

(AUTONOMOUS)
MSc (SS) DEGREE EXAMINATION MAY 2026
(Ninth Semester)

Branch - **SOFTWARE SYSTEMS (Five Years Integrated)**

DATA SCIENCE

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(5 x 1 = 5)

- 1 Which measure is a central tendency measure?
(i) Range (ii) Variance
(iii) Mean (iv) Standard Deviation
- 2 Which database supports large-scale parallel processing?
(i) Single-user DB (ii) Parallel database
(iii) Spreadsheet (iv) File system
- 3 What does EM stand for?
(i) Expectation-Maximization (ii) Error Maximization
(iii) Equal Mean (iv) Estimation Method
- 4 Find the decomposition used in Gauss–Markov theorem computation:
(i) Gradient Descent (ii) Normal Equation
(iii) K-Means (iv) Decision Tree
- 5 Find the technique used to detect groups in a network:
(i) Clustering (ii) Community Detection
(iii) Regression (iv) Sampling

SECTION - B (15 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 x 3 = 15)

- 6 a Evaluate different sampling techniques.
OR
b Explain the difference between population and sample.
- 7 a Analyze the working principle of MapReduce.
OR
b Classify types of NoSQL databases with examples.
- 8 a Determine the dimension of a subspace.
OR
b Discuss advantages of spline regression.
- 9 a Illustrate QR factorization of a matrix.
OR
b Prepare a short note on SVD.
- 10 a Evaluate challenges in opinion mining.
OR
b Justify the importance of privacy protection.

Cont...

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

11 a Elucidate the concept of normal distribution.

OR

b Appraise the impact of data cleaning on model accuracy.

12 a Compare MapReduce with traditional database query processing.

OR

b Classify components of the Hadoop ecosystem and explain their roles.

13 a Analyze the working of the EM algorithm.

OR

b Compare linear regression and spline regression.

14 a Classify the assumptions of the Gauss–Markov Theorem.

OR

b Compare QR decomposition and SVD.

15 a Classify ethical issues in data science and explain each with examples.

OR

b Formulate an ethical strategy for collaborative network analysis.

Z-Z-Z

END

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Branch – **SOFTWARE SYSTEMS (five year integrated)**

MAJOR ELECTIVE COURSE – III INFORMATION RETRIEVAL

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Which factor directly influences document length normalization in TF-IDF weighting?
 - (i) Collection frequency
 - (ii) Term rank
 - (iii) Vocabulary size
 - (iv) Vector magnitude of the document
- 2 Identify the key feature that distinguishes the Extended Boolean Model from the classical Boolean model.
 - (i) Strict binary matching
 - (ii) Exact AND/OR evaluation
 - (iii) No ranking mechanism
 - (iv) Partial matching with term weights
- 3 Find the classifier that assumes conditional independence among features given the class label.
 - (i) kNN
 - (ii) Naive Bayes
 - (iii) Support Vector Machine
 - (iv) Rocchio
- 4 Which algorithm assigns separate hub and authority scores to web pages?
 - (i) PageRank
 - (ii) SALSA
 - (iii) HITS
 - (iv) TrustRank
- 5 What technique extracts semantic relationships such as “works-for” or “located-in” from text?
 - (i) Relation Extraction
 - (ii) Named Entity Recognition
 - (iii) Query Expansion
 - (iv) Co-reference Resolution

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a. Explain the process of index term selection using a thesaurus.
OR
b. Discuss tokenization with a simple example.
- 7 a. Explain the major retrieval models used in IR systems.
OR
b. Illustrate the process of ranked retrieval.
- 8 a. Apply query expansion to improve a given search query.
OR
b. Determine how Rocchio algorithm updates the query vector.

Cont...

- 9 a Explain how near-duplicate web pages are classified and detected.
OR
b Illustrate content-based recommendation with a simple example.
- 10 a Determine how co-reference resolution helps in integrating web documents.
OR
b Assume a web page containing product details. Explain how relation extraction can be applied.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Interpret the effectiveness of Porter's stemming algorithm in improving retrieval performance.
OR
b Elucidate the role of stop-word removal in improving indexing efficiency.
- 12 a Analyze the effectiveness of TF-IDF weighting in ranked retrieval systems.
OR
b Survey the limitations of Boolean matching in large-scale information retrieval.
- 13 a Assess the accuracy of Naive Bayes and kNN classifiers for text categorization.
OR
b Justify the need for dimensionality reduction using LSI and PCA.
- 14 a Justify the need for duplicate detection in modern web search engines.
OR
b Evaluate the role of relevance feedback in information filtering systems.
- 15 a Formulate a strategy to improve accuracy in Named Entity Recognition.
OR
b Develop a web mining framework for information integration.

Z-Z-Z

END

MSc (SS) DEGREE EXAMINATION MAY 2026
(Ninth Semester)

Branch – **SOFTWARE SYSTEMS (Five Years Integrated)**

INTRODUCTION TO MULTIMEDIA

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(5 x 1 = 5)

1. Multimedia is widely used to add special _____ to movies.
(i) effects (ii) arrangement
(iii) attachment (iv) control
2. Which of the following format of video compression was used for efficient coding of video sequence?
(i) MPEG-1 (ii) MPEG-2
(iii) MPEG-3 (iv) MPEG-4
3. Which of the following format of video compression was used for efficient coding of video sequence?
(i) 10:1 (ii) 4:1
(iii) 5:1 (iv) 6:1
4. _____ is basically a form of pictorial presentation.
(i) Drawings (ii) Animations
(iii) creativity (iv) photo
5. Adobe flash software platform is used for _____.
(i) production of hardware (ii) production of middle ware.
(iii) production of animations (iv) production of software

SECTION - B (15 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 x 3 = 15)

6. a. Explain the elements of multimedia.
OR
b. Discuss about animation principle & techniques.
7. a. Illustrate the video formats.
OR
b. Explain the video compression.
8. a. Discuss about audio basics.
OR
b. Explain the sound card with neat diagram.

Cont...

9. a. Justify the concepts of warping.
OR
b. Discuss about project planning.
10. a. Explain the macromedia flash basics.
OR
b. Survey the concepts of publishing & exploring.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

11. a. Examine the application of multimedia.
OR
b. Explain multimedia in broadcast application.
12. a. Explain the video hardware.
OR
b. Discuss about video conversion.
13. a. Illustrate audio formats resolution.
OR
b. Discuss about electronic music & synthesize.
14. a. Explain morphing.
OR
b. Justify the concepts of onion skinning.
15. a. Justify adding sound & working with objects.
OR
b. State the points on creating animation & interactivity.

Z-Z-Z

END

Branch – SOFTWARE SYSTEMS (Five Years Integrated)

SOCIAL NETWORK ANALYSIS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 _____ in a network is referred to as social contagion, because it spreads from one person to another in the style of a biological epidemic.
(i) Structural effects (ii) Population effects
(iii) Cascading behavior (iv) Strategic interaction
- 2 A link represents _____ communication, if the user both sent messages to the friend at the other end of the link, and also received messages from them during the observation period.
(i) one-way (ii) reciprocal
(iii) maintained relationship (iv) All the above
- 3 In SIS Epidemic model, which of the following state is not present?
(i) Susceptible (ii) Removed (iii) Infections (iv) Life cycle
- 4 _____ is the amount of money it expects to receive on average each time a user clicks on one of its ads and arrives at its site.
(i) Click through rate (ii) Valuation for the item
(iii) Revenue per click (iv) Market clearing price
- 5 Authority update-rule refers to _____
(i) The intuition behind authorities is based on the idea that pages play multiple roles in the network
(ii) The intuition behind Page rank starts with simple voting based on in-links
(iii) For each page p, update hub(p) to be the sum of the authority scores of are pages that it points to
(iv) For each page p, update auth(p) to be the sum of the hub scores of all pages that point to it

SECTION – B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Discuss the types of networks.
OR
b Illustrate the tools for visualizing network data.
- 7 a Show the mechanisms underlying Homophily.
OR
b Explain the structural balance in positive and negative relationships.
- 8 a Illustrate the Cascades and Clusters.
OR
b Explain the SIR Epidemic model.

Cont...

- 9 a Show the results of Network Exchange experiments
OR
b How Advertising can be used as a matching market?
- 10 a Discuss the Spectral analysis of Hubs and Authorities.
OR
b Illustrate Link analysis for web mining

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

- 11 a Explain Population effects in Network dynamics
OR
b Write short notes on Nodes, edges and paths in Graph theory
- 12 a Analyze Triadic closure and reasons for triatic closure.
OR
b Discuss structural holes in strong and weak ties.
- 13 a Illustrate Rich-Get-Richer Models.
OR
b Analyze a model for decentralized search.
- 14 a Discuss Dependence exclusion and satiation with suitable example of a powerful network position.
OR
b Illustrate setting prices through an auction.
- 15 a Summarize Page Rank with suitable example.
OR
b Discuss Random walks.

Z-Z-Z

END

(AUTONOMOUS)
MSc (SS) DEGREE EXAMINATION MAY 2026
(Ninth Semester)

Branch – **SOFTWARE SYSTEMS (Five Years Integrated)**

MODERN DATABASE SYSTEMS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(5 x 1 = 5)

- 1 Which component is crucial for optimizing distributed queries?
(i) Data replication (ii) Indexing
(iii) Query decomposition (iv) Data compression
- 2 What is the primary advantage of NoSQL databases for big data?
(i) Strong consistency (ii) Scalability
(iii) Limited schema flexibility (iv) High disk space usage
- 3 Which NoSQL model is most suited for time-series data?
(i) Key-value store (ii) Document store
(iii) Column-oriented store (iv) Graph store
- 4 Which of the following use cases is best suited for a graph database?
(i) Storing large documents (ii) Social network analysis
(iii) Financial transactions (iv) Simple key-value data storage
- 5 Microsoft Azure is a platform primarily used for:?
(i) Local database management (ii) Cloud computing and storage
(iii) Real-time analytics (iv) Graph database operations

SECTION - B (15 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 x 3 = 15)

- 6 a Discuss about the SPARC Architecture.
OR
b Classify the Data Model and its types with suitable examples.
- 7 a State the Basic Principles of NoSQL models.
OR
b Differentiate the SQL Databases and NoSQL Databases.
- 8 a Illustrate the Hbase Architecture.
OR
b Criticize about the Concepts of Orient DB with example.

Cont...

