The Syllabus for B. Tech. CS & IT prepared by the following committee and presented before the board of studies members for the review. The contact details of all the members are given below:

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UNIVERSITY OF CALICUT

SCHEME OF STUDIES, EXAMINATION AND DETAILED SYLLABUS

BACHELOR OF TECHNOLOGY
IN
INFORMATION TECHNOLOGY

FOR 2014 ADMISSION ONWARDS

2014 Scheme for B. Tech. Information Technology (IT) Branch for 3rd to 8th Semesters

SCHEME OF III SEMESTER B.Tech COURSE

Code	Subject	Hours/ Week			Marks		Duration of End Semester exam-ination	Cred-its
		L	T	P/ D	In-ternal	End Semes ter		
EN14 301	Engineering Mathematics III	3	1	0	50	100	3	4
EN14 302	Computer Programming in C	2	0	2	50	100	3	4
IT14 303	Computer Organization & Design	3	1	0	50	100	3	4
IT14 304	Discrete Computational Structures	3	1	0	50	100	3	4
IT14 305	Electronic Circuits	3	1	0	50	100	3	4
IT14 306	Switching Theory & Logic Design	3	1	0	50	100	3	4
IT14 307 (P)	*Programming Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
IT14 308 (P)	*Digital Electronics Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
	TOTAL	**17**	**5**	**8**	**400**	**800**	**24**	**28**

Note: For EN14 302 Computer Programming in C, the end semester examination will be held by the University as a theory paper.

SCHEME OF IV SEMESTER B.Tech COURSE

Code	Subject	Hours/ Week			Marks		Duration of End Semester exam-ination	Cred-its
		L	T	P/ D	In-ternal	End Semes ter		
EN14 401	Engineering Mathematics IV	3	1	0	50	100	3	4

EN14 402	Environmental Science	3	1	0	50	100	3	4
IT14 403	Data Structures and Algorithms	3	1	0	50	100	3	4
IT14 404	Object Oriented Programming in Java	3	1	0	50	100	3	4
IT14 405	Systems Programming	3	1	0	50	100	3	4
IT14 406	Digital Data Communication	3	1	0	50	100	3	4
IT14 407 (P)	*Data Structures Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
IT14 408 (P)	*Programming Environments Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
	TOTAL	**18**	**6**	**6**	**400**	**800**	**24**	**28**

SCHEME OF V SEMESTER B.Tech COURSE

Code	**Subject**	**Hours/ Week**			**Marks**		**Duration of End Semester examination**	**Credits**
		L	**T**	**P/D**	**Internal**	**End Semester**		
IT14 501	Industrial Economics and Principles of Management	3	1	0	50	100	3	4
IT14 502	Software Engineering	3	1	0	50	100	3	4
IT14 503	Operating Systems	3	1	0	50	100	3	4
IT14 504	Database Management Systems	3	1	0	50	100	3	4
IT14 505	Introduction to Microprocessor Systems	3	1	0	50	100	3	4
IT14 506	Theory of Computation	3	1	0	50	100	3	4
IT14 507 (P)	*Database Management Systems Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
IT14 508 (P)	*Microprocessor Programming Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
	TOTAL	**18**	**6**	**6**	**400**	**800**	**24**	**28**

SCHEME OF VI SEMESTER B.Tech COURSE

Code	Subject	Hours/ Week			Marks		Duration of End Semester exam-ination	Cred-its
		L	T	P/ D	In-ternal	End Semes ter		
IT14 601	Digital Signal Processing	3	1	0	50	100	3	4
IT14 602	Computer Graphics & Multi-media	3	1	0	50	100	3	4
IT14 603	Compiler Design	3	1	0	50	100	3	4
IT14 604	Computer Networks	3	1	0	50	100	3	4
IT14 605	Human Computer Interaction	3	1	0	50	100	3	4
IT14 606	Object Oriented Modeling and Design	3	1	0	50	100	3	4
IT14 607 (P)	*Systems Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
IT14 608 (P)	*Mini Project*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
	TOTAL	**18**	**6**	**6**	**400**	**800**	**24**	**28**

SCHEME OF VII SEMESTER B.Tech COURSE

Code	Subject	Hours/ Week			Marks		Duration of End Semester exam-ination	Cred-its
		L	T	P/ D	In-ternal	End Semes ter		
IT14 701	Design & Analysis of Al-gorithm	3	1	0	50	100	3	4
IT14 702	Cryptography & Network Se-curity	3	1	0	50	100	3	4
IT14 703	Internet Technologies	3	1	0	50	100	3	4
IT14 704	Elective I	3	1	0	50	100	3	4
IT14 705	Elective II	3	1	0	50	100	3	4
IT14 706 (P)	*Computer Graphics & Multime-*	*0*	*0*	*3*	*50*	*100*	*3*	*2*

	dia Lab							
IT14 707 (P)	*Network Programming Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
IT14 708 (P)	*Project*	*0*	*0*	*4*	*100*	*-*	*-*	*4*
	TOTAL	**15**	**5**	**10**	**450**	**700**	**21**	**28**

