UNIVERSITY OF KERALA

B. TECH. DEGREE COURSE

(2013 SCHEME)

SYLLABUS FOR

VII SEMESTER

INFORMATION TECHNOLOGY

SCHEME -2013

VII SEMESTER
INFORMATION TECHNOLOGY (F)

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	Internetworking with TCP/IP (F)	5	4	1	-	50	3	100	150
13.702	Principles of Programming Languages (F)	3	2	1	-	50	3	100	150
13.703	Web Application Development (F)	5	4	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 Networks Lab (F)	4	-	-	4	50	3	100	150
13.708	Seminar, Project Design and Industrial Visit (F)	3	-	-	3	150	-	-	150
	Total	**29**	**16**	**6**	**7**	**500**		**700**	**1200**

13. 705 Elective I

13.705.1	Multimedia Systems and Data Compression (FR)
13.705.2	Information Theory (F)
13.705.3	Mobile Computing (F)
13.705.4	Statistical Reasoning (F)

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	Computer Peripherals & Interfacing (F)
13.706.4	Optimization Techniques (F)

13.701 INTERNETWORKING WITH TCP/IP (F)

Teaching Scheme: 4(L) - 1(T) - 0(P) **Credits**: 5

Course Objective:

- *To understand the architecture of the internet.*
- *To understand the major protocols used at various layers of networks.*

Module – I

Internet architecture and addressing: Mapping internet addresses to physical addresses (ARP), Determining an internet address at startup (RARP), Connectionless datagram delivery (IPV4), Forwarding IP datagrams, Error and control messages (ICMP), Classless and subnet address extensions (CIDR), Protocol Layering, User Datagram Protocol, Reliable stream transport service.

Module – II

Routing architecture : Cores, peers, and algorithms, Routing between peers (BGP), Routing within an autonomous system (RIP, OSPF), Internet multicasting, IP switching and MPLS, Private network interconnection (NAT, VPN), Bootstrap and autoconfiguration (DHCP).

Module – III

Applications : Domain Name System (DNS), Remote login and desktop (TELNET, SSH), File transfer and access (FTP, TFTP, NFS), Electronic Mail (SMTP, POP, IMAP, MIME), World Wide Web (HTTP).

Module – IV

Voice and Video Over IP : Real-time Transport Protocol, RTCP, IP telephony, Resource reservation and Quality of Service , RSVP.
Internet management : Simple Network Management Protocol (SNMP), architectural model, protocol framework, Management Information Base (MIB), Formal definitions using ASN.1, Message formats.

References:

Douglas E. Comer, *Internetworking with TCP/IP Volume I, Principles, Protocols and Architecture*, 6/e, Pearson Education, 2013.

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 have a good understanding of internet architecture and the major network protocols.

13.702 PRINCIPLES OF PROGRAMMING LANGUAGES (F)

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

Course Objectives:

- *To understand the fundamental principles of programming language design, semantics, and implementation.*
- *To understand various programming paradigms and assess their effectiveness.*

Module – I

Names, Scopes, and Bindings: Names and Scopes, Binding Time, Scope Rules, Storage Management, Aliases, Overloading, Polymorphism, Binding of Referencing Environments.

Control Flow: Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Non-determinacy.

Module – II

Data Types: Type Systems, Type Checking, Records and Variants, Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and Input/ Output, Equality Testing and Assignment.

Subroutines and Control Abstraction: Static and Dynamic Links, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Coroutines.

Module – III

Functional and Logic Languages: Lambda Calculus, Overview of Scheme, Strictness and Lazy Evaluation, Streams and Monads, Higher-Order Functions, Logic Programming in Prolog, Limitations of Logic Programming.

Data Abstraction and Object Orientation: Encapsulation, Inheritance, Constructors and Destructors, Dynamic Method Binding, Multiple Inheritance.

Module – IV

Innovative features of Scripting Languages: Scoping rules, String and Pattern Manipulation, Data Types, Object Orientation.

Concurrency: Threads, Synchronization, Language-Level Mechanisms.

Run-time program Management: Virtual Machines, Late Binding of Machine Code, Reflection, Symbolic Debugging, Performance Analysis.

References

1. Michael L. Scott, *Programming Language Pragmatics*, 4/e, Morgan Kaufmann Publishers, 2015.

2. Kenneth C. Louden, *Programming Languages: Principles and Practice*, 3/e, Cengage Learning, 2012.
3. Robert Harper, *Practical Foundations for Programming Languages*, 2/e, Cambridge University Press, 2016.