- 9 a Justify in detail about the XML databases.
OR
b Elucidate about the Apache Hadoop Architecture.
- 10 a Design the Microsoft Azure in detail.
OR
b Justify about Automatic Schema Matching.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Illustrate the Distributed Query Processing and Optimization.
OR
b Explain the Architecture of parallel databases.
- 12 a Determine the NoSQL data Models with example.
OR
b Classify the various types of NOSQL database.
- 13 a Discuss about the Amazon DynamoDB NoSQL database service.
OR
b Evaluate the in-memory Key-value store in NoSQL.
- 14 a Elucidate the MongoDB in detail.
OR
b Appraise the Structure and features of Neo4j.
- 15 a Evaluate in detail about XML Schema Embedding.
OR
b Sketch about the Data Warehouse Integration.

Z-Z-Z

END

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**MSc (SS) DEGREE EXAMINATION MAY 2026
(Ninth Semester)**

Branch - SOFTWARE SYSTEMS (Five Years Integrated)

DISCIPLINE SPECIFIC ELECTIVE - IV: BIG DATA ANALYTICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

- 1) Which technology is most closely related to Big Data for storage and computation?

a) Cloud Computing	b) Edge Computing
c) Grid Computing	d) Embedded Systems
- 2) HDFS stands for _____

a) High Data File Storage	b) Hadoop Distributed File System
c) Hadoop Data Flow System	d) High Distributed File Structure
- 3) Which of the following is not a data transportation method?

a) Data pipelines	b) Network transfers
c) Physical shipment	d) Data ignoring
- 4) Which model is used for stream data representation?

a) Static model	b) Stream data model
c) Batch model	d) Time-independent model
- 5) Which of the following is an example of structured Big Data application?

a) Database records	b) Social media images
c) Audio transcripts	d) Video streams

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

- 6) a) Explain the main challenges in big data.
OR
b) Elaborate the need of big data value.
- 7) a) Narrate the salient features of NoSql database.
OR
b) Determine the purpose of Flume in Hadoop ecosystem.
- 8) a) Summaries the specification of bio-medical data.
OR
b) Illustrate the data pre-processing in big data acquisition.
- 9) a) State the benefits of stream computing.
OR
b) Discuss the counting distinct elements in a stream.
- 10) a) Show the Map-Reduce for machine learning
OR
b) Highlight the application of social network.

Cont...

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

11) a) Analyze the relationship between cloud computing and big data.

OR

b) Enumerate the evolution of database.

12) a) Discuss the implementation of Hadoop Eco system.

OR

b) Elucidate the general requirements of Mahout.

13) a) Compare and construct the enterprise data and IoT data.

OR

b) Examine the data transportation in big data acquisition.

14) a) Discover the general architecture of stream data model.

OR

b) Assume the Real Time Analytics Platforms (RTAP) applications.

15) a) Elucidate the Nearest Neighbour Classifier with example.

OR

b) Determine the application of health care and medical.

Z-Z-Z END

Branch – SOFTWARE SYSTEMS (FIVE YEARS INTEGRATED)

PROGRAMMING IN PYTHON

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Identify the statement used to skip the current loop iteration. (i) break (ii) pass (iii) continue (iv) exit	K1	CO1
	2	Predict the output type of 5/2 in Python 3. (i) int (ii) float (iii) complex (iv) boll	K2	CO1
2	3	Identify how a dictionary stores data? (i) Index-value (ii) Key-value (iii) Value-value (iv) Key-index	K1	CO2
	4	Show which data structure does not allow duplicate elements? (i) List (ii) Tuple (iii) Dictionary (iv) Set	K2	CO2
3	5	Identify a class is a _____ of objects (i) Instance (ii) Blueprint (iii) Variable (iv) Function	K1	CO3
	6	Express the use of Operator overloading (i) Code duplication (ii) Code readability (iii) Execution time (iv) Memory usage	K2	CO3
4	7	Identify the keyword that is used to import all names from a module (i) Include (ii) from module import * (iii) import all (iv) load module	K1	CO4
	8	Show which standard library module provides operating system interfaces? (i) sys (ii) math (iii) os (iv) pathlib	K2	CO4
5	9	What is the core data structure in NumPy ? (i) list (ii) tuple (iii) ndarray (iv) Series	K1	CO5
	10	Show the use of Numpy funtion dot() (i) Element-wise multiplication (ii) Matrix multiplication (iii) Sorting arrays (iv) Indexing arrays	K2	CO5

Cont...

SECTION - B (35 Marks)
 Answer ALL questions
 ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain different data types available in Python with suitable examples.	K4	CO1
		(OR)		
	11.b.	Figure out the use of break and continue statements in loops with sample programs.		
2	12.a.	Explain dictionary operations to store and retrieve student details in a program.	K5	CO2
		(OR)		
	12.b.	Prescribe a user-defined function to perform arithmetic operations.		
3	13.a.	Analyse the execution flow in multilevel inheritance.	K4	CO3
		(OR)		
	13.b.	Examine how polymorphism is achieved using operator overloading.		
4	14.a.	Evaluate the advantages of using Python standard library modules.	K5	CO4
		(OR)		
	14.b.	Assess the benefits of organising code into packages.		
5	15.a.	Create a Matplotlib program to visualize given data using different chart.	K6	CO5
		(OR)		
	15.b.	Construct a small data analysis task using NumPy ndarray operations.		

SECTION - C (30 Marks)

Answer ANY THREE questions
 ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Analyze the various decision-making statements in Python and illustrate their usage with examples.	K4	CO1
2	17	Prescribe a program that reads data from a file, processes it, and writes the results into another file.	K5	CO2
3	18	Analyse multiple inheritance with an example and explain the flow of control.	K4	CO3
4	19	Explain how to create modules and packages?	K5	CO4
5	20	Recommend a Python application that reads multiple CSV files using Pandas and generates summarized analytical reports.	K6	CO5

Z-Z-Z

END

Branch – **SOFTWARE SYSTEMS (FIVE YEARS INTEGRATED)**

AGILE SOFTWARE DEVELOPMENT

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Identify what agile computing primarily emphasizes: (i) Strict documentation (ii) Heavy upfront design (iii) Adaptability and collaboration (iv) Rigid processes	K1	CO1
	2	Show which of the following is not an agile process model? (i) Extreme Programming (ii) Scrum (iii) Waterfall (iv) Crystal	K2	CO1
2	3	Recall what effective team communication in agile promotes. (i) Isolation (ii) Delays (iii) Cooperation (iv) Bureaucracy	K1	CO2
	4	Interpret what is meant by Teams Functioning as eco systems. (i) Static roles (ii) Interdependent relationships (iii) Individual work only (iv) Fixed processes	K2	CO2
3	5	State what Self-adapting systems in agile respond to? (i) Static environments (ii) Changing requirements (iii) Fixed plans (iv) No feedback	K1	CO3
	6	Explain the key values of the Agile Manifesto (i) Processes over people (ii) Documentation over working software (iii) Customer collaboration (iv) Contract negotiation	K2	CO3
4	7	Identify what Extreme Programming (XP) focuses on: (i) Documentation (ii) Pair programming and TDD (iii) Fixed roles (iv) Long releases	K1	CO4
	8	Show the focus areas of Crystal methodology (i) Team size and criticality (ii) Tools and techniques (iii) Documentation (iv) Fixed processes	K2	CO4
5	9	Identify where Agile testing is integrated with: (i) Deployment only (ii) Development process (iii) Maintenance phase (iv) Design phase only	K1	CO5
	10	Explain how Test Driven Development begins (i) Writing code (ii) Writing tests (iii) Refactoring (iv) Documentation	K2	CO5

Cont...

Module No.	Question No.	Question	K Level	CO
1	11.a.	Elaborate the problems associated with parsing experience in agile environments.	K4	CO1
		(OR)		
	11.b.	Determine the role of individuals in agile development.		
2	12.a.	Explain the importance of communication and cooperation in agile teams.	K5	CO2
		(OR)		
	12.b.	Illustrate the teams as ecosystems with suitable example.		
3	13.a.	Show the application of agile outside software development.	K6	CO3
		(OR)		
	13.b.	Evaluate the features of Crystal Orange Web.		
4	14.a.	Discuss the Extreme Programming (XP) and its core practices.	K4	CO4
		(OR)		
	14.b.	Assume the functions of Crystal process model.		
5	15.a.	State the benefits of Test Driven Development (TDD)	K5	CO5
		(OR)		
	15.b.	Organize the role of continuous integration in agile testing.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Analyze the three levels of listening and their role in effective agile communication.	K4	CO1
2	17	Examine the teams as communities in agile development.	K5	CO2
3	18	Outline the need of programming as theory building.	K6	CO3
4	19	Demonstrate the importance of Feature Driven Development (FDD).	K4	CO4
5	20	Conclude the agile lifecycle and its impact on testing.	K5	CO5

Z-Z-Z

END

Branch – **SOFTWARE SYSTEMS (FIVE YEARS INTEGRATED)**

MAJOR ELECTIVE COURSE – II BIG DATA ANALYTICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What are all the four characteristics of Big Data? (i) Volume, Variance, Velocity, Value (ii) Volume, Variety, Velocity, Value (iii) Volume, Data, Redundancy, Confidentiality (iv) Volume, Scalability, Energy, Value	K1	CO1
	2	How Apache Hadoop define _____ as "datasets which could not be captured, managed and processed by general computers within an acceptable scope". (i) Data Analysis (ii) Big Data (iii) Social Networks (iv) Database	K2	CO1
2	3	Choose: means the delivery and use mode of IT infrastructure that is acquiring necessary resources through the Internet on-demand or in an expandable way. (i) Grid Computing (ii) Big Data (iii) Cloud Computing (iv) Capacity	K1	CO2
	4	Show which of the following is the advantage of Hadoop? (i) Distributed Processing (ii) Centralized Management (iii) Strong Flexibility (iv) IoT enabled	K2	CO2
3	5	What is the first step of big data, specifically, it is large-scale, highly diverse and complex datasets generated through longitudinal and distributed data sources. (i) Data acquisition (ii) Data generation (iii) Data Distribution (iv) All the above	K1	CO3
	6	Show which is a widely used network data packet capture function library (i) Log files (ii) Cloud Computing files (iii) Mobile technology (iv) Libpcap	K2	CO3
4	7	State the term unbounded data refers to _____ (i) Data is often represented as series of events (ii) technique used to segment data streams over time (iii) Data flows continuously without a defined start or end (iv) All the above	K1	CO4
	8	Infer which layer responsible for collecting data streams from the sources and making them available for processing by the stream processing engine (i) Ingestion layer (ii) Data Sources (iii) Data Routing (iv) Data Transformation	K2	CO4
5	9	Which among the following is the next generation power grid constituted by traditional energy networks integrated with computation, communications and control for optimized generation, supply and consumption of electric energy (i) Grid Computing (ii) Smart Grid (iii) Collective Intelligence (iv) Social Networking	K1	CO5

Cont...