SCHEME OF VIII SEMESTER B.Tech COURSE

Code	**Subject**	**Hours/ Week**			**Marks**		**Duration of End Semester exam-ination**	**Cred-its**
		L	**T**	**P/ D**	**In-ternal**	**End Semes ter**		
IT14 801	Computer Architecture & Par-allel Processing	3	1	0	50	100	3	4
IT14 802	Mobile Communication Sys-tems	3	1	0	50	100	3	4
IT14 803	Natural Language Processing	3	1	0	50	100	3	4
IT14 804	Elective III	3	1	0	50	100	3	4
IT14 805	Elective IV	3	1	0	50	100	3	4
IT14 806 (P)	*Seminar*	*0*	*0*	*3*	*100*	*-*	*-*	*2*
IT14 807 (P)	*Project*	*0*	*0*	*7*	*150*	*-*	*-*	*4*
IT14 808 (P)	*Viva Voce*	*0*	*0*	*0*	*-*	*100*	*3*	*4*
	TOTAL	**15**	**5**	**10**	**500**	**600**	**18**	**30**

Total Credits =210

IT14 704 Elective I

IT14 704 (A)	**Advanced Topics in Database Systems (Global)**
IT14 704 (B)	Digital Image Processing

IT14 704 I	Grid Computing
IT14 704 (D)	Graph Theory and Combinatorics
IT14 704 (E)	Software Quality Management

IT14 705-Elective II

IT14 705(A)	Soft Computing
IT14 705(B)	**E-Commerce (Global)**
IT14 705I	Machine Learning
IT14 705(D)	Advanced Data Structures
IT14 705 (E)	Artificial Intelligence

IT14 804-Elective III

IT14 804 (A)	Advanced Topics in Operating Systems
IT14 804 (B)	Information Retrieval
IT14 804 I	Distributed Systems
IT14 804 (D)	**Management Information Systems (Global)**
IT14 804 (E)	High Speed Networks

IT14 805-Elective IV

IT14 805 (A)	Industrial Psychology
IT14 805 (B)	Optical Communication Network
IT14 805 I	Neural Networks and Fuzzy Logic
IT14 805 (D)	**Web Programming (Global)**
IT14 805 (E)	Network Administration and Management

EN14 301: ENGINEERING MATHEMATICS III

(Common for all branches)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objective

- *To provide a quick overview of the concepts and results in complex analysis that may be useful in engineering.*
- *To introduce the concepts of linear algebra and Fourier transform which are wealths of ideas and results with wide area of application.*

Module I: Functions of a Complex Variable (13 hours)

Functions of a Complex Variable – Limit – Continuity – Derivative of a Complex function – Analytic functions – Cauchy-Riemann Equations – Laplace equation – Harmonic Functions – Conformal Mapping – Examples: e^z, sinz, coshz, $(z+{}^1/_z)$– Mobius Transformation.

Module II: Functions of a Complex Variable (14 hours)

Definition of Line integral in the complex plane – Cauchy's integral theorem (Proof of existence of indefinite integral to be omitted) – Independence of path – Cauchy's integral formula – Derivatives of analytic functions (Proof not required) – Taylor series (No proof) – Laurent series (No proof) – Singularities – Zeros – Poles – Residues – Evaluation of residues – Cauchy's residue theorem – Evaluation of real definite integrals.

Module III: Linear Algebra (13 hours) – (Proofs not required)

Vector spaces – Definition, Examples – Subspaces – Linear Span – Linear Independence – Linear Dependence – Basis – Dimension– Orthogonal and Orthonormal Sets – Orthogonal Basis – Orthonormal Basis – Gram-Schmidt orthogonalisation process – Inner product spaces – Definition – Examples – Inequalities ; Schwartz, Triangle (No proof).

Module IV: Fourier Transforms (14 hours)

Fourier Integral theorem (Proof not required) – Fourier Sine and Cosine integral representations – Fourier transforms – transforms of some elementary functions – Elementary properties of Fourier transforms – Convolution theorem (No proof) – Fourier Sine and Cosine transforms – transforms of some elementary functions – Properties of Fourier Sine and Cosine transforms.

Text Books

Module I:

Erwin Kreysig, *Advanced Engineering Mathematics, 8e,* John Wiley and Sons, Inc.