Internal Continuous Assessment *(Maximum Marks-50)*

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, problem solving, 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.

Course outcome:

At the end of the course, the student will have a good understanding of the fundamental principles governing the design, semantics and implementation of programming languages.

13.703 WEB APPLICATION DEVELOPMENT (F)

Teaching Scheme: 4(L) - 1(T) - 0(P) **Credits**: 5

Course Objectives:

- *To understand the basic concepts of JDBC, servlets and JSP.*
- *To understand the design and development of a J2EE application.*

Module – I

Introduction : Web architecture, web application lifecycle, XML and J2EE.

Design and development of a J2EE application: J2EE Layers, Application components, J2EE Architecture, Development methodology Task list for building J2EE applications database design defining the application creating the interface, building pages, creating data access objects, validating the code.

Module – II

JDBC: Architecture, JDBC API, Retrieving and updating Data, SQLtoJava Data Types, JDBC Execution Types, Metadata, Scrollable resultsets, transaction support, Batch Statements.

Servlets: Introduction to Servlets, Benefits of Servlets, use as controller in MVC, basic HTTP,

Servlet container, Servlets API, javax.servelet Package, Reading Servlet parameters, service method detail, HTML clients, servlet lifecycle, HTTP response header, session management, dispatching requests, Servlets with JDBC, web applications.

Module – III

Java Server Pages: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Setting attributes, Error Handling and Debugging, Using JavaBeans Components in JSP Pages, Sharing Data between JSP pages Passing Control and Data between Pages – Sharing Session and Application Data – application Models MVC Design.

Module – IV

Enterprise Java Beans : Overview, distributed programming, EJB framework, Session and entity beans, Stateless and stateful session bean, Bean attributes, Parts of a Bean, container managed persistence (CMP) and bean managed lifecycle of EJB java message service (JMS) and message driven beans (MDB), distributed programming services, CORBA and RMI Transaction management, Security, deployment, personal roles for EJB Development, building session beans creating session beans Entity beans.

References:

1. Joseph J. Bambara and , Paul R. Allen, *J2EE UNLEASHED*, Pearson Education, 2007.
2. Jason Hunter and William Crawford, *Java Servlet Programming,* 2/e, O'Reilly Media 2001.
3. Roman, Rima Patel and Gerald Brose (Ed), *Mastering EJB*, 3/e, John Wiley & Sons 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 develop web applications using J2EE, servlets, JSP and EJB.

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 INFORMATION THEORY (F) (Elective I)

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

Course Objective:

- *To provide basic concepts of Information Theory.*
- *To design and analyze coding/decoding scheme for digital communication application.*

Module - I

Information theory: - Concept of amount of information - units, Entropy -marginal, conditional and joint entropies - relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels.

Module - II

Discrete channels: - Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetric channel, Shannon theorem. Continuous channels: - Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Trade off between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.

Module - III

Source coding: - Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes: - Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.

Module - IV

Codes for error detection and correction: - Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes: - Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.

References:

1. Ranjan Bose, *Information Theory, Coding and Cryptography*, 2/e, Tata McGraw-Hill, New Delhi, 2008.
2. Simon Haykin, *Communication Systems*, 4/e, John Wiley & Sons, 2001.
3. Taub and Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 2007.
4. Shu Lin and Daniel J. Costello Jr., *Error Control Coding Fundamentals and Applications*, 2/e, Prentice Hall, 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 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: *Each question may contain sub-questions a), b) etc. Descriptive questions should not exceed 40%.*

Course Outcome:

After the successful completion of the course:

- *The students gain fundamental knowledge in information theory*
- *The students will be able to do coding and decoding*
- *The students will be able to perform error correction and detection in different coding techniques.*

13.705.3 MOBILE COMPUTING (F) (Elective I)

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

Course Objective:

- *Learn the basics of Mobile computing.*
- *Learn networking concepts relevant to modern wireless systems.*
- *Learn emerging mobile computing ideas and best practices.*

Module - I

Introduction - issues in mobile computing, Cellular Wireless Networks. Telecommunication systems – GSM- System Architecture-Protocols-Connection Establishment-Frequency Allocation-Routing-Handover-Security, GPRS, DECT, TETRA, UMTS and IMT-2000.

Module - II

Satellite Networks - Basics, Routing, Localization, Handover, Parameters and Configurations, Capacity Allocation – FAMA and DAMA. Broadcast Systems – DAB, DVB.

Wireless Networks-Wireless LAN – IEEE 802.11 – IEEE ,802.11a – 802.11b, HIPERLAN – Blue Tooth.