5	10	Identify which aims to automatically retrieve, extract and evaluate information from web documents and services so as to discover useful knowledge. (i) Web content (ii) Web Analysis (iii) Supervised learning (iv) Web structured mining	K2	CO5
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SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Illustrate the development of Big Data.	K2	CO1
		(OR)		
	11.b.	Discuss the Big Data era and its characteristics.		
2	12.a.	Demonstrate the relationship between Cloud computing and big data.	K3	CO2
		(OR)		
	12.b.	Show the usage of Data Center.		
3	13.a.	Examine Enterprise data in Big Data generation.	K3	CO3
		(OR)		
	13.b.	Explore Internet Data and Bio-medical Data.		
4	14.a.	Explain Stream Computing.	K4	CO4
		(OR)		
	14.b.	Analyze about the sampling data in a stream.		
5	15.a.	Explain Big Data Application evolution.	K5	CO5
		(OR)		
	15.b.	Defect Map Reduce for machine learning.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Briefly explain Intelligent Data Analysis and nature of data.	K4	CO1
2	17	Analyse Hadoop preliminaries and NoSQL.	K4	CO2
3	18	Explain Data Collection process in a step by step manner.	K4	CO3
4	19	Examine Real Time Analytics Platform (RTAP) applications.	K4	CO4
5	20	Compare and contrast Web Data Analysis and Multimedia Data Analysis.	K4	CO5

Z-Z-Z

END

MAJOR ELECTIVE COURSE – I: DESIGN AND ANALYSIS OF ALGORITHMS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. The allowed balance factor values in an AVL tree are
 (i) -2, -1, 0, 1, 2 (ii) -1, 0, 1 (iii) 0, 1 (iv) Only 0
2. In a Splay Tree, after searching an element
 (i) It remains in the same position (ii) It is deleted
 (iii) It is moved to the root (iv) It becomes a leaf
3. Divide and Conquer is mainly used to
 (i) Simplify problems recursively (ii) Reduce memory
 (iii) Avoid recursion (iv) Increase complexity
4. The all-pairs shortest path problem is solved using:
 (i) Dijkstra's algorithm (ii) Floyd-Warshall algorithm
 (iii) Prim's algorithm (iv) Kruskal's algorithm
5. Objective of 0/1 Knapsack problem
 (i) Minimize weight (ii) Find shortest path
 (iii) Sort items (iv) Maximize profit within capacity

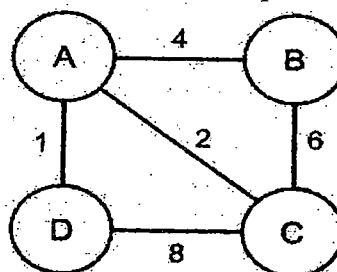
SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a. Apply Master's Theorem to solve the recurrence:
 $T(n) = 2T(n/2) + nT(n) = 2T(n/2) + nT(n) = 2T(n/2) + n$
 OR
 b. Analyze the characteristics of AVL Tree
7. a. Given a Splay Tree, apply the search operation for an element and demonstrate the sequence of rotations (Zig, Zig-Zig, Zig-Zag).
 OR
 b. Describe indexed sequential access with a suitable example and explain its working mechanism, advantages, and disadvantages.
8. a. Analyze the time complexity of Strassen's matrix multiplication and compare it with the standard matrix multiplication method.
 OR
 b. Apply Prim's algorithm to construct the Minimum Spanning Tree starting from vertex A.



9. a. Apply the dynamic programming approach to find the Longest Common Subsequence of the strings: X = "ABCB" and Y = "BDC".
 OR
 b. Analyze the relationship between P, NP, NP-Complete.

Cont...

used to solve it.

OR

- b. Explain the Branch and Bound approach for solving the Travelling Salesman Problem. Illustrate with the following 4-city cost matrix:

From \ To	A	B	C	D
A	∞	10	15	20
B	10	∞	35	25
C	15	35	∞	30
D	20	25	30	∞

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 x 6 = 30)

- 11 a. a Assess a scenario where Master's Theorem cannot be applied. Justify alternative approaches for solving such recurrences.

OR

- b. Insert 1,2,3,4,5,6 and 7 in a empty AVL tree. Compare with Binary Search Tree

- 12 a. Assess the importance of amortized analysis in understanding the real performance of Splay Trees

OR

- b. Insert the keys 12, 19, 15, 6, 35 into a B-Tree of order 3.

13. a Construct a Huffman tree for the given set of characters with frequencies: A: 4, B: 5, C: 9, D: 6, E: 3 and determine the Huffman codes for each character.

OR

- b. Evaluate whether Merge Sort or Quick Sort is more suitable for large datasets and justify your answer.

14. a. Analyze how the Dynamic Programming approach reduces the complexity of the Traveling Salesman Problem

OR

- b. Analyze the role of polynomial-time reductions in proving that a problem is NP-Complete.

15. a. Apply the dynamic programming approach to solve the 0/1 Knapsack problem for the following data:

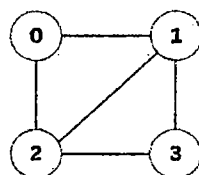
Item	Weight	Profit
1	1	8
2	3	18
3	4	20
4	2	12

Knapsack capacity = 5

- Construct the DP table
- Determine the maximum profit

OR

- b. Apply graph coloring to color the vertices of a given graph using the minimum number of colors



Z-Z-Z

END

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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2026
(Eighth Semester)

Branch – **SOFTWARE SYSTEMS (Five Year integrated)**

DEEP LEARNING

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(5 x 1 = 5)

- 1 Find where the Back propagation algorithm is used
 - (i) Perceptron only
 - (ii) Auto encoders and Deep Neural Networks
 - (iii) KNN
 - (iv) Decision Trees
- 2 Identify the use of Adam optimizer
 - (i) Data cleaning
 - (ii) Network optimization
 - (iii) Image resizing
 - (iv) Feature selection
- 3 Choose the application for which AlexNet is mainly known for
 - (i) Image classification
 - (ii) Speech recognition
 - (iii) Text translation
 - (iv) Time series prediction
- 4 A Monte Carlo method is based on _____
 - (i) Deterministic rules
 - (ii) Random sampling
 - (iii) Gradient descent
 - (iv) Backpropagation
- 5 Find the main characteristics of Big Data
 - (i) Small size data
 - (ii) Structured data only
 - (iii) Large volume, velocity, and variety
 - (iv) Manual processing

SECTION - B (15 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 x 3 = 15)

- 6 a Define convex function with an example.
OR
b Explain the purpose of a loss function.
- 7 a Explain the saddle point problem in neural networks.
OR
b Classify the different adaptive learning rate.
- 8 a Define LeNet.
OR
b Differentiate between GRU and LSTM.

Cont...

- 9 a Explain Monte Carlo methods with applications.
OR
b Explain Linear Factor Models in deep learning.
- 10 a Discuss the role of deep learning in Big Data analytics.
OR
b Describe the applications of deep learning in Computer Vision.

SECTION -C (30 Marks)

Answer ALL questions
ALL questions carry EQUAL Marks (5 x 6 = 30)

- 11 a Compare single-layer Perceptron and Multi-Layer Perceptron architectures.
OR
b Evaluate the working of Gradient Descent and its variants in optimization problems.
- 12 a Differentiate between RMSProp and Adam optimizers.
OR
b Justify the need for Ridge and Lasso regularization in neural networks.
- 13 a Analyze the structure and properties of Convolutional Neural Networks.
OR
b Survey the applications of CNN and RNN in real-world domains.
- 14 a Assess the importance of Representational Learning in building deep models.
OR
b Classify the types of Autoencoders and explain their research significance.
- 15 a Compare deep learning approaches used in Computer Vision and Natural Language Processing.
OR
b Design a deep learning based system for IoT applications.

Z-Z-Z

END

MSc(SS) DEGREE EXAMINATION MAY 2026
(Eighth Semester)

Branch – **SOFTWARE SYSTEMS (Five Year integrated)**

CLOUD COMPUTING AND DEVOPS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(5 x 1 = 5)

- 1 Where are the components located in distributed computing?
(i) In a single system (ii) On different networked computers
(iii) Only in cloud (iv) Inside a cluster only
- 2 Which of the following is a cloud deployment model?
(i) Centralized Cloud (ii) Static Cloud
(iii) Public Cloud (iv) Local Cloud
- 3 Which company introduced MapReduce?
(i) Google (ii) Amazon
(iii) IBM (iv) Microsoft
- 4 Find the main goal of DevOps is to:
(i) Increase Documentation (ii) Improve collaboration between teams
(iii) Replace Developers (iv) Reduce Hardware Cost
- 5 Choose the main purpose of Jenkins.
(i) Network Routing (ii) Database Management
(iii) File Compression (iv) Continuous integration

SECTION - B (15 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 x 3 = 15)

- 6 a Explain the architecture of Distributed Computing.
OR
b Discuss the advantages and disadvantages of Cluster Computing.
- 7 a Illustrate the difference between cloud computing and grid computing.
OR
b Classify the different types of Virtualization.
- 8 a Explain the architecture of GFS.
OR
b Discuss Amazon EC3 and S3 Storage in cloud computing framework.
- 9 a Justify DevOps and explain its main objectives.
OR
b State any Three differences between the Waterfall model and the Agile model.
- 10 a Explain Docker briefly.
OR
b Illustrate Puppet as a Configuration Management tool.

Cont...

