UNIVERSITY OF KERALA

B. TECH. DEGREE COURSE

(2013 SCHEME)

SYLLABUS FOR

VII SEMESTER

COMPUTER SCIENCE & ENGINEERING

SCHEME -2013

VII SEMESTER

COMPUTER SCIENCE & ENGINEERING (R)

Course No	Name of subject	Credits	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D/ P				
13.701	Computer Graphics (R)	4	3	1	-	50	3	100	150
13.702	Seminar, Project Design and Industrial Visit (R)	4	-	-	4	150	-	-	150
13.703	Embedded Systems (R)	4	3	1	-	50	3	100	150
13.704	Software Engineering and Project Management (FR)	3	2	1	-	50	3	100	150
13.705	Elective I	3	2	1	-	50	3	100	150
13.706	Elective II	3	2	1	-	50	3	100	150
13.707	Computer Hardware and Interfacing Lab (R)	4	-	-	4	50	4	150	200
13.708	Operating Systems and Network Programming Lab(R)	4	-	-	4	50	4	100	200
	Total	**29**	**12**	**5**	**12**	**500**		**800**	**1300**

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)

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

Output Primitives-Scan Conversion- Line Drawing Algorithms, Midpoint Circle drawing Algorithm- Filled Area Primitives- Scan Line, Inside-Outside Tests, Boundary Fill and Flood Fill Algorithms- Attributes of Output Primitives.

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.

Visible Surface Detection Algorithms Back face Detection and removal, Z- Buffer algorithm, Depth sorting, scan line algorithm.

Module - IV

Illumination & Shading Models - Color Models, RGB, CMY, HSV, HLS , Animations, Categories, Functions & Techniques, Basic Illumination Models- Ambient Light, Diffuse Reflection, Phong Model- Gouraud shading and Phong shading.

Graphics programming using OpenGL, Introduction, OpenGL Utility Toolkit (GLUT) -Drawing Primitives, Handling Events.

References:

1. Donald Hearn and M. Pauline Baker, *Computer Graphics-C Version*, 2/e, Pearson, 2011.
2. William M. Newman and Robert F. Sproull, *Principles of Interactive Computer Graphics*, McGraw Hill.
3. David F. Rogers, *Procedural Elements for Computer Graphics,* Tata McGraw Hill, 2001.
4. Hill F.S., *Computer Graphics using OpenGL*, Pearson, 2007.
5. James D. Foley, Andries Van Dam, Steven K. Feiner and John F. Hughes, *Computer Graphics Principles and Practice in C* - 2/e, Addison-Wesley, 1997.
6. Edward Angel**,** *Interactive Computer Graphics A Top-Down approach Using OpenGL*, 5/e, Pearson, 2009.
7. Pradeep K Bhatia, *Computer Graphics*-, I. K. International Publication, 2008.

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 7^{th} 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.*

Pre-requisites: ***13.402 -*** *Computer Organization and Design.*

Module - I

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

8051 Micro controller hardware- I/O pins, ports and circuits- External memory- Counters and Timers- Serial Data I/O- Interrupts. 8051 instruction set- Addressing modes- Assembly language programming- I/O port programming- Timer and counter programming- Serial communication- Interrupt programming- 8051 interfacing to LCD, Sensors and Keyboard.

Module - II

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

CPUs - i/o devices- i/o primitives- busy wait i/o- interrupts- supervisor mode- exception-traps- coprocessors- caches- memory management- CPU performance. Process and OS– multiple tasks- context switching- scheduling policies-, interprocess- communication mechanisms.

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:

1. Wayne Wolf and Morgan Kaufmann, Computers *as Components-Principles of Embedded Computer System Design*, 3/e, Morgan Kaufmann Publishers, 2012.
2. Muhammed Ali Mazidi and Janice Gillispie Mazidi, *The 8051 Microcontroller and Embedded Systems*, 2/e, Pearson Education 2007.
3. Huang, *Embedded System Design Using C8051*, Cengage Learning.
4. Rajkamal, *Microcontrollers Architecture, Programming, Interfacing and System Design*,2/e, Pearson Education, 2012.
5. *Fundamentals of Embedded system software*, Daniel W Lewis, Pearson Education, 2012
6. Steve Heath, *Embedded System Design,* 2/e, Butterworth-Heinemann, 2003.
7. Kennath J Ayala, *The 8051 Microcontroller Architecture Programming and Application*, 2/e. Cengage Learning, 2004.

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

Project Management concept: People, Product-Process-Project. Project scheduling and tracking: Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task Software configuration management: Basics and standards User interface design- rules. Computer aided software engineering tools - CASE building blocks, taxonomy of CASE tools, integrated CASE environment.

