



SMT. INDIRA GANDHI COLLEGE OF ENGINEERING

An Autonomous Institute with NAAC 'A' Grade
Approved by AICTE, Affiliated to the University of Mumbai.



END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4371142

Subject Name: Blockchain

Subject Code: CSDC7022

Duration: 3 Hours

Branch: Computer Engineering

Date: 30/12/25

Sem: VII

Max Marks: 80

Note:

- 1) Attempt all questions
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks

CO Marks

- Q.1 Answer the following (any two)
- a. What is a Merkle tree? Explain the structure of a Merkle tree CO1 6
 - b. List and explain the components of blockchain technology with examples CO1 6
 - c. Differentiate between public, private and consortium blockchain CO1 6
- Q.2 Answer the following (any two)
- a. What is cryptocurrency wallet? Explain Different types of wallets with suitable examples CO2 6
 - b. Differentiate between k (PoW), (PoS), (PoB), and (PoET) with suitable examples. CO2 6
 - c. Differentiate between Bitcoin, Altcoins and tokens with suitable examples. CO2 6
- Q.3 Answer the following (any two)
- a. What is smart contract? Explain different types and structure of smart contracts? CO3 8
 - b. Explain the role of address and address payable in solidity with example CO3 8
 - c. Explain different visibility specifier of functions in solidity with example CO3 8
- Q.4 Answer the following (any two)
- a. Explain ethereum architecture and workflow in detail. CO4 8
 - b. Explain the main function of the EVM in the Ethereum network. CO4 8
 - c. Describe the types of test networks used in Ethereum. CO4 8
- Q.5 Answer the following (any two)
- a. Explain State machine replication CO5 8
 - b. Explain RAFT consensus algorithm with a suitable example. CO5 8
 - c. Describe Hyperledger fabric architecture and workflow in detail. CO5 8
- Q.6 Answer the following (any ~~one~~ two)
- a. What is Corda? Explain its features and applications. CO6 6
 - b. Explain the working of DeFi applications with suitable examples based on blockchain technology. CO6 8
 - c. Write short notes on Ripple? CO6 4



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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4371112

Subject Name
Subject Code: CSC701
Duration: 3 hours

Machine Learning
Branch: Computer

Date: 20/12/25
Sem: VII
Max Marks: 80

Note:

- 1) Attempt all questions
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks

CO Marks

Q.1 Answer the following (any two)

- a. Explain any four business applications of Machine learning. CO1 4
- b. Differentiate between overfitting and underfitting with suitable examples. CO1 4
- c. Compare Supervised, Unsupervised, and Reinforcement Learning based on data and learning method. CO1 4

Q.2 Answer the following (any Two)

- a. Create a decision tree using Gini Index to classify following dataset for profit. CO2 9

Age	Competition	Type	Profit
Old	Yes	software	Down
Old	No	Software	Down
Old	No	Hardware	Down
Mid	Yes	Software	Down
Mid	Yes	Hardware	Down
Mid	No	Hardware	Up
Mid	No	Software	Up
New	Yes	Software	Up
New	No	Hardware	Up
New	No	Software	Up

- b. Explain Logistic regression and performance evaluation metrics. CO2 9
- c. A clinical trial gave the following data about the BMI and Cholesterol level of 10 patients. CO2 9
Predict the likely value of Cholesterol level for a patient who has BMI of 25.

BMI	19	21	24	28	14	16	23	22	15	18
Cholesterol	140	189	210	240	130	100	135	166	130	170

Q.3 Answer the following (any two)

- a. Compare Bagging and Boosting with reference to ensemble learning. CO3 6
- b. Explain the necessity of cross-validation in machine learning applications CO3 6
- c. Explain the different ways to combine classifiers. CO3 6

