Course Title: MIS, Data Structure and Recent Technologies
Course No: Comp Sc Ed 322 (CSE 322) (IVth Paper)
Nature of course: Theory and Practical
Level: B. Ed.
Year: First

<table>
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<tr>
<th>Specific Objectives</th>
<th>Contents</th>
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<td>Understand basic of information system and Planning.</td>
<td>Unit I: Introduction to Information System (5)</td>
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<td>Identify and understand different hardware and communication system used in the information system.</td>
<td>Unit II: Basic components of Information System (5)</td>
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<td>Define a problem and constraints.</td>
<td>Unit III: Conceptual and Detailed System Design (4)</td>
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1. **Course Description**
   The management information system deals with the introduction to information system, different basic components of information system, idea of conceptual and detailed system design, implementation, evaluation, and maintenance of information system, application of database management, design and implementation of management information system, process for system design methodology, and finally the basic concepts of internet and intranet. The course in data structure and algorithm lays out the principles data structuring, use of stack, queue, list, linked lists, recursion, trees, sorting, searching, graphs and their implementations. This course also deals with the comparison of different algorithms. It also introduces the concept of computer science teaching methodology.

2. **General Objectives**
The general objectives of this course are as follows:
- to introduce and apply the knowledge of computer based information systems,
- to help designing and setting up complex information system to the student,
- to provide fundamental knowledge on date structure designing and implementation for storing information,
- to provide the knowledge of various algorithms used in computer science.

3. **Specific Objectives and Contents**
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| List | 12.1 Definition  
12.2 Static and dynamic list structure  
12.3 Array implementation of lists  
12.4 Queues as list |
|---|---|
| • Understand and implement linked list. | Unit XIII: Linked lists (5)  
13.1 Definition and link list as an ADT  
13.2 Dynamic implementation  
13.3 Basic operations in linked list: node insertion deletion, insertion and deletion after and before nodes linked stacks and Queues  
13.4 Doubly linked lists and its advantages |
| • Understand and implement recursive process with reference to Tower-of-Hanoi problem. | Unit XIV: Recursion (4)  
14.1 Principle of recursion  
14.2 Comparison between recursion and iteration, recursion example  
14.3 TOH and Fibonacci sequence  
14.4 Applications of recursion  
14.5 Search tree |
| • Understand the concept and implementation of tree structure. | Unit XV: Trees (5)  
15.1 Concept and definitions  
15.2 Basic operation in binary tree  
15.3 Tree search and insertion/deletions binary tree traversals (preorder, post order and in order) tree height level and depth  
15.4 Balanced trees: AVL balanced trees, Balancing algorithm  
15.5 The Huffman algorithm  
15.6 Game tree, B-Tree |
| • Identify different sorting algorithm and implement it. | Unit XVI: Sorting (5)  
16.1 Internal and external sort  
16.2 Insertion and selection sort  
16.3 Exchange sort Bubble and quick sort Merge and Radix sort Shell sort, Binary sort, Heap sort as priority queue  
16.4 Efficiency of sorting big ‘O’ notation |
| • Identify different searching algorithm and implement it. | Unit XVII: Searching (5)  
17.1 Search technique essential of search  
17.2 Sequential search binary search, tree search general search tree  
17.3 Hashing: Hash function and hash tables  
17.4 Collision resolution technique  
17.5 Efficiency comparisons of different search technique |
| • Represent and implement graphs. | Unit XVIII: Graphs (5)  
18.1 Representation and applications  
18.2 Graphs as an ADT  
18.3 Transitive closure |
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- Understand different types of algorithms and demonstrate its applications.

**Unit XIX: Algorithms**

19.1 Deterministic and non-deterministic algorithm
19.2 Divide and conquer algorithm
19.3 Series and Parallel algorithm
19.4 Heuristic and Approximate algorithm

- Get familiar with multimedia techniques and its applications.

**Unit XX: Multimedia**

20.1 Introduction to Multimedia
20.2 Component of Multimedia: Text, Graphics, Audio, Video and Animation
20.3 Application of Multimedia

- State artificial intelligence techniques and perform its applications.

**Unit XXI: Artificial Intelligence**

21.1 Concept of AI
21.2 Component of AI
21.3 Uses of AI
21.4 Ethical Aspect of AI

- Identify contemporary technology and perform its applications.

**Unit XXII: Contemporary Technology**

22.1 e- Business
22.2 e-Learning
22.3 e-Governances
22.4 e-Medicine
22.5 Virtual Reality
22.6 Robotics

**Laboratory:**
The laboratory exercises shall include projects on designing of Information system using Object oriented methodology. Case study shall be included. The data structure and algorithms should include following laboratory exercises based on C or C++:

1. Implementations of stack.
2. Implementations of linear and circular queues.
4. Implementation of linked list: singly and double linked.
5. Implementation of trees: AVL tree Balancing of ALV
6. Implementation of merge sort.
8. Implementation of Graphs: Graph traversals.
10. Implementation of heap.

4. Instructional Techniques
The instructional techniques for this course are divided into two groups. First group consists of general instructional techniques applicable to most of the units. The second group consists of specific instructional techniques applicable to specific units.

4.1 General Instructional Techniques
- Providing the reading materials to the students to familiarize the units.
- Lecture, question-answer, discussion, brainstorming, practical, and buzz session.

4.2 Specific Instructional Techniques

Unit I
- Lecture
- Discussion

Unit II
- Lecture
- Practical
- Discussion
- Group work

Unit III
- Lecture
- Discussion
- Group work

Unit IV
- Lecture
- Practical
- Discussion
- Group work

Unit V
- Lecture
- Practical
- Discussion
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Unit VI
- Lecture
- Discussion
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Unit VII
- Lecture
- Practical
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Unit VIII
- Lecture
- Discussion
- Group work
Unit IX
- Lecture
- Practical
- Discussion
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Unit X
- Lecture
- Practical
- Discussion
- Group work

Unit XI
- Lecture
- Practical
- Discussion
- Group work

Unit XII
- Lecture
- Practical
- Discussion
- Group work

Unit XIII
- Lecture
- Practical
- Discussion
- Group work

Unit XIV
- Lecture
- Practical
- Discussion
- Group work

Unit XV
- Lecture
- Practical
- Discussion
- Group work

Unit XVI
- Lecture
- Practical
- Discussion
- Group work

Unit XVII
- Lecture
- Practical
5. Evaluation
Students will be evaluated on the basis of the class test during academic session, classroom participation, presentation of the reports and other practical activities. The scores obtained will be used for feedback purposes. The students will be evaluated through the annual examination held by the Office of the Controller of Examinations on the basis of objective questions, short and long questions. The types and number of questions to be asked in the annual examination is mentioned below:

<table>
<thead>
<tr>
<th>Types of questions</th>
<th>Total questions to be asked</th>
<th>Number of questions to be answered and marks allocated</th>
<th>Total marks</th>
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<td>Group C: Long question</td>
<td>1 with one or question</td>
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6. Recommended Books and References

Recommended Books
V. Rajaraman, "Analysis and design of Information Systems", Prentice Hall of India, 1998. (For Units V)
www.wikipedia.com (For Units XXII)

References
G.W Rowe , Introduction to Data Structure and Algorithms with C and C++ , prentice Hall India .
R.L Kruse, B.P. Leung, C.L. Tondo, data structure and program Design in C Prentice-Hall India.