PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Fifth Semester)

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

DATA COMMUNICATIONS & NETWORKING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 Which of the following layer of OSI model also called end-to-end layer?
(i) Presentation layer (ii) Network layer
(iii) Session layer (iv) Transport layer

2 Protocols are_____.
(i) Agreements on how communication components and DTE's are to communicate
(ii) Logical communication channels for transferring data
(iii) Physical communication channels sued for transferring data
(iv) None of the Channels

3 _____ provides a connection-oriented reliable service for sending messages.
(i) TCP (ii) IP (iii) UDP (iv) All of the above

4 The processes on each machine that communicate at a given layer are called _____.
(i) UDP process (ii) Intranet process
(iii) Server technology (iv) Peer-peer process

5 What is the size of MAC Address?
(i) 16-bits (ii) 32-bits (iii) 48-bits (iv) 64-bits

6 The Router do in a network _____.
(i) Forwards a packet to all outgoing links
(ii) Forwards a packet to the next free outgoing link
(iii) Determines on which outing link a packet is to be forwarded
(iv) Forwards a packet to all outgoing links except the originated link

7 _____layer of the TCP / IP stack corresponds to the OSI model transport layer.
(i) Host to host (ii) Application
(iii) Internet (iv) Network Access

8 Which of the through is share the data of two computers?
(i) Library (ii) Network (iii) Grouping (iv) Integrated system

9 The term FTP stands for_____.
(i) File transfer program (ii) File transmission protocol
(iii) File transfer protocol (iv) File transfer protection

10 The private key in asymmetric key cryptography is kept by
(i) Sender (ii) Receiver
(iii) Sender and Receiver (iv) Middle man

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a) Write down the uses of Computer Networks.
(OR)
b) Explain the Switching techniques.

12 a) Explain about the Elementary Data Link protocol.
(OR)
b) Discuss the Data Link layer switching in detail.

13 a) Explain about the Network layer services in detail.
(OR)
b) Classify the routing algorithm in detail.

14 a) Give a short note on Transport Layer.
(OR)
b) List various features of a User Datagram protocol.

15 a) Explain the Domain Name System with example.
(OR)
b) Discuss about the Symmetric key algorithm in detail.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Question no. 16 is compulsory

16 Discuss about the network hardware and software in detail.

17 a) Explain in detail about the Sliding Window Protocols.
(OR)
b) Describe the Medium Access control sublayer in detail.

18 a) Detail discuss about the Network layer design issues.
(OR)
b) Explain the Congestion Control algorithms.

19 a) Explain about the elements of Transport protocols in detail.
(OR)
b) Discuss the TCP Internet Transport Protocols.

20 a) Explain in detail about Domain Name System.
(OR)
b) What is mean by Digital Signatures? Explain.

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Fifth Semester)

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

SOFTWARE QUALITY ASSURANCE & SOFTWARE TESTING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1. An investigation to decide whether a prospective project is worth starting is defined as ___.
   (i) The feasibility study (ii) Project execution
   (iii) Planning (iv) Requirements analysis

2. Detailed documentation of what the proposed system is to do is known as _____.
   (i) Design (ii) Coding
   (iii) Specification (iv) Implementation

3. Prototypes that are developed and modified until it is finally in a state where it can become the operational system are known as _____.
   (i) Throw-away prototypes (ii) evolutionary prototypes
   (iii) Incremental prototypes (iv) Decrement prototypes

4. JSP is referred to as _____.
   (i) Jason Structured Programming (ii) Jackson Software Programming
   (iii) Jackson Structured Process (iv) Jackson Structured Programming

5. The _____ approach consists of creating a list of all the activities that the project is thought to involve.
   (i) activity-based (ii) product-based
   (iii) hybrid (iv) WBS

6. In CPM, the _____ represent events of activities.
   (i) arrowed lines (ii) circles
   (iii) ellipses (iv) rectangles

7. Which requirements are the foundation from which quality is measured?
   (i) Hardware (ii) Software
   (iii) Programmers (iv) None of the mentioned

8. Degree to which design specifications are followed in manufacturing the product is called
   (i) Quality Control (ii) Quality of conformance
   (iii) Quality Assurance (iv) Quality Testing

9. WinRunner is a _____ tool.
   (i) Functional Performance (ii) Non-Functional Performance
   (iii) Load Testing (iv) Stress Testing

10. The objective of _____ is to find out the maximum capability of the product Parameters.
    (i) stress testing (ii) reliability testing
    (iii) scalability testing (iv) interoperability testing

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11. a. Explain the activities covered by software project management.

(OR)

b. Analyze the management control process.

12. a. Discuss the waterfall model for system development.

(OR)

b. Interpret in detail about software prototyping.

13. a. Illustrate the procedural code-oriented approach for software effort estimation.

(OR)

b. Using a bar chart, prepare a project plan for scheduling and sequencing activities.

14. a. Compare the aspects of product quality with process quality management.

(OR)

b. Analyze the components of quality plan.

15. a. Explain the phases of software project.

(OR)

b. Discuss the different types of code coverage testing.

SECTION -C (40 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 8 = 40)

Question no. 16 is compulsory

16. For a case study example, design a framework for stepwise project planning.

17. a. Determine the several risk evaluation methods for a project.

(OR)

b. Justify the various cost-benefit evaluation techniques.

18. a. Discuss about
(i). The objectives of activity planning
(ii). Project schedules

(OR)

b. Use an appropriate example and determine the forward pass, backward pass and critical path for a CPM network.

19. a. Assess the quality factors of ISO 9126.

(OR)

b. Elucidate the different techniques to enhance software quality.

20. a. Enumerate the methodology for performance testing.

(OR)

b. Interpret the different black box testing approaches.

Z-Z-Z END

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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Fifth Semester)

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

DISCIPLINE SPECIFIC ELECTIVE – I:
DESIGN AND ANALYSIS OF ALGORITHMS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1. Recursion is similar to which of the following?
   (i) Switch Case (ii) Loop (iii) If-else (iv) if elif else

2. What is the auxiliary space complexity of merge sort?
   (i) O(1) (ii) O(log n) (iii) O(n) (iv) O(n log n)

3. Which of the following sorting algorithms is the fastest?
   (i) Merge sort (ii) Quick sort (iii) Insertion sort (iv) Shell sort

4. Which data structure is most suitable for implementing best first branch and bound strategy?
   (i) priority queue (ii) queue (iii) stack (iv) linked list

5. Consider a complete graph G with 4 vertices. The graph G has ____ spanning trees.
   (i) 15 (ii) 8 (iii) 13 (iv) 16

6. How many unique colors will be required for proper vertex coloring of a bipartite graph having n vertices?
   (i) 0 (ii) 1 (iii) 2 (iv) n

7. What is the objective of the knapsack problem?
   (i) To get maximum total value in the knapsack
   (ii) To get minimum total value in the knapsack
   (iii) To get maximum weight in the knapsack
   (iv) To get minimum weight in the knapsack

8. Which of the following is an NP complete problem?
   (i) Hamiltonian cycle
   (ii) Travelling salesman problem
   (iii) Calculating chromatic number of graph
   (iv) Finding maximum element in an array

9. In Huffman coding, data in a tree always occur?
   (i) roots (ii) leaves (iii) left sub trees (iv) right sub trees

10. The problem of placing n queens in a chessboard such that no two queens attack each other is called as?
    (i) n-queen problem (ii) eight queens puzzle
    (iii) four queens puzzle (iv) 1-queen problem

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a) Explain about recurrences in detail.
OR
b) Discuss on Randomized algorithm.

12 a) Sketch about Brute Force method.
OR
b) Evaluate travelling salesman problem.

13 a) Illustrate Binary search in detail.
OR
b) Explain about Huffman code.

14 a) Discuss about the Backtracking.
OR
b) State Graph coloring problem and explain it.

15 a) Discuss about Polynomial time.
OR
b) Explain about Hamiltonian cycle in NP complete.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Question no. 16 is compulsory

16 Analyze about Substitution method in detail.

17 a) Elucidate on closest-pair and convex-hull problem.
OR
b) Assess the knapsack problem.

18 a) Criticize merge sort with necessary theory.
OR
b) Interpret minimum cost spanning tree with suitable example.

19 a) Evaluate all pairs shortest path algorithm in detail.
OR
b) Analyze eight Queen's problem with necessary theory.

20 a) Elucidate in detail about NP completeness.
OR
b) Assess about travelling salesman problem in NP complete.

Z-Z-Z END

19SSP40B

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Sixth Semester)

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

DISCIPLINE SPECIFIC ELECTIVE – II SOFT COMPUTING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 What does FAM stand for?
i) Fuzzy Association Memory ii) Fuzzy Associative Memory
iii)Fuzzy Assist Memory iv) None of the above

2 What are some of desirable characteristics of associative memories?
i) Ability to store large number of patterns
ii) Fault tolerance
iii) Able to recall, even for input pattern is noisy
iv) All of the mentioned

3 What does ART stand for?
i) Automatic resonance theory ii) Adaptive resonance theory
iii) Artificial resonance theory iv) None of the mentioned

4 What type of inputs does ART – 1 receives?
i) Bipolar ii) Both Bipolar And Binary
iii) Binary iv) None Of The Mentioned

5 What is Fuzzy Logic?
i) A method of reasoning that resembles human reasoning.
ii) A Method of question that resembles human answer.
iii) A method of giving answer that resembles human answer.
iv) None of the above

6 How many parts are there in Fuzzy Logic Systems Architecture?
i) 3 ii) 4 iii) 5 iv) 6

7 _____ Mimic the principle of natural genetics.
i) Genetic Programming ii) Genetic Evolution
iii) Genetic Algorithm iv) None of the above.

8 Which is not a suitable problems for genetic algorithms?
i) Dynamic Process Control
ii) Pattern recognition with complex patterns
iii) Simulation of biological models
iv) Simple optimization with few variables

9 _____ is a process in which a given bit pattern is transformed into another bit pattern by means of logical bit-wise operation.
i) Inversion ii) Masking
iii) Conversion iv) Segregation

10 The _____ Causes all the bits in the first operand to the shifted to the left by the number of positions indicated by the second operand.
i) Shift Right ii) Shift both Operator
iii) Shift Left iv) None of the above

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a. Explain about Auto correlators.