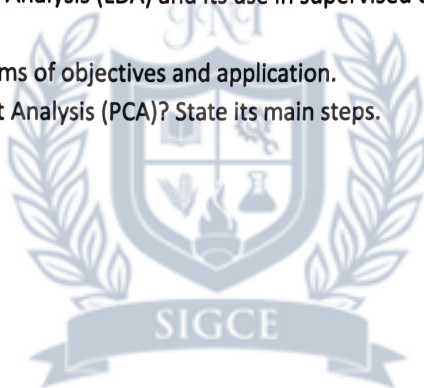


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- Q.4 Answer the following (any two)
- a. Explain the concept of margin and support vector with the help of a neatly labelled diagram. CO4 8
 - b. Describe Multiclass Classification. CO4 8
 - c. What is the Kernel Trick in SVM? CO4 8
- Q.5 Answer the following (any two)
- a. What is Density based clustering? Explain the steps used for clustering task using Density-Based Spatial Clustering of Applications with Noise (DBSCAN) algorithm. CO5 8
 - b. Demonstrate MST (Minimum Spanning Tree) algorithm along with an example. CO5 8
 - c. Cluster the following 6 points into $K = 3$ clusters using K-Means (Euclidean distance). CO5 8
Initial centroids: use points P1, P3 and P4 as the initial centroids.
Points:
 $P1 = (1, 1)$; $P2 = (1.5, 2)$; $P3 = (3, 4)$; $P4 = (5, 7)$; $P5 = (3.5, 5)$; $P6 = (4.5, 5)$
- Q.6 Answer the following (any two)
- a. Describe Linear Discriminant Analysis (LDA) and its use in supervised dimensionality reduction. CO6 5
 - b. Compare PCA and LDA in terms of objectives and application. CO6 5
 - c. What is Principal Component Analysis (PCA)? State its main steps. CO6 5





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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4371151

Subject Name: Cyber Security and Laws		Date: 06/11/2025
Subject Code: ILO 7016	Branch: Computer	Sem: VII
Duration: 3 Hrs		Max Marks: 80

Note:

- 1) Attempt all questions
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks

	CO	Marks
Q.1 Answer the following (any two)		10M
a. Define cybercrime. Explain its origin and evolution with examples.	CO1	5M
b. Describe the objectives and key provisions of the Indian Information Technology Act, 2000 (ITA 2000) in dealing with cybercrimes.	CO1	5M
c. Discuss the ethical, legal, and social implications of cybercrime on individuals and organizations.	CO1	5M
Q.2 Answer the following (any two)		20M
a. What is Social Engineering? Describe various types of social engineering attacks and illustrate how they exploit human psychology rather than technical vulnerabilities.	CO3	10M
b. Discuss the Security Challenges in Cloud Computing. How do virtualization, data privacy, and multi-tenancy increase cyber risks in the cloud environment?	CO3	10M
c. Explain the concept of Botnets. Describe their structure, lifecycle, and how they are used in large-scale attacks such as DDoS and spam campaigns.	CO3	10M
Q.3 Answer the following (any two)		10M
a. Define keyloggers and spyware. Explain how they are installed, what data they collect, and two ways to detect or remove them.	CO4	5M
b. Explain phishing. Describe two common phishing techniques	CO4	5M
c. Differentiate between viruses and worms.	CO4	5M
Q.4 Answer the following (any two)		16M
a. Define E-Commerce. Explain the different models of e-commerce and the legal issues arising from online commercial transactions.	CO3	8M
b. Explain the concept of Cyberspace. Discuss its characteristics, scope, and how it differs from the physical world in terms of jurisdiction and governance.	CO3	8M
c. Describe the Global Trends in Cyber Law. Compare how major countries like the USA, EU, and India handle cyber legislation and data protection.	CO3	8M
Q.5 Answer the following (any two)		12M
a. Describe the responsibilities of intermediaries under Section 79 of the IT Act, 2000 as amended in 2008.	CO2	6M
b. Explain the main objectives and scope of the Indian Information Technology Act, 2000.	CO2	6M
c. Explain the penalties and punishments prescribed under the IT Act, 2000 for offenses such as hacking, identity theft, and publishing obscene material online.	CO2	6M



