UNIVERSITY OF KERALA

B. TECH. DEGREE COURSE

(2013 SCHEME)

SYLLABUS FOR

VII SEMESTER

COMPUTER SCIENCE & ENGINEERING
### SCHEME -2013

### VII SEMESTER

#### COMPUTER SCIENCE & ENGINEERING ( R )

<table>
<thead>
<tr>
<th>Course No</th>
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<th>CA Marks</th>
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<th>U E Max Marks</th>
<th>Total Marks</th>
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<td>13.701</td>
<td>Computer Graphics ( R )</td>
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<td>13.702</td>
<td>Seminar, Project Design and Industrial Visit (R )</td>
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<td>13.703</td>
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<td>13.704</td>
<td>Software Engineering and Project Management ( FR)</td>
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#### 13.705 Elective I

| 13.705.1  | Multimedia Systems and Data Compression ( FR)             |
| 13.705.2  | Computational Geometry ( R )                              |
| 13.705.3  | Control Systems Engineering ( R )                         |
| 13.705.4  | Web Technology ( R )                                      |
| 13.705.5  | C# and .NET Framework ( R )                               |

#### 13.706 Elective II

| 13.706.1  | Fuzzy Set Theory and Applications ( FR)                   |
| 13.706.2  | Data Mining and Information Retrieval ( FR)               |
| 13.706.3  | Digital Image Processing ( R )                            |
| 13.706.4  | Pattern Recognition and Scene Analysis ( R )              |
| 13.706.5  | Advanced Data Base Management System ( R )                |

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13.701 COMPUTER GRAPHICS (R)

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

Course Objective:
- To introduce the concepts related to graphic devices.
- To develop an awareness of the various graphic functions and algorithms.

Pre-requisites: Students need to have an exposure in programming language and basic knowledge of linear algebra and calculus.

Module - I

Introduction- Basic concepts in Computer Graphics, Applications, Display Systems, CRT, Raster, Random Scan Displays, Flat Panel Display Systems


Module - II

Two-Dimensional Transformations- Two dimensional transformations, Basic Transformations, Matrix representations and Homogeneous coordinates systems, Composite Transformations with concatenation.

Two-Dimensional Viewing- Windowing concepts, Viewing pipeline - Clipping, Line Clipping and Polygon Clipping Algorithms.

Module - III

Three-Dimensional Concepts- Introduction to graphics in three dimensions, specification of a 3D view, Basic 3D Transformations.

Projections, Classification of 3D to 2D Projections - Parallel and perspective projections, vanishing points.


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:

- Capture the knowledge about the working principles of graphic devices in selecting appropriate graphics hardware for various applications.
- Apply geometric transformations on 2D primitives and use formal mechanisms for displaying views of a picture on an output device.
• Apply geometric transformations on 3D objects and use formal mechanisms for displaying views of a picture on an output device
• Analyze various basic graphic algorithms, and explore the methods used for detecting visible surfaces in a three dimensional scene.
• Explain and differentiate various color, illumination and shading models.
• Develop the skill for graphics programming using OpenGL.
13.702 SEMINAR, PROJECT DESIGN AND INDUSTRIAL VISIT (R)

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

Course Objectives:

- To do a detailed study of a selected topic based on current journals or published papers and present a seminar based on the study done.
- To get exposed to real life industrial situations and gain practical experience in a relevant domain in computer science engineering, and to instill a motivation for pursuing a covetable job as an engineer in future.
- To identify a problem for the final-year project, outline a solution, and prepare a preliminary design for the solution.
- To improve the ability to perform as an individual as well as a team member in completing a project work.

SEMINAR
Each student is required to present a seminar on a topic of current relevance in Computer Science and Engineering. They are expected to refer research and review papers from standard journals like ACM, IEEE, ELSEVIER, IEE, COMPUTER JOURNAL, etc. Each student shall give a power point presentation of 30 minutes duration on his/her seminar topic in an audience of students and staff members from the department.

Students from lower semesters may also attend the seminar presentation. The seminar presentation shall be assessed by a panel consisting of the Head of the Department, seminar coordinator, and 2/3 faculty members. The Head of the Department shall be the chairman of the panel.