OR

b. List the Applications of Associative memory.

12 a. Discuss about Simplified ART Architecture with diagram.

OR

b. Mention about Applications of ART.

13 a. What is Fuzzy Logic and list its importance.

OR

b. Enumerate predicate Logic in Fuzzy Systems.

14 a. List the applications of Genetic Algorithms.

OR

b. Elucidate the working principle Genetic Algorithms.

15 a. Discuss about Mutation operator in Genetic Modelling.

OR

b. Discuss about Bit wise operators in Genetic Modelling.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Question no. 16 is compulsory

16. Discuss about Hetero correlators and Associative Memory for Real Coded Patterns.

17 a. Discuss about Architecture of ART 1 with diagram.

OR

b. Discuss about Architecture of ART 2 with diagram.

18 a. Compare and contrast Fuzzy versus Crisp sets.

OR

b. Enumerate Fuzzy Rule Based System.

19 a. Discuss about Creation of offspring in Genetic Algorithm.

OR

b. List the fundamentals of Genetic Algorithm.

20 a. Explain inversion and deletion in Genetic Algorithm.

OR

b. Discuss about Generational Cycle in Genetic Algorithms.

Z-Z-Z END

19SSP44

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Eighth Semester)

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

ASP.NET WITH C#

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 The file extension of an ASP.NET web form is _____.
(i) .docx (ii) .aspx (iii) .jpeg (iv) None of the above

2 _____ is not an ASP.NET page event.
(i) Load (ii) Init (iii) Import (iv) All of the mentioned

3 To use the .NET Framework Data Provider for SQL Server, an application must reference the _____ namespace.
(i) System.Data.Client (ii) System.Data.SqlClient
(iii) System.Data.Sql (iv) None of the mentioned

4 _____object is used to fill a DataSet/DataTable with query results in ADO.net.
(i) DataReader (ii) Dataset (iii) DataAdapter (iv) DataTables

5 In ASP.NET if one uses Windows authentication the current request attaches an object called as _____
(i) Serialization (ii) WindowsPrincipal
(iii) WindowDatset (iv) None of the Above

6 In ASP.NET if one wants to maintain session then which of the following is used?
(i) In-process storage (ii) Microsoft SQL Server
(iii) Session State Service (iv) All the Above

7 Give one word: What model does ASP.NET request processing is based on_____
(i) Bottom-up (ii) Top-down (iii) Waterfall (iv) Pipeline

8 The first event triggers in an aspx page is_____.
(i) Page_Init() (ii) Page_Load() (iii) Page_click() (iv) page_lock()

9 What class does the ASP.NET Web Form class inherit from by default?
(i) System.Web.UI.Page (ii) System.Web.UI.Form
(iii) System.Web.GUI.Page (iv) System.Web.Form

10 We can manage states in asp.net application using_____
(i) Session Objects (ii) Application Objects
(iii) ViewState (iv) All of the above

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a) Determine the basics of C# language.
OR
b) Illustrate the different types of HTML server controls with example.

12 a) Evaluate the purpose of List controls used in ASP.NET.
OR
b) How will you custom cookies in state management? Describe.

13 a) Show the purpose of repeated value data binding.
OR
b) How to use the templates with the DataList control? Explain.

14 a) Analysis the need of file system information.
OR
b) Explain the various types of XML classes.

15 a) How the designing helped in scalability in C#? Explain.
OR
b) Distinguish between the forms and windows authentication.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Question no. 16 is compulsory

16 Enumerate the anatomy of web form in visual studio.

17 a) Formulate the exception handling mechanism used in ASP.NET.
OR
b) Determine the anatomy of an ASP.NET application.

18 a) Explain the data binding with multiple templates in ASP.NET with examples.
OR
b) Justify the steps to prepare your list for selecting and editing in C#.

19 a) Illustrate the importance of XML in ADO.NET.
OR
b) Elucidate the XML display and transforms with example.

20 a) Construct the ASP.NET security model with neat diagram.
OR
b) Summarize the methods of reading and writing with streams.

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Eighth Semester)

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

DISCIPLINE SPECIFIC ELECTIVE – III: MACHINE LEARNING

Time: Three Hours | Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 _____is a method of data analysis that automates analytical model building.
(i) Artificial Intelligence (ii) Machine Learning
(iii) Data Sciences (iv) Deep Learning

2 Choose a disadvantage of decision trees among the following.
(i) Decision trees are robust to outliers (ii) Factor analysis
(iii) Decision trees are prone to overfit (iv) All of the above

3 The procedure to incrementally update each of weights in neural is referred to as
(i) synchronisation (ii) learning law
(iii) learning algorithm (iv) both learning algorithm & law

4 Neural Networks are complex _____with many parameters.
(i) Linear Functions (ii) Nonlinear Functions
(iii) Discrete Functions (iv) Exponential Functions

5 A statement made about a population for testing purpose is called
(i) Statistic (ii) Hypothesis
(iii) Level of Significance (iv) Test-Statistic

6 Match the following:

	List – A		List – B
a)	Type I Error	i)	Small standard error
b)	Large sample	ii)	Non-parametric
c)	Multiple regression	iii)	False positive
d)	Chi-square test	iv)	One dependent variable

(i) (a) – (iv), (b) – (i), (c)-(ii), (d)-(iii)
(ii) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
(iii) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
(iv) (a)-(iii),(b)-(iv), (c)-(i), (d)-(ii)

7 **Statement -I** : A genetic algorithm is a stochastic hill-climbing search in which a large population of states is maintained.
Statement -II: In nondeterministic environments, agents can apply AND-OR search to generate contingent plans that reach the goal regardless of which outcomes occur during execution.
In the light of the above statements, choose the correct answer from the options given below.
(i) Both statements are true
(ii) Both statements are false
(iii) Stat. I is true, but Stat. II is false
(iv) Stat. II is true, but Stat. I is false

8 Consider the following:
(a) Evolution (b) Selection (c) Reproduction (d) Mutation
Which of the following are found in genetic algorithms?
(i) (b), (c) and (d) only (ii) (b) and (d) only
(iii) (a), (b), (c) and (d) (iv) (a), (b) and (d) only

9 How many types of feedback does reinforcement provide?
(i) 1 (ii) 2
(iii) 3 (iv) 4

Cont...

10 Which kind of data does reinforcement learning use?
(i) Labeled data (ii) Unlabelled data
(iii) None (iv) Both

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a Explain about the problems of decision tree learning.
OR
b Justify to avoid overfitting the data in decision tree learning.

12 a Discuss the perceptron training rule in detail.
OR
b Illustrate threshold unit algorithm with example.

13 a Analyze the Basics of Sampling Theory.
OR
b What is Mean and Variance in Binomial Distribution? Evaluate them with an example.

14 a Organize Genetic operator and illustrate the types of crossover operators.
OR
b State about population Evolution and the Schema Theorem.

15 a Solve an algorithm for learning Q for a function with an example.
OR
b Determine about temporal difference learning.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks
Question No.16 is Compulsory (5 x 8 = 40)

16 Define Missing Attribute values. Elucidate how to handle the training examples with missing values and differing cost in detail.

17 a Detail discussion about the Back propagation Algorithm with example.
OR
b Justify the convergence and local minima with an example.

18 a Differentiate in error of two hypotheses with example.
OR
b Compare two learning algorithms with a specific hypothesis.

19 a Illustrate an example to view as a general optimization method that searches a large space of candidate objects seeking best performance according to the fitness function.
OR
b Discuss the Evolution and Learning in detail.

20 a Analyze the learning task with a problem.
OR
b Predict to handle nondeterministic MDPS to extend the Q learning algorithm for the deterministic case.

Z-Z-Z END

19SSP47

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Eighth Semester)

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

PRINCIPLES OF MARKETING MANAGEMENT

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1. What is the main objective of marketing?
   (i) Increasing sales (ii) Increasing production
   (iii) identify the needs of the consumers (iv) Increasing profits.

2. Which stage of the PLC the sales volume are peak and the demand of the product stable?
   (i) Growth stage (ii) Decline stage
   (iii) Saturation (iv) Introduction

3. What is the objective of relationship marketing?
   (i) Customer retention (ii) Customer delight
   (iii) Customer dissatisfaction (iv) Customer satisfaction

4. What is an important element of behavior segmentation?
   (i) Region (ii) Gender
   (iii) Buying motive (iv) Age

5. Introduction of a new service at high price is called:
   (i) Skimming pricing (ii) Penetrative pricing
   (iii) Premium pricing (iv) Price lining

6. Labelling and packaging are associated with:
   (i) Price mix (ii) Product mix
   (iii) Place mix (iv) Promotion mix

7. What refers to subdividing a large market into smaller market?
   (i) Niche marketing (ii) Market segmentation
   (iii) Marketing research (iv) Marketing Information System

8. What strategy refers to the introduction of new products in the market?
   (i) Product development (ii) Market development
   (iii) Market Penetration (iv) Price development

9. Channels of distribution is Known as :
   (i) Trade channel (ii) Path channel
   (iii) Proper channel (iv) Improper channel

10. Online marketing is also termed as:
    (i) Internet marketing (ii) Web marketing
    (iii) Both (i) and (ii) (iv) OAM

SECTION - B (35 Marks)

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

11. a. Explain the importance of marketing.

(OR)

b. Show the features of modern Marketing concept.

Cont...

12. a. Write down the list of benefits of marketing segmentation.

(OR)

b. Sketch of the concept of positioning in market.

13. a. Explain the factors influencing product line strategies.

(OR)

b. How to classify the product? Explain.

14. a. Show the importance of channels of distribution.

(OR)

b. Explain the various service rendered by retailers to customers.

15. a. List out its advantages of relationship marketing.

(OR)

b. Explain the concept of database marketing.