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- | | | |
|---|-----|-----|
| Q.6 Answer the following (any two) | | 12M |
| a. What is the Sarbanes–Oxley Act (SOX)? Discuss its main objectives | CO4 | 6M |
| b. What is the Health Insurance Portability and Accountability Act (HIPAA)? Explain how it safeguards patient health data and privacy. | CO4 | 6M |
| c. Explain the importance of Information Security Standards and Compliance? Why are such frameworks necessary for modern organizations? | CO4 | 6M |





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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4371143

Subject Name: Blockchain

Subject Code: CSDC7022

Duration: 3 hours

Branch: Computer Engineering

Date: 04/11/2025

Sem: VII

Max Marks: 80

Note:

- 1) Attempt all questions
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks

	CO	Marks
Q.1 Answer the following (any two)		
a. Explain the working principle of a Consensus Protocol in blockchain technology with a suitable diagram.	CO1	6
b. Explain the structure of a block in a blockchain with a neat diagram.	CO1	6
c. Explain the origin and evolution of blockchain technology.	CO1	6
Q.2 Answer the following (any two)		
a. What is Transaction structure? Explain transaction life cycle in detail.?	CO2	6
b. Explain the concept of UTXO Model of Bitcoin.	CO2	6
c. State and explain different types of Cryptocurrencies.	CO2	6
Q.3 Answer the following (any Two)		
a. What is smart contract? What are the different types and structure of smart contracts?	CO3	8
b. Explain the view and pure functions in solidity with suitable examples	CO3	8
c. Explain the role of address payable in solidity with example	CO3	8
Q.4 Answer the following (any Two)		
a. Compare Bitcoin and Ethereum in terms of architecture, purpose, and functionality.	CO4	8
b. Explain in detail the process of sending Ethers using Meta Mask, including wallet setup, gas fees, and transaction confirmation.	CO4	8
c. Explain Mist Wallet in detail	CO4	8
Q.5 Answer the following (any Two)		
a. What is the need for a Private Blockchain? Explain with suitable examples?	CO5	8
b. Compare BFT and PBFT Consensus in detail.	CO5	8
c. Differentiate between PAXOS and RAFT Consensus algorithms	CO5	8
Q.6 Answer the following (any one two)		
a. Explain the architecture and main components of the Corda blockchain platform.	CO6	4
b. Explain the architecture and working of the Quorum blockchain platform.	CO6	4
c. Write short notes on Ripple and explain its main features and working.?	CO6	4



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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code:

4371131

Subject Name: Natural Language Processing

Subject Code: CSDC7013

Duration: 3 Hrs

Branch: Computer Engineering

Date: 01/11/2025

Sem: VII

Max Marks: 80

Note:

- 1) Attempt all questions
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks

CO Marks

- | | | | |
|-----|--|---|----|
| Q.1 | Answer the following (any two) | | |
| | a. Differentiate between syntactic and semantic ambiguity in NLP. | 1 | 3 |
| | b. Explain the architecture of a generic NLP system. | 1 | 3 |
| | c. Name the various levels of NLP giving an example taken through each level. | 1 | 3 |
| Q.2 | Answer the following (any three) | | |
| | a. Describe how FST can be used as morphological parser. | 2 | 6 |
| | b. Explain inflectional morphology for nouns and verbs. | 2 | 6 |
| | c. Explain Good Turing Discount algorithm with an example. | 2 | 6 |
| | d. Apply using Laplace smoothed Bigram model to predict the probability $P(<S> \text{ I learn Java } </S>)$. | 2 | 6 |
| | Given: $<S> \text{ I am a student } </S>$, $<S> \text{ I like to learn Java } </S>$, $<S> \text{ I am studious } </S>$, $<S> \text{ I study in Mumbai } </S>$ | | |
| Q.3 | Answer the following (any two) | | |
| | a. Explain POS and the various POS tagging techniques used in NLP. | 3 | 10 |
| | b. Consider the following corpus: $<S> \text{ Academy/NN test/V athletes/NN } </S>$, $<S> \text{ Athletes/NN wait/V for/P the/ DT result/NN } </S>$, $<S> \text{ Athletes/NN pass/V the /DT test/NN } </S>$.
Compute emission and transition probabilities for a bigram HMM. Also decode the following sentence using Viterbi algorithm. "Athletes wait for the test" | 3 | 10 |
| | c. What is the advantage of CYK parser over other parsers? Explain working of CYK parser with an example. | 3 | 10 |
| Q.4 | Answer the following (any two) | | |
| | a. Explain the various elements of Lexical Semantics with examples. | 4 | 8 |
| | b. Explain Decision List Supervised algorithm for word sense disambiguation. | 4 | 8 |
| | c. Explain unsupervised Hyperlex algorithm for word sense disambiguation. | 4 | 8 |
| Q.5 | Answer the following (any one) | | |
| | a. Explain following syntactic and semantic constraints on coreference –
Recency, Repeated mention, Parallelism and Selectional restriction based on verb and its violation. | 5 | 10 |
| | b. Explain how coreference resolution is performed with Centering algorithm using an example. | 5 | 10 |