SECTION -C (30 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 x 6 = 30)

- 11 a Compare SOA and web services in a distributed computing environment.
OR
b Justify the need for cluster computing with its architecture and applications.
- 12 a Elucidate Cloud Computing, highlighting its characteristics and evolution.
Justify the pros and cons of cloud computing.
OR
b. Analyze the architecture of VMM and discuss its importance in cloud computing.
- 13 a Enumerate the architecture of HDFS and explain its components in detail.
OR
b Criticize the Aneka framework and examine its role in cloud computing
- 14 a Analyze the role of DevOps in cloud computing environments.
OR
b Evaluate DevOps and its integration with SDLC models.
- 15 a Elucidate Continuous Integration and Deployment using Jenkins.
OR
b Compare configuration management tools – Ansible, Puppet, and Chef in detail.

Z-Z-Z

END

(AUTONOMOUS)
MSc (SS) DEGREE EXAMINATION MAY 2026
(Fifth Semester)

Branch - **SOFTWARE SYSTEMS (Five Years Integrated)**

SOFTWARE ENGINEERING AND TESTING

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	_____ is an incremental software process model that emphasizes a short development cycle. (i) Waterfall Model (ii) Prototyping Model (iii) RAD Model (iv) Spiral Model	K1	CO1
	2	Which technique is used to translate the needs of the customer into technical requirements for software? (i) Quality Function Deployment (ii) The concurrent Development Model (iii) Business Process Engineering (iv) Architectural Pattern	K2	CO1
2	3	If a project has frequently changing requirements, which process model is most appropriate? (i) Waterfall (ii) Spiral (iii) V-Model (iv) Incremental	K1	CO1
	4	Software is divided into separately named and addressable components called (i) Modules (ii) Patterns (iii) Segments (iv) Program Classes	K2	CO1
3	5	Six Sigma uses which metric to measure process quality? (i) Defects per million opportunities (DPMO) (ii) Lines of code (iii) Number of features (iv) Processing speed	K1	CO1
	6	What does validation testing aim to ensure? (i) The s/w meets technical requirements (ii) The software fulfills user expectations (iii) The software is bug-free (iv) The software is secure	K2	CO1
4	7	The testing is a systematic technique for constructing the software architecture while at the same time conducting test to uncover errors associated with interfacing. (i) Unit testing (ii) System testing (iii) Validation testing (iv) Integration testing	K1	CO1
	8	Which of the following is an example of white-box testing? (i) Regression testing (ii) Boundary value analysis (iii) Statement coverage testing (iv) User acceptance testing	K2	CO1
5	9	In UML modeling, which diagram best illustrates how objects interact to fulfill a use case? (i) State diagram (ii) Class diagram (iii) Collaboration diagram (iv) Component diagram	K1	CO1
	10	Which analysis considers data and the processes that transform the data as separate entities? (i) Interface analysis (ii) Structured analysis (iii) Bounded value analysis (iv) Analysis patterns	K2	CO1

Cont...

SECTION-B (35 Marks)
 Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Construct the Flow-oriented Modeling.	K2	CO2
	(OR)			
	11.b.	Justify the Class-Responsibility-Collaborator (CRC) Modeling.		
2	12.a.	Analyze about the Specialized Process Model.	K2	CO2
	(OR)			
	12.b.	Summarize the various Design concepts.		
3	13.a.	Explain the System Testing.	K2	CO2
	(OR)			
	13.b.	Explain about the Control Structure testing.		
4	14.a.	Explain the Performance Testing.	K5	CO5
	(OR)			
	14.b.	Criticize about the Object-oriented Testing Strategies.		
5	15.a.	Predict and create the Requirements Workflow in UML.	K6	CO6
	(OR)			
	15.b.	Classify the UML Component and Object Diagrams.		

SECTION -C (30 Marks)
 Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Develop the User-Interface Analysis and design steps.	K2	CO2
2	17	Analyze about the various types of Coupling	K2	CO2
3	18	State and explain Independent Program paths.	K4	CO4
4	19	Formulate in detail about the User Interface Testing.	K6	CO6
5	20	State about the Business Modeling Workflow in UML.	K5	CO5

Z-Z-Z END

(Fifth Semester)
Branch - **SOFTWARE SYSTEMS (five years Integrated)**
ARTIFICIAL INTELLIGENCE

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The foundations of Artificial Intelligence include a) Mathematics, Philosophy, and Computer Science b) Only programming languages c) Hardware architecture only d) Network protocols	K1	CO1
	2	A rational agent is one that a) Always acts emotionally b) Selects actions to maximize utility c) Never makes mistakes d) Works without sensors	K2	CO1
2	3	A heuristic function in search algorithms is a) An exact cost measure b) An estimated cost from current state to goal c) A random value d) The actual path cost	K1	CO2
	4	Alpha-Beta pruning is primarily used in a) Database searching b) Game tree search to reduce nodes explored c) Sorting algorithms d) Graph coloring	K2	CO2
3	5	Inference in knowledge-based systems is used for a) Storing data only b) Deriving new knowledge from existing knowledge c) Deleting information d) Compressing files	K1	CO3
	6	The main difference between syntax and semantics in logic is a) Syntax is form, semantics is meaning b) They are identical c) Syntax is meaning, semantics is form d) Neither deals with logic	K2	CO3
4	7	Probabilistic reasoning deals with a) Certain knowledge only b) Reasoning under uncertainty using probabilities c) Deterministic outcomes d) Boolean logic only	K1	CO4
	8	Inference in temporal models can be classified as a) Forward and backward only b) Filtering, prediction, smoothing, and likelihood c) Random inference d) Static inference only	K2	CO4
5	9	Sequential decision problems consist of a) Single decision only b) States, actions, transition model, and rewards c) Only rewards d) Only actions	K1	CO5
	10	Game theory in AI is used for: a) Video game design only b) Analyzing strategic interactions between agents c) Computer graphics d) Database management	K2	CO5

Cont...

SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Describe the various types of intelligent agents with examples.	K2	CO1
	(OR)			
	11.b.	Explain the characteristics and properties of agent-based systems.		
2	12.a.	Demonstrate the Genetic Algorithm approach for optimization problems.	K3	CO2
	(OR)			
	12.b.	Illustrate the backtracking search method for constraint satisfaction problems.		
3	13.a.	Apply Propositional Logic to represent and solve a real-world problem.	K3	CO3
	(OR)			
	13.b.	Examine the inference mechanisms in First Order Logic with examples.		
4	14.a.	Analyze the working of Hidden Markov Models in temporal reasoning.	K4	CO4
	(OR)			
	14.b.	Compare probabilistic reasoning techniques in Dynamic Bayesian Networks.		
5	15.a.	Infer value iteration and policy iteration algorithms for decision-making.	K4	CO5
	(OR)			
	15.b.	Analyze mechanism design principles in multi-agent systems.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Critically evaluate the historical development of AI and analyze how intelligent agents have evolved over time.	K4	CO1
2	17	Analyze the differences between uninformed search (BFS, DFS) and informed search (A*, Best-First).	K4	CO2
3	18	Compare Forward Chaining and Backward Chaining inference methods with suitable problem scenarios.	K4	CO3
4	19	Evaluate exact and approximate inference methods in Bayesian networks and their applications in real-world scenarios.	K4	CO4
5	20	Analyze the role of game theory in multi-agent environments with practical examples.	K4	CO5

Z-Z-Z

END

MSc(SS) DEGREE EXAMINATION MAY 2026
(Sixth Semester)

Branch -SOFTWARE SYTEMS(Five years Integrated)

OPEN SOURCE TECHNOLOGIES

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Select the component of UNIX that acts as an interface between the user and the kernel. (i) File System (ii) Shell (iii) Hardware (iv) Compiler	K1	CO1
	2	Which command is used to search for a pattern in a file? (i) cat (ii) grep (iii) more (iv) head	K1	CO1
2	3	Choose the symbol which is used to access the second command-line argument. (i) \$0 (ii) \$1 (iii) \$2 (iv) \$3	K1	CO2
	4	Which system call is used to close a file descriptor? (i) stop() (ii) close() (iii) end() (iv) finish()	K1	CO2
3	5	Select the data structure that stores information about open files in UNIX. (i) Superblock (ii) Process table (iii) File table (iv) Buffer pool	K1	CO3
	6	When a new file is created in a UNIX file system, what does the system assign to it? (i) A new buffer (ii) A new inode (iii) A new process (iv) A new superblock	K1	CO3
4	7	How is a process defined in an operating system? (i) A program stored on disk (ii) A file in memory (iii) A program in execution (iv) A command interpreter	K1	CO4
	8	Which system call is used to create a new process in UNIX? (i) exec() (ii) create() (iii) newproc() (iv) fork()	K1	CO4
5	9	Select the IPC mechanism which is most suitable for high-speed communication. (i) Shared memory (ii) Signal (iii) Message queue (iv) Pipe	K1	CO5
	10	Which data structure maintains mapping between logical and physical memory in demand paging? (i) Inode table (ii) Page table (iii) Process table (iv) File table	K1	CO5

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Outline the File System in Unix.	K2	CO1
		(OR)		
	11.b.	Illustrate the task of Grep Family of commands in Unix.		
2	12.a.	Analyze the File System architecture in Shell.	K4	CO2
		(OR)		
	12.b.	Compare stat and fstat system calls.		
3	13.a.	Examine the structure of Buffer Pool.	K4	CO3
		(OR)		
	13.b.	Inspect the structure of regular File.		
4	14.a.	Explain about Process States.	K5	CO4
		(OR)		
	14.b.	Determine the concept of Process Identifiers.		
5	15.a.	Elaborate the Message Queues in Inter Process Communication.	K6	CO5
		(OR)		
	15.b.	Discuss briefly about Demand Paging in Memory Management.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain about Advanced Filters in Unix.	K2	CO1
2	17	Analyze Command Line Arguments and Positional Parameters in Shell.	K4	CO2
3	18	Examine the functions of an Inode Assignment to a new file.	K4	CO3
4	19	Justify the functions of Process Scheduling.	K5	CO4
5	20	Discuss in detail about Page Faults in Memory Management.	K6	CO5