SECTION -C (30 Marks)

Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 x 10 = 30)

16. Describe the major process involved in marketing.

17. Enumerate the various types of buying motives.

18. List out the factors influencing pricing.

19. Enumerate the various kinds of channels of distribution.

20. Explain online marketing and bring out its merits and demerits.

Z-Z-Z END

19SSP53A

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2023
(Ninth Semester)

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

DISCIPLINE SPECIFIC ELECTIVE- IV:
ADVANCED DATA STRUCTURES

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 Which of the following is an application of Red-black trees and why?
(i) used to store strings efficiently
(ii) used to store integers efficiently
(iii) can be used in process schedulers, maps, sets
(iv) for efficient sorting

2 Which of the following is the most widely used external memory data structure?
(i) B-tree (ii) Red Black Tree
(iii) AVL tree (iv) Both (ii) and (iii)

3 _____ is self-adjusting version of a leftist heap.
(i) Rightist heap (ii) d-heap
(iii) Binary heap (iv) Skew heap

4 Time taken in decreasing the node value in binomial heap is _____.
(i) O (n) (ii) O(1) (iii) O(logn) (iv) O(nlogn)

5 Which algorithm is used to solve a maximum flow problem?
(i) Prim's algorithm (ii) Kruskal's algorithm
(iii) Dijkstra's algorithm (iv) Ford-Fulkerson algorithm

6 _____ is matching with the largest number of edges.
(i) Non-bipartite matching (ii) Stable marriage
(iii) Maximum bipartite matching (iv) Simplex

7 _____ is a Rabin and Karp Algorithm.
(i) Shortest Path Algorithm (ii) Minimum spanning tree Algorithm
(iii) Approximation Algorithm (iv) String Matching Algorithm

8 Rabin Karp algorithm and naive pattern searching algorithm have the same worst case time complexity.
(i) True (ii) False (iii) May be (iv) Can't say

9. A given connected graph G is an Euler graph if and only if all vertices of G are of _____.
(i) same degree (ii) even degree
(iii) odd degree (iv) different degree

10 Topological sort can be implemented by _____.
(i) Using Depth First Search
(ii) Using Breadth First Search
(iii) Using Depth and Breadth First Search
(iv) Using level ordered search

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a Elaborate on splay trees with neat diagram.

OR

b Elucidate on B-trees and its operations.

12 a Why tree is named as Binomial Tree? Explain and draw a binomial tree with 12 elements.

OR

b Elaborate on Skew Heaps with example.

13 a Appraise on Iterative improvement technique.

OR

b Explain the maximum matching in bipartite graphs.

14 a Elaborate on Naive String Matching algorithm with appropriate example.

OR

b Describe the Knuth-Morris-Pattern Algorithm.

15 a Elucidate on Topological Sort.

OR

b How do you find a strongly connected components? Explain.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Question no. 16 is compulsory

16 Describe the insertion and deletion operation in B Tree.

17 a Discuss the properties and operations of Leftist Heaps.

OR

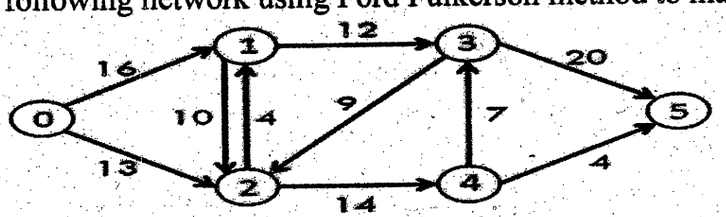
b Elaborate on Fibonacci Heaps with suitable example.

18 a Analyze the Maximum Flow Problem solving method.

OR

b Illustrate Stable Marriage Problem with suitable example.

19 a Solve the following network using Ford Fulkerson method to maximize the flow.



OR

b Enumerate on Naive String Matching algorithm.

20 a Describe BFS and DFS traversal in graph with example.

OR

b Discuss the following: i) Hamiltonian Graph ii) Isomorphism Graph.

Z-Z-Z END

19SSP53B

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2023
(Ninth Semester)

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

DISCIPLINE SPECIFIC ELECTIVE IV:
PRINCIPLES OF COMPILER DESIGN

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 Which of the following file is an output of the assembler?
(i) Program file (ii) Data File
(iii) Object File (iv) Task File

2 Macro expansion is performed by
(i) Macro processor (ii) Macro pre-processor
(iii) Assembler (iv) Micro pre-processor

3 Number of tokens in the statement: printf("k= %d, &k = %x", k, &k);
(i) 11 (ii) 31 (iii) 10 (iv) 4

4 Symbol table is generated by
(i) Assembler (ii) Compiler
(iii) Loader (iv) Interpreter

5 In _____ phase of compiler design, characters are grouped in to tokens.
(i) Code generator (ii) Lexical analyzer
(iii) Parser (iv) Code optimization

6 The Tuples for NDFA is _____
(i) $\sum$, Q, q0, F, δ (ii) Q, q0, F, δ
(iii) Θ, Q, q0, F,δ (iv) F, Q, Δ, q0, δ

7 Top down parser generates
(i) Right-most derivation in reverse
(ii) Left-most derivation in reverse
(iii) Right-most derivation
(iv) Left-most derivation

8 Which of the following parser is most powerful?
(i) Operator precedence (ii) SLR
(iii) Canonical LR (iv) LALR

9 A tool to depict the structure of basic blocks, flow of values among them and offers optimization is
(i) DAG (ii) CAG (iii) SAG (iv) PAG

10 Which optimization technique is used to reduce the multiple jumps?
(i) Latter optimization (ii) Peephole optimization
(iii) Local optimization (iv) Code optimization

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a. Describe in detail. Statement of the problem in designing assembler.

OR

b. Outline the tasks of Macro instructions.

12 a. Specify the data structure in the design of direct linking loader.

OR

b. State some compiler construction tools.

13 a. Write a short note on Lexical errors with example.

OR

b. Distinguish NFA and DFA.

14 a. How will you define a context free grammar?

OR

b. Explain about Recursive Descent parsing.

15 a. Write the three address code sequence for the following assignment statement: d:=(a-b)+(a-c)+(a-c).

OR

b. Summarize the facts related to back patching of Boolean expressions.

SECTION - C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks
Question No.16 is Compulsory (5 x 8 = 40)

16. Write about the use of databases in assembler passes with neat diagram.

17 a. Discuss the need for various loader schemes.

OR

b. Describe in detail about general Phases of compilers.

18 a. Write an algorithm to convert NFA to DFA and minimize to DFA.

OR

b. Prioritize the importance of expressing tokens in regular expression.

19 a. Why SLR and LALR are more economical to construct than canonical LR?

OR

b. Differentiate top down parsing from bottom up parsing.

20 a. Enumerate and explain various issues in the design of code generators.

OR

b. Explain the principle sources of code optimization in detail.

Z-Z-Z END

20SSP40

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Sixth Semester)

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

UNIX ARCHITECTURE & PROGRAMMING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 The following part of the UNIX operating system interacts with its hardware.
(i) Vi editor (ii) shell (iii) kernel (iv) none of these

2 Which command is used for making the scripts interactive?
(i) chmod +w (ii) chmod +rw (iii) chmod +r (iv) chmod +x

3 The positional parameters are_____.
(i) special variables and patterns
(ii) pattern matching parameters
(iii) special variables to read user input
(iv) From the command lines, the special variables for assigning arguments

4 The shell script is___.
(i) File containing a series of commands (ii) File containing special symbols
(iii) group of commands (iv) group of functions

5 Each entry in the inode table is the size of
(i) 32kb (ii) 64 Gb (iii) 64kb (iv) 64 bytes

6 Which option is used with ls command for knowing the inode number of the file?
(i) –l (ii) -i (iii) -a (iv) -o

7 Which is not the component of the Context of a Process?
(i) user-level context (ii) data
(iii) stack (iv) Queue

8 The kernel calculates the process priority as _____.
(i) (CPU/2)+60 (ii) (CPU/3)+60 (iii) (CPU/2)+50 (iv) (CPU/3)+50

9 _____ is a kernel process that swaps out memory pages that are no longer part of the working set of process.
(i) page reference (ii) page stealer (iii) page fault (iv) page management

10 Which is not the bit field in Page Table Entry of Demand Paging Data Structure?
(i) Valid (ii) Reference (iii) Read (iv) Age

SECTION - B (25 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a) Explain about the comparison commands with suitable example.

OR

b) Discuss about wild card characters and explain shell wild card characters with example.

Cont...

12 a) Write a short note on positional parameters.

OR

b) Brief about redirection operation.

13 a) Highlight the advantages and disadvantages of Buffer Cache.

OR

b) Illustrate the conversion of a pathname into an inode.

14 a) Outline different states of a process.

OR

b) Illustrate the movement of a process based on Priority Queues.

15 a) Brief about the demand paging in memory management.

OR

b) Write a short note on page fault.

SECTION -C (40 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 8 = 40)

Question no. 16 is compulsory

16 Explain the directory commands with suitable example.

17 a) Explain the concept of decision making with example.

OR

b) Describe the architecture of file system.

18 a) Explain the procedures for reading and writing disk blocks.

OR

b) Describe the structure of regular file.

19 a) Explain about the operations performed to manipulate regions in a stack.

OR

b) Elaborate the method of process scheduling.

20 a) Describe the parts of the swapping process.

OR

b) Elaborate the concept of the page-stealer process.

Z-Z-Z END

19SSP40A

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Sixth Semester)

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

DISCIPLINE SPECIFIC ELECTIVE – II : CRYPTOGRAPHY

Time : Three Hours Maximum 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks **(10 x 1 = 10)**

1. _____ is the science and art of transforming messages to make them secure and immune to attacks.
(i) Cryptography (ii) Calligraphy
(iii) Cryptanalysis (iv) None of the above

2. The _____Cipher reorders the plaintext characters to create a cipher text.
(i) Substitution (ii) Transposition
(iii) Either (i) or (ii) (iv) Neither (i) nor (ii)

3. Which of the following ciphers is a block cipher?
(i) Caesar Cipher (ii) Vernam Cipher
(iii) Playfair Cipher (iv) None of the above

4. AES uses a _____ bit block size and a key size of _____ bits.
(i) 128; 128 or 256 (ii) 64; 128 or 192
(iii) 256; 128, 192, or 256 (iv) 128; 128, 192, or 256

5. Which of the following is a mode of operation for the Block ciphers in cryptography?
(i) Electronic Code Book (ECB) (ii) Cipher Block Chaining (CBC)
(iii) Counter (CTR) mode (iv) All of the above

6. The man-in-the-middle attack can endanger the security of the Diffie-Hellman method if two parties are not
(i) Authenticated (ii) Joined
(iii) Submit (iv) Separate

7. Public-key cryptography is also known as?
(i) Asymmetric cryptography (ii) Symmetric cryptography
(iii) Both (i) and (ii) (iv) None of the above

8. A digital signature is a mathematical technique which validates?
(i) Authenticity (ii) Integrity
(iii) Non-repudiation (iv) All of the above

9. What does the acronym Dos stands for?
(i) Distributed denial of software (ii) Denial of Service
(iii) Distribution of Services (iv) Denial of Software

10. Ideally, what characters should you use in a password to make it strong?
(i) Letters and Numbers only (ii) Mixed Case Characters
(iii) Special Characters (iv) All of the above

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks **(5 x 5 = 25)**

11. a. Discuss about Security Attacks and Security services offered.
OR
b. Elucidate about Substitution Techniques with examples.

