UNIVERSITY OF KERALA

B. TECH. DEGREE COURSE

(2018 SCHEME)

SYLLABUS FOR

VII SEMESTER

INFORMATION TECHNOLOGY

Course no	Name of subject	Credit	Weekly load, hours			C A Marks	Exam Duration Hrs	U E Max Marks	Total Marks
			L	T	D /P				
18.701	Internetworking with TCP/IP (F)	3	3	1	-	50	3	100	150
18.702	Software Testing	3	3	1	-	50	3	100	150
18.703	Computer Peripherals and Interfacing(F)	3	3	1	-	50	3	100	150
18.704	Elective I	3	3	1	-	50	3	100	150
18.705	Elective II	3	3	1	-	50	3	100	150
18.706	Computer Networks Lab (F)	3	0	0	3	50	3	100	150
18.707	Seminar ,project design and Industrial Visit(F)	5	0	0	6	150	3	-	150
	TOTAL	**23**	**15**	**5**	**9**	**450**		**600**	**1050**

18. 704 Elective I

18.704.1 Multimedia Systems and Data Compression (FR)

18.704.2 Mobile Computing(F)

18.704.3 Programming Using Python (F)

18.704.4 Statistical Reasoning (F)

18.705 Elective II

18.705.1 Fuzzy Set Theory and Applications (FR)

18.705.2 Data Mining and Information Retrieval (FR)

18.705.3 Information Theory (F)

18.705.4 Optimization Techniques (F)

18.701 INTERNETWORKING WITH TCP/IP (F)

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

CourseObjective:

- *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 Assessmen*(MaximumMarks-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) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each module.

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

Course Outcome:

After successful completion of this course, the students will have a good understanding of internet architecture and the major network protocols.

18.702 SOFTWARE TESTING (F)

TeachingScheme:3(L)-1(T)-0(P) **Credits: 3**

CourseObjective:

This course enables the students to

- *Understand the concepts involved in software testing*
- *Get exposure to various types of testing tools*

Module – I

Characteristics of Software – Software Development process – Software quality Management– Processes related to software quality.Fundamentals of Software Testing–Principles of Software Testing – Structured approach to testing. Developing testing methodologies–Levels of Testing– Acceptance Testing–Special Tests–Testing Tools.

Module – II

Test planning Test strategy – Test plan templates (System testing) – Guidelines for developing test plan.Test Estimation–Test standards–Building Testd data andTest cases.Test coverage– traceability matrix. Test Scenario–Test Scripts.Tools used to build test data
Testing object oriented software–Testing web applications.

Module – III

Test metrics and tes treports–categories of the product/project test metrics–Resources consumed in Testing–Effectiveness of testing–defect density–defect leakage ratio– residual defect density–test team efficiency–test case efficiency.
Integration test reports–SystemTestreport–acceptance test report–Guidelines for writing and using test report,final test reporting–test status report benchmarking.Test tools used to build reports

Module - IV

Managing change-Software configuration management-change management–risk analysis and management.
Basics of automation testing–why,when and how to perform automation testing-Factors for choosing a particular tool-overview for the major functional testing tools-Overview of Test management and bug tracking tools..

References:

1. *MarnieLHutcheson,Software Testing Fundamentals:Methods and Metrics,Wiley 2003.*
2. *LouiseTamres,Introducing Software Testing,Addison-WesleyProfessional2002.*
3. *GlenfordJ.Myers,Corey Sandler,TomBadgett,The Art of Software Testing,Wiley 2011.*

Internal Continuous Assessment *(Maximum Marks50)*

50% - Tests (minimum 2)

30%- Assignments(minimum2)suchashomework,problemsolving,quiz,literature survey, seminar, term-project etc.

20%- Regularity in the class

University Examination Pattern:

Examination duration:3hours *MaximumTotalMarks:100*

The question paper shall consist of 2 parts.

Part A (20 marks) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be atleast one question from each module.

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

Course Outcome:

At the end of the course, the students will have

- *A sound understanding of the principles and concepts involved in software testing.*
- *An understanding of the various tools and procedures used in software testing*

18.703.COMPUTER PERIPHERALS AND INTERFACING (F)

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

Course Objective:

- *To provide the necessary knowledge and skills regarding the functioning of peripheraldevices*
- *To provide the required background for installation, maintenance and testing of peripheraldevices.*
- *To introduce performance issues related to CPU andmemory*
- *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 Marks50)*

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:3hours Maximum Total Marks: 100 The question paper shall consist of 2parts.