Z-Z-Z END

WEB APPLICATION DEVELOPMENT

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The values GET, POST, HEAD etc are specified in ____ of HTTP message a) Request line b) Header line c) Status line d) Entity body	K1	CO1
	2	Identify the correct order in which the following actions take place in an interaction between a web browser and a web server 1. The web browser requests a webpage using HTTP 2. The web browser establishes a TCP connection with the web server 3. The web server sends the requested webpage using HTTP 4. The web browser resolves the domain name using DNS a) 4,2,1,3 b) 1,2,3,4 c) 4,1,2,3 d) 2,4,1,3	K2	CO1
2	3	What is the correct syntax for referring to an external CSS? a) <link rel="stylesheet" type="text/css" href="mystyle.css"> b) <stylesheet rel="stylesheet" type="text/css" href="mystyle.css"> c) <style rel="stylesheet" type="text/css" href="mystyle.css"> d) All of the above	K1	CO2
	4	What is frame spacing attribute? a) It specifies the amount of space between two frames b) It specifies the amount of space needed between frame and a frameset c) It specifies the amount of space between frames in a frameset d) It specifies the amount of space between frames and the web browser	K2	CO2
3	5	The "new Point(3,2)", is a kind of ____ expression. a) Object Creation Expression b) Primary Expression c) Invocation Expression d) Constructor Calling Expression	K1	CO3
	6	Which one of the following is correct output for the following given JavaScript code: <p id="demo"></p> <script> functionourFunction() { document.getElementById("demo").innerHTML=Math.abs(-7.25); } </script> a) 7.25 b) -7.25 c) 25 d) -7	K2	CO3
4	7	Which of the following PHP functions can be used to get the current memory usage? a) memory_get_usage() b) memory_get_peak_usage() c) get_peak_usage() d) get_usage()	K1	CO4
	8	What will be the output of the following PHP code? <?php \$x = 10; \$y = 20; if (\$x > \$y && 1 1) print " PHP " ; else print "Welcome Home"; ?> a) no output b) Welcome Home c) PHP d) error	K2	CO4
5	9	Which command is used to access a MySQL database via command line? a) mysql -u user -p b) ssh database c) connect to mysql d) open-mysql	K1	CO5
	10	What is the purpose of the XMLHttpRequest object in AJAX? a) To send HTTP requests to the server and receive responses b) To render XML data received from the server c) To update the HTML content of a web page d) To validate user input in a form	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the web server architecture and working principles with neat diagram.	K2	CO1
	(OR)			
	11.b.	Elaborate the basic characteristics of HTTP. List and explain the methods available in HTTP with example.		
2	12.a.	Describe about Bootstrap grid system and its working with an example.	K3	CO2
	(OR)			
	12.b.	Explore frames and framesets and explain how to create vertical and horizontal columns with coding example?		
3	13.a.	Identify two basic ways to register event handlers? Explain them with code examples.	K3	CO3
	(OR)			
	13.b.	Examine looping statements. List and explain special looping methods defined by the Array class.		
4	14.a.	Determine how to read data from web form control like Check boxes and explain with coding an example.	K5	CO4
	(OR)			
	14.b.	Compare the three types of arrays in PHP? Explain the situations when we can use them with coding examples.		
5	15.a.	Differentiate between web server and Data base server. Assume you have created a website for your foodcourt, explain the process of hosting your site.	K5	CO5
	(OR)			
	15.b.	Evaluate different types of tables in MySQL and Explain the steps of Database connectivity of PHP and MySQL		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	What is WWW? Explain the role of HTML,HTTP,CGI and web browsers in WWW.	K1	CO1
2	17	Illustrate on the follwoing (i)Lists in HTML with code example. (ii)Anchor tag with its attributes with code example	K3	CO2
3	18	Build the five ways to invoke JavaScript functions? Explain with code example, analyse the situations when we can use them?	K3	CO3
4	19	Explain all predefined functions available to work on regular expressions with coding examples.	K5	CO4
5	20	Summarize about domains. List some generic top level domain names. Explain the domain registrations process with an example.	K5	CO5

Z-Z-Z

END

MSc(SS) DEGREE EXAMINATION MAY 2026
(Fourth Semester)

Branch- SOFTWARE SYSTEMS (Five years Integrated)

OPERATING SYSTEM CONCEPTS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Question No.	Question	K Level	CO
1	A program in execution is called a _____ a) Thread b) Process c) Job d) Instruction	K1	CO1
2	Which of the following is not a type of operating system? a) Real-time OS b) Batch OS c) Distributed OS d) Cloud OS	K2	CO1
3	What is the main disadvantage of First-Come-First-Serve (FCFS) scheduling? a) Starvation b) Convoy effect c) High throughput d) Preemptive nature	K1	CO2
4	Which of the following mechanisms is used to handle deadlocks? a) Mutual exclusion b) Preemption c) Virtual memory d) Circular wait prevention	K2	CO2
5	Which memory management technique divides memory into fixed-size blocks? a) Segmentation b) Paging c) Swapping d) Contiguous Allocation	K1	CO3
6	Which of the following page replacement algorithms is optimal? a) FIFO b) LRU c) Optimal d) Clock	K2	CO3
7	What is the purpose of disk scheduling? a) Allocate memory b) Optimize r/w efficiency c) Prevent deadlocks d)) Allocate CPU time	K1	CO4
8	Which of the following disk scheduling algorithms minimizes seek time? a) FCFS b) SSTF c) FIFO d) Round Robin	K2	CO4
9	What is the primary goal of virtualization in operating systems? a) Improve CPU scheduling b) Provide an abstraction of hardware resources c) Increase disk speed d) Reduce memory fragmentation	K1	CO5
10	What is containerization? a) A type of OS scheduling b) A lightweight form of virtualization c) A file management system d) A paging mechanism	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

ALL questions carry EQUAL Marks (3 x 7 = 21)			
Question No.	Question	K Level	CO
11.a.	Explain the major components of an operating system.	K2	CO1
(OR)			
11.b.	Describe different types of system calls with examples.		
12.a.	Examine different scheduling criteria and their significance.	K3	CO2
(OR)			
12.b.	Express the impact of race conditions on concurrent processing.		
13.a.	Compare fixed and dynamic partitioning in memory management.	K4	CO3
(OR)			
13.b.	Examine how paging helps in efficient memory allocation.		
14.a.	Explain the different types of I/O buffering techniques.	K5	CO4
(OR)			
14.b.	Compare different types of disk scheduling algorithms.		
15.a.	Explain how hypervisors manage virtual machines.	K5	CO5
(OR)			
15.b.	Evaluate the role of virtualization in cloud computing.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Define interprocess communication (IPC) and explain mechanisms and their implementation.	K1	CO1
17	Develop different process scheduling algorithms with examples and compare their efficiency.	K3	CO2
18	Express various memory management techniques and their importance in system performance.	K3	CO3
19	Compare different file allocation methods and their efficiency.	K5	CO4
20	Explain how virtualization enhances resource management and efficiency in data centers.	K5	CO5

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2026
(Fourth Semester)

Branch – **SOFTWARE SYSTEMS (FIVE YEARS INTEGRATED)**

COMPUTER NETWORKS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What is the name of the number of bits transmitted per second? (i) Baud Rate (ii) Bit Rate (iii) Sampling Rate (iv) Bandwidth	K1	CO1
	2	Select the layer of the OSI model that is responsible for routing. (i) Transport Layer (ii) Data Link Layer (iii) Network Layer (iv) Physical Layer	K2	CO1
2	3	Choose the switching technique that establishes a dedicated path before data transfer? (i) Packet Switching (ii) Message Switching (iii) Circuit Switching (iv) Virtual Switching	K1	CO2
	4	Which code is used for single-bit error correction? (i) CRC (ii) Hamming Code (iii) Parity Code (iv) Manchester Code	K2	CO2
3	5	Tell the name of the ARQ protocol that retransmits all frames after an error occurs. (i) Stop-and-Wait ARQ (ii) Selective Reject ARQ (iii) Go-Back-NARQ (iv) Sliding Window	K1	CO3
	6	Which device operates at the Physical Layer? (i) Bridge (ii) Repeater (iii) Switch (iv) Router	K2	CO3
4	7	Select the correct length of an IPv6 address. (i) 128 bits (ii) 64 bits (iii) 32 bits (iv) 256 bits	K1	CO4
	8	What is DHCP used for? (i) Detect errors. (ii) Translate Address (iii) Encrypt Data (iv) Assign IP Address Automatically	K2	CO4
5	9	Which mechanism is used by TCP for Congestion Control? (i) CSMA/CD (ii) Slow Start (iii) Parity Check (iv) Stop-and-Wait	K1	CO5
	10	Choose the protocol used for sending Emails? (i) TCP (ii) FTP (iii) SMTP (iv) DNS	K2	CO5

Cont...

SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Outline on the applications of computer networks in detail	K2	CO1
		(OR)		
	11.b.	Explain bandwidth and data rate with examples.		
2	12.a.	Examine the features of Circuit Switching and Packet Switching.	K3	CO2
		(OR)		
	12.b.	Illustrate Hamming Code for single-bit error correction with an example.		
3	13.a.	Demonstrate the working of Stop-and-Wait ARQ with a suitable example.	K3	CO3
		(OR)		
	13.b.	Identify how Random Access Protocols are used in Ethernet networks.		
4	14.a.	Explain IP addressing and subnetting to solve a suitable example.	K5	CO4
		(OR)		
	14.b.	Justify ICMP message types into appropriate categories.		
5	15.a.	Determine the TCP Three-Way Handshake with a Suitable Diagram.	K5	CO5
		(OR)		
	15.b.	Compare SMTP and MIME based on their functions.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain data encoding techniques and the relationship between bit rate, baud rate, bandwidth, and sampling rate.	K2	CO1
2	17	Examine TDM, FDM, and CDM.	K3	CO2
3	18	Identify Flow control and Error control techniques.	K3	CO3
4	19	Compare Distance Vector Routing and Link State Routing.	K5	CO4
5	20	Evaluate FTP, DNS, and HTTP, protocols with their working and features.	K5	CO5

Z-Z-Z

END

MSc (SS) DEGREE EXAMINATION MAY 2026
(Third Semester)