12. a. What is block Ciphers technique in cryptography?
OR
b. Explain the structure of Advanced Encryption Standard.

13. a. Discuss about Cipher Feedback Mode with diagram.
OR
b. Explain Public Key Cryptography and list its advantages.

14. a. Discuss about Message Authentication Functions.
OR
b. Enumerate the importance of Digital Signatures.

15. a. Mention the criteria for a good Password Management.
OR
b. Mention the necessity of Firewall in Network Security.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks **(5 x 8 = 40)**
Question no. 16 is compulsory

16. Explain any two Symmetric Cipher model with examples.

17. a. What is the structure of Data Encryption Standard?
OR
b. Analyze the structure of Advanced Encryption Standards and comment on why it makes it so strong?

18. a. List the various phases of RSA algorithm.
OR
b. Elucidate about Diffie-Hellman Key Exchange with example.

19. a. Discuss about HMAC Algorithm.
OR
b. Elucidate NIST Digital signature algorithm.

20. a. Who are called Intruders and comment on how to detect intruders?
OR
b. What are Viruses and mention its threats. How to protect our systems from it?

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Sixth 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 x 1 = 10)

1. _____to adapt to new circumstances and to detect and extrapolate patterns.
(i) Machine learning (ii) Knowledge representation
(iii) Natural language processing (iv) Artificial intelligence

2 _____can be applied to trees of any depth, and it is often possible to prune entire sub-trees rather than just leaves.
(i) Alpha-beta pruning (ii) Minimum
(iii) Maximum (iv) Decision tree

3 _____is a field of artificial intelligence that is concerned with presenting real-world information.
(i) Knowledge reasoning (ii) Fuzzy logic
(iii) Fuzzy inference (iv) Knowledge Representation

4 Fuzzy inference is the process of formulating the mapping from a given input to an output using_____
(i) fuzzy rules (ii) fuzzy reasoning
(iii) fuzzy membership (iv) fuzzy logic

5 In_____, analytically compute the conditional probability distribution over the variables of interest.
(i) exact inference (ii) approximate inference
(iii) inference logic (iv) inference fuzzy

6 _____are generative models, in which the joint distribution of observations and hidden states, or equivalently both the prior distribution of hidden states and conditional distribution of observations given states, is modeled.
(i) Evaluation (ii) Decoding
(iii) Learning (iv) Hidden Markov models

7 A _____refers to a stochastic decision-making process that uses a mathematical framework to model the decision-making of a dynamic system.
(i) hidden markov process (ii) Markov process
(iii) Markov chains (iv) Markov decision process

8 _____ deals with planning systems that reason on long-term goals by multiple collaborative agents which want to maintain privacy on their knowledge.
(i) Multi-agent planning (ii) Interface agent
(iii) Intelligent agent (iv) Learning agent

9 _____is when it can provide a set of unlabelled data, which it is required to analyze and find patterns inside.
(i) Unsupervised learning (ii) labeled data
(iii) association rules (iv) clustering

Cont...

10 Behaviors are _____through rewards which are gained through experiences with the environment.

(i) supervised (ii) unsupervised
(iii) semi-supervised (iv) reinforced

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a. What is Artificial Intelligence? Explain.

OR

b. Describe the heuristic functions.

12 a. What is knowledge representation and reasoning in artificial intelligence? Explain.

OR

b. What is fuzzy interference system?

13 a. What causes uncertainty in AI?

OR

b. Distinguish the approximate inference in Bayesian Network.

14 a. Explain the basics of utility theory in AI.

OR

b. Write the short notes on markov decision process.

15 a. What is supervised learning?

OR

b. Describe the robotics in AI.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Question no. 16 is compulsory

16 Demonstrate the foundations of artificial intelligence.

17 a. What are the four ways of knowledge representation in AI? Discuss.

OR

b. State the knowledge representation in fuzzy logic.

18 a. What is probabilistic reasoning? Explain with example.

OR

b. Explain the dynamic Bayesian network.

19 a. Discuss about the sequential decision problems.

OR

b. Explain about the multi-agent decision theory.

20 a. Discuss about the neural networks.

OR

b. Explain the Reinforcement learning.

Z-Z-Z END

20SSP42

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Sixth Semester)

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

CLOUD COMPUTING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 _____ computing refers to applications and services that run on a distributed network using virtualized resources.
i) Distributed ii) Cloud
iii) Soft iv) Parallel

2 Which of the following cloud concept is related to pooling and sharing of resources?
i) Polymorphism ii) Abstraction
iii) Virtualization iv) inheritance

3 _____ has many of the characteristics of what is now being called cloud computing.
i) Internet ii) Software iii) Web Service iv) hardware

4 Which of the following can be identified as cloud?
i) Web Applications ii) Intranet
iii) Hadoop iv) AWS

5 _____ refers to the location and management of the cloud's infrastructure.
i) Service ii) Deployment iii) Application iv) security

6 Which of the following is deployment model?
i) public ii) private
iii) hybrid iv) public, private and hybrid

7 Cloud computing is a _____ system and it is necessarily unidirectional in nature.
i) stateless ii) stateful iii) reliable iv) controllable

8 Which of the following is most important area of concern in cloud computing?
i) Security ii) Storage iii) Scalability iv) accessibility

9 You can't count on a cloud provider maintaining your _____ in the face of government actions.
i) scalability ii) reliability iii) privacy iv) dynamic

10 _____ as a Service is a development environment that builds upon an existing cloud computing application infrastructure.
i) Software ii) Platform iii) Analytics iv) Compliance

SECTION - B (25 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a) Analysis the real time applications of utility computing.
OR
b) Determine the pros and cons of utility computing.

Cont...

12 a) Explain the complete history of cloud computing.

OR

b) Illustrate the main functions of IaaS.

13 a) Show the different types of virtualization.

OR

b) Evaluate the need of virtualization of cloud.

14 a) Discuss the GFS architecture with neat diagram.

OR

b) Assume the functions of map reduce programming.

15 a) State the advantages of Aneka frame work.

OR

b) Organize the applications of distributed search engines.

SECTION -C (40 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 8 = 40)

Question no. 16 is compulsory

16 Analyze the complete architecture of distributed computing.

17 a) Differentiate between the SaaS and PaaS.

OR

b) Enumerate the deployment models of cloud computing.

18 a) Elucidate the implementation of AJAX and Mashup.

OR

b) Assess the architecture of VVM with diagram.

19 a) Formulate the architecture and functions of HDFS.

OR

b) Evaluate the need of Microsoft Azure infrastructure.

20 a) Discuss the importance of IBM blue cloud.

OR

b) Outline the distributed data mining in the cloud.

Z-Z-Z END

20SSP43

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Sixth Semester)

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

DISCIPLINE SPECIFIC ELECTIVE – II
SOFTWARE PROJECT MANAGEMENT

Time: Three Hours | Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 What is the first step in project planning?
(i) Analysis (ii) Design (iii) Coding (iv) All of given

2 What limits the options of the project team?
(i) Constraints (ii) Assumptions (iii) Technology (iv) Deliverables

3 _____ define testing procedures and certification process.
(i) Software Support (ii) Software Development
(iii) Software Management (iv) Software Testing

4 CMM stands for _____.
(i) Capability Maturity Model (ii) Capacity Maturity Model
(iii) Customer Maturity Model (iv) Common Maturity Model

5 COCOMO stands for _____.
(i) COnstructive COst Model (ii) COnstructive COMM Model
(iii) COMMON COst Model (iv) COnstructive COst METHOD

6 Risk must be considered in the _____ phase and weighed against the potential benefit of the project's success in order to decide if the project should be chosen.
(i) completion (ii) execution (iii) planning (iv) initiation

7 Project selection criteria are typically classified as _____.
(i) Financial and non-financial (ii) Short-term and long-term
(iii) Strategic and tactical (iv) Required and optional

8 What is the first step in developing a risk management plan?
(i) Analyse the risks.
(ii) Estimate the likelihood of the risks occurring.
(iii) Identify potential project risks.
(iv) Develop a risk mitigation plan.

9 The cost impact of a risk event occurring as a project proceeds through its life cycle tends to _____.
(i) Slowly rise (ii) Slowly drop
(iii) Drop sharply and then level out (iv) Rise sharply and then level out

10 A good starting point for developing time and cost estimates is
(i) Past experience (ii) Work packages
(iii) Task analysis (iv) Time and motion studies

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a Write short notes on problems in software project.
OR
b Discuss the function point Analysics in detail.

12 a Summarize the sequencing and scheduling in detail.
OR
b Discuss the shorting the project duration.

13 a What is mean by resource allocation? Explain with example.
OR
b Explain the software project survival in detail.

14 a Explain the basic functions of configuration management.
OR
b Write a short note on Prototyping.

15 a Explain the functions of project management tools.
OR
b Detail discussion about the advantages of management tools.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks
Question No.16 is Compulsory (5 x 8 = 40)

16 Discuss the COCOMO model for project estimation.

17 a Explain the Network planning model with suitable example.
OR
b Discuss the Critical activities in project.

18 a Explain the resource monitoring and controlling.
OR
b How to maintain huge projects? Explain the divide and conquer method.

19 a Explain the standards of configuration management.
OR
b Discuss the models of Prototyping for configuration management.

20 a Discuss any one project CASE study in detail.
OR
b Explain any one Project Management tool with example.