Sections: 12.3, 12.4, 12.5, 12.6, 12.7, 12.9

Module II:

Erwin Kreysig, *Advanced Engineering Mathematics, 8e,* John Wiley and Sons, Inc.

Sections: 13.1, 13.2, 13.3, 13.4, 14.4, 15.1, 15.2, 15.3, 15.4

Module III:

Bernaed Kolman, David R Hill, *Introductory Linear Algebra, An Applied First Course,* Pearson Education.

Sections: 6.1, 6.2, 6.3, 6.4, 6.8, Appendix.B.1

Module IV:

Wylie C.R and L.C. Barrett, *Advanced Engineering Mathematics*, McGraw Hill.

Sections: 9.1, 9.3, 9.5

Reference books

1. H S Kasana, *Complex Variables, Theory and Applications,* 2e, Prentice Hall of India.
2. John M Howie, *Complex Analysis,* Springer International Edition.
3. Anuradha Gupta, *Complex Analysis*, Ane Books India.
4. Shahnaz bathul, *Text book of Engineering Mathematics, Special functions and Complex Variables,* Prentice Hall of India.
5. Gerald Dennis Mahan, *Applied mathematics*, Springer International Edition.
6. David Towers, *Guide to Linear Algebra*, MacMillan Mathematical Guides.
7. Inder K Rana, *An Introduction to Linear Algebra*, Ane Books India.
8. Surjeet Singh, *Linear Algebra,* Vikas Publishing House.
9. Howard Anton, Chris Rorres, *Elementary Linear Algebra, Applications Version*, John Wiley and Sons.
10. Anthony Croft, Robert Davison, Martin Hargreaves, *Engineering Mathem-*

atics, Pearson Education.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

University Examination Pattern

EN14 302 COMPUTER PROGRAMMING IN C

(Common for all branches)

Teaching scheme **Credits**: 4

2 hours lectures and 2 hours lab per week

Objectives

- *To impart the basic concepts of computer and information technology*
- *To develop skill in problem solving concepts through learning C programming in practical approach.*

Module I (8 hours)

Introduction to Computers: CPU, Memory, input-output devices, secondary storage devices, Processor Concepts – Evolution and comparative study of processors. Machine language, assembly language, and high level language. Inside a PC, Latest trends and technologies of storage, memory, processor, printing etc. Concept of Program and data, System software – BIOS, Operating System- Definition-Functions-Windows, and Linux. Compilers and assemblers, Computer networks, LAN, WiFi.

Module II (9 hours)

Basic elements of C: Flow chart and algorithm – Development of algorithms for simple problems. Structure of C program – Operators and expressions – Procedure and order of evaluation – **Input and Output functions.** *While*, *do-while* and *for* statements, *if*, *if-else*, *switch, break, continue, goto,* and *labels*. Programming examples.

Module III (10 hours)

Functions and Program structures: Functions – declaring, defining, and accessing functions – parameter passing methods – **Recursion** – Storage classes – *extern*, *auto*, *register* and *static*. Library functions. Header files – C pre-processor. Example programs. **Arrays**: Defining and processing arrays – passing arrays to functions – two dimensional and multidimensional arrays – application of arrays. Example programs.

Module IV (9 hours)

Structures – declaration, definition and initialization of structures, unions, **Pointers**: Concepts, declaration, initialization of pointer variables simple examples **Concept of a file** – File operations File pointer.

Text Books

1. P. Norton, *Peter Norton's Introduction to Computers*, Tata McGraw Hill, New Delhi.
2. E. Balaguruswamy, *Programming in ANSI C*, 3rd ed., Tata McGraw Hill, New Delhi, 2004

Reference Books

1. B. Gottfried, *Programming with C*, 2nd ed, Tata McGraw Hill, New Delhi, 2006
2. B. W. Kernighan, and D. M. Ritchie, *The C Programming Language*, Prentice Hall of India, New Delhi, 1988
3. K. N. King. *C Programming: A Modern Approach*, 2nd ed., W. W. Norton & Company, 2008
4. P. Norton, *Peter Norton's Computing Fundamentals*, 6th ed., Tata McGraw Hill, New Delhi, 2004.
5. S. Kochan, *Programming in C*, CBS publishers & distributors
6. M. Meyer, R. Baber, B. Pfaffenberger, *Computers in Your Future*, 3rd ed., Pearson Education India

Internal Continuous Assessment *(Maximum Marks-50)*

50% - Lab Practical Tests
20% - Assignments
20% - Main Record
10% - Regularity in the class

University Examination Pattern

IT14 303: Computer Organization and Design

(Common with CS14 303)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To lay the foundation for the study of hardware organization of digital computers. It brings out the interplay between various building blocks of computers, without being specific to any particular computer. At the end of the course, the student is expected to gain a fair idea about the functional aspects of each building block in computer design, in the general sense.*