Branch – **SOFTWARE SYSTEMS (FIVE YEARS INTEGRATED)**

DATABASE MANAGEMENT SYSTEM CONCEPTS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following best describes <i>data independence</i> ? a) The ability to change data without affecting the program b) The ability to modify schema at one level without affecting schema at the next higher level c) The ability to store data without redundancy d) The ability to access data from multiple sources	K1	CO1
	2	Select the correct option : In an Entity-Relationship (ER) model, a <i>weak entity</i> is identified by: a) Its own primary key b) A foreign key from another entity c) A combination of its partial key and owner entity's key d) None of the above	K2	CO1
2	3	Find the correct statement. In a sequential file organization, records are stored and accessed: a) In random order b) In order of their hash key c) In sorted order of a key field d) Using tree structures	K1	CO2
	4	Summarize the primary key in a relational database: a) Can have duplicate values b) Can be NULL c) Must uniquely identify each tuple in a relation d) Is used only for sorting	K2	CO2
3	5	Define trigger in PL/SQL a) A stored procedure that runs automatically in response to an event b) A function that returns a value c) A program that executes only manually d) None of the above	K1	CO3
	6	What is the use of GROUP BY clause in SQL a) Restrict the number of rows in the result b) Sort the data in ascending order c) Eliminate duplicate rows d) Combine rows with identical values into summary rows	K2	CO3
4	7	Which is the stronger version of Boyce–Codd Normal Form (BCNF): a) 2NF b) 3NF c) 4NF d) 5NF	K1	CO4
	8	Interpret the meaning functional dependency $X \rightarrow Y$ a) X and Y are independent attributes b) Y determines X c) The value of X determines the value of Y d) X and Y have no relationship	K2	CO4
5	9	Choose the best answer : In database security, Mandatory Access Control (MAC) is based on: a) User identity and ownership b) Labels and security levels assigned to data and users c) User-granted privileges d) None of the above	K1	CO5
	10	Which of the following is a concurrency control technique? a) Time stamping, Indexing b) Locking, Indexing c) Time stamping, Locking d) Deadlock	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Identify the three levels of data abstraction in a database system and explain how they contribute to data independence.	K3	CO1
		(OR)		
	11.b.	Apply the concept of entity, attribute, and relationship and explain with suitable examples. Explain the different types of relationships that can exist between entities.		
2	12.a.	List and explain the different types of file organizations with suitable examples.	K4	CO2
		(OR)		
	12.b.	Inspect the different types of data integrity constraints enforced in a relational model. Why are they essential for maintaining database consistency?		
3	13.a.	Make use of Views in SQL and Discuss how they enhance data security and simplify query management, with an example	K3	CO3
		(OR)		
	13.b.	Identify aggregate and scalar functions in SQL? Explain any four aggregate functions with examples.		
4	14.a.	Classify the anomalies in database design? Explain insertion, update, and deletion anomalies with examples.	K4	CO4
		(OR)		
	14.b.	Analyze the Armstrong's axioms used for inferring functional dependencies.		
5	15.a.	Interpret different locking techniques used in transaction management. How does a lock-based protocol ensure serializability?	K5	CO5
		(OR)		
	15.b.	Explain the ACID properties of a database transaction. Why are they important for maintaining consistency?		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Build the three-schema architecture and explain in detail.	K3	CO1
2	17	Examine the Relational Algebra Operations used in the relational model with suitable example.	K4	CO2
3	18	Explain the purpose and syntax of procedures, functions, and triggers in PL/SQL, providing suitable examples for each.	K5	CO3
4	19	Solve the following relation Vendor (ID, Name, Account_No, Bank_Code_No, Bank) Identify the Functional Dependencies and normalize the table till 3NF.	K6	CO4
5	20	Examine the various security threats to databases and the defense mechanisms and also explain how integrity constraints maintain consistency in multi-user database environments.	K4	CO5

Z-Z-Z

END

Branch - SOFTWARE SYSTEMS (Five Years Integrated)

PROGRAMMING IN JAVA

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following is used to take input from the console in Java? a) Scanner b) Input c) Console d) Reader	K1	CO1
	2	Constructor in Java is identified by: a) Having no return type b) Being static c) Using void keyword d) Having parameters only	K2	CO1
2	3	In Java, a package is: a) A collection of classes b) A single class c) A method d) A data type	K1	CO2
	4	The catch block in exception handling is used to: a) Throw exceptions b) Handle exceptions c) Ignore exceptions d) Create exceptions	K2	CO2
3	5	Which method is used to start a thread's execution? a) run() b) start() c) init() d) execute()	K1	CO3
	6	Synchronized methods in Java are used to: a) Speed up execution b) Prevent data corruption c) Create threads d) Stop threads	K2	CO3
4	7	Which package contains the basic I/O classes in Java? a) java.util b) java.io c) java.net d) java.awt	K1	CO4
	8	Swing components are part of which package? a) java.awt b) javax.swing c) java.applet d) java.gui	K2	CO4
5	9	The diamond operator <> in generics was introduced in: a) Java 5 b) Java 6 c) Java 7 d) Java 8	K1	CO5
	10	Varargs in Java is denoted by: a) ... b) [] c) {} d) ()	K2	CO5

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

ALL questions carry EQUAL Marks (5 × 7 = 35)				
Module No.	Question No.	Question	K Level	CO
1	11.a.	Interpret the role of constructors and their types in Java with suitable examples.	K2	CO1
	(OR)			
	11.b.	Infer the differences between object-based and object-oriented programming with examples.		

Cont...

2	12.a.	packages with code examples.	K3	CO2
	(OR)			
	12.b.	Demonstrate the use of throw and throws keywords in exception handling.		
3	13.a.	Apply thread priorities to control thread execution in a multithreaded environment.	K3	CO3
	(OR)			
	13.b.	Apply the Runnable interface approach to create and manage threads.		
4	14.a.	Compare reading and writing operations using console input/output streams.	K4	CO4
	(OR)			
	14.b.	Analyze the applet lifecycle methods and their significance in applet execution.		
5	15.a.	Examine the concept of enumerations (Enums) and their advantages in J2SE 5.0.	K4	CO5
	(OR)			
	15.b.	Dissect the differences between Vector and ArrayList in the Collections Framework.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Examine the concept of method overloading and constructor overloading with detailed examples.	K4	CO1
2	17	Analyze how abstract classes differ from interfaces and demonstrate when to use each with comprehensive code examples.	K4	CO2
3	18	Inspect the main thread and its importance in Java multithreading with code demonstrating thread creation and management.	K4	CO3
4	19	Examine the stream class hierarchy in Java I/O and illustrate with examples of reading and writing files.	K4	CO4
5	20	Test the effectiveness of annotations and static import features in J2SE 5.0 with practical programming examples.	K4	CO5

Z-Z-Z

END

Branch – SOFTWARE SYSTEMS (FIVE YEARS INTEGRATED)

APPLIED LINEAR ALGEBRA

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	A square matrix with 1's on the main diagonal and zero elsewhere is called an _____. (i) zero matrix (ii) null matrix (iii) diagonal matrix (iv) identity matrix	K1	CO1
	2	If A is a square matrix, the sum of the entries on the main diagonal is defined as _____. (i) transpose of A (ii) trace of A (iii) idempotent (iv) transition of A	K2	CO1
2	3	A finite set that contains _____ is linearly dependent. (i) zero (ii) one (iii) two (iv) three	K1	CO2
	4	All bases for a _____ dimensional space have the same number of vectors. (i) finite (ii) infinite (iii) n (iv) none of the above	K2	CO2
3	5	A square matrix is invertible if and only if λ _____ is not a eigen value of A. (i) equal to zero (ii) not equal to zero (iii) equal to one (iv) not equal to one	K1	CO3
	6	Cauchy Schwarz inequality $ \langle u, v \rangle \leq$ _____. (i) $\ u\ $ (ii) $\ v\ $ (iii) $\ 1\ $ (iv) $\ u\ \ v\ $	K2	CO3
4	7	Triangle inequality for vector u, v is $\ u + v\ \leq$ _____. (i) $\ u\ + \ v\ $ (ii) $\ u\ $ (iii) $\ u\ $ (iv) $\ u\ / \ v\ $	K1	CO4
	8	In every eigen Value of A the geomertic multiplicity is _____ algebraic multiplicity. (i) less than (ii) less than or equal to (iii) greater than (iv) equal to	K2	CO4
5	9	If T: $V \rightarrow W$ is a lintear transformation then $T(0) =$ _____. (i) 1 (ii) 0 (iii) 2 (iv) -1	K1	CO5
	10	If I: $V \rightarrow V$ is defined by $I(v) = v$ is called an _____ operator. (i) Identity (ii) Inverse (iii) Transverse (iv) null	K2	CO5

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Find p(A) for $p(x) = x^2 - 2x - 3$ and matrix $A = \begin{bmatrix} -1 & 2 \\ 0 & 3 \end{bmatrix}$.	K2	CO1
		(OR)		
	11.b.	Determine whether the given matrix A is elementary matrix, Where $A = \begin{bmatrix} 1 & 0 \\ 0 & -3 \end{bmatrix}$		
2	12.a.	If $u = (1, 2, -1)$ and $v = (6, 4, 2)$, Show that $w = (9, 2, 7)$ is a linear combination of u and v.	K2	CO2
		(OR)		

Cont...

3	13.a.	Confirm by multiplication that x is an eigen value of A and find the eigen value where $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$, $x = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$	K2	CO3
		(OR)		
	13.b.	Show that A and B are similar matrices, where $A = \begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 0 \\ 3 & -2 \end{bmatrix}$		
4	14.a.	Find a matrix that generates the stated weighted inner product on two dimensional space $(u,v) = 2u_1v_1 + 3u_2v_2$	K3	CO4
		(OR)		
	14.b.	Show that the vectors u and v are orthogonal where $u = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ $v = \begin{bmatrix} 0 & 2 \\ 0 & 0 \end{bmatrix}$		
5	15.a.	Let T be a transformation defined by $T[p(x)] = xp(x)$, Find the matrix for T relative to the basis $B_1 = [1, x, x^2]$ and $B_2 = [1, x, x^2, x^3]$.	K3	CO5
		(OR)		
	15.b.	Determine whether the mapping T is a linear transformation and find its kernel where $T \begin{bmatrix} a & b \\ c & d \end{bmatrix} = a^2 + b^2$.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Verify $(AB)C = A(BC)$ for $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 0 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 0 \\ 2 & 3 \end{bmatrix}$	K2	CO1
2	17	Extend the product $Ax=b$ as a linear combination of column vectors where $A = \begin{bmatrix} -1 & 3 & 2 \\ 1 & 2 & -3 \\ 2 & 1 & -2 \end{bmatrix}$ $x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$, $b = \begin{pmatrix} 1 \\ -9 \\ -3 \end{pmatrix}$	K2	CO2
3	18	Find the characteristic equation, eigen value for $\begin{pmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{pmatrix}$	K3	CO3
4	19	Find the least square solution of the equation $Ax=b$, Where $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \\ 4 & 5 \end{bmatrix}$ $x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$, $b = \begin{bmatrix} 2 \\ 7 \\ 5 \end{bmatrix}$	K3	CO4
5	20	Let T be a transformation $T \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} x_1 + x_2 \\ -x_1 \end{pmatrix}$. Find T_B^{-1} , B relative to $B = (u_1, u_2)$ $B' = (v_1, v_2, v_3)$ Where $v_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ $v_2 = \begin{bmatrix} 2 \\ 2 \\ 0 \end{bmatrix}$ $v_3 = \begin{bmatrix} 3 \\ 0 \\ 0 \end{bmatrix}$	K3	CO5