References:

1. Roger S. Pressman, *Software Engineering,* 8/e, McGraw Hill, 2014.

2. Walker Royce, *Software Project Management : A Unified Frame Work,* Pearson Education, 1998
3. Ian Sommervile, *Software Engineering,* 7/e, University of Lancastor, Pearson Education, 2004.
4. Aggarwal K. K. and Yogesh Singh, *Software Engineering*, 2/e, New age International Publishers, 2005.
5. Kelkar S. A., *Software Project Management: A Concise Study*, 3/e, PHI, 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:

- *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

Basic Concepts of Multimedia Systems, Applications of Multimedia Systems, Media Types, Architecture of Multimedia System, Types of Multimedia Systems- Stand alone multimedia system, workstation peers, Client Server Configuration. Multimedia Database Management Systems, Multimedia-specific Properties of an MMDBMS, Data Modelling in MMDBMSs.

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

Audio Compression- Differential Pulse code modulation (DPCM), Adaptive DPCM, MPEG audio coders, Dolby audio coders. Video Compression- Video Compression Principle, frame types, Motion estimation and compensation, MPEG-1, MPEG-2, MPEG-4, MPEG-7.

Module - IV

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

References:

1. Fred Halsall, *Multimedia Communications*, Pearson Education, 2009.
2. Ralf Steinmetz and Klara Nahrstedt, *Multimedia: Computing, Communications and Applications*, Pearson Education, 2012.
3. Khalid Sayood, *Introduction to Data Compression*, 4/e, Morgan Kaufmann Publishers, Fourth edition, 2012.
4. Raghavan S. V. and Satish. K. Tripati, *Networked Multimedia Systems*, Prentice Hall of India
5. Prabhat K. Anadleigh and Kiran Thakrar, *Multimedia Systems Design*, Prentice Hall of India, 2007.
6. R. Parekh, *Principles of Multimedia*, TMH, McGraw-Hill, 2008.
7. Pandey S. and M. Pandey, *Multimedia: System, Technology and Communication*, Katharia and Sons.

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:

- *Identify different digital media, and explain the features and architecture of multi-media 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

Convex Hulls- Convex Hull Algorithms in the Plane -Graham's Scan Algorithm, Jarvi's March, Divide and Conquer Algorithm, Dynamic Convex Hull Algorithm. Triangulation— Triangulation of a point set, Triangulation Algorithms, Polygon Triangulation, Convexity, Helly's theorem, Delauny Triangulation, Voronoi Diagrams- Applications in the plane , Post Office Problem.

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:

1. Franco P. Preparata and Michael Ian Shamos, *Computational Geometry an Introduction*, Texts and Monographs in Computer Science, Springer Verlag, 2012.
2. Herbert Edelsbrunner, *Algorithms in Combinatorial Geometry*, EATCS Monographs on Theoretical Computer Science, Springer Verlag, 2012.
3. Joseph O' Rourke, *Art Gallery Theorems,* Oxford Press Publications.
4. Michael J. Laszlo, *Computational Geometry and Computer Graphics in C++,* Prentice Hall of India, 2002.

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:

- *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

Time domain analysis: Standard test signals – Order of a system – Time response of first and second order systems – Damping ratio – Natural frequency – Time domain specifications – Steady state errors – Static error constants – Generalized error series.

Module - III

Frequency domain analysis: Frequency domain specifications – Frequency response of a second order system – Gain margin and phase margin. *Concept of stability*: Routh Hurwitz criterion – Nyquist stability criterion.

Module - IV

Control System Components: Error detectors – Potentiometers and Synchros – Tachogenerators – Servomotors and Gear trains. *Transducers*: Variable Resistance, Inductance and capacitance displacement transducers. Strain gauges – Principle of operation of strain gauges. Pressure transducers – Potentiometric, inductive and capacitive transducers. Electromagnetic flow meter. Temperature Sensors – Platinum resistance thermometer – Thermistors – Thermo couple.

References:

1. Nagarath I. J. and M. Gopal, *Control Systems Engineering*, 2/e, New Age Int., New Delhi, 2009(Modules I and II).
2. Bhatacharya S. K., *Control Systems Engineering*, 2/e, Pearson Education, 2012.(Module III)
3. Ghosh A. K., *Introduction to Instrumentation and Control*, PHI Publications, 2005. (Module III).
4. Ogata K., *Modern Control Engineering*, Prentice-Hall of India, New Delhi.
5. Kuo B.C. and Golnaraghi, *Automatic Control Systems*, 8/e, Wiley India, 2009.

6. Dorf R. C. and R. H. Bishop, *Modern Control Systems*, Pearson Education.
7. Rangan C. S., G. R. Sarma and V. S. V. Mani, *Instrumentation Devices and Systems*, 2/e, Tata McGraw Hill, 2008. (Module III).