Module I (14 hours)

Basic Structure of computers – functional units – Historical Perspective –Basic operational concepts – bus structures, Measuring performance: evaluating, comparing and summarizing performance. Memory locations and addresses – memory operations – instructions and instruction sequencing ,Instruction sets- RISC and CISC paradigms, Addressing modes

Module II (12 hours)

Computer arithmetic – Signed and unsigned numbers – Addition and subtraction – Logical operations – Constructing an ALU – Multiplication and division – faster versions of multiplication- floating point representation and arithmetic

Module III (12 hours)

The processor: Building a data path – Simple and multi-cycle implementations – Microprogramming – Exceptions, Introduction to pipelining-pipeline Hazards

Module IV (14 hours)

Memory hierarchy – Caches – Cache performance – Virtual memory – Common framework for memory hierarchies Input/output – I/O performance measures – I/O techniques – interrupts, polling, DMA; Synchronous vs. Asynchronous I/O;

Controllers.Types and characteristics of I/O devices – Buses – Interfaces in I/O devices – Design of an I/O system

Text Books

1. W. Stallings, *Computer Organization and Architecture: Designing for Performance*, 8th Ed., Pearson Education India. 2010.
2. D. A. Patterson and J. L. Hennessy, *Computer Organization and Design*, 4th Ed., Morgan Kaufmann, 2008.

Reference Books

1. Heuring V.P. & Jordan H.F., *Computer System Design & Architecture*, Addison Wesley
2. Hamacher, Vranesic & Zaky, *Computer Organisation*, McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 304 : Discrete Computational Structures

(Common with CS14 304)

Teaching scheme

Credits: 4

(3 hours lecture and 1 hour tutorial per week)

Objectives

- *To provide the mathematical foundations required in any stream of study in Computing.*
- *To provide a sound understanding of the various algorithms and methods*
- *To get familiar with the essential proof techniques, logic and useful mathematical objects.*

Module I (13 hours)

Logic – Logical connectives and Truth tables – Logical equivalence and laws of logic – Logical implication and rules of inference- Quantifiers – Proofs of theorems using rules of universal specification and universal generalization.

Module II (13 hours)

Relational Structures – Cartesian products – Relations – Relation matrices – Properties of relations – Composition of relations – Equivalence relations and partitions – Functions – One-to-one, onto functions – Composition of functions and inverse functions – Partial orders – Hasse diagrams.

Module III (13 hours)

Group Theory – Definition and elementary properties – Cyclic groups – Homomorphisms and Isomorphisms – Subgroups – Cosets and Lagrange’s theorem – Elements of coding theory- Hamming metric – Generator matrices – Group codes – Hamming matrices.

Module IV (13 hours)

Recurrence Relations – Introduction, Linear recurrence relations with constant coefficients – Homogeneous solutions – Particular solutions – Total solutions

Generating Function – solutions of recurrence relations by the method of generating functions.

Text Books

1. Ralph P Grimaldi, *Discrete and Combinatorial Mathematics: An applied introduction (Fourth Edition)*, Pearson Education

References

1. Truss J K, *Discrete Mathematics for Computer Scientists*, Pearson Education.
2. Donald F Stanat & David F McAllister, *Discrete and Mathematical Structures in Computer Science*, Prentice Hall.
3. Thomas Koshy, Discrete Mathematics with Applications, Academic Press/Elsevier,
4. Kolman B & Busby R C, *Discrete and Mathematical Structures for Computer Science*, Prentice Hall of India. 2005
5. C.L. Liu, *Elements of Discrete Mathematics*, Tata McGraw Hill, 2002

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 305 : Electronic Circuits

(Common with CS14 305)

Teaching scheme

Credits: 4

(3 hours lecture and 1 hour tutorial per week)

Objectives

- *To introduce the concepts and working principles of electronic circuits essential for the computing field.*

Module I (14 hours)

Diode switch, clipping and clamping circuits – Types of Diodes – light emitting diodes – photo diode – opto coupler – laser diode – the schottky diode – varactor diodes – varistors – current-regulator diodes – step recovery diodes – back diodes – tunnel diodes – pin diodes – Transistors – Transistor switch and amplifier circuits – Bistable multivibrator – Schmitt trigger – Monostable and astable multivibrator

Module II (15 hours)

MOSFETs – Depletion mode MOSFET – Depletion mode MOSFET Amplifiers – Dual Gate D-MOSFETs – Enhancement-mode MOSFET – Drain characteristics of E-MOSFET – Digital switching – CMOS circuits – Non-linear Op-amp circuits – Comparators with Zero Reference Voltage – Comparators with Non-zero references – Comparator with 21odelling21 – Window comparator – Integrator – Waveform conversion with op-amp – waveform generation using op-amp

Module III (10 hours)

Logic levels – Concepts of SSI, MSI, LSI and VLSI – Logic families: NOT gate, TTL, ECL, CMOS logic – Interfacing – Comparison of logic families – TTL and, MOS flip-flops.