Z-Z-Z

END

MSc (SS) DEGREE EXAMINATION MAY 2026
(Second Semester)

Branch – **SOFTWARE SYSTEMS (FIVE YEARS INTEGRATED)**

DATA STRUCTURES AND ALGORITHMS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following is a linear data structure? (i) Graph (ii) Tree (iii) Array (iv) Heap	K1	CO1
	2	What is the time complexity to access an element by its index in an array? (i) O(n) (ii) O(log n) (iii) O(1) (iv) O(n log n)	K2	CO1
2	3	Find the operation is used to add a new element to the top of a stack. (i) Enqueue (ii) Push (iii) Pop (iv) Dequeue	K1	CO2
	4	Tell about a "Deque". (i) A queue with only one end (ii) A double-ended queue (iii) A priority-based stack (iv) A queue that uses a heap	K2	CO2
3	5	How many fields a node in a singly linked list must contain? (i) One (ii) Three (iii) Four (iv) Two	K1	CO3
	6	Select the following operations that is more efficient in a doubly linked list than in a singly linked list. (i) Searching for an item (ii) Deleting a node whose location is given (iii) Traversing to the end (iv) Pointing to the end	K2	CO3
4	7	Name the tree that has number of edges from the root to a specific node. (i) Height (ii) Depth (iii) Length (iv) Width	K1	CO4
	8	Label the following that is true about the in-order traversal of a Binary Search Tree (BST). (i) It traverses in a non-increasing order. (ii) It traverses in an increasing (sorted) order. (iii) It traverses in a random fashion. (iv) It performs a level-order traversal.	K2	CO4
5	9	Match the following sorting algorithms that is fastest for sorting small arrays. (i) Quick sort (ii) Shell sort (iii) Insertion sort (iv) Heap sort	K1	CO5
	10	Choose the following sorting algorithm does not use recursion. (i) Bottom up merge sort (ii) Heap sort (iii) Merge sort (iv) Quick sort	K2	CO5

Cont...

SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Apply the properties of algorithm.	K3	CO1
		(OR)		
	11.b.	Construct the Classification with an example.		
2	12.a.	Explain Circular queue.	K2	CO2
		(OR)		
	12.b.	Summarize about Linear queue.		
3	13.a.	Explain about circularly Linked Lists .	K5	CO3
		(OR)		
	13.b.	Determine use of doubly Linked Lists		
4	14.a.	Analyze the representation of Trees.	K4	CO4
		(OR)		
	14.b.	Classify the representation of Graphs.		
5	15.a.	Estimate the importance of Binary search .	K5	CO5
		(OR)		
	15.b.	Evaluate a Merge sort.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain about the development of an Algorithm.	K2	CO1
2	17	Outline on Stack and Queue operations.	K4	CO2
3	18	Assess the implementation of Linked representations.	K5	CO3
4	19	Measure the basic Terminologies of trees and Graphs.	K5	CO4
5	20	Investigate Heap sort with an example.	K4	CO5

Z-Z-Z

END

MSc (SS) DEGREE EXAMINATION MAY 2026
(Second Semester)

Branch -**SOFTWARE SYSTEMS**(Five Year integrated)

OBJECT ORIENTED PROGRAMMING WITH C++

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which programming paradigm emphasizes functions and procedures? (i) Object-Oriented Programming (ii) Functional Programming (iii) Procedure-Oriented Programming (iv) Logic Programming	K1	CO1
	2	Relate the 'endl' manipulator in C++ to its function in an output statement. (i) Inserts a tab space (ii) Inserts a linefeed (iii) Accepts user input (iv) Clears the output buffer	K2	CO1
2	3	Which of the following is a valid function prototype in C++? (i) int add(int a, int b); (ii) int add(int a, int b) (iii) void add(int a, int b) (iv) func add(int a, int b);	K1	CO2
	4	Interpret the default access specifier for members of a C++ class. (i) static (ii) public (iii) protected (iv) private	K2	CO2
3	5	Recall the purpose of a destructor in a C++ class. (i) Initialize objects (ii) Release memory objects (iii) Copy objects (iv) Overload operators	K1	CO3
	6	Interpret which operator can only be overloaded using a friend function in C++. (i) + (ii) - (iii) << (iv) ++	K2	CO3
4	7	Select the type of inheritance that allows a class to inherit from only one base class. (i) Single Inheritance (ii) Multiple Inheritance (iii) Multilevel Inheritance (iv) Hybrid Inheritance	K1	CO4
	8	Interpret the role of 'this' pointer in a C++ class. (i) Pointer to base class (ii) Pointer to derived class (iii) Pointer to current object (iv) Pointer to virtual function	K2	CO4
5	9	Which feature of C++ enables a function to operate with different data types? (i) Inline functions (ii) Virtual functions (iii) Function templates (iv) Friend functions	K1	CO5
	10	Interpret which block is responsible for catching an exception. (i) catch (ii) throw (iii) try (iv) finalize	K2	CO5

Cont...

SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Compare Procedural Oriented Programming with Object Oriented Programming.	K2	CO1
		(OR)		
	11.b.	Explain the structure of a C++ program with an example.		
2	12.a.	Apply an inline function in a C++ program and discuss its advantages and limitations.	K3	CO2
		(OR)		
	12.b.	Develop a C++ program to demonstrate declaring and initializing an array of objects.		
3	13.a.	Examine the declaration and invocation of a parameterized constructor in a class.	K4	CO3
		(OR)		
	13.b.	Compare and contrast overloading unary and binary operators in C++ with suitable examples.		
4	14.a.	Interpret a C++ multiple inheritance hierarchy and explain how virtual base classes resolve ambiguity.	K5	CO4
		(OR)		
	14.b.	Assess how derived class pointers influence polymorphism in C++ using virtual and non-virtual functions.		
5	15.a.	Explain class template with suitable example.	K5	CO5
		(OR)		
	15.b.	Assess exception handling in C++ using a program that throws, catches, and rethrows an exception.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Illustrate expressions and control structures in C++ with examples.	K2	CO1
2	17	Develop a C++ program to demonstrate the use of friend functions in C++.	K3	CO2
3	18	Analyze type conversion between class types in C++ using a conversion constructor.	K4	CO3
4	19	Explain a C++ program demonstrating multilevel inheritance and the sequence of constructor and destructor calls.	K5	CO4
5	20	Explain how command-line arguments are used to open and read a file in C++ with an example.	K5	CO5

Z-Z-Z END

MSc (SS) DEGREE EXAMINATION MAY 2026

(Second Semester)

Branch - **SOFTWARE SYSTEMS (Five years Integrated)**

DATA STRUCTURES AND ALGORITHMS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

1. Abstract Data Type focuses on:
i) Implementation details ii) Memory allocation
iii) What operations are performed iv) Hardware structure
2. An expression is valid if:
i) Stack is empty at the end ii) Stack is never used
iii) Stack has elements at end iv) Only opening brackets exist
3. Which traversal visits nodes in the order: Left → Root → Right?
i) Pre-order ii) In-order iii) Post-order iv) Level order
4. What happens when deleting a node with two children in BST?
i) Delete directly ii) Ignore node
iii) Replace with inorder successor or predecessor iv) Move node to root
5. Which sorting algorithm uses divide and conquer strategy?
i) Bubble Sort ii) Selection Sort iii) Insertion Sort iv) Merge Sort

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

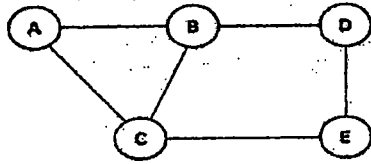
- 6 a. Recommend whether to use Primitive data type or Abstract data type to implement banking operations. Justify your answer.
OR
b. Discuss about dense matrix and sparse matrix. Recommend a suitable data structure to store sparse matrix.
- 7 a. Analyse the primitive operations in stack.
OR
b. Discuss the applications of the queue data structure.
- 8 a. Explain why singly linked list is better than a doubly linked list in few concepts.
OR
b. Organize a min heap with the following data: 5,4,6,7,1,2 and 8.

Cont...

- 9 a. Explain the properties of a binary search tree and justify how it differs from binary tree.

OR

- b. Illustrate how graphs are represented by adjacency matrix and adjacency list. For the given graph prepare the adjacency list and adjacency matrix



- 10 a. State the properties of efficient hashing function.

OR

- b. Apply radix sorting technique and sort the following numbers:
125, 365, 58, 72, 1, 6, 99, 53, 351

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 6 = 30)

- 11 a. Evaluate Best, worst case and average case of an algorithm. Compare them with suitable example.

OR

- b. Analyse the insertion and deletion operations in a One dimensional array. List the advantages and disadvantages of using arrays.

- 12 a. Determine how recursion and expression handled using stack with an example.

OR

- b. Design a double ended queue and compare it with a single ended queue.

- 13 a. Interpret linked stack and linked queue with a suitable example.

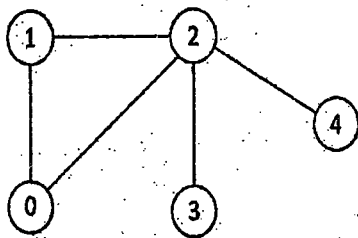
OR

- b. Design an expression tree with minimum of 7 nodes and construct in-order, pre-order and post-order expressions by traversing the expression tree.

- 14 a. Construct a Binary search tree with 5, 8, 10, 16, 4, 2, 7, 11. After completing the insertion delete the number 8.

OR

- b. Construct DFS and BFS for the following graph.



- 15 a. Analyse the collision resolution technique in linear probing with suitable example.

OR

- b. Appraise insertion sort and bubble sort for the following numbers in the given order 15, 57, 2, 31, 8, 14 and 17.