Each student should also prepare a well-documented report on the seminar topic as per an approved format and submit to the department at the time of his/her seminar presentation. While preparing the report, at least three cross references must be used. The seminar report must not be the reproduction of the original report. The seminar report will also be evaluated for the award of sessional marks.

PROJECT DESIGN:
The project is aimed at improving the professional skill and competency of the students. The project is for a period of two semesters and students (not more than 4 members in a group) are expected to carry out a complete project. The titles of the projects and the guiding faculty members should be identified at the beginning of the seventh semester.

The design and development of the project may include hardware and/or software. The project is expected to be completed in the eighth semester. The seventh semester is mainly for the preliminary works of the project viz. design of the project, literature survey,
collection of materials and fabrication methodology etc. An interim report is to be submitted by each student at the end of the seventh semester.

For the award of the sessional marks, the interim report and the students’ involvement in the preliminary works of the project 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.

**INDUSTRIAL VISIT**

Industrial visit is considered as one of the tactical methods of teaching. The main reason behind this- it lets student to know things practically through interaction, working methods and employment practices. Moreover, it gives exposure from academic point of view. Main aim industrial visit is to provide an exposure to students about practical working environment .They also provide students a good opportunity to gain full awareness about industrial practices. Through industrial visit students get awareness about new technologies. Technology development is a main factor, about which a students should have a good knowledge. Visiting different companies actually help students to build a good relationship with those companies. We know building relationship with companies always will always help to gain a good job in future. After visiting an industry students can gain a combined knowledge about both theory and practical. Students will be more concerned about earning a job after having an industrial visit.

Each student should do at least two industrial visits and a report of the same should be submitted at the end of 7th semester. Evaluation shall be done by the committee constituted for project design based on this report. A certified report on industrial visits should be available with the student for Project and Viva voce at the end of Eighth semester.

**Internal Continuous Assessment (Maximum Marks-150)**

- 50 Marks - Seminar
- 60 Marks - Project Design (20 Marks by Guide and 40 Marks by Evaluation Committee)
- 20 Marks - Industrial Visit
- 20 Marks - Regularity in the class

**Course outcome:**

At the end of the course, the students would have acquired the basic skills to for performing literature survey and paper presentation. This course shall provide students better communication skills, exposure to working of industries and improve their leadership quality as well as the ability to work in groups, and thus aid them in building a successful career as an engineer.
13.703 EMBEDDED SYSTEMS (R)

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

Course Objectives:

- To introduce various design, analysis, and validation methods for developing embedded system programs.
- To develop real time applications of embedded systems.


Module - I

Fundamentals of Embedded Systems - complex systems and microprocessors - Embedded system design process, Requirements


Module - II

Specifications- architecture design of embedded system- design of hardware and software components- structural and behavioural description.


Module - III

Embedded computing platform, CPU bus, memory devices- i/o devices- component interfacing- designing with microprocessor. Program Design & Analysis -Data flow graphs- basic compilation techniques- analysis & optimization of execution time- program size - Validation and testing- Design example, Software Modem. Networks, Distributed Embedded Architectures, Networks for embedded systems, Network based design, Internet enabled systems.

Module - IV

Embedded system Design: Microchip PIC16 family, PIC16F873 processor architecture, features memory organization, general purpose registers, special function registers, on chip
peripherals, Watchdog timer, ADC, Data EEPROM, Asynchronous serial port, SPI mode, I2C mode. Interfacing with LCD, ADC, Stepper motor, Key board, DAC, 7 segment LED display.

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 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 successful completion of this course, the student will be able to:
• Explain concepts of embedded system including complex systems and microprocessors.
• Use Design, Analysis and Validation methods to develop various embedded system programs.
• Describe Distributed Embedded Architectures and Networks for embedded systems.
• Design various embedded system applications in real time environment with microchip PIC16F873.
• Develop programs to interface PIC16F873 with peripheral devices including LCD, ADC, Stepper motor, Key board, DAC, seven segment LED display.
13.704 SOFTWARE ENGINEERING AND PROJECT MANAGEMENT (FR)

Teaching Scheme: 2(L) - 1(T) - 0(P)  
Credits: 3

Course Objective:

- To develop awareness regarding the theoretical and methodological issues related to software engineering and project management.
- To develop software projects based on current technologies.