Module IV (13 hours)

Memories: Basic concepts – Read only memories – Programmable ROMs – Static and dynamic random access memories – Memory expansion – Magnetic bubble memories – Magnetic surface storage devices – CD-ROMs – Special memories -1 Sample and hold circuit – D/A converters – A/D converters – Timing

Text Books

1 .Mahadevaswamy U.B & V. Nattarasu, *Electronic Circuits : Computer Engineer's Perspective*, Sanguine Technical Publishers, 2008 (Module I & II)
2. Taub H. & Schilling D., *Digital Integrated Electronics*, McGraw Hill (Modules III & IV)

References

1. Nagarath I. J., *Electronics Analog & Digital*, Prentice Hall India
2. Floyd T.L., *Digital Fundamentals*, Universal Book Stall
3. Schilling D.L. & Belove C, *Electronic Circuits: Discrete & Integrated*, McGraw Hill.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 306 Switching Theory and Logic Design

(Common with CS14 306)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To introduce the principles, features and properties of digital devices and circuits.*
- *To provide the basic concepts of computations and logic designs of ALU of a Computer*

Module I(14 hours)

Number Systems and Codes - Binary-Coded Decimals –Weighted Codes-Gray Code-Alphanumeric Codes- Boolean algebra – Postulates and theorems –Boolean functions and logical operations- Switching Expressions- Minterms, Maxterms, Generalization of De Morgan's Laws –Normal and canonical forms – Self-dual functions –Incompletely Specified Functions- Karnaugh map – prime cubes – Quine-McClusky algorithm.

Module II(14 hours)

Combinational Logic-Implementation of Logic Expressions - Universal property of the NAND and NOR gates –Analysis and design of combinational logic circuits – Adders – Parallel adders and look-ahead adders – Comparators - Decoders and encoders – Code conversion – Multiplexers and demultiplexers – Parity generators and checkers – ROMs, PLAs.

Module III(14 hours)

Counters and shift registers – SR, JK, D and T flip-flops – Excitation tables – Triggering of flipflops – Flip-flop applications – Latches – Ripple counters – Design of Synchronous counters – Up-down counters - Design of sequential circuits – Counter decoding – Counter applications – Shift registers and their

applications – Synchronous sequential machines-Basic concepts-State tables and diagrams.

Module IV(10 hours)

Fault diagnosis and tolerance – Fault classes and models – Fault diagnosis and testing – Test generation – Fault table method – Path sensitization method –Boolean difference method – Fault tolerance techniques.

Text Books

1. *Brian Holdsworth*, Clive Woods. *Digital Logic Design* Fourth edition,Paperback(Modules I,II,IV)
2. Floyd T.L., Digital Fundamentals, Universal Book Stall (Module III).

Reference Books

1. Norman Balbanian, Bradely Carlson, *Digital Logic Design Principles*,Wiley India Pvt. Ltd
2. Biswas N. N., *Logic Design Theory*, Prentice Hall of India
3. Millman J. & Halkias C.C., Integrated Electronics: Analog & Digital Circuits & Systems, Tata McGraw Hill.
4. RAO, *Switching Theory and Logic Design*, 1st Ed., Pearson Education

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 307(P) : Programming Lab

Teaching scheme **Credits:2**
3 hours practical per week

Objectives

- *To give a strong foundation for developing the art of programming to the students of computing streams. For adequacy this has to be complemented by exercises appearing in the references..*

Set 1 (3 lab sessions)

HCF (Euclid's algorithm) and LCM of given numbers – Find mean, median and mode of a given set of numbers – Conversion of numbers from binary to decimal, hexadecimal, octal and back – Evaluation of functions like ex, sin(x) and cos(x) for a given numerical precision using Taylor's series – Testing whether a given number is prime.

Set 2 (2 lab sessions)

String manipulation programs: sub-string search, deletion – Lexicographic sorting of a given set of strings – Generation of all permutations of the letters of a given string using recursion.