Module - III

Mobile Network Layer - Mobile IP, Dynamic Host Configuration Protocol- Routing- DSDV-DSR-AODV-ZRP. Introduction to wireless sensor networks.

Module - IV

Mobile Transport Layer – Traditional TCP, Classical TCP improvements, TCP over 2.5/3G wireless networks.
Support for mobility – File Systems, WWW, WAP- Architecture, WDP,WTLS, WML, WMLScript i-mode, SyncML, WAP 2.0.

References:

1. Jochen Schiller, *Mobile Communications*, 2/e, Pearson Education, 2003.
2. William Stallings, *Wireless Communications and Networks*, Pearson Education 2004.
3. Chai K.Toh, *AdHoc Mobile Wireless Networks,* Pearson Education 2001.

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.

Course Outcome:

After the successful completion of the course students will have:

- *The ability to describe the major techniques involved and network systems issues for the design and implementation of mobile computing systems.*
- *A sound understanding of the key components and technologies involved and to gain hands-on experiences in setting up wired as well as wireless networks.*

13.705.4 STATISTICAL REASONING (F) (Elective I)

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

Course Objective:

- *The basic concepts of statistical reasoning.*
- *An understanding of the diverse applications of statistics.*

Module - I

Exploratory Data Analysis – Distribution of a single categorical variable, distribution of a quantitative variable. Graphs – histograms, stem plot. Numerical measures – measures of centre, measures of spread, box plot, standard deviation. Role type classification – scatter plot, linear relationships. Causation and lurking variables.

Module - II

Producing Data – Sampling – probability sampling plans, simple random sampling, cluster sampling, stratified sampling. Identifying study design, causation and observational studies, causation and experiments, randomization. Sample surveys – open vs. closed questions, unbalanced response options, leading questions, sensitive questions.

Module - III

Probability – Introduction, relative frequency, discrete random variables, continuous random variables – probability distribution, normal random variables, standard normal table, applications. Sampling distributions – behaviour of sample proportion, behaviour of sample mean.

Module - IV

Inference – Introduction. Estimation – point estimation, interval estimation, confidence interval for population mean, confidence interval for population proportion. Hypothesis testing for population proportion, hypothesis testing for population mean. Type I and Type II errors.

References:

1. Jeff Bennett, Bill L Briggs and Mario F Triola, *Statistical Reasoning for Everyday Life*, 4/e, Pearson Education, 2013.
2. Edward W Minium, Robert C Clarke and Theodore Coladarci, *Elements of Statistical Reasoning*, 2/e, Wiley, 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.

Course Outcome:

At the end of the course, the students will have

- *The ability to choose, generate, and properly interpret appropriate descriptive and inferential methods.*
- *A sound understanding of the diverse applications of statistics and its relevance to various fields of study.*

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 COMPUTER PERIPHERALS AND INTERFACING (F) (Elective II)

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

Course Objective:

- *To provide the necessary knowledge and skills regarding the functioning of peripheral devices*
- *To provide the required background for installation, maintenance and testing of peripheral devices.*
- *To introduce performance issues related to CPU and memory*
- *To understand the components on the motherboard, different storage media, features of different I/O peripheral devices and their interfaces.*

Module - I

Introduction-Motherboard Components -Processors-Introduction-Microprocessor Components-Desktop processors-Microprocessor Associates-Microprocessor Packaging-Microprocessor Sockets.

Module - II

Memory- Introduction-DRAM, SDRAM, DDR, DDR2, DDR3. RAM slots-types- Introduction-SIMM, DIMM, RIMM, Micro DIMM. Expansion Slots- PCI slot, AGP Slots, PCI-Express slots, USB, Serial ports, Parallel ports.

Module - III

Input / Output Devices – Scanners –flat bed scanner-working process. Printers – Impact and Non Impact Printers – Dot matrix, working – Laser printers, working– Inkjet printers, working. Mechanical mouse and Optical mouse-working. Storage interfaces – ATA/IDE -SATA-SCSI.

Module - IV

Display adapters- introduction- VGA, SVGA, XGA, SXGA, WXGA, WUXGA,WQXGA– Serial access mass storage devices - Magnetic tapes and Streamer tapes - Random access mass storage devices - Magnetic disks, Magneto Optical disks, read and write process- Hard disks -tracks and sectors-operation of hard disk–. Introduction-CDs, DVDs, Blu-ray Discs.

References:

1. Scott Mueller, *Upgrading and Repairing PCs,* 22/e, Que Publishing, 2015.
2. Hans Peter Messmer, *The Indispensable PC Hardware Book,* 4/e, Addison Wesley 2001.
3. Michael Meyers, *Managing and Troubleshooting PCs*, 4/e, McGraw Hill, 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.