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Q.6 Answer the following (any one)

- | | | |
|--|---|----|
| a. Illustrate the working of Information retrieval system using Boolean Information retrieval. | 6 | 10 |
| b. Explain types of Question answering system and illustrate its working. | 6 | 10 |





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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4371122

Subject Name: Big Data Analytics

Date: 30/10/25

Subject Code: CSC702

Branch: Computer Engineering

Sem: VII

Duration: 3.00 Hours

Max Marks: 80

Note:

- 1) Attempt all questions
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks

CO Marks

Q.1 Answer the following (any two)	8
a. Explain V's in big data	CO1 4
b. Explain how big data problems are handled by Hadoop system.	CO1 4
c. What is Limitation of Hadoop	CO1 4
Q.2 Answer the following (any Two)	16
a. Explain Map Reduce execution pipeline with suitable example	CO2 8
b. Write a map reduce pseudo code for word count problem. Illustrate with an example showing all the steps.	CO2 8
c. Explain natural join and grouping and aggregation relational algebraic operation using MapReduce.	CO2 8
Q.3 Answer the following (any Two)	20
a. List and explain the core business drivers behind the NoSQL movement.	CO3 10
b. What is a key-value store? What are the benefits of using a key-value store	CO3 10
c. What is graph store? Give an example where a graph store can be used to effectively solve a particular business problem.	CO3 10
Q.4 Answer the following (any Two)	20
a. Explain DGIM algorithm for counting ones in a stream with example.	CO4 10
b. With a neat sketch, explain the architecture of the data-stream management system.	CO4 10
c. For the stream of integers: 9, 8, 7, 6, 5, 4, 3, 2. Use the hash function, $h(x)=(2x+1) \bmod 32$ and treat the result as a 5-bit binary integer. Show the steps of the Flajolet-Martin algorithm to estimate the number of distinct elements in this stream.	CO4 10
Q.5 Answer the following (any two)	8
a. Define collaborative filtering. Using an example of an e-commerce site like flipkart or amazon	CO5 4
b. Justify the use of a Content-Based Recommendation System with a specific case study.	CO5 4
c. Explain Girvan-Newman Algorithm.	CO5 4



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Q.6 Answer the following (any two)

- a. List and explain various functions that allow users to handle data in R workspace with appropriate examples.
- b. List and discuss various types of data structures in R
- c. Give any one example of,while and for loop in R.

8
CO6 4
CO6 4
CO6 4





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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4371111

Subject Name
Subject Code: CSC701
Duration: 3 hours

Machine Learning
Branch: Computer

Date: 28/10/2025
Sem: VII
Max Marks: 80

Note:

- 1) Attempt all questions
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks

CO Marks

Q.1 Answer the following (any two)

- | | | |
|---|-----|---|
| a. What are the issues in Machine Learning ? | CO1 | 4 |
| b. Explain training error and generalization error. | CO1 | 4 |
| c. How to choose the right ML algorithm? | CO1 | 4 |

Q.2 Answer the following (any two)

- | | | |
|--|-----|---|
| a. Write detailed notes on Performance Metrics for Classification | CO2 | 9 |
| b. Consider the example below where the mass, y (grams), of a chemical is related to the time, x (seconds), for which the chemical reaction has been taking place according to the table. Find the equation of the regression line. Also explain performance evaluation measures for regression. | CO2 | 9 |