Set 3 (2 lab sessions)

Matrix operations: Programs to find the product of two matrices – Inverse and determinant (using recursion) of a given matrix – Solution to simultaneous linear equations using Jordan elimination

Set 4 (3 lab sessions)

Files: Use of files for storing records with provision for insertion – Deletion, search, sort and update of a record

Reference Books

1 Schildt H., *C The Complete Reference*, Tata McGraw Hill
2. TanH.H. &D'OrazioT.B., *C Programming for Engineering & Computer Science*, McGraw Hill
3. Cormen T.H. et al, *Introduction to Algorithms*, Prentice Hall of India

University Examination Pattern *(Maximum marks: 100)*

70% - Algorithm, Program, output
20% - Viva voce
10% - Fair record

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record

30%- Test/s

10%- Regularity in the class

IT14 308(P) : Digital Electronics Lab

Teaching scheme **Credits:2**
3 hours practical per week

Objectives

This course gives hand on experience on digital electronics components and systems, which are fundamental building blocks of the Computer systems. Experiments are structured to cover extensively the characteristics and features of indispensable digital electronic circuits and systems

1. Combinational circuits Address, MUX- DEMUX, Encoders Decoders, and Design using ROM.
2. Study of Flip Flops using gates and Flip Flop Ics.
3. Ripple counters – Design of different sequences.
4. Clocked sequential circuits – Design.
5. Synchronous counters – Design.
6. Shift Registers – Right, Left, Serial, Parallel.
7. 7 – Segment display systems (With Counters and Decoders).
8. Design of combinatorial and sequential circuits using PLAs and PALs.
9. Astable MV and Schmitt Trigger using gates, Applications of 555 as AMV, MMV and Frequency divider.

References :

1. Floyd T.L. and Jain, Digital Fundamentals, 8th Edition, Pearson Education, 2006
2. Digital Design, Morris M Mano and Michael D Ciletti, 4th Edition, Pearson Education, 2007

3. Fundamentals of Digital Circuits, A. Anand Kumar, PHI, 2003
4. Introduction to Digital Logic with Laboratory Exercises, James Feher, Jacobs Foundation,
Zurich, 2010 (available online)

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record

30%- Test/s

10%- Regularity in the class

University Examination Pattern *(Maximum marks: 100)*

70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objective

- *To inculcate the students an adequate understanding of the basic concepts of probability theory.*
- *To make them develop an interest in the area which may find useful to pursue their studies*
- *To stimulate the students understanding of the z-transform*
- *To make the student get acquainted with the basics of PDE*

Module I: Probability Distributions (13 hours)

Random variables – Mean and Variance of probability distributions – Binomial Distribution – Poisson Distribution – Poisson approximation to Binomial distribution

– Hyper Geometric Distribution – Geometric Distribution – Probability densities – Normal Distribution – Uniform Distribution – Gamma Distribution.

Module II: *Z* – Transforms (14 hours)

Some elementary concepts – Definition of ***Z***-transform – Convergence of ***Z***-transform – Examples of ***Z***-transform – Properties of ***Z***-transform – Inverse ***Z***-transform – Convolution Theorem

Module III: Series Solutions of Differential Equations (14 hours)

Power series method for solving ordinary differential equations – Frobenius method for solving ordinary differential equations – Bessel's equation – Bessel functions – Generating functions (No proof) – Relation between Bessel functions – Orthogonality property of Bessel functions (Proof not required).

Module IV: Partial Differential Equations (13 hours)

Introduction – Solutions of equations of the form $F(p,q) = 0$; $F(x,p,q) = 0$; $F(y,p,q) = 0$; $F(z,p,q) = 0$; $F_1(x,q) = F_2(y,q)$; Clairaut's form, $z = px + qv + F(p,q)$; Legrange's form, $Pp + Qq = R$ – Classification of Linear PDE's – Derivation of one dimensional wave equation and one dimensional heat equation – Solution of these equation by the method of separation of variables.

Text Books

Module I:
Richard A Johnson, CB Gupta, *Miller and Freund's Probability and statistics for Engineers, 7e*, Pearson Education – Sections: 4.1, 4.2, 4.3, 4.4, 4.6, 4.8, 5.1, 5.2, 5.5, 5.7

Module II:
Babu Ram, *Engineering Mathematics Vol. II, 2/e*, Pearson Education.
Sections: 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7.

Module III:
Erwin Kreysig, *Advanced Engineering Mathematics, 8e,* John Wiley and Sons, Inc.
Sections: 4.1, 4.4, 4.5

Module IV:
N Bali, M Goyal, C Watkins, *Advanced Engineering Mathematics, A Computer Approach, 7e,* Infinity Science Press, Fire Wall Media.
Sections: 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9
Erwin Kreysig, *Advanced Engineering Mathematics, 8e,* John Wiley and Sons, Inc.
Sections: 11.2, 11.3, 9.8 Ex.3, 11.5