Module - I

Introduction to software engineering - scope of software engineering, historical aspects, economic aspects, maintenance aspects, specification and design aspects, team programming aspects. Software engineering a layered technology, processes, methods and tools. Software process models, prototyping models, incremental models, spiral model, waterfall model. Capability maturity model (CMM), ISO 9000. Phases in Software development, requirement analysis - requirements elicitation for software, analysis principles, software prototyping, specification.

Module - II

Planning phase, project planning objective, software scope, empirical estimation models - COCOMO, single variable model, staffing and personal planning. Design phase, design process, principles, concepts, effective modular design, top down, bottom up strategies, stepwise refinement. Coding, programming practice, verification, size measures, complexity analysis, coding standards.

Module - III

Testing, fundamentals, white box testing, control structure testing, black box testing, basis path testing, code walkthroughs and inspection, testing strategies-Issues, Unit testing, integration testing, Validation testing, System testing. Maintenance - Overview of maintenance process, types of maintenance. Risk management: software risks - risk identification - risk monitoring and management.

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 theoretical and methodological issues involved in modern software engineering project management
- Develop the transferable skills in logical analysis, communication and project management necessary for working within a team.
- Translate a specification to a design, and identify the components to build the architecture for a given problem, using an appropriate software engineering methodology.
- Select and use project management frameworks that ensure successful outcomes.
- Develop software projects based on current technologies, by managing resources economically and keeping ethical values.
13.705.1 MULTIMEDIA SYSTEMS AND DATA COMPRESSION (FR) (Elective I)

Teaching Scheme: 2(L) - 1(T) - 0(P)  
Credits: 3

Course Objective:
- To introduce the concepts related to multimedia DBMS.
- To develop an awareness regarding different types of multimedia systems.

Module - I

Module - II
Introduction to Compression techniques - Lossless Compression, Lossy Compression. Entropy coding, Source Encoding. Text Compression – Static Huffman coding, Arithmetic Coding, LZ Coding, LZW Coding. Image Compression- JPEG.

Module - III

Module - IV
Multimedia Synchronization- Intra Object Synchronization, Inter object Synchronization, Reference Model for Multimedia – Synchronization.

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 different digital media, and explain the features and architecture of multimedia systems.
- Discuss the properties of multimedia DBMS and apply them in data modeling.
- Analyze compression techniques for different media like text, image, audio and video and use them in real world applications.
- Describe multimedia synchronization and its reference model.
- Clearly distinguish the types of multimedia systems.
13.705.2 COMPUTATIONAL GEOMETRY (R) (Elective I)

Teaching Scheme: 2(L) - 1(T) - 0(P)  
Credits: 3

Course Objective:

- To develop efficient algorithms using various geometric algorithms and techniques.
- To perform complexity analysis of algorithms.

Pre-requisites: 13.603 – Design and Analysis of Algorithms

Module - I

Geometric Preliminaries, DCEL (Doubly Connected Edge List) data structure, Geometric Duality, Geometric Searching - Planar Straight Line Graph (PSLG), Point Location Problem, Location of a point in a planar subdivision, Plane Sweep Algorithm, Slab method, Chain method, Regularization of PSLG, Range Searching Problems.

Module - II


Module - III

Arrangements of Lines - Zone Theorem, Many Faces in arrangements, Constructing the arrangements, Forbidden graph theorem, Bipartite graph for many face problems.

Module - IV

Linear Programming - Linear Programming in Two Dimensions, Prune - Eliminate Redundant Half-Planes. Introduction to Visibility Problems - Definition of direct visibility, Point visibility and Edge visibility, Algorithm for computing point-visible region inside a polygon.

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:*

- Develop efficient algorithms by exploiting geometric properties, using appropriate data structures and geometric techniques.