Course Outcome:

After successful completion of this course, students will be capable of:

- *Knowing the operations, components and internal parts of PC peripherals and their troubleshooting.*
- *Interfacing various devices to the microprocessor.*
- *Effectively utilizing microcontroller peripherals and gain significant knowledge about the operation and maintenance of UPS.*

13.706.4 OPTIMIZATION TECHNIQUES (F) (Elective II)

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

Course Objective:

- *To introduce* various optimization techniques and their applications.

Module - I

Definition of operations research, modeling in operations research, general methods of solving operations research models, scientific methods in operations research Mathematical formulation of linear programming problem, Graphical solution, Simplex algorithm and its applications, use of artificial variables, quality, economic interpretation, degeneracy and elementary sensitivity analysis.

Module - II

Transportation problem – mathematical formulation – initial feasible solution by VAM method, degeneracy, unbalance transportation problem – Assignment problem, mathematical formulation, the assignment algorithm, unbalanced assignment problems.

Module - III

Replacement model, types of replacement problems, problem of choosing between two machines, determination of best replacement age of machine using present worth and discount rate, group replacement game theory – definition of a game – two person zero sum game – graphical solution, application in marketing, advertisement etc. – decision theory – decision under risk – expected value of profit or loss, expected variance criterion, decision trees, decision under uncertainty – the Laplace criterion, the minimax criterion, minimax regret criterion, Hurvitz criterion.

Module - IV

Network analysis – project scheduling by PERT – CPM, arrow head representation, calculation of critical path, probability and cost consideration in project scheduling. Construction of the time chart, resource leveling.

References:

1. Frederick S. Hiller and Generald J. Liebermann, *Introduction to Operations Research*, McGraw Hill, 2004.
2. Goel, B. S. and S. K. Mittal, *Operations Research*, Pragti Prakashan, 1990.

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.

Course Outcome:

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

- *Describe the basic concepts of optimization*
- *Formulate the optimization models for real field engineering problems*
- *Select and apply appropriate method for solving real life problems.*

13.707 COMPUTER NETWORKS LAB (F)

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

Course Objective :

This course intends to provide hands-on experience to students in configuration and operation of computer networks.

Experiments Using Routers and Switches:

1. Basic router configuration.
2. Implementing static routing.
3. Implementing dynamic routing using RIP
4. Implementing dynamic routing using OSPF
5. Implementing dynamic routing using EIGRP
6. Basic switch configuration
7. VLAN configuration
8. VTP, VTP pruning.
9. Implement interVLAN routing
10. Backup and recovery of configuration files of a router using TFTP server.
11. Access Control List (Standard and Extended)
12. Configuring PPP

Practice Experiments

- Familiarization of different Network Cables, Color coding, Crimping.
- Familiarization of Wireless Access Point.

Internal Continuous Assessment *(Maximum Marks-50)*

40% - Test (minimum 2)

40% - Regular lab work and proper maintenance of lab records

20% - Regularity in the class

University Examination Pattern:

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

Questions based on the list of exercises prescribed.

Marks should be awarded as follows:

20% - Design

20% - Implementation

30% - Output/Results and inference

30% - Viva voce

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

Course Outcome:

At the end of the course, the students would have acquired the necessary hands-on skills on configuring routers and switches, and in implementing and managing networks.

13.708 SEMINAR, PROJECT DESIGN & INDUSTRIAL VISIT (F)

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

Course Objective :

- *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 identify a problem for the final-year project, outline a solution, and prepare a preliminary design for the solution.*
- *To visit an industrial establishment and gain practical experience in a relevant domain in Information Technology.*
- *To improve the ability of students to perform as an individual as well as a team member in completing a project work.*

SEMINAR: Each student should present a seminar of 30 minutes duration on any one of the emerging topics in Information Technology. The seminars should preferably be based on research papers from reputed journals and should be done under the guidance of a faculty member of the department. A seminar report should be prepared and submitted. 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.

PROJECT DESIGN: Each student along with other team members and under the supervision of a faculty member should identify a problem for the final year project. It should be based on the core subjects of the discipline and could involve software and/or hardware implementation. The preliminary work for the project literature survey, design etc. should be carried out in this semester.

An evaluation should be conducted at the end of the semester based on 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: Each student should do at least two industrial visits and gain practical experience in a relevant domain in Information Technology. A report of the same should be submitted at the end of 7^{th} semester and 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

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

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.