Reference books

1. H Parthasarathy, *Engineering Mathematics, A Project & Problem based approach,* Ane Books India.
2. B V Ramana, *Higher Engineering Mathematics,* McGrawHill.
3. J K Sharma, *Business Mathematics, Theory and Applications,* Ane Books India.
4. Wylie C.R and L.C. Barret, *Advanced Engineering Mathematics*, McGraw Hill.
5. V R Lakshmy Gorty, *Advanced Engineering Mathematics-Vol. I, II.*, Ane Books India.
6. Sastry S.S., *Advanced Engineering Mathematics-Vol. I and II*., Prentice Hall of India.
7. Michael D Greenberg, *Advanced Engineering Mathematics*, Pearson Education.
8. Lary C Andrews, Bhimsen K Shivamoggi, *Integral Transforms for Engineers*, Prentice Hall of India.
9. Babu Ram, *Engineering Mathematics Vol.I & II*, Pearson Education.
10. S.Palaniammal, *Probability and Random processes*, Prentice Hall of India.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

University Examination Pattern

EN14 402 ENVIRONMENTAL SCIENCE

(Common for all branches)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To understand the problems of pollution, loss of forest, solid waste disposal, degradation of environment, loss of biodiversity and other environmental issues*
- *To create awareness among the students to address these issues and conserve the environment in a better way.*

Module I (8 hours)

The Multidisciplinary nature of environmental science. Definition-scope and importance-need for public awareness. Natural resources. Renewable and non-renewable resources: Natural resources and associated problems-forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their defects on forests and tribal people- water resources: Use and over utilization of surface and ground water, floods, drought , conflicts over water, dams-benefits and problems.- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.-Food resources: World food problems, changes caused by agriculture over grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.-Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy resources, Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Module II (8 hours)

Ecosystems-Concept of an ecosystem-structure and function of an ecosystem – producers, consumers, decomposers-energy flow in the ecosystem-Ecological succession- Food chains, food webs and Ecological pyramids-Introduction, types, characteristics features, structure and function of the following ecosystem-Forest ecosystem- Grassland ecosystem –Desert ecosystem-Aquatic ecosystem(ponds, streams, lakes, rivers, oceans , estuaries)

Biodiversity and its consideration Introduction- Definition: genetic, species and ecosystem diversity-Bio-geographical; classification of India –value of biodiversity:

consumptive use, productive use, social ethical , aesthetic and option values Biodiversity at Global, national , and local level-India at mega –diversity nation- Hot spot of biodiversity-Threats to biodiversity: habitat loss, poaching of wild life, man , wild life conflicts – Endangered and endemic species of India-Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Module III (10 hours)

Environmental pollution Definition-Causes, effects and control measures of Air pollution- Water pollution –soil pollution-Marine pollution-Noise pollution-Thermal pollution-Nuclear hazards-Solid waste management: Causes, effects and control measures of urban and industrial wastes-Role of an individual in prevention of pollution. Pollution case studies-Disaster management: floods , earth quake, cyclone and landslides-Environmental impact assessment

Module IV (10 hours)

Environment and sustainable development-Sustainable use of natural resources-Conversion of renewable energy resources into other forms-case studies-Problems related to energy and Energy auditing-Water conservation, rain water harvesting, water shed management-case studies-Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust-Waste land reclamation Consumerism and waste products-Reduce, reuse and recycling of products-Value education.

Text Books:

1. Daniels & Krishnaswamy, Environmental studies, Wiley India pvt ltd, 2009
2. Raman Sivakumar, Introduction to environmental science and engineering, 2nd edn, .Tata McGraw Hill, 2010
3. Anindita Basak, Environmental Studies, Pearson Education, 2009
4. Suresh K.D, Environmental Engineering and Management, Katson Books, 2007
5. Benny Joseph, Environmental studies, 2nd edn, McGraw Hill, 2009

References:

1. Raghavan Nambiar,K Text book of Environmental Studies,Scitech Publishers(India) Pvt. Ltd
2. S.P Misra, S.N Pandey, Essential Environmental studies, Ane books, Pvt Ltd, 2009
3. P N Palanisamy, P Manikandan,A Geetha, Manjula Rani, Environmental Science, Pearson Education, 2012
3. D.L. Manjunath, Environmental Studies, Pearson Education, 2011

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

Note: Field work can be Visit to a local area to document environmental assets-river/forest/grass land/mountain or Visit to local polluted site-urban/rural/industrial/agricultural etc. Or Study of common plants, insects, birds etc. Or Study of simple ecosystems-pond, river, hill slopes etc. Or mini project work on renewable energy and other natural

resources , management of wastes etc.