- Apply learned techniques and algorithms for solving problems in diversified fields like data base searching, data mining, graphics, and image processing pattern recognition, computer vision motion planning and robotics.

- Perform complexity analysis of algorithms

- Explain clearly the visibility problems used in geometric techniques.

- Identify properties of geometric objects, express them as lemmas or theorems, and prove their correctness.
13.705.3 CONTROL SYSTEMS ENGINEERING (R) (Elective I)

Teaching Scheme: 2(L) - 1(T) - 0(P)  
Credits: 3

Course Objective:

- To familiarize the concept of control systems.
- To perform time domain and frequency domain analysis of systems.

Module - I

Open loop and closed loop control systems: Transfer function – Poles and zeros – Transfer function of linear systems – Simple electrical, mechanical, and electromechanical systems – Block diagram representation – Block diagram reduction – Signal flow graph – Mason’s gain formula.

Module - II


Module - III


Module - IV


References:

4. Ogata K., Modern Control Engineering, Prentice-Hall of India, New Delhi.

**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:

- Have a thorough understanding of open loop and closed loop control systems.
- Have a clear idea on time domain and frequency domain analysis.
- Have an understanding on control system components.
- Understand the concept of stability by knowing various criteria.
- Learn the principle of operation of strain gauge & transducers.
13.705.4 WEB TECHNOLOGY (R) (Elective I)

**Teaching Scheme:** 2(L) - 1(T) - 0(P)  
**Credits:** 3

**Course Objective:**
- To introduce the concept of web page development.
- To provide an awareness regarding E-commerce applications.

**Pre-requisites:** 13.604-Computer Networks

**Module - I**

**Module - II**

**Module - III**
NAT, VPN, DHCP, DNS – Namespace, Internet Domain Names, Mapping Domain Names to Address, Domain Name Resolution.

**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:

- Use HTML components to develop websites.
- Perform scripting and styles on web pages.
- Explain various Ecommerce applications.
- Analyze different network application protocols.
- Use various protocols for data transfer between files and web.
13.705.5 C# AND .NET FRAMEWORK (R) (Elective I)

Teaching Scheme: 2(L) - 1(T) - 0(P)  
Credit: 3

Course Objective:
- To develop object oriented programs on C#.
- To develop web based applications on .NET framework.

Pre-requisites: 13.403 – Object Oriented Techniques

Module - I
Introduction to C#: Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

Module - II
Object Oriented Aspects of C#: Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

Module - III

Module - IV
The CLR And The .NET Framework: Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

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:

- Describe basic concepts and develop programs in C# using object oriented features, delegates, events, errors and exceptions.
- Interpret data access and develop windows.
- Explain Common language runtime (CLR) as a platform for managed code.
- Describe the features of Common language runtime (CLR) and develop efficient code with C# on .NET framework.
- Develop web based applications & services on .NET framework.
13.706.1 FUZZY SET THEORY AND APPLICATIONS (FR) (Elective II)

Teaching Scheme: 2(L) - 1(T) - 0(P)  Credits: 3

Course Objective:

- To introduce the basic mathematical elements of fuzzy sets.
- To develop an awareness regarding the classical and fuzzy set operations.
- To provide an understanding on fuzzy logic inference systems.

Module - I


Module - II

Membership functions, Features, Various forms, Fuzzification, Membership value assignments, Intuition, Inference, Rank ordering, Inductive reasoning.

Module - III

Defuzzification to Crisp sets, Lambda-Cuts ($\lambda$-cuts) for Fuzzy sets and relations, Defuzzification methods. Classical Logic and Fuzzy Logic. Fuzzy systems, Natural language, Linguistic hedges. Fuzzy rule-based systems, Graphical techniques of inference.

Module - IV

Applications, Fuzzy Controllers (overview & example), Fuzzy Systems and Neural Networks, Fuzzy Neural Networks, Fuzzy Clustering, Fuzzy Pattern Recognition, Fuzzy Image Processing, Fuzzy Databases and Information retrieval systems.