Z-Z-Z END

20SSP17

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2023
(Third Semester)

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

OPERATING SYSTEMS

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)

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

1 The number of processes completed per unit time is known as _____.
(i) Output (ii) Throughput
(iii) Efficiency (iv) Capacity

2 Which one of the following is the deadlock avoidance algorithm?
(i) Bankers (ii) round robin
(iii) elevator (iv) Karn's

3 _____ is a memory buffer and it is used to contain speed differential.
(i) cache (ii) accumulator
(iii) disk buffer (iv) stack pointer

4 _____ is the time taken when accessing data on the disk.
(i) settle time (ii) Rotation latency
(iii) seek time (iv) waiting time

5 Which type of VM is full virtualization?
(i) type 1 (ii) type 2
(iii) type 3 (iv) type 4

SECTION - B (15 Marks)

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

6 a Explain briefly the objectives and functions of operating system.
OR
b Analyze the process states with neat sketch.

7 a Prioritize the scheduling algorithms and explain them briefly.
OR
b Explain about the dead lock detection and recovery.

8 a Explain the simple paging in brief.
OR
b State the significance of virtual memory management.

Cont...

9 a Enumerate the disk scheduling algorithms in brief.

OR

b Elucidate the file access methods in OS.

10 a Explain the I/O virtualization in short.

OR

b Discuss about the virtual machine on multicore CPU's.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a Explain about the process description and control in detail.

OR

b List the types of thread in OS and explain them in detail.

12 a Evaluate the importance of semaphore in detail.

OR

b Discuss on Mutual exclusion.

13 a Explain the memory management requirements.

OR

b Elaborate the page replacement strategies with example.

14 a List and discuss on the types of I/O devices.

OR

b Describe on free space management.

15 a Elucidate on the types of Virtualization.

OR

b Comprehend Type 1 and Type 2 Hypervisers.

Z-Z-Z END

20SSP23

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Fourth Semester)

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

COMPUTER NETWORKS & TCP/IP

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** question
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 For large networks, which topology is used_____.
(i) Bus (ii) Tree
(iii) Ring (iv) Mesh

2 CRC stands for _____.
(i) cyclic redundancy check (ii) code repeat check
(iii) code redundancy check (iv) cyclic repeat check

3 A subset of a network that includes all the routers but contains no loops is called ___.
(i) spanning tree (ii) spider structure
(iii) spider tree (iv) special tree

4 Which of the following routing algorithms can be used for network layer design?
(i) shortest path algorithm (ii) distance vector routing
(iii) link state routing (iv) all of the mentioned

5 Which protocol does HTTP use for transferring web pages at the Transport layer?
(i) IP (ii) UDP
(iii)TCP (iv) ARP

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a) Discriminate types of Networks.
OR
b) Explain about the Data Encoding.

7 a) Difference between Synchronous and Asynchronous Transmission.
OR
b) Discuss about the CRC code.

8 a) Describe the Random Access Protocol.
OR
b) Illustrate the Spanning Tree.

Cont...

9 a) Elaborate ICMP Protocol with example.

OR

b) Discuss about Distant Vector routing protocol.

10 a) Narrate Port number with example.

OR

b) Discuss about the HTTP Protocol.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a) Explain about the Analog and Digital data transmission.

OR

b) Explain about the OSI Reference Model with neat sketch.

12 a) Compare packet switching and circuit switching.

OR

b) Illustrate the concept of Hamming code.

13 a) Demonstrate Sliding window protocol.

OR

b) Discuss about the Wireless LAN's.

14 a) Discuss about the IP Addressing.

OR

b) Elaborate Link state routing with example.

15 a) Describe about the Congestion Control.

OR

b) Elaborate DNS with example.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Fourth Semester)

Branch – **SOFTWARE SYSTEMS (5 Years Integrated)**

LINEAR ALGEBRA

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. A ----- in a matrix A is a location in A that corresponds to a leading 1 in the reduced echelon form of A.
   i) Pivot column ii) pivot position
   iii) pivot element iv) pivot row

2. Let $p_1(t) = 1, p_2(t) = t$ and $p_3(t) = 4 - t$, Then $\{p_1(t), p_2(t), p_3(t)\}$ is ---.
   i) Linearly dependent ii) linearly independent
   iii) basis iv) none of these

3. A mapping $T: \mathbb{R}^n \to \mathbb{R}^m$ is said to be ------- if each b in $\mathbb{R}^m$ is the image of at most one x in $\mathbb{R}^n$.
   i) One one ii) range iii) onto iv) domain

4. Let $v = (1, -2, 2, 0)$, The length of v is ---.
   i) 4 ii) 2 iii) 1 iv) 3

5. In the dynamical system $x_{k+1} = Ax_k$, when $A = \begin{bmatrix} 2.0 & 0 \\ 0 & 0.5 \end{bmatrix}$, then the solution x_k is -----.
   i) Unbounded ii) bounded iii) repeller iv) attractor

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a) Apply elementary row operations to transform the following matrix first into echelon form and then into reduced echelon form;

$$\begin{bmatrix} 0 & 3 & -6 & 6 & 4 & -5 \\ 3 & -7 & 8 & -5 & 8 & 9 \\ 3 & -9 & 12 & -9 & 6 & 15 \end{bmatrix}$$

OR

b) Determine if the following system is consistent;
$x_2 - 4x_3 = 8\,;\; 2x_1 - 3x_2 + 2x_3 = 1\,;\; 5x_1 - 8x_2 + 7x_3 = 1.$

7. a) Determine if the columns of the matrix $A = \begin{pmatrix} 0 & 1 & 4 \\ 1 & 2 & -1 \\ 5 & 8 & 0 \end{pmatrix}$ are linearly independent.

OR

b) Let $H = \{(a - 3b, b - a, a, b) : a \text{ and } b \text{ in } \mathbb{R}\}$. Show that H is a subspace of $\mathbb{R}^4$.

8. a) Let $A = \begin{bmatrix} 1 & -3 \\ 3 & 5 \\ -1 & 7 \end{bmatrix}, b = \begin{bmatrix} 1 \\ 2 \\ -5 \end{bmatrix}$ and define a transformation $T: \mathbb{R}^2 \to \mathbb{R}^3$ by $T(x) = Ax$. Find an x in $\mathbb{R}^2$ whose image under T is b.

OR

b) Define a linear transformation $T: \mathbb{R}^2 \to \mathbb{R}^2$ by $T(x) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -x_1 \\ x_2 \end{bmatrix}$
Find the images under T of $u = \begin{bmatrix} 4 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ and $u + v = \begin{bmatrix} 6 \\ 4 \end{bmatrix}$.

9. a) Let $W = span\{x_1, x_2\}$, $x_1 = \begin{bmatrix} 3 \\ 6 \\ 0 \end{bmatrix}, x_2 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ .Construct an orthogonal basis $\{v_1, v_2\}$ for W.

OR

Cont...

9 b) Find a least squares solution of the inconsistent system Ax=b for $A = \begin{bmatrix} 4 & 0 \\ 0 & 2 \\ 1 & 1 \end{bmatrix}, b = \begin{bmatrix} 2 \\ 0 \\ 11 \end{bmatrix}$.

10. a) Let $A = \begin{bmatrix} 4 & -1 & 6 \\ 2 & 1 & 6 \\ 2 & -1 & 8 \end{bmatrix}$. An eigenvalue of A is 2. Find a basis for the corresponding eigenspace.

OR

b) Let $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$. Find a formula for A^k, given that $A = PDP^{-1}$, when $P = \begin{bmatrix} 1 & 1 \\ -1 & -2 \end{bmatrix}$ and $D = \begin{bmatrix} 5 & 0 \\ 0 & 3 \end{bmatrix}$.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11. a) Determine if the following homogeneous system has a nontrivial solution. Describe the solution set;
$3x_1 + 5x_2 - 4x_3 = 0\,; -3x_1 - 2x_2 + 4x_3 = 0\,; 6x_1 + x_2 - 8x_3 = 0.$

OR

b) Let $A = \begin{bmatrix} 1 & 3 & 4 \\ -4 & 2 & -6 \\ -3 & -2 & -7 \end{bmatrix}$ and $b = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$. Is the equation Ax=b consistent for all possible values of b_1, b_2, b_3?

12 a) Given v_1 and v_2 in a vector space V, let $H = span(v_1, v_2\}$. Show that H is a subspace of V.

OR

b) Find a spanning set for the null space of the matrix
$A = \begin{bmatrix} -3 & 6 & -1 & 1 & -7 \\ 1 & -2 & 2 & 3 & -1 \\ 2 & -4 & 5 & 8 & -4 \end{bmatrix}$.

13. a) Let $T(x_1, x_2) = (3x_1 + x_2, 5x_1 + 7x_2, x_1 + 3x_2)$. Show that T is a one-to-one linear transformation. Does T map $\mathbb{R}^2$ onto $\mathbb{R}^3$.

OR

b) Using the standard basis, find the 4×4 matrix P that represents a cyclic permutation T from $x = (x_1, x_2, x_3, x_4)$ to $T(x) = (x_4, x_1, x_2, x_3)$. Find the matrix for T^2. What is the triple shift $T^3(x)$ and why is $T^3 = T^{-1}$? Find two real independent eigenvectors of P. What are all the eigenvalues of P?

14. a) Find the least squares solution of Ax=b for $A = \begin{bmatrix} 1 & 3 & 5 \\ 1 & 1 & 0 \\ 1 & 1 & 2 \\ 1 & 3 & 3 \end{bmatrix}, b = \begin{bmatrix} 3 \\ 5 \\ 7 \\ -3 \end{bmatrix}$.

OR

b) Find a QR factorization of $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$.

15. a) Orthogonally diagonalize the matrix $A = \begin{bmatrix} 3 & -2 & 4 \\ -2 & 6 & 2 \\ 4 & 2 & 3 \end{bmatrix}$.

OR

b) Find a singular value decomposition of $A = \begin{bmatrix} 1 & -1 \\ -2 & 2 \\ 2 & -2 \end{bmatrix}$.

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Fourth Semester)

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

MICROPROCESSOR & INTERFACING

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 How many bit program counter is available in 8085?
(i) 4-bit (ii) 8-bit
(iii) 16-bit (iv) 32-bit

2 Which is not the control bus signal?
(i) Read (ii) Write
(iii) Reset (iv) None of these

3 Which of the following statement is correct regarding the instruction CMP A?
(i) Compare accumulator with register A
(ii) Compare accumulator with memory
(iii) Compare accumulator with register H
(iv) This instruction does not exist

4 Which of the following is true about MOV A, B instruction?
(i) It means move the content of register A to register B
(ii) It uses immediate addressing mode
(iii) It doesn't affect the flag register
(iv) It is a 2-byte instruction

5 How many pins of the 8255 can be used as the I/O ports?
(i) 8 (ii) 16
(iii) 24 (iv) 32

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Discuss in detail about Peripheral initiated operations.
OR
b Classify the Memory types of microprocessors.