Time (x sec)	5	7	12	16	20
Mass (y grams)	40	120	180	210	240

- | | | |
|---|-----|---|
| c. Demonstrate the CART method with an example. | CO2 | 9 |
|---|-----|---|

Q.3 Answer the following (any two)

- | | | |
|--|-----|---|
| a. Explain the Random Forest algorithm in detail. | CO3 | 6 |
| b. Write a short note on XG Boost ensemble method. | CO3 | 6 |
| c. Explain K-fold cross-validation in detail. | CO3 | 6 |

Q.4 Answer the following (any two)

- | | | |
|---|-----|---|
| a. Explain Support Vector Machine as constraint optimization problem. | CO4 | 8 |
| b. Explain kernel trick in Support Vector Machine. | CO4 | 8 |
| c. Explain Support Vector Regression (SVR). | CO4 | 8 |

Q.5 Answer the following (any two)

- | | | |
|---|-----|---|
| a. Explain the concept of Expectation Maximization Algorithm. | CO5 | 8 |
| b. Explain Clustering with minimal spanning tree along with example. | CO5 | 8 |
| c. Using k-means algorithm, cluster the following 8 samples into 3 clusters: $A_1=(2,10)$, $A_2=(2,5)$, $A_3=(8,4)$, $A_4=(5,8)$, $A_5=(7,5)$, $A_6=(6,4)$, $A_7=(1,2)$, $A_8=(4,9)$. Consider the initial seeds (centers | CO5 | 8 |



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of each cluster) are A1, A4 and A7. Run the k-means algorithm for 1 epoch only and evaluate new cluster centroids.

Q.6 Answer the following (any two)

- | | | |
|---|-----|---|
| a. What is Principal Component Analysis (PCA)? State its main steps. | CO6 | 5 |
| b. Explain how dimensionality reduction helps in improving computational efficiency and reducing overfitting. | CO6 | 5 |
| c. Explain the difference between feature selection and feature extraction in dimensionality reduction. | CO6 | 5 |





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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 42711563

Date: 06/11/2025

Subject Name: Computer security and Laws

Subject Code: ILO7016

Branch: BE CSE- AIML

Sem: VII

Duration: 3 Hrs

Max Marks: 80

Note:

- 1) Attempt all questions.
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

Marks

Q.1 Answer the following (any two)	CO1 8
a. Explain phishing. Describe its common techniques and one method to prevent it.	4
b. Describe the need for information security in today's digital era to prevent cybercrimes.	4
c. Classify cybercrimes and explain different categories with relevant examples.	4
Q.2 Answer the following (any four)	CO2 20
a. Explain the key provisions of the Information Technology Act, 2000.	5
b. Define the term "attack vector." Explain different types of attack vectors used by cybercriminals.	5
c. Explain NERC compliance and its importance for critical infrastructure security.	5
d. Explain the concept of cyber stalking. Discuss preventive measures against it.	5
e. What are attacks on wireless networks?	5
Q.3 Answer the following (any three)	CO3 12
a. Explain Steganography. How is it misused in cybercrime and how can investigators detect it?	4
b. Discuss common attacks on wireless networks. Explain two vulnerabilities and corresponding security measures.	4
c. What is password cracking? Explain two common password cracking methods and countermeasures.	4
d. Explain SQL injection attacks. Describe how they work and list two secure coding practices to prevent them.	4
Q.4 Answer the following (any four)	CO4 16
a. Discuss the intellectual property (IP) aspects of cyber law. Explain how digital content and software are protected under IP rights.	4
b. Explain the security aspects of cyber law. How does it ensure data protection and privacy?	4
c. Explain the concept of cyberspace. Discuss its significance in today's digital world.	4
d. What is need of Indian Cyber Laws?	4
e. What is legal framework of electronic data?	4
Q.5 Answer the following (any three)	CO5 12
a. Explain the penalties prescribed under the IT Act, 2000 for various cyber offenses.	4
b. What is difference between VIRUS and WORM?	4