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:

- Understand the basic mathematical elements of fuzzy sets.
- Compare fuzzy set and classical set theories.
- Design and analysis of fuzzy logic inference system
- Design and analyze fuzzy inference applications in the area of control system, Clustering, Pattern Recognition, Processing, and Fuzzy Databases.
- Develop fuzzy based systems for real world problems using modern tool.
13.706.2 DATA MINING AND INFORMATION RETRIEVAL (FR) (Elective II)

**Teaching Scheme:** 2(L) - 1(T) - 0(P)  
**Credits:** 3

**Course Objective:**
- To introduce the major concept related to data mining, data warehousing, and knowledge recovery.
- To develop an awareness regarding the algorithms used in practical data mining.

**Module - I**
Fundamentals of data mining - Basic data mining tasks, Issues, DM versus KDD Data preprocessing - Aggregation, Sampling, Dimensionality reduction, Feature subset selection, Feature creation, Discretization and Binarization, Variable transformation Data warehousing and OLAP Technology – Introduction to Data warehouse, Multidimensional data model, Data warehouse architecture and implementation, Data warehousing and data mining, System architecture.

**Module - II**

**Module - III**

**Module - IV**

**References:**
5. Berson A. and S. J. Smith, *Data Warehousing, Data Mining and OLAP*, TMH.

**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 key processes of data mining, data warehousing and knowledge discovery process
- Convert raw input data to an appropriate form suitable for a range of data mining algorithms.
- Describe the basic principles and algorithms used in practical data mining and understand their strengths and weaknesses
- Design and implement a data mining application using sample, realistic data sets and modern tools
- Explore recent trends in data mining such as web mining, spatial temporal mining, and time series analysis.
13.706.3 DIGITAL IMAGE PROCESSING (R) (Elective II)

Teaching Scheme: 2(L) - 1(T) - 0(P)  
Credits: 3

Course Objective:

- To understand the fundamental concepts and applications of Digital Image Processing.
- To study the various operations in Digital Image Processing.
- To know various transform domains.

Module - I

Introduction to image processing: Pixels; coordinate conventions; Imaging Geometry; Spatial Domain; Frequency Domain; sampling and quantization; Image transforms – DFT, Wavelet, Contourlet; overview of various imaging methods; Applications of Image Processing.

Module - II


Module - III


Module - IV

Image Segmentation: Pixel-Based Approach- Multi-Level Thresholding, Local Thresholding, Threshold Detection Method; Region-Based Approach- Region Growing Based Segmentation, Region Splitting, Region Merging, Split and Merge, Region Growing; Edge and Line Detection - Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance; Line Detection, Corner Detection.

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:

- Get the fundamental concepts of image processing
- Understand the need for transforms.
- Analyze images in spatial and frequency domain.
- Know the various applications and operations in image processing.
13.706.4 PATTERN RECOGNITION AND SCENE ANALYSIS (R) (Elective II)

Teaching Scheme: 2(L) - 1(T) - 0(P)  
Credits: 3

Course Objective:

- To provide a clear understanding of decision making techniques.
- To develop an awareness regarding the image analysis techniques.

Module - I


Module - II


Module - III


Module - IV


References:

2. Duda R. O., P.E. Hart and D.G. Stork, Pattern Classification, 2/e, Wiley India, 2012.

**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:*

- Be well aware of statistical and non-parametrical decision making.
- Have a clear idea on techniques for processing waveforms and images.
- Perform image analysis.
- Learn various clustering algorithm.
- Knows how to classify data based on given training set.
13.706.5 ADVANCED DATA BASE MANAGEMENT SYSTEM (R) (Elective II)

Teaching Scheme: 2(L) - 1(T) - 0(P) Credits: 3

Course Objective:

- To introduce the concepts related to distributed and object oriented DBMS.
- To develop an awareness regarding the applications of data base, data mining, and data warehousing in web technology.

Pre-requisites: 13.405 - Data Base Design

Module - I
Overview of relational database concepts- distributed DBMS – concepts and design-functions and architecture of DDBMS- distributed relational database design- transparencies in DDBMS.