7 a Sketch and explain the details of microprocessor bus timings.
OR
b Explain the basic concepts of memory interfacing.

8 a What is Looping? Explain with example.
OR
b Show the importance of 16-bit arithmetic instructions.

Cont...

9 a Write an assembly language program for addition of two 8-bit numbers.

OR

b Write an assembly language program for subtraction of two 8-bit numbers.

10 a With neat sketch draw and explain about 8255 block diagram.

OR

b Illustrate how masking of 8-bit data with MSB works.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a Draw and explain in detail about microprocessor architecture and its operations.

OR

b Determine the internal data operations and registers of 8085 microprocessor.

12 a Recommend the importance of memory structure and its requirements.

OR

b Differentiate the address decoding with memory addressing.

13 a What are the logical instructions? Solve with examples.

OR

b Develop an ALP using rotate and compare instructions.

14 a Write an assembly language program for sorting numbers in ascending order.

OR

b Develop an assembly language program for multiplication of two 8-bit numbers.

15 a Design the binary counter and explain it's with functional blocks.

OR

b Construct the water level indicator using 8255 PPI with neat diagram.

Z-Z-Z END

20SSP26

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2023
(Fourth Semester)

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

SOFTWARE ENGINEERING TECHNIQUES

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. _____ is an incremental software process model that emphasizes a short development cycle.
   (i) Waterfall Model (ii) RAD Model
   (iii) Prototyping Model (iv) Spiral Model

2. Which technique is used to translate the needs of the customer into technical requirements for software?
   (i) Quality Function Deployment (ii) Business Process Engineering
   (iii) The concurrent Development Model (iv) Architectural Pattern

3. Which analysis considers data and the processes that transform the data as separate entities?
   (i) Interface analysis (ii) Bounded value analysis
   (iii) Structured analysis (iv) Analysis patterns

4. Software is divided into separately named and addressable components called ___.
   (i) Modules (ii) Patterns (iii) Segments (iv) Program Classes

5. 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) Validation testing
   (iii) System testing (iv) Integration testing

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a) Outline the need for software engineering.
   OR
   b) List out the five kinds of generic process framework applicable for the majority of software projects.

7. a) Discuss the different options to achieve reliable cost and effort estimates.
   OR
   b) What is a structural analysis and design technique? Discuss.

8. a) Describe the need for data dictionary in data modeling.
   OR
   b) Discuss the different steps followed by analyst to create a behavioral model.

9. a) Write notes on architectural design elements.
   OR
   b) Write a short note on decision tree. Give an example.

Cont...

10.a) State the various kinds of test strategies for conventional software.

OR

b) Show the details of system documentation manual.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11. a) Describe the various factors that influence the quality and productivity in software engineering.

OR

b) Explain the spiral model used for software development.

12. a) Illustrate the COCOMO Model used for software project estimation.

OR

b) Describe in detail the requirement engineering tasks.

13.a) Explain the interactive approaches to requirements analysis and modeling.

OR

b) Design the context level and level-1 DFD for the safe home security function.

14. a) Elaborate the various design concepts evolved for software engineering.

OR

b) Elucidate in details about the HIPO diagram.

15. a) Enumerate the black box testing technique.

OR

b) Formulate the role and importance of post implementation review for software implementation.

Z-Z-Z END

20SSP27

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Fourth Semester)

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

TRANSFORMATION TECHNIQUES

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. $L^{-1}\left[\frac{1}{s^{n+1}}\right]$ =-------
   (i) $\frac{t^n}{n}$ (ii) $\frac{t^n}{n!}$ (iii) $\frac{t}{n!}$ (iv) $\frac{t^3}{n!}$

2. The equation $z[n+2](2n - z[n-1]) = n+1$ is---
   i) linear ii) first order
   iii) non linear iv) second order

3. $z(na^n)$ =------
   (i)$\frac{a}{(z-a)^2}$ (ii)$\frac{z}{(z-a)^2}$ (iii) $\frac{az}{(z-a)^2}$ (iv) $\frac{az}{z-a}$

4. If $\mathcal{F}\{f(t)\} = F(\omega)$ and $\mathcal{F}\{g(t)\} = G(\omega)$ then ----
   (i) $\mathcal{F}\{f * g\} = F(\omega)\, G(\omega)$ (ii) $\mathcal{F}\{f * g\} = F(t)\, G(t)$
   (iii) $\mathcal{F}\{fg\} = F(\omega)\, G(\omega)$ (iv) $\mathcal{F}\{F * G) = f(\omega)\, g(\omega)$

5. The linear convolution of the two finite sequences $f[n]$ and $g[n]$ is defined as $h[n]$ =
   (i) $\sum_{m=0}^{n} f[m]g[n], n = 0,1,..(N_1 + N_2 - 2)$
   (ii) $\sum_{m=0}^{n} f[m]g[n-m], n = 0,1,..(N_1 + N_2 - 2)$
   (iii) $\sum_{m=0}^{n} f[n-m]g[m], n = 0,1,..(N_1 + N_2 - 2)$
   (iv) $\sum_{m=0}^{n} f[n]g[n-m], n = 0,1,..(N_1 + N_2 - 2)$

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. a) Find the Laplace transform of $-e^{-t} + \frac{1}{2}(\sin t + \cos t)$.

   OR

   b) Find the inverse Laplace transform of $\frac{2s+3}{s^2+6s+13}$.

7. a) Determine $x[4]$ given $2x[k+2] - x[k+1] + x[k] = -k^2$; $x[0] = 1$; $x[1] = 3$.

   OR

   b) Design a digital filter based on taking a moving average of the last three values of a sampled signal.

8. a) Find the z transform of the sequence defined by $f(k) = k$, $k\varepsilon\mathbb{N}$.

   OR

   b) Find the sequence whose z transform is $(z) = \frac{2z^2 - z}{(z-5)(z+4)}$.

Cont...

9. a) Find $\mathcal{F}[u(t)e^{-t} + u(t)e^{-2t}]$.

OR

b) Find $\mathcal{F}[\sin at]$.

10. a) Show that the function $\bar{F}(\omega) = T\sum_{n=0}^{N-1} f[n]\, e^{-j\omega nT}$ is periodic with period $\frac{2\pi}{T}$.

OR

b) Verify Rayleigh's theorem for the sequence $f[n] = 5,4$.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11. a) Solve $\frac{dx}{dt} + x = 9e^{2t}$; $x(0) = 3$ using the Laplace transform.

OR

b) Solve $x'' + 2x' + 2x = e^{-t}$; $x(0) = x'(0) = 0$ using Laplace transform.

12. a) Determine the numerical solution of a difference equation for low pass filter.

OR

b) A computer is fed a signal representing the position of an object as a function of time. Prior to entering the computer, the signal is sampled using an analogue to digital converter. Derive a difference equation and associated block diagram to obtain the acceleration of the object as a function of time.

13. a) The continuous signal $f(t) = \cos\frac{\pi t}{2}$ is sampled at 1 second intervals starting from t=0.

i) Find the Laplace transform of the sampled signal $f^*(t)$.

ii) Show that $F^*(s)$ has an infinity of poles.

iii) Find the z transform of the sampled signal and show that this has just two poles.

OR

b) The sequence $f[k]$ is defined by

$$f[k] = \begin{cases} 0 & k = 0,1,2,3,\ldots \\ 1 & k = 4,5,6,\ldots \end{cases}$$

Write down the sequence $f[k+1]$ and verify that $\mathcal{Z}\{f[k+1]\} = zF(z) - zf[0]$, $F(z)$ is the transform of $f[k]$.

14. a) Show that the Fourier transform of

$$f(t) = \begin{cases} 3 & -2 \le t \le 2 \\ 0 & otherwise \end{cases}$$

is given by $F(\omega) = \frac{6\sin 2\omega}{\omega}$.

i) Use the first shift theorem to find the Fourier transform of $e^{-jt}f(t)$.

ii) Verify the first shift theorem by obtaining the Fourier transform of $e^{-jt}f(t)$ directly.

OR

b) Find the Fourier transform of $f(t) = \begin{cases} e^{-3t} & ; \ t \ge 0 \\ e^{3t} & ; \ t < 0 \end{cases}$

Deduce the function whose Fourier transform is $G(\omega) = \frac{6}{10+2\omega+\omega^2}$.

15. a) Find the discrete fourier transform of the sequence $f[n] = 1,2,-5,3$.

OR

b) Find the discrete cosine transform $F[k]$ of the sequence $f[n] = 2,4,6$.

Z-Z-Z END

20SSP16

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Third Semester)

Branch – **SOFTWARE SYSTEM (Five Years Integrade Course)**

PROGRAMMING IN JAVA

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Which one is a collection of tools that are used for developing and running java programs?
i) API ii) JDK iii) JSL iv) AWT

2 A special type of method called _____ that enables an object to initialize itself when it is created.
i) Constructor ii) Method declaration
iii) Methods overloading iv) Interface

3 A thread is said to be _____ state when it is prevented from entering into the runnable state.
i) Dead ii) Running iii) Newborn iv) Blocked

4 The component class is the super class in _____.
i) java.lang ii) java.io iii) java.awt iv) java.net

5 A _____ type is a type whose fields consist of a fixed set of constants.
i) enum ii) vector iii) set iv) map

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a) Explain about the abstract class in java.

OR

b) Write a JAVA program to sorting a list of numbers using an array.

7 a) State the difference between class and Interface.

OR

b) Develop a java program to illustrate the nested try catch statements.

8 a) How to define thread? Give its syntax.

OR

b) Write a java program to implement thread class with runnable interface.

9 a) State the different ways to read input from console in Java.

OR

b) Show the native method in java.

10 a) What is generic class? How to create and use generic class?

OR

b) Describe the need of wrapper class.

Cont...

SECTION -C (30 Marks)

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

11 a) Explain in detail the basic concepts of object oriented programming.