Z-Z-Z

END

MSc(SS) DEGREE EXAMINATION MAY 2026
(First Semester)

Branch – **SOFTWARE SYSTEMS (Five Year integrated)**

CALCULUS AND ITS APPLICATIONS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	If $f(x) = x + 5$, $g(x) = x - 3$ what is the value of $g(f(0))$? a) 5 b) 0 c) 2 d) -3	K1	CO1
	2	Write the value of $\lim_{x \rightarrow 0} \frac{\sin 2x}{5x}$ a) 2/5 b) 5/2 c) 0 d) ∞	K2	CO1
2	3	The series $\sum_{n=1}^{\infty} \frac{1}{n^2}$ _____ a) converges b) diverges c) neither converges nor diverges d) both convergent and divergent	K1	CO2
	4	Compute the value of $\sum_{n=0}^{\infty} \frac{4}{2^n}$? a) 4 b) 2 c) 1 d) 8	K2	CO2
3	5	If $f(x, y, z) = xy + yz + zx$, What is f_{yxz} ? a) 1 b) 4 c) 2 d) 0	K1	CO3
	6	If $w = x^2 + y^2$, $x = r - s$, $y = r + s$. Estimate $\frac{\partial w}{\partial r}$ a) 4s b) 4r c) 4x d) 4y	K2	CO3
4	7	The ODE $y' + p(x)y = r(x)$ is said to be homogeneous if $r(x)$ _____ a) = 0 b) $\neq 0$ c) = $p(x)$ d) $\neq p(x)$	K1	CO4
	8	The equation $-cydx + 2xdy = 0$ is exact if $c =$ _____ a) 1 b) -2 c) -1 d) 2	K2	CO4
5	9	The Fourier coefficients can be found using _____ formula a) Euler's b) Lagrange's c) Cauchy's d) Poisson's	K1	CO5
	10	The function $f(x) = x + x^2$ in $(-\pi, \pi)$ is _____ a) even b) odd c) neither even nor odd d) both even and odd	K2	CO5

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Discuss the behavior of $f(x) = \frac{x^2-1}{x-1}$ near $x=1$.	K2	CO1
		(OR)		

Cont...

1	11.b.	Characterize the scaling and reflection of the function $y = \sqrt{x}$ graphically.	K2	CO1
2	12.a.	Using comparison test discuss the convergence of $\sqrt{\frac{n+1}{n^2+2}}$	K2	CO2
	(OR)			
	12.b.	Infer for what values of x the power series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} x^n}{n}$ converges		
3	13.a.	Discuss the continuity of $f(x, y) = \begin{cases} \frac{2xy}{x^2+y^2} & (x, y) \neq (0,0) \\ 0 & (x, y) = (0,0) \end{cases}$	K2	CO3
	(OR)			
	13.b.	Compute the tangent plane and normal line of the level surface $f(x, y, z) = x^2 + y^2 + z - 9 = 0$ at the point (1,2,4)		
4	14.a.	Set a model for Radio activity-Exponential decay Given an amount of a radioactive substance, say, 0.5 g (gram), find the amount present at any later time.	K4	CO4
	(OR)			
	14.b.	Elobrate on "Population dynamics"		
5	15.a.	calculate a_0, a_n in the fourier series expansion of the square wave function $f(x) = \begin{cases} 0 & \text{in } -4 < x < 0 \\ 5 & \text{in } 0 < x < 4 \end{cases}$	K3	CO5
	(OR)			
	15.b.	Calculate the half range fourier sine series expansion of the function $f(x) = ax + b$ in $0. < x < l$		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Evaluate $\lim_{x \rightarrow 1} \frac{x^2+x-2}{x^2-x}$ and $\lim_{x \rightarrow 0} \frac{\sqrt{x^2+100}-10}{x^2}$	K2	CO1
2	17	Discuss the convergence of the p series $\sum_{n=1}^{\infty} \frac{1}{n^p}$	K2	CO2
3	18	A company manufactures stainless steel right circular cylindrical molasses storage tanks that are 25 ft high with a radius of 5 ft. How sensitive are the tanks' volumes to small variations in height and radius? If the values are reversed discuss the change.	K2	CO3
4	19	Identify the solution of $(x^2 + y^2 + x)dx + xydy = 0$	K4	CO4
5	20	If $f(x) = \frac{\pi-x}{2}$, then derive the Fourier series expansion in the interval $(0, 2\pi)$ and hence find $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$	K3	CO5

MSc (SS) DEGREE EXAMINATION MAY 2026
(First Semester)

Branch- **SOFTWARE SYSTEMS(Five Years Integrated)**

COMPUTER ORGANIZATION AND ARCHITECTURE

Time: Three Hours

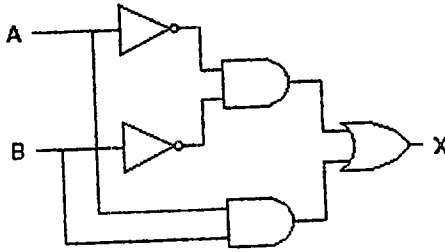
Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Any Signed Negative Binary Number is recognized by its _____. i) MSB ii) LSB iii) -ve Sign iv) +ve Sign	K1	CO1
	2	The following Hexadecimal Number (1E.43) ₁₆ is equivalent to _____. i) (36.506) ₈ ii) (36.206) ₈ iii) (35.506) ₈ iv) (35.206) ₈	K2	CO1
2	3	Simplified Expression/s for the following Boolean Function $F(A,B,C,D) = \sum(0,1,2,3,6,12,13,14,15)$ is/are: (A) $A'B' + AB + A'C'D'$ (B) $A'B' + AB + A'CD'$ (C) $A'B' + AB + BC'D'$ (D) $A'B' + AB + BCD'$ i) A Only ii) B Only iii) A and C iv) B and D	K1	CO2
	4	Which of the following Logic Expressions represents the Logic Diagram?  i) $X = (AB)' + A'B'$ ii) $X = (AB)' + AB$ iii) $X = AB' + A'B$ iv) $X = A'B' + AB$	K2	CO2
3	5	In Reverse Polish Notation, expression $A*B+C*D$ is written as _____. i) $AB*CD*+$ ii) $*BCD*+$ iii) $AB*CD+*$ iv) $*B*CD+$	K1	CO3
	6	A group of bits that tell the computer to perform a specific operation is known as _____. i) Instruction Code ii) Micro-Operation iii) Accumulator iv) Register	K2	CO3
4	7	Which of the following is lowest in memory hierarchy? i) Cache Memory ii) Secondary Memory iii) Registers iv) RAM	K1	CO4
	8	A Stack-Organized Computer uses instruction of _____. i) Indirect ii) Two iii) Zero iv) Index	K2	CO4
5	9	An interface that provides I/O transfer of data directly to and from the memory unit and peripheral is termed as _____. i) DDA ii) DR iii) BR iv) DMA	K1	CO5

Cont..

Branch – **SOFTWARE SYSTEMS (Five Year integrated)**

COMPUTER ORGANIZATION AND ARCHITECTURE

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

$$(10 \times 1 = 10)$$

Module No.	Question No.	Question	K Level	CO
1	1	What is a Circuit? a) Open-loop through which electrons can pass b) Closed-loop through which electrons can pass c) Closed-loop through which Neutrons can pass d) Open-loop through which Neutrons can pass	K1	CO1
	2	Which characteristic of IC in Digital Circuits represents a function of the switching time of a particular transistor? a) Fan – out b) Fan – in c) Power dissipation d) Propagation delay	K2	CO1
2	3	A single transistor can be used to build which of the following digital logic gates? a) AND gates b) OR gates c) NOT gates d) NAND gates	K1	CO1
	4	The canonical sum of product form of the function $y(A,B) = A + B$ is _____ a) $AB + BB + A'A$ b) $AB + AB' + A'B$ c) $BA + BA' + A'B'$ d) $AB' + A'B + A'B'$	K2	CO1
3	5	A full adder logic circuit will have _____ a) Two inputs and one output b) Three inputs and three outputs c) Two inputs and two outputs d) Three inputs and two outputs	K1	CO2
	6	The difference between a flip-flop & latch is _____ a) Both are same b) Flip-flop consist of an extra output c) Latches has one input but flip-flop has two d) Latch has two inputs but flip-flop has one	K2	CO2
4	7	The 8-bit encoding format used to store data in a computer is ____ a) ASCII b) EBCDIC c) ANCI d) USCII	K1	CO3
	8	CISC stands for _____ a) Complete Instruction Sequential Compilation b) Computer Integrated Sequential Compiler c) Complex Instruction Set Computer d) Complex Instruction Sequential Compilation	K2	CO3
5	9	The DMA transfers are performed by a control circuit called as _____ a) Device interface b) DMA controller c) Data controller d) Overlooker	K1	CO5
	10	The program used to find out errors is called _____ a) Debugger b) Compiler c) Assembler d) Scanner	K2	CO5

Cont...

SECTION - B (35 Marks)
 Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain about Fixed Point & Float Point Number Conversions.	K2	CO1
	(OR)			
	11.b.	Summarize about Digital Computers and Digital Systems.		
2	12.a.	Simplify the Boolean function that has the don't-care conditions $F(w, x, y, z) = \Sigma (1, 3, 7, 11, 15)$ $d(w, x, y, z) = \Sigma (0, 2, 5)$.	K4	CO2
	(OR)			
	12.b.	Examine the Boolean function $F = A + B'C$ and express it in a sum of minterms.		
3	13.a.	Construct the Full Adder and Half Adder Circuit.	K3	CO3
	(OR)			
	13.b.	Illustrate the concept of i) Encoder ii) Demultiplexer		
4	14.a.	Summarize Input Output and Interrupts.	K2	CO4
	(OR)			
	14.b.	Explain the Basic Computer Instructions.		
5	15.a.	Discuss on Stack Organization.	K6	CO5
	(OR)			
	15.b.	Elaborate on the Arithmetic and Logic Micro Operations with a circuit.		

SECTION - C (30 Marks)
 Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Convert the Following i) Decimal 63 to Binary. ii) Decimal 328 to Octal. iii) (0.513) ₁₀ to Octal. iv) (0.6875) ₁₀ to Binary.	K2	CO1
2	17	Analyse the Concept of Basic Definition and Axiomatic Definition of Boolean Algebra.	K4	CO2
3	18	Construct and explain the types of Multiplexers.	K3	CO3
4	19	Expound on Computer Registers.	K5	CO4
5	20	Discuss about Instruction Formats with example.	K6	CO5

Z-Z-Z

END