University Examination Pattern

IT14 403 : Data Structures and Algorithms

(Common with CS14 403)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of continuous data structures*
- *To develop understanding about fundamental searching and sorting techniques..*

Module I (10 hours)

Review of Data Types- Scalar Types – Primitive types – Enumerated types- Subranges – Arrays- sparse matrices – representation – Records – Complexity of Algorithms – Time & Space Complexity of Algorithms – Recursion: Recursive algorithms – Analysis of Recursive algorithms

Module II (14 hours)

Linear Data Structures – Stacks – Queues-Lists – Dequeus – Linked List – singly, doubly and circular lists – Application of linked lists – Polynomial Manipulation – Stack & Queue implementation using Array & Linked List – Typical problems – Conversion of infix to postfix – Evaluation of postfix expression – priority queues

Module III (14 hours)

Non Linear Structures – Graphs – Trees – Graph & Tree implementation using array & Linked List – Binary trees – Binary tree traversals – pre-order, in-order & postorder – Threaded binary trees – Binary Search trees – AVL trees – B trees and B+ trees-Graph traversals – DFS, BFS – shortest path – Dijkstra’s algorithm, Minimum spanning tree – Kruskal Algorithm, prims algorithm

Module IV (14 hours)

Searching – Sequential Search – Searching Arrays and Linked Lists – Binary Searching – Searching arrays and Binary Search Trees – Hashing – Open & Closed Hashing-Hash functions – Resolution of Collision –Sorting-n^2 Sorts – Bubble Sort – Insertion Sort – Selection Sort – n log n Sorts – Quick Sort – Heap Sort – Merge Sort – External Sort – Merge Files

Text Books

1. Ellis Horo
   C, Univers
2. Cormen T.

Reference Bo

1. Aho A.V
   Educatio
2. Debasis Samanta., Classic data Structures , PHI Learning.
3. Yedidyah Langsam, Moshe J Augenstein, Tanenbaum -Data Structures using C and C++,PHI Learning
4. Deshpande P.S, Kakde O.G, *C and Data Structures*, Dream- tech India Pvt. Ltd.
5. G.S Baluja.,Data Structures through C,Dhanpat Rai & Co.
6. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson.
7. A Chitra, P.T Rajan.,Data Structures, Tata McGrawHill.
8. Robert Kruse,Data Structures and Program Design in C,Pearson Education-2nd Edition.
9. Ashok N Kamthane, Programming and Data Structures, Pearson.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

IT14 404 : Object Oriented Programming In Java

(Common with CS14 404)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To familiarize the student with the Object Oriented Programming Concepts*
- *Also to give a fair idea about Programming In Java and its use as an Application development tool.*

Module I (12 hours)

Review of Object Oriented Concepts – Objects and classes in Java – defining classes – methods – access specifiers – static methods– constructors – finalize method – Arrays – Strings –Packages – JavaDoc comments, Dealing with Errors, Catching Exceptions, , Debugging Techniques, Using a Debugger.

ModuleII (12 hours)

Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes – the Object class – Reflection – interfaces – object cloning – inner classes. Applet Basics-The Applet HTML Tags and Attributes, Multimedia, The Applet Context, JAR Files.

ModuleIII (13 hours)

Streams and Files –Use of Streams, Object Streams, File Management.
Multi-threaded programming– Thread properties – Creating a thread – Interrupting threads –Thread priority- thread synchronization – Synchronized method -Interthread communication

Module IV (15 hours)

Database Programming –The Design of JDBC, The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query

Execution, Metadata, Scrollable and Updatable Result Sets, Row Sets, Transactions, Advanced Connection Management.

Remote Objects-Remote Method Invocation, setting up RMI, Parameter passing in Remote Methods.

Text Books

1. Cay S. Horstmann and Gary Cornell, "Core Java: Volume I & II– Fundamentals", Eighth Edition, Pearson Education, 2008.
2. Herbert Schildt , The Complete Reference Java2, Eighth Edition, Tata McGraw Hill

References

1. K. Arnold and J. Gosling, "The JAVA programming language", Pearson Education.
2. Timothy Budd, "Understanding Object-oriented programming with Java", Pearson Education.
3. Doug Lea, Concurrent programming in Java Design Principles and Patterns, Pearson Education.
4. George Reese, " Database programming, with JDBC and Java", O'Reilly.
5. Bruce Eckel,"Thinking in java", Pearson- 4th Edition.
6. Mahesh P. Matha-Core Java, A Comprehensive Study, PHI Learning-2011.
7. Dr.G.T.Thampi,Object Oriented Programming in Java,Dream-tech press
8. Hari Mohan Pandey, *Java Programming,* Pearson Education
9. Deitel & Deitel, *Java : How to Program,* PHI

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 405: Systems Programming

(Common with CS14 405)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To familiarize the students with the essentials of system software design. System software consists of programs necessary to make the hardware function properly.*
- *To equip the student with the right kind of tools for computer systems design and development.*

Module