OR

b) With neat syntax express the switch..case statement with example program.

12 a) Enumerate how to create and access the packages.

OR

b) Elucidate the various kinds of common java exceptions.

13 a) Outline the importance of Inter-thread communication in java.

OR

b) Enumerate the synchronization with its methods with suitable thread program.

14 a) Give detailed notes on I/O stream classes in java.

OR

b) Write a program to create student registration form using Applet with following fields. Name of the student, Address, Sex, Class, Mobile number, Mail-id.

15 a) Differentiate between for loop with enhanced for loop in java.

OR

b) Explain Varargs with neat syntax and example.

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Ninth Semester)

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

CLOUD COMPUTING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1. _____ refers to a Network or Internet.
   (i) Computing (ii) Cloud Computing
   (iii) Cloud (iv) CRM

2. Which of the following is owned by an organization that sells cloud services?
   (i)Private (ii)Hybrid
   (iii) Community (iv) Public

3. _____ is the cloud computing services model in which hardware is virtualized in the cloud
   (i) IaaS (ii) PaaS (iii) CaaS (iv) storage Service

4. Cloud computing architecture is a combination of _____
   (i) Service-oriented architecture and grid computing
   (ii) Service-oriented architecture and event-driven architecture.
   (iii) Utility computing and event-driven architecture.
   (iv) Virtualization and event-driven architecture.

5. Which of the model involves the special types of services that users can access on a Cloud Computing platform?
   (i) Service (ii) Planning (iii) Deployment (iv) Application

6. Which one of the following can be considered as the example of the Front-end?
   (i) Cisco Metapod (ii) Google Compute Engine
   (iii) Web Browser (iv) Amazon Web Services

7. Which of the following cloud storage is mainly meant for developers and to support applications built using Web services?
   (i) Unmanaged (ii) Managed
   (iii) Disk (iv) Storage

8. Live Mesh gives _____ of online storage and an online desktop that looks a lot like Windows Vista.
   (i) 5 GB (ii) 2 GB (iii) 8 GB (iv) 4 GB

9. Which of the following Webmail service has IM clients embedded in it?
   (i) Yahoo Office Communications Server (ii) Computing Services
   (iii) AOL Server
   (iv) Microsoft Office Communications Server

Cont...

10. Guidelines for writing and using blogs and wikis include all of the following EXCEPT:
(i) Check blog and wiki entries for credibility
(ii) Write the same content for internal and external audiences
(iii) Keep Web writing guidelines in mind
(iv) Use standard software.

SECTION - B (25 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11. a. Discuss the Pros and Cons of Cloud computing.
(or)
b. Explain the types of cloud services development.

12. a. Summarize the implementation of cloud computing for the community.
(or)
b. Write a short note on Managing Schedules.

13. a. Discuss the process of Collaborating cloud on calendars.
(or)
b. Describe the process of Collaborating Cloud on Project Management with an example.

14. a. Examine the importance of using Cloud Storage.
(or)
b. List and explain the Photo Editing Applications.

15. a. Evaluate the Web Conference Tools with an example.
(or)
b. Write the advantages and disadvantages of creating a Group.

SECTION -C (40 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)
Q.no.16 is Compulsory

16. Identify the technique for discovering Cloud Services and its tools.

17.a. Illustrate the process of Collaborating on Schedules.
(or)
b. Explain in detail about collaborating on Group projects and Events.

18.a. Elucidate the process of Collaborating on Calendars Schedules and Task Management.
(or)
b. Differentiate Collaborating on Event management and on Contact management.

19.a. Summarize the advantage of Sharing Files in cloud storage.
(or)
b. Analyze how to control cloud with web-based desktops.

20.a. Evaluate the implementation of Cloud on Social Networks with suitable examples.
(or)
b. What is Cloud Via Blogs and Wikis? Differentiate Blogs and Wikis.

Z-Z-Z END

22SSP209

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2023
(Second Semester)

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

DATA STRUCTURE 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 _____ is a sequential representation of similar data types.
(i) Queue (ii) Array
(iii) Stack (iv) List

2 The queue which wraps around upon reaching the end of the array is called as_____.
(i) linked queue (ii) doubly linked list
(iii) circular queue (iv) representation of queue list

3 The operator symbol placed before two operands called _____.
(i) infix (ii) polish
(iii) postfix (iv) reverse polish

4 The efficiency of a BFS algorithm is dependent on _____.
(i) Algorithm (ii) Tree
(iii) Problem (iv) Graph

5 The operation of processing each element in the list is known as_____.
(i) sorting (ii) merging
(iii) inserting (iv) traversal

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Discuss abstract data types.
OR
b Explain about one dimensional array.

7 a Illustrate about recursion.
OR
b Sketch out the circular queue.

8 a Illustrate about single linked list.
OR
b Discuss about binary tree with example.

Cont...

9 a Illustrate about representations using adjacency matrix.

OR

b Explain about time complexity analysis.

10 a Discuss about linear probing in detail.

OR

b Explain about bubble sort with example.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a Analyze about worst and average case time complexities.

OR

b Criticize sparse matrices and its applications.

12 a Elucidate about linear queue with example.

OR

b Analyze about priority queues with example.

13 a Enumerate doubly linked lists with suitable example.

OR

b Categorize infix and prefix expression with example.

14 a Criticize insertion of elements in binary search trees.

OR

b Elucidate about Graph Traversal Algorithm.

15 a Analyze about Hash function.

OR

b Elucidate about Insertion sort with example.

Z-Z-Z END

22SSP208

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Second Semester)

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

OBJECT ORIENTED PROGRAMMING WITH C++

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 How many types of access specifiers are provided in OOP?
i) 4 ii) 3 iii) 2 iv) 1

2 Which is more effective while calling the functions?
i) call by value ii) call by pointer iii) call by object iv) call by reference

3 How many approaches are used for operator overloading?
i) 1 ii) 2 iii) 3 iv) 4

4 Which of the following operator cannot be overloaded?
i) + ii) ?: iii) - iv) %

5 Which keyword is used to handle the exception?
i) Catch ii) throw iii) try iv) none of the above

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a) Analyze about Procedure oriented programming.
OR
b) Explain the structure of C++.

7 a) Explain about private member function.
OR
b) Illustrate the use of friend function in C++ with example.

8 a) Explain about Parameterized constructor.
OR
b) Discuss the overloading of unary and binary operators with example.

9 a) Illustrate about the Hybrid inheritance with example.
OR
b) Explain about aggregation.

10 a) Explain the basic concept of polymorphism.
OR
b) Justify the use of exception handling with example.

Cont...

SECTION -C (30 Marks)

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

11 a) Interpret the concept and benefits of OOP.

OR

b) Elucidate the types of operators in C++ with example.

12 a) Differentiate between private member functions and static member functions.

OR

b) Develop a C++ program to justify the use of objects as function Arguments.

13 a) Develop a C++ program to illustrate the use of destructors overloading.

OR

b) Interpret about the operator type conversion.

14 a) Elucidate about single and multiple inheritance with example.

OR

b) Assess briefly about nesting of classes.

15 a) Categorize the types of polymorphism.

OR

b) Enumerate about file pointers.

Z-Z-Z END

22SSP210

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Second Semester)

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

DISCRETE STRUCTURES AND APPLIED GRAPH THEORY

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)

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

1 The logical expression of "You can access the internet from campus only if you are a computer science major or you are not a freshman" is_____ .
(i) $a \rightarrow (c \vee \neg f)$ (ii) $(a \vee c) \rightarrow (\neg f)$
(iii) $a \rightarrow (c \vee f)$ (iv) $a \rightarrow (c \wedge \neg f)$

2 If $f(x) = 2x + 3$ and $g(x) = 3x + 2$ then $g \circ f =$_____ .
(i) $6x + 7$ (ii) $6x - 7$
(iii) $6x + 11$ (iv) $6x - 11$

3 A digraph is called _____ graph, whose underlying graph is a complete graph.
(i) simple (ii) bipartite
(iii) regular (iv) tournament

4 A _____ is an edge-cut consisting of a single edge .
(i) cut-edge (ii) edge-cut
(iii) vertex-cut (iv) cut-vertex

5 If G is an Eulerian graph, then the degree of every vertex is _____ .
(i) odd (ii) equal
(iii) even (iv) unequal

SECTION - B (15 Marks)

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

6 a Show that $\neg(p \vee (p \wedge \neg q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences.

OR

b Use mathematical induction to show that
$1 + 2 + 2^2 + \cdots + 2^n = 2^{n+1} - 1$ for all nonnegative integers n.

7 a Let R be the relation on the set of people such that xRy if x and y are people and x is older than y. Show that R is not a partial ordering.

OR

b Draw the Hasse diagram of the poset $(\{2,4,5,10,12,20,25\},/)$ and which elements of this poset are maximal, and which are minimal?

8 a Prove that a closed trail can be decomposed into edge-disjoint cycles.

OR

b Give the application of edge attributes in Maximum-Flow Problem.

Cont...

9 a Let e be any edge of a k-connected graph G, for $k \geq 3$. Then prove that edge-deletion subgraph $G - e$ is $(k-1)$-connected.

OR

b State and prove the Whitney Synthesis theorem.

10 a Bring out the Eulerian tour algorithm.

OR

b State the three rules for showing that a graph is not a Hamiltonian.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a Show that the premises "A student in this class has not read the book", and "Everyone in this class passed the first class", imply the conclusion "Someone who passed the first exam has not read the book".

OR

b Prove that $\sqrt{2}$ is irrational by giving a proof by contradiction.

12 a Prove that the transitive closure of a relation R equals the connectivity relation R^*.

OR

b Prove that the congruence modulo m is an equivalence relation, where $m > 1$.

13 a Define Eccentricity, Diameter, radius and a central vertex of a graph with example.

OR

b Prove that a graph is bipartite if and only if it has no cycles of odd length.

14 a State and prove the Whitney's 2-connected characterization theorem.

OR

b Prove that the Harary graph $H_{k,n}$ is k-connected, when $k = 2r$.

15 a Let G be a simple n-vertex graph, where $n \geq 3$, such that $\deg(x) + \deg(y) \geq n$ for each pair of non-adjacent vertices x and y. Then prove that G is Hamiltonian.

OR

b Explain the three commonly encountered variations of the TSP that can be transformed to a standard TSP.