Module - II
Distributed transaction management- concurrency control deadlock management-distributed database recovery replication servers- query optimization- mobile database.

Module - III

Module - IV
Web technology and DBMS- web as application platform – data warehousing concepts – data warehouse architecture- online analytical processing – OLAP benchmarks, applications, benefits and tools – introduction to data mining.

References:

3. Rajesh Narang, Object Oriented Interfaces and Databases, 2/e, PHI, 2011.
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:

- Explain the concepts and architecture of distributed DBMS.
- Apply transaction management, concurrency control, recovery techniques and query optimization methods in designing distributed database.
- Discuss the concepts and issues of object oriented DBMS and design an object oriented database.
- Identify the role of DBMS, data warehousing and data mining in web technology.
- Perform OLAP operations and data mining techniques.
**13.707 COMPUTER HARDWARE AND INTERFACING LAB (R)**

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

**Course Objective:**

- To familiarize the usage of components like ports, interfacing cards, and peripherals.
- To implement assembly language programs in 8051 microcontroller.
- To implement interfacing of peripheral devices with 8051 microcontroller.

**Pre-requisites:** 13.605 – PC Hardware Interfacing

**List of Exercises:**

1. Familiarization of the components / Cards inside a computer, standard connectors, cords, different ports, various computer peripherals. NIC and other I/O cards, and their uses.

2. Assembling of PC from Components.

3. Interfacing with parallel ports:-
   - Interfacing LEDs, 7 segment display devices, relays, sensors etc.
   - Testing of simple logic gates using parallel port.
   - Data transfer to the printer by direct access of parallel port registers
   - Inputting external data using the unidirectional/bidirectional parallel port.
   - Controlling a stepper motor using parallel port.
   - Interfacing ADC and DAC to parallel port.
   - PC to PC data transfer using parallel port.

4. Interfacing using serial ports:-
   - Finding the base addresses of COM ports in a system.
   - Data acquisition through COM port using ADC chip.
   - Serial communication between two computers using BIOS serial port services

5. 8051 Micro controller experiments:-
   - Familiarization of 8051 trainer kit by executing simple Assembly Language programs such as Multi byte addition, searching, sorting, and code conversion
   - Interfacing experiments with 8051:-
   - Data transfer using serial port
   - LCD interfacing
   - Keyboard interfacing
   - Sensor interfacing
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:*

- Identify and use the components like ports, interfacing cards and peripherals to assemble a PC.
- Implement assembly language programs using 8051 microcontroller.
- Interface peripheral devices with 8051 microcontroller.
- Demonstrate the interfacing of various devices, transducers, relays and other circuits with PC through parallel port to control data transfer.
- Generate square waveform, saw-tooth waveform and other mixed waveform using 8051.
13.708 OPERATING SYSTEMS AND NETWORK PROGRAMMING LAB (R)

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

Course Objective:

- To implement problems related to inter process communication and process synchronization.
- To implement various medium access control protocols.

Pre-requisites: 13.503 – Operating Systems,
13.604 – Computer Networks

List of Exercises:

1. Inter-process communication using mail boxes, pipes, message queues and shared memory
2. Implementation of dining philosophers problem by multiprogramming using threads, semaphores and shared memory
3. Implementation of bankers algorithm
4. Software simulation of Medium Access Control protocols – 1) Go Back N. 2) Selective Repeat and 3) Sliding Window
5. Implementation of a sub set of simple mail transfer protocol using UDP
6. Implementation of a sub set of a file transfer protocol using TCP/IP
7. Implementation of finger utility using remote procedure call (RPC)

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 projects etc.)

20% - Regularity in the class

University Examination Pattern:

Examination duration: 4 hours        Maximum Total Marks: 150

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 problems related to inter process communication and process synchronization.
- Implement the various Medium Access Control protocols.
- Implement the Simple Mail Transfer Protocol (SMTP) using UDP and File Transfer Protocol (FTP) using TCP/IP.
- Implement finger utility using Remote Procedure Call (RPC).
- Manage dead lock and resource allocation using Bankers algorithm.