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

Introduction to Internet. Web Browsers, Web Servers Web Design. HTML. Java Script – Simple Java Script. Variables, Objects, DOM. DHTML, XML – Introduction, Key components, KTD and Schemas. PHP – Control Loops, Arrays, Functions & Forms.

Module - II

Proxy Server, Search Engines, Plug-ins and Helper Applications. Web Server hardware & software – software for Web Server – Website & internet utility program – Web Server hardware – E-commerce software – basic function of E-commerce software – payment system for e-commerce – online payment basics – payment cards – electronic cash – electronic wallets – stored value cards.

Module - III

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

Module - IV

Remote Login & Desktop - Telnet, SSH File Transfer and Access - FTP, TFTP, NFS. Electronic Mail - SMTP, POP, IMAP, MIME, Worldwide Web, HTTP. Video over IP.

References:

1. Ralph Moseley, *Developing Web Applications*, Wiley India edition, 2007.
2. Garhy P. Schneider, *E-commerce Strategy*, Technology & Implementation, Cengage Learning India Edition.
3. Comer D. E., *Internetworking with TCP/ IP, Principles, Protocols and Architectures* Vol 1, 5/e, PHI, 2006.
4. Andrew S Tanenbaum, *Computer Networks*, Fourth Edition, Pearson, 2010.
5. Forouzan B. A., *TCP/IP Protocol Suite*, 3/e, Tata McGraw Hill.

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) **Credits**: 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

Application Development on .NET: Building Windows Applications, Accessing Data with ADO.NET. **Web Based Application Development On .NET:** Programming Web Applications with Web Forms, Programming Web Services.

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:

1. Liberty J., *Programming C#*, 2nd Edn, O'Reilly Media publisher, 2002.
2. Andrew Troelsen, *C# and the .NET Platform*, 2nd Edn, A1Press,Wiky India,2003.
3. *The* Herbert Schildt, *Complete Reference: C#*, Tata McGraw-Hill, 2004.
4. Balagurusamy E., *Programming in C#*, Tata McGraw-Hill, 2004.
5. Robinson et al, *Professional C#*, 2/e, Wrox Press, 2002.
6. Thamarai Selvi S. and R. Murugesan, *A Textbook on C#*, Pearson Education, 2003.

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:

- *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

Uncertainty and imprecision, Fuzzy sets and membership. Classical sets and Fuzzy sets, Operations, Properties. Classical relations and Fuzzy relations, Cartesian product, Crisp and Fuzzy relations, Tolerance and Equivalence relations, Cosine amplitude method, Max-Min method.

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 (⍰-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:

1. Timothy J. Ross, *Fuzzy Logic with Engineering Applications*, 3/e, Wiley Int., 2010. (Modules I and II)
2. George J. Klir and Bo Yuan, *Fuzzy Sets and Fuzzy Logic: Theory and Applications*, Pearson Publications, 1995. (Module III)
3. George J. Klir and Tina A. Folger, *Fuzzy Sets, Uncertainty, and Information*, PHI
4. H.J. Zimmerman, *Fuzzy Set Theory and its Applications*, 4/e, Kluwer Academic Publishers, 2001.
5. John Yen and Reza Langari, *Fuzzy Logic: Intelligence, Control, and Information*, Pearson Education, 2007.

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

Association and Prediction - Classification and prediction, Issues, Algorithms-Decision tree-based, statisticalbased, Distance-based, Nueral network and rule-based. Support vector machines, Other classification methods, Prediction, Accuracy and Error measures, Evaluation of accuracy of classifier or predictor, Increasing the accuracy, model selection.

Module - III

Cluster analysis –Types of data in cluster analysis, classification of major clustering methods. Partitional algorithms -Hierarchical methods, Density based methods, Grid based methods, Model based clustering methods. Clustering large data bases, Constraint based cluster analysis.

Module - IV

Association and Correlation -Basic algorithms, Advanced association rule techniques, Measuring the quality rules, From association mining to correlation analysis, Constraint based association mining. Advanced Topics -Multidimensional analysis and descriptive mining of complex data objects, Spatial mining, Multimedia mining, Text mining, Web mining, Temporal mining.

References:

1. Jiawei Han and Micheline Kamber, *Data Mining:Concepts and Techniques*, 3/e, Morgan Kaufmann Publishers, 2012.
2. Margaret H. Dunham and S. Sridhar, *Data Mining:Introductory and Advanced Topics*, Pearson Education, 2006.