Part A (20 marks) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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 theirtroubleshooting.*
- *Interfacing various devices to themicroprocessor.*

Effectively utilizing microcontroller peripherals and gain significant knowledge about the operation and maintenan

18.704.1 MULTIMEDIA SYSTEMS AND DATA COMPRESSION (FR) (Elective I)

Teaching Scheme: 3(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.*

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) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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 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*

18.704.2 MOBILE COMPUTING (F)
(Elective I)

Teaching Scheme: 3(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, WMLScripti-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) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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 system 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*

18.704.3 PROGRAMMING USING PYTHON(FR)

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

Course Objectives:

- *To develop problem solving skills*
- *To understand the basics of python*
- *To create solutions for complex engineering and real life problem using python*

Module-I

Introduction to basic problem solving strategies, Installation of Anaconda, Familiarisation of jupyter notebook. Python variables, Assignment statement, expressions, Arithmetic, Relational, Logical, Bitwise operators and their precedence, Conditional statements: if, if-else, if-elif-else; simple programs, Notion of iterative computation and control flow - range function, While Statement, For loop, break statement, Continue Statement, Pass statement, else, assert.

Module -II

Python's Built-in Data types, Numbers, Strings - Slicing, Indexing, Concatenation and other operations on Strings, Accepting input from Console, printing statements, Simple 'Python 'programs.
Lists, tuples and dictionary, Various operations on List, Tuples and dictionary, concept of mutability.
Functions, calling functions, type conversion and coercion, composition of functions, mathematical functions, user-defined functions, parameters and arguments. Programs using external module and packages

Module -III

Reading config files in python. Writing log files in python, Understanding read functions - read(), readline() and readlines(), Understanding write functions- write() and writelines() Manipulating file pointer using seek, Programming using file operations
Concept of class, object and instances Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support

Module -IV

Avoiding code break using exception handling, Safe guarding file operation using exception handling, Handling and helping developer with error code, Programming using Exception handling.
NumPy Basics, Creating NumPy Arrays, Subset, Slice, Index and Iterate through Arrays,Multidimensional Arrays, Basic Operations, Operations on Arrays, Basic Linear Algebra Operations.
Pandas Basics, Indexing and Selecting Data, Merge and Append, Grouping and Summarizing Dataframes, Lambda function & Pivot tables

References:

1. *Downey, A. et al., How to think like a Computer Scientist: Learning with Python, John Wiley, 2015*
2. *Lambert K. A., Fundamentals of Python - First Programs, Cengage Learning India, 2015*
3. *Guzdial, M. J., Introduction to Computing and Programming in Python, Pearson India*
4. *Perkovic, L., Introduction to Computing Using Python, 2/e, John Wiley, 2015*

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) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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 be able to

1. *Ability to design algorithmic solutions for the given problem.*
2. *Ability to convert algorithms to python programs*
3. *Ability to do data analysis using advanced python modules*
4. *Ability to understand the object oriented concepts of python*

13.704.4 STATISTICAL REASONING (F)
(Elective I)

Teaching Scheme:3(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 Marks50)*

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) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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.*

18.705.1 FUZZY SET THEORY AND APPLICATIONS (FR)
(Elective II)

Teaching Scheme: 3(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 *Max Total Marks 100*

The question paper shall consist of 2 parts.

Part A (20 marks) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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 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.*

18.705.2 DATA MINING AND INFORMATION RETRIEVAL (FR) (Elective II)

Teaching Scheme: 3(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.*

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) Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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 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.*

18.705.3 INFORMATION THEORY (F)
(Elective I)

Teaching Scheme: 3(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, Tradeoff 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) - Ten Short answer questions of 2marks each. All questions are compulsory. There should be at least one question from each 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:

- *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.*

18.705.4 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, PragtiPrakashan, 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) - Ten Short answer questions of 2 marks each. All questions are compulsory. There should be at least one question from each 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.*

18.706 COMPUTER NETWORKS LAB (F)

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

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.

18.707 SEMINAR, PROJECT DESIGN & INDUSTRIAL VISIT (F)

Teaching Scheme: 0(L) - 0(T) -6(P) **Credits**: 5

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 one Industrial visit 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