Z-Z-Z END

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PSG COLLEGE OF ARTS & SCIENCE
(Autonomous)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Second Semester)

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

PROBABILITY AND STATISTICS

Time: Three Hours Maximum: 50 Marks

SECTION – A (5 MARKS)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 × 1 = 5)

1. If A and B are two events which have no point in common, the events A and B are _____.
   (i) complementary to each other (ii) independent
   (iii) mutually exclusive (iv) dependent

2. The mean and variance of binomial distribution are 8 and 4, respectively. Then, P(X==1) is equal to _____.
   (i) $\frac{1}{2^{12}}$ (ii) $\frac{1}{2^4}$ (iii) $\frac{1}{2^6}$ (iv) $\frac{1}{2^8}$

3. Whether a test is one sided or two sided depends on _____.
   (i) alternative hypothesis (ii) composite hypothesis
   (iii) null hypothesis (iv) simple hypothesis

4. Equality of several normal population means can be tested by _____.
   (i) ANOVA (ii) F-test (iii) Chi-square test (iv) t-test

5. The estimate of β in the regression equation Y = α + βX + e by the method of least square is _____.
   (i) biased (ii) unbiased (iii) consistent (iv) efficient

SECTION – B (15 MARKS)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 × 3 = 15)

6. (a) State and prove multiplication theorem on probability.
   OR
   (b) A bag contains 7 Red, 12 White and 4 Green balls. What is the probability that:
   (i) all 3 balls are white (ii) 3 balls from each colour.

7. (a) The joint probability density function of two-dimensional random variables X and Y is given by $f(x) = \begin{cases} 2, 0 \le x \le y \le 1 \\ 0, \quad otherwise \end{cases}$ find the distribution of U = X+Y.
   OR
   (b) Derive the mean and variance of binomial distribution.

8. (a) Obtain 100(1-α)% confidence limits(for large sample) for the parameter λ of the Poisson distribution: $f(x,\lambda) = \frac{e^{-\lambda}\lambda^x}{x!}$; x=0,1,2,...
   OR
   (b) Describe in detail about hypothesis testing.

9. (a) The sales data of an item in six shops before and after a special promotional campaign are as under:

Shops	A	B	C	D	E	F
Before Campaign	53	28	31	48	50	42
After Campaign	58	29	30	55	56	45

   Can the campaign be judged to be a success? Test at 5% level of significance.
   OR

Cont...

9. (b) 1000 students at college level were graded according to their I.Q and the economic conditions of their homes. Use chi-square test to find out whether there is any association between economic condition at home and I.Q.
Given $\chi^2_{0.05} = 3.84$

	IQ		
Economic Condition	High	Low	Total
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

10. (a) State the properties of regression coefficients.

OR

(b) Describe the meaning of independent variable and dependent variable in regression.

SECTION – C (30 MARKS)

Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 × 6 = 30)

11. (a) State and prove Baye's theorem.

OR

(b) From a city population, the probability of selecting (1) a male or a smoker is 7/10, (2) a male smoker is 2/5, and (3) a male, if a smoker is already selected is 2/3. Find the probability of selecting (i) a non-smoker (ii) a male and (iii) smoker, if a male is first selected.

12. (a) The joint probability density function of three dimensional random variables X, Y and Z is given by $f(x,y,z) = e^{-(x+y+z)}$; $x>0$, $y>0.z>0$. Find joint MGF of X, Y and Z, and hence find the moments of X, Y and Z.

OR

(b) Derive the mean and variance of normal distribution.

13. (a) Describe the procedure of testing the significance of two proportions.

OR

(b) Intelligence test on two groups of boys and girls gave the following results:

	Mean	S..D	N
Girls	75	15	150
Boys	70	20	250

Is there a significance difference in the mean score obtained by boys and girls?

14. (a) Two random samples were drawn from two normal population and their values are

A: 66 67 75 76 82 84 88 90 92
B: 64 66 74 78 82 85 87 92 93 95 97

Test whether the two populations have the same variance at the 5% level of significance (F=3.36) at 5% level for $v_1 = 10$ and $v_2 = 8$.

OR

(b) The following table shows the lives (in hours) of four batches of electric lamps:

Batches	Life of Bulbs in Hours							
1	1600	1610	1650	1680	1700	1720	1800	
2	1580	1640	1640	1700	1750			
3	1460	1550	1600	1620	1640	1660	1740	1820
4	1510	1520	1530	1570	1600	1680		

Perform an analysis of variance of these data and show that a significance test does not reject their homogeneity.

15. (a) Find Regression equations from the following data:

X	28	41	40	38	35	33	46	32	36	33
Y	30	34	31	34	30	26	28	31	26	31

OR

(b) Elucidate in detail about linear regression and least squares.

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Second Semester)

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

OBJECT ORIENTED PROGRAMMING USING C++

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. What is inheritance in OOPS?
   (i) Wrapping data (ii) Deriving new class from existing
   (iii) Providing modularity (iv) Efficient coding

2. An inline function is expanded during
   (i) Compile time (ii) run time
   (iii) never expanded (iv) end of the program

3. Which is the correct example for binary operator?
   (i) ++ (ii) —
   (iii) Dereferencing operator (iv) +

4. Which of the following is an example for non linear data type?
   (i) Tree (ii) Array
   (iii) Linked list (iv) Queue

5. Exception handling is implemented in the C++ program using
   (i) Exception keyword (ii) try catch block
   (iii) Exception block (iv) Error handling schedules

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a. Bring out the basic concepts of oops.

OR

b. Pin the structure of C++ Program with a small example.

7 a. Cover the concept of call by reference with a small note and an example.

OR

b. What is a friend function?Give an example.

8 a. Outline the feature of dynamic initialization of objects.

OR

b. Discuss the importance of operator overloading with example.

9 a. How the Hybrid inheritance happens. Give the flow diagram.

OR

b. Where the virtual functions are used in C++ program?

10 a. Why are templates used in C++ ?

OR

b. List the string functions and give the syntax for copying the string.

Cont...

SECTION -C (30 Marks)

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

11 a. Point out the paradigms in OOPS.

OR

b. Illustrate the list of operators in C++ with examples.

12 a. Formulate the features of Function overloading in C++.

OR

b. State the importance of static member function in C++.

13 a. Connect the points related to constructors in C++.

OR

b. Explain the procedure of overloading binary operators using the friend function.

14 a. Infer the information related to inheritance.

OR

b. Prepare a detailed note regarding polymorphism.

15 a. Discuss the feature of Exception handling in C++.

OR

b. Demonstrate the use of file pointers in C++ with an example.

Z-Z-Z END

TOTAL PAGES: 2

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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2023
(Second Semester)

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

DATA STRUCTURES

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 An m x n matrix is said to be Sparse, if many of its elements are
(i) Zero (ii) One
(iii) Same (iv) All the above

2 When the new element is pushed into a stack, the value of top is?
(i) top = top - 1 (ii) top = top + 1
(iii) top = 1 (iv) top = 0

3 A heap is a
(i) left skewed tree (ii) right skewed tree
(iii) perfect tree (iv) complete binary tree

4 If the searching element is smaller than root node in BST, the search move to
(i) right subtree (ii) left subtree
(iii) Null (iv) leaf node

5 Which sorting technique uses divide and conquer approach?
(i) Insertion sort (ii) Bubble sort
(iii) Merge sort (iv) Radix sort

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a What is an Abstract Data Type? Define it.
OR
b What is an Array? Lists the operations performed on Array.

7 a How the subroutines are handled by using Stack?
OR
b Define priority queue with example.

8 a Describe the circular list shortly.
OR
b Convert the expression into its prefix and postfix notation.
A + B * C - D

9 a What are steps to be followed to search an element in Binary Search Tree?
OR
b Define Breadth First Traversal in a Graph.

10 a Describe about hash Function.
OR
b How to perform merge sort? Specify the steps to be followed.

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions

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

11 a Demonstrate various time complexities through an example.

OR

b Illustrate the Sparse Matrix with example.

12 a Elucidate the primitive operations of Stack.

OR

b List out the applications of Queue in detail.

13 a Enumerate the Doubly linked list with an example.

OR

b Construct the max Heap tree for the following elements:
44, 33, 77, 22, 66, 22, 55

14 a Perform an insertion and deletion operation in the BST.

OR

b Categorize the representation methods of a Graph shortly.

15 a Elaborate the successful and unsuccessful search in Hashing method.

OR

b Perform the Insertion sort for the following elements.
12, 34, 21, 45, 55, 23, 11.

Z-Z-Z END

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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION MAY 2023
(Second Semester)

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

COMPUTER ORGANISATION

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)

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

1. Floating point representation is used to store.
   (i) Boolean values (ii) Whole numbers
   (iii) Real Integers (iv) Integers

2. The 'heart' of the processor which performs many different operations ____
   (i) Arithmetic and Logic Unit (ii) Motherboard
   (iii) Control Unit (iv) Memory

3. The process that can periodically check the status of an I/O devices, is known as
   (i) cold swapping (ii) I/O Instructions
   (iii) Polling (iv) periodic operation

4. Devices that accepts data from outside the computer and transfer into the CPU are called
   (i) Input devices (ii) Digital devices
   (iii) Analog devices (iv) Peripherals

5. The communication between the components in a microcomputer takes place via the address and __
   (i) I/O bus (ii) Data bus
   (iii) Address bus (iv) Control lines

SECTION - B (15 Marks)

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

6 a Determine the representation of signed format.
OR
b Discuss instruction codes.

7 a Design of single stage ALU.
OR
b Explain stack organization.

8 a Classify the memory hierarchy.
OR
b Justify RAM and ROM address spaces.

9 a Differentiate I/O bus versus Memory bus.
OR
b Show the input and output processor.

10 a Organize Interconnection structures.
OR
b Illustrate cross bar switch.

Cont...

SECTION -C (30 Marks)

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

11 a Enumerate Data types.

OR

b Elucidate Input – Output interrupts.

12 a Formulate arithmetic micro operations.

OR

b Predict multiprocessor organization.

13 a Develop Cache memory.

OR

b Construct an associative memory.

14 a Example of I/O interface.

OR

b Design a concept of DMA.

15 a Illustrate about a characteristics of multiprocessors.

OR

b Invent parallel processing.

Z-Z-Z END