3. William H. Inmon, *Building the Data Warehouse*, 4/e, Wiley Publishing, 2005.
4. Arun K Pujari, *Data mining techniques*, Universities Press, 2001.
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 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:

- *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

Image Enhancement in spatial domain: Basic Gray Level Transformation functions – Point Processing: Contrast Stretching, Thresholding; Piecewise-Linear Transformation Functions: Contrast Stretching, Gray Level Slicing, Bit Plane Slicing; Histogram Processing – Specification, Equalization; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging. Basics of Spatial Filtering – Smoothing: Smoothing Linear Filters, Ordered Statistic Filters; Sharpening: The Laplacian, Unsharp Masking and High Boost Filtering.

Module - III

Image Enhancement in Frequency Domain : Basis of Filtering in Frequency Domain, Filters - Smoothing Frequency Domain Filters : Ideal Low Pass Filter, Gaussian Low Pass Filter, Butterworth Low Pass Filter; Sharpening Frequency Domain Filters: Ideal High Pass Filter, Gaussian High Pass Filter, Butterworth High Pass Filter, Homomorphic Filtering.

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:

1. A. K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall of India, 1989.

2. Rafael C. Gonzalez, Richard E. Woods, *Digital Image Processing* (English) 3rd Edition, Pearson India, 2013,
3. Milan Sonka, Vaclav Hlavac, Roger Boyle, *Image Processing, Analysis, and Machine Vision*, Thomson Learning, 2008.
4. Al Bovik, *The Essential Guide to Image Processing*, Academic Press, 2009.
5. S. Jayaraman, S. Esakkirajan, T. Veerakumar, *Digital Image Processing*, McGraw Hill Education ,2009.

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

Introduction. Probability – Probabilities of events, Random Variables, Joint Distributions and Densities, Moments of Random Variables, Estimation of Parameters from Samples, Minimum Risk Estimators. Statistical Decision Making – Bayes' Theorem, Multiple Features, Conditionally Independent Features, Decision Boundaries, Unequal Costs of Error, Estimation of Error Rates, The Leaving-One-Out Technique, Characteristic Curves, Estimating the Composition of Populations.

Module - II

Nonparametric Decision Making – Histograms, Kernel and Window Estimators, Nearest Neighbor Classification Techniques, Adaptive Decision Boundaries, Adaptive Discriminant Functions, Minimum Squared Error Discriminant Functions, Choosing a Decision Making Technique. Clustering – Hierarchical clustering, Partitional Clustering. Artificial Neural Networks – Nets without Hidden Layers, Nets with Hidden Layers, Back-Propagation Algorithm, Hopfield Nets.

Module - III

Processing of Waveforms and Images – Gray Level Scaling Transformations, Histogram Equalization, Geometric Image Scaling and Interpolation, Smoothing Transformations, Edge Detection, Laplacian and Sharpening Operators, Line Detection and Template Matching, Logarithmic Gray Level Scaling.

Module - IV

Image Analysis – Scene Segmentation and Labelling, Counting Objects, Perimeter Measurement, Following and Representing Boundaries, Least Squares and Eigenvector Line Fitting, Shapes of Regions, Morphological Operations, Texture.

References:

1. Gose E., R. Johnsonbaugh and S. Jost, *Pattern Recognition and Image Analysis*, PHI, 1999.
2. Duda R. O., P.E. Hart and D.G. Stork, *Pattern Classification*, 2/e, Wiley India, 2012.
3. Duda R.O. and P. E. Hart, *Pattern Classification and Scene Analysis*, John Wiley & Sons, New York, 1973.

4. Fu K.S., *Syntactic Pattern Recognition and Applications*, Prentice Hall, Eaglewood cliffs, N.J.,1982.
5. Theodoridis S. and K. Koutroumbas, *Pattern Recognition*, 3/e, Elsevier, Fourth edition, 2008.
6. Bishop C. M., *Neural Network for Pattern Recognition*, Oxford University Press, New York, 1998.

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 FUZZY SET THEORY AND APPLICATIONS (FR) (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

Object DBMS- weaknesses of RDBMS- object oriented concepts- storing objects in relational database- OODBMS concepts and design – perspectives- persistence- issues in OODBMS- advantages and disadvantages- object group- object database standard – object store object-relational database examples.

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:

1. Thomas Connolly and Caroly Begg, *Database Systems, A Practical Approach to Design Implementation and Management*, 4/e, Pearson Education, 2008.
2. Elmasri and Navathe, *Fundamentals of Database Systems,* Addison Wesley, 2008.
3. Rajesh Narang, *Object Oriented Interfaces and Databases*, 2/e, PHI, 2011.
4. Prabhu C. S. R., *Object Oriented Database Systems: Approaches and Architectures,* 3/e, PHI.
5. Panneerselvam R., *Database Management Systems*, 2/e, PHI, 2011.
6. Prabhu C. S. R., *Data Warehousing*, 3/e, PHI, 2008.

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.*