UNIVERSITY OF KERALA

B. TECH. DEGREE COURSE

(2013 SCHEME)

SYLLABUS FOR

VIII SEMESTER

COMPUTER SCIENCE & ENGINEERING
## SCHEME -2013
### VIII SEMESTER
### COMPUTER SCIENCE & ENGINEERING (R)

<table>
<thead>
<tr>
<th>Course No</th>
<th>Name of subject</th>
<th>Credits</th>
<th>Weekly load, hours</th>
<th>CA Marks</th>
<th>Exam Duration Hrs</th>
<th>UE Max Marks</th>
<th>Total Marks</th>
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<tbody>
<tr>
<td>13.801</td>
<td>Cryptography and Network Security (R)</td>
<td>4</td>
<td>3 T 1 D/P</td>
<td>50</td>
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<td>Computer System Architecture (R)</td>
<td>4</td>
<td>3 T 1 D/P</td>
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<td>3</td>
<td>100</td>
<td>150</td>
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<tr>
<td>13.803</td>
<td>Distributed Systems (R)</td>
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<td>3 T 1 D/P</td>
<td>50</td>
<td>3</td>
<td>100</td>
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<td>13.804</td>
<td>Elective III</td>
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<td>3 T 1 D/P</td>
<td>50</td>
<td>3</td>
<td>100</td>
<td>150</td>
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<td>13.805</td>
<td>Elective IV</td>
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<td>3 T 1 D/P</td>
<td>50</td>
<td>3</td>
<td>100</td>
<td>150</td>
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<td>13.806</td>
<td>Algorithm Design and Graphics Lab (R)</td>
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<td>- T 4 D/P</td>
<td>50</td>
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**13.804 Elective III**

- 13.804.1 Soft Computing (FR)
- 13.804.2 Cloud Computing (FR)
- 13.804.3 Fundamentals of Neural Networks (R)
- 13.804.4 Mobile and Wireless Networks (R)
- 13.804.5 Optimization Techniques and Decision Making (R)

**13.805 Elective IV**

- 13.805.1 Robotics and Computer Vision (FR)
- 13.805.2 Graph Theory (FR)
- 13.805.3 Natural Language Processing (FR)
- 13.805.4 Mobile Computing (R)
- 13.805.5 Artificial Intelligence (R)
13.801 CRYPTOGRAPHY AND NETWORK SECURITY (R)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:
- To introduce the classical encryption techniques for information hiding.
- To develop an awareness regarding the application of mathematical concept for developing cryptographic algorithms.

Pre-requisites: 13.604-Computer Networks

Module – I

Module – II

Module – III

Module – IV
References:


Internal Continuous Assessment (Maximum Marks-50)

- 50% - Tests (minimum 2)
- 30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project, software exercises, etc.
- 20% - Regularity in the class

University Examination Pattern:

*Examination duration: 3 hours  Maximum Total Marks: 100*

The question paper shall consist of 2 parts.

Part A (20 marks) - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

Part B (80 Marks) - Candidates have to answer one full question out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

Course Outcome:

After successful completion of this course, the students will be able to:

- Discuss various classical encryption techniques for information hiding.
- Use mathematical concepts to develop cryptographic algorithms.
- Choose and apply encryption algorithms to solve security problems in real world applications.
- Discuss various authentication functions and digital signatures to provide authenticity and/or confidentiality in digital communication.
- Apply the network security protocols for network applications.
13.802 COMPUTER SYSTEM ARCHITECTURE (R)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objectives:
- To provide an understanding of the different kinds of computer system architectures and their evolution.
- To provide an insight into the implementation of parallel processing performed in computers.
- To give a thorough understanding of pipeline design and its various aspects.


Module – I
Parallel computer models - The state of computing, multi processors and multi computers, multi vector and SIMD computers, Parallel Random Access Machines and VLSI complexity model, Architectural development tracks. Program and network properties - conditions of parallelism, system interconnect architectures. Principles of scalable performance-scalability analysis and approaches.

Module – II
Processors and memory hierarchy – advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology. Bus and shared memory - backplane bus systems, shared memory organizations.

Module – III
Pipelining and superscalar techniques – linear vs. nonlinear pipelining, instruction pipeline design, arithmetic pipeline design, superscalar and super pipeline design.

Module – IV
Multiprocessors and multicomputers - multiprocessor system interconnects, cache coherence and synchronization mechanism, three generations of multicomputers, Intel Paragon system architecture. Multivector and SIMD computers - vector processing principles, multivector multiprocessors, SIMD computer organizations. Scalable, multithreaded and data flow architectures - latency hiding techniques, principles of multithreading, scalable and multithreaded architectures, data flow and hybrid architectures.
References:


Internal Continuous Assessment (Maximum Marks-50)

50% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project, software exercises, etc.
20% - Regularity in the class

University Examination Pattern:

Examination duration: 3 hours Maximum Total Marks: 100

The question paper shall consist of 2 parts.

Part A (20 marks) - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

Part B (80 Marks) - Candidates have to answer one full question out of the two from each module. Each question carries 20 marks.

Note: The question paper shall contain at least 30% analytical/problem solving questions.

Course Outcome:

After successful completion of this course, the students will be able to:

- Understand the different classes of computer architecture and select an appropriate architecture for a given application.
- Apply the various scalability analysis techniques.
- Familiarize the concepts of memory hierarchy and interconnection systems.
- Utilize the concept of pipelining to identify its various applications.
- Apply collision free scheduling for initiating operations in non linear pipeline design.
13.803 DISTRIBUTED SYSTEMS (R)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objectives:

- To introduce the major concepts related to distributed systems and distributed file systems.
- To develop an awareness regarding transaction management and concurrency control.

Pre-requisites: 13.503-Operating System & 13.604-Computer Networks

Module – I


Module – II


Module – III

Operating system support: Operating system layer – protection – processes and threads-communication and invocation – Operating system architecture security: Overview of security techniques.

Module – IV

Distributed file system: File service architecture - network file system- Andrew file system- recent advances Transactions and concurrency control: nested transactions-locks-optimistic concurrency control-comparison of methods for concurrency control-flat and nested distributed transactions- distributed deadlocks, transactions recovery. Replication System model and group communication- fault tolerant services, transactions with replicated data.

References:


**Internal Continuous Assessment (Maximum Marks-50)**

- 50% - Tests (minimum 2)
- 30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project, software exercises, etc.
- 20% - Regularity in the class

**University Examination Pattern:**

- Examination duration: 3 hours  
  Maximum Total Marks: 100

The question paper shall consist of 2 parts.

**Part A (20 marks)** - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B (80 Marks)** - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

After successful completion of this course, the student will be able to:

- Describe the features of distributed systems and distributed file systems with their specific architectures.
- Understand the issues of distributed system and recognize various types of distributed systems
- Explain the networking and communicating perspectives of distributed systems.
- Associate the support of operating system and its security architecture used in distributed systems.
- Discuss the concurrency control, transaction management and recovery mechanisms used in distributed systems.
Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:

- To provide a clear understanding on artificial neural networks and genetic algorithms.
- To solve various crisp and fuzzy set operations.

Module – I


Module – II


Module – III


Module – IV


References:


**Internal Continuous Assessment** *(Maximum Marks-50)*

- **50%** - Tests (minimum 2)
- **30%** - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
- **20%** - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours  Maximum Total Marks: 100*

The question paper shall consist of 2 parts.

**Part A (20 marks)** - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B (80 Marks)** - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

After the successful completion of the course students will be able to:

- Have a clear understanding on artificial neural networks.
- Perform crisp and fuzzy set operations.
- Identify various Defuzzification methods
- Explain various genetic algorithms.
- Apply genetic algorithm to solve real world problems.
13.804.2 CLOUD COMPUTING (FR) (Elective III)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:
- To understand the design of cloud services.
- To understand the concept of virtualization
- To apply different cloud programming models as per need.
- To be able to set up a private cloud.
- To learn to design the trusted cloud computing system

Module - I

Module – II

Module – III

Module – IV

References:
5. George Reese, *Cloud Application Architectures: Building Applications and Infrastructure in the Cloud*, O'Reilly.

**Internal Continuous Assessment** *(Maximum Marks-50)*

- 50% - Tests (minimum 2)
- 30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
- 20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours*  
*Maximum Total Marks: 100*

The question paper shall consist of 2 parts.

**Part A** (20 marks) - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B** (80 Marks) - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

After the successful completion of the course students will be able to:

- Have a clear understanding on cloud computing and virtualization techniques.
- Address core issues of cloud computing such as security, privacy, and interoperability.
- Design cloud services and setup a private cloud.
- Design compute and storage clouds based on applications.
- Understand the characteristics and services provided by cloud.
13.804.3 FUNDAMENTALS OF NEURAL NETWORKS (R) (Elective III)

Teaching Scheme: 3(L) - 1(T) - 0(P)  Credits: 4

Course Objective:
- To introduce the major concepts related to neural networks.
- To provide an awareness regarding the usage of different kinds of neural networks to solve different problems.

Pre-requisites: 13.706.2- Data Mining and Information Retrieval

Module – I

Module – II

Module – III

Module – IV

References:

**Internal Continuous Assessment (Maximum Marks-50)**

- 50% - Tests (minimum 2)
- 30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
- 20% - Regularity in the class

**University Examination Pattern:**

- Examination duration: 3 hours
- Maximum Total Marks: 100

The question paper shall consist of 2 parts.

**Part A (20 marks)** - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B (80 Marks)** - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

After the successful completion of the course students will be able to:

- Compare and contrast the architecture, learning algorithms and functions of various types of neural networks.
- Select appropriate type of neural network and develop solution for a given problem
- Determine various parameters to achieve good performance of neural networks and analyze its behavior.
- Learn various applications of neural network in real life.
- Distinguish human brain from simple artificial neural network models.
13.804.4 MOBILE AND WIRELESS NETWORKS (R) (Elective III)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:

- To introduce the major concepts related to wireless communication.
- To develop awareness regarding the medium access control protocols in designing wireless networks.
- To provide an understanding regarding different generations of cellular wireless networks.

Pre-requisites: 13.604-Computer Networks

Module – I


Module – II


Module – III


Module – IV


References:


**Internal Continuous Assessment (Maximum Marks-50)**

50% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours Maximum Total Marks: 100*

The question paper shall consist of 2 parts.

**Part A (20 marks)** - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B (80 Marks)** - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

After the successful completion of the course students will be able to:

- **Explain different transmission techniques and modulation schemes for wireless communication**
- **Use appropriate medium access control protocol in designing wireless networks**
- **Summarize various technology trends for next generation cellular wireless networks.**
- **Identify the components of GSM, GPRS and Bluetooth software model for mobile computing.**
- **Describe protocol architecture of WLAN technology, WAP and WML file systems.**
- **Illustrate routing algorithms and different transmission control techniques in transport layer.**
13.804.5 OPTIMIZATION TECHNIQUES AND DECISION MAKING (R) (Elective III)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:
- To learn basics of optimization techniques
- To learn basics of linear programming
- To learn meta-heuristic search techniques
- To develop solutions for conventional and non-conventional optimization problems

Module I

Decision-making procedure under certainty and under uncertainty - Operations Research- Probability and decision-making- Queuing or Waiting line theory-Simulation and Monte-Carlo Technique-Nature and organization of optimization problems- Scope and hierarchy of optimization-Typical applications of optimization-Essential features of optimization problems - Objective function-Investment costs and operating costs in objective function - Optimizing profitably constraints-Internal and external constraints-Formulation of optimization problems.

Module II

Continuous functions - Discrete functions - Unimodal functions - Convex and concave functions - Necessary and sufficient conditions for optimum of unconstrained functions- Numerical methods for unconstrained functions - One-dimensional search - Gradient-free search with fixed step size. Linear Programming - Basic concepts of linear programming - Graphical interpretation-Simplex method - Apparent difficulties in the Simplex method.

Module III

Transportation Problem, Loops in transportation table, Methods of finding initial basic feasible solution, Tests for optimality. Assignment Problem, Mathematical form of assignment problem, methods of solution, Network analysis by linear programming and shortest route, maximal flow problem.

Module IV


References:

Internal Continuous Assessment (Maximum Marks-50)

50% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
20% - Regularity in the class

University Examination Pattern:

Examination duration: 3 hours Maximum Total Marks: 100

The question paper shall consist of 2 parts.

Part A (20 marks) - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

Part B (80 Marks) - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

Note: The question paper shall contain at least 30% analytical/problem solving questions.

Course Outcome:

After the successful completion of the course students will be able to:

- Ability to formulate mathematical models for optimization problems.
- Ability to analyze the complexity of solutions to an optimization problem.
- Ability to design programs using meta-heuristic search concepts to solve optimization problems.
- Ability to develop hybrid models to solve an optimization problem.
13.805.1 ROBOTICS AND COMPUTER VISION (FR) (Elective IV)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:

To familiarize the concepts in image analysis, high-level vision and robotics.

Module - I

History, Present Status and Future Trends of Robotics: robotics and programmable automation, historical background, laws of robotics, robot definitions, robotics systems and robot anatomy, human systems and robotics, specifications of robots, present application status, machine intelligence, computer and robotics—future trends, flexible automation versus robotics technology, safety measures in robotics.

Module - II

Robot Kinematics and Dynamics: Introduction, forward and reverse kinematics (transformation) of three degrees of freedom robot arm, forward and reverse transformation of a four degrees of freedom manipulator in 3-D, homogeneous transformations, kinematic equations using homogeneous transformations, inverse kinematics of robot, robot arm dynamics.

Module - III

Vision as an information processing task, A geometrical framework for vision. 2D and 3D images interpretation, Segmentation, Binary and grey morphology operations, Thresholding, Filtering, Edge and corner detection, Features detection. Contours, Tracking edges and corners, object detection and tracking, Image data compression, Real time Image processing.

Module - IV


References:


**Internal Continuous Assessment (Maximum Marks-50)**

- 50% - Tests (minimum 2)
- 30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
- 20% - Regularity in the class

**University Examination Pattern:**

- Examination duration: 3 hours  
  Maximum Total Marks: 100

The question paper shall consist of 2 parts.

**Part A (20 marks)** - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B (80 Marks)** - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

After the successful completion of the course students will be able to:

- Identify the role of inverse kinematics in position controlled robots
- Learn the basics of robotics to perform routine tasks.
- Understands the controls used in robotics.
- Implement various image processing algorithms.
- Identify the components used in computer vision.
13.805.2 GRAPH THEORY (FR) (Elective IV)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:

- To introduce the major concept areas of graph theory.
- To develop an awareness regarding the applications of theorems used in graph theory.
- To provide practical, hands on experience in real world applications of graph theory.

Pre-requisites: 13.303-Discrete Structures

Module – I


Module – II

Combinatorial versus geometric graphs, Planar graphs, Different representation of planar graphs, geometric dual, combinatorial dual, vector spaces of graph, ban2 vectors of a graph, orthogonal vectors and spaces Directed graphs – types of digraphs, Digraphs and binary relation, Euler graphs, trees with directed edges.

Module – III

Graphs theoretic algorithms and computer programming - Algorithm for computer representation of a graph, algorithm for connectedness and components, spanning tree, directed circuits, shortest path, searching the graphs, Isomorphism.

Module – IV

Graphs in switching and cording theory – contact networks, Analysis of contact Networks, synthesis of contact networks, sequential switching networks, unit cube and its graph, graphs in coding theory.

References:


**Internal Continuous Assessment** *(Maximum Marks-50)*

- 50% - Tests *(minimum 2)*
- 30% - Assignments *(minimum 2)* such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
- 20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours**

**Maximum Total Marks: 100**

The question paper shall consist of 2 parts.

**Part A (20 marks)** - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B (80 Marks)** - Candidates have to answer one full question *(question may contain sub-divisions)*, out of the two from each module. Each question carries 20 marks.

**Note:** The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

*After the successful completion of the course students will be able to:*

- **Demonstrate knowledge of fundamental concepts in graph theory, including properties and characterization of bipartite graphs and trees, Euclidian and Hamiltonian graphs.**
- **Understand and apply some of the classical theorems of graph theory.**
- **Represent real life situations with mathematical graphs.**
- **Develop algorithms for connectedness and components, spanning tree, directed circuits, shortest path, searching the graphs, Isomorphism.**
- **Solve real world problems by applying graph theoretic results and algorithms.**
13.805.3 NATURAL LANGUAGE PROCESSING (FR) (Elective IV)

**Teaching Scheme:** 3(L) - 1(T) - 0(P)  
**Credits:** 4

**Course Objective:**

- To impart conceptual and application level aspects of Natural Language Processing.

**Pre-requisites:** 13.406-Formal Languages and Automata Theory

**Module – I**


**Module – II**

Statistical Machine Translation (MT), Statistical Alignment Models and Expectation Maximization (EM) and its use in statistical MT alignment models; complete statistical MT system decoding and A* Search.

**Module – III**

Information Extraction (IE) and Named Entity Recognition (NER). Information sources, rule-based methods, evaluation (recall, precision). Introduction to supervised machine learning methods. Naive Bayes (NB) classifiers for entity classification, Maximum Entropy Classifiers

**Module – IV**

Syntax and Parsing for Context-Free Grammars (CFGs): Parsing, treebanks, attachment ambiguities. Context-free grammars. Top down and bottom-up parsing, empty constituents, left recursion, and repeated work, Probabilistic CFGs.

**References:**


**Internal Continuous Assessment** *(Maximum Marks-50)*

50% - Tests (minimum 2)
30% - Assignments (minimum 2) such as homework, problem solving, quiz, literature survey, seminar, term-project etc.

20% - Regularity in the class

University Examination Pattern:

Examination duration: 3 hours  Maximum Total Marks: 100

The question paper shall consist of 2 parts.

Part A (20 marks) - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

Part B (80 Marks) - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

Note: The question paper shall contain at least 30% analytical/problem solving questions.

Course Outcome:

After the successful completion of the course students will be able to:

- Understand the basics of Natural Language Processing and thereby figure out ambiguity and uncertainty that exist in languages.
- Apply the concept of N-gram models to solve problems.
- Become aware of the significance of Information Extraction and Named Entity Recognition in Natural Language Processing.
- Evaluate information retrieval methods using the concepts of precision and recall.
- Be thoroughly knowledgeable regarding syntax and parsing for Context Free Grammars.
13.805.4 MOBILE COMPUTING (R) (Elective IV)

Teaching Scheme: 3(L) - 1(T) - 0(P)  Credits: 4

Course Objective:
- To study the relevance and underlining infrastructure of multimedia system.
- To enable the students to apply contemporary theories of multimedia learning to the development of multimedia products.

Pre-requisites: 13.604-Computer Networks

Module – I


Module – II

Wireless Communication Systems:-Telecommunication Systems-GSM-GSM services & features, architecture, channel type, frame structure, signal processing in GSM & DECT features & characteristics, architecture, functional concepts & radio link, personal access communication system (PACS)-system architecture-radio interface, Protocols. Satellite Systems-GEO, LEO, MEO.

Module – III


Module – IV

References:


Internal Continuous Assessment (Maximum Marks-50)

50% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.
20% - Regularity in the class

University Examination Pattern:

Examination duration: 3 hours Maximum Total Marks: 100

The question paper shall consist of 2 parts.

Part A (20 marks) - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

Part B (80 Marks) - Candidates have to answer one full question (question may contain sub-divisions), out of the two from each module. Each question carries 20 marks.

Note: The question paper shall contain at least 30% analytical/problem solving questions.

Course Outcome:

After the successful completion of the course students will be able to:

- Clearly differentiate 3-G and 2-G networks
- Learn the architecture of WAP & WWW.
- Usage of various standard communication protocols.
- Understand the services provided by wireless ATM.
- Implement wireless communication in a mobile network.
13.805.5 ARTIFICIAL INTELLIGENCE (R) (Elective IV)

Teaching Scheme: 3(L) - 1(T) - 0(P)  
Credits: 4

Course Objective:

- To introduce the major concepts related to artificial intelligence and machine learning.
- To develop awareness on the languages and programming techniques related to artificial intelligence.

Pre-requisites: 13.602 - Principles of Programming Languages

Module – I

Artificial Intelligence: History and Applications, Production Systems, Structures and Strategies for state space search- Data driven and goal driven search, Depth First and Breadth First Search, DFS with Iterative Deepening, Heuristic Search- Best First Search, A* Algorithm, AO* Algorithm, Constraint Satisfaction, Using heuristics in games- Minmax Search, Alpha Beta Procedure.

Module – II


Module – III


Module – IV

Language and Programming Techniques for AI- Introduction to PROLOG, Syntax for predicate calculus programming, Abstract Data Types in PROLOG, A production system
example in PROLOG, Meta- Predicates, Types and Unification, Meta-Interpreters, Learning algorithms in PROLOG, Natural Language processing in PROLOG.

References:

2. Patterson D. W., *Introduction to Artificial Intelligence and Expert Systems*, PHI.

**Internal Continuous Assessment** *(Maximum Marks-50)*

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, quiz, literature survey, seminar, term-project etc.

20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours*  
*Maximum Total Marks: 100*

The question paper shall consist of 2 parts.

**Part A** (20 marks) - Five Short answer questions of 4 marks each. All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**Part B** (80 Marks) - Candidates have to answer one full question (question may contain subdivisions), out of the two from each module. Each question carries 20 marks.

*Note:* The question paper shall contain at least 30% analytical/problem solving questions.

**Course Outcome:**

*After the successful completion of the course students will be able to:*

- Have a thorough understanding of algorithms related to artificial intelligence.
- Understand clearly the concept of machine learning.
- Usage of natural language applications in real life.
- Utilize the languages and programming techniques for artificial intelligence effectively.
- Understands the benefits of using logical programming language.
13.806 ALGORITHM DESIGN AND GRAPHICS LAB (R)

Teaching Scheme: 0(L) - 0(T) - 4(P)                  Credits: 4

Course Objective:

- To implement various geometric algorithms.
- To develop programs for computer graphics animation.

Pre-requisites: 13.603-Design and Analysis of Algorithm  
13.701-Computer Graphics

Programs shall be developed using OpenGL

The exercises may include the following:

1. Line drawing algorithm,
2. Circle drawing algorithm,
4. Line clipping and polygon clipping algorithms.
5. Polygon filling and hatching algorithms.
6. Alphanumeric character generation.
7. Animation,
8. Transformation and projections of 3D objects, back face removal algorithm.
9. Representation of graphs using adjacency lists, implementation of graph searching algorithms DFS and BFS.
11. Implementation of Kruskal’s algorithm to compute minimum cost spanning tree.
12. Implementation of Dijkstra’s shortest path algorithm and graphic simulation.
13. Height balanced trees (Red-black tree) - insertion and deletion operations.
15. Matrix chain ordering and multiplication using dynamic programming.

Internal Continuous Assessment (Maximum Marks-50)

40% - Test

40% - Class work and Record (Up-to-date lab work, problem solving capability, keeping track of rough record and fair record, term project, etc.)

20% - Regularity in the class
University Examination Pattern:

Examination duration: 4 hours          Maximum Total Marks: 150

Questions based on the list of exercises prescribed.

Marks should be awarded as follows:

  20% - Algorithm/Design
  30% - Implementing / Conducting the work assigned
  25% - Output/Results and inference
  25% - Viva voce

Candidate shall submit the certified fair record for endorsement by the external examiner.

Course Outcome:

After successful completion of this course, students will be able to:

• Implement different algorithms for lines, circles and characters, and compare the output obtained.
• Create geometric objects and implement algorithms for transformation, filling, clipping and back face elimination.
• Design and execute programs for computer graphics animation.
• Implement graph algorithms and demonstrate their working with graphical simulation.
• Implement algorithms graphically for creating and updating red black tree.
13.807 PROJECT WORK AND VIVA VOCE (FR)

Teaching Scheme: 0(L) - 0(T) - 5(P)  
Credits: 5

Course Objective:
- To provide motivation for the students to solve real world problems using mathematics and engineering principles.
- To motivate students to participate in group discussions and thereby exchange ideas.
- To serve as platform to identify research issues in existing systems.

Pre-requisites: 13.702 Seminar, Project Design and Industrial Visit (R)

PROJECT WORK:
The project is the continuation of the seventh semester project. Students are expected to utilize the project time for the development and implementation of the project whose design and other works have been completed in the seventh semester. A detailed project report in soft bound in an approved format is to be submitted at the end of the semester.

The performance of the students in the project work shall be assessed on a continuous basis. There shall be at least an interim evaluation and a final evaluation of the project work. Each student in the group may give a power point presentation on the project work during the evaluation process. For the award of the sessional marks, the project report and the power point presentation of the project work shall be assessed by a panel consisting of the Head of the Department, project coordinator, project guide, and a senior faculty member. The Head of the Department shall be the chairman of the panel. The students may be assessed individually and in groups.

VIVA VOCE:
At the time of viva-voce examination, the project work has to be evaluated in addition to assessing the students’ knowledge in the field of Computer Science and Engineering and other related and advanced topics. He/she is expected to present his/her academic records including project report, seminar report, etc. at the time of viva-voce examination. Evaluation is a serious process that is to be conducted under the equal responsibility of both the internal and external examiners.

Internal Continuous Assessment (Maximum Marks-150)

Marks by Committee: 50%  
Marks by Guide: 50%

25% - Presentation/viva, clarity in presentation, awareness to the work/topic etc.
50% - Current relevance of the work, implementation/experimentation of the work, involvement in the work etc.

25% - Evaluation of the report

University Examination Pattern:

Viva-Voce  
Maximum Total Marks: 100

Marks should be awarded as follows:

50% - General topics covering Computer Science and Engineering and other related and advanced topics.

35% - Project work.

15% - Seminar topic

Course Outcome:

After successful completion of this course, the students will be able to:

- Apply knowledge of mathematics, science and engineering principles to solve complex real world problems bringing out economically and socially feasible solutions upholding ethical values.
- Participate in peer group discussions and integrate ideas.
- Apply the knowledge base about advanced topics pertaining to area of study to design and implement solutions to challenging problems.
- Test and analyze the developed system for further improvement.
- Identify new research problems from issues raised during implementation.
- Communicate problems and solutions to society through reports.
- Manage time and resources effectively.