$

(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	Logical Thinking	Interest	Job Offer
≥ 9	Yes	Excellent	Good	Fast	Yes	Yes
≥ 9	Yes	Good	Good	Fast	Yes	Yes
≥ 8	No	Good	Good	Fast	No	No
≥ 9	Yes	Good	Good	Slow	No	Yes

(10 Marks)

b. List the limitations of Find-S algorithm. **(03 Marks)**

c. Write K-Nearest-Neighbors (K-NN) algorithm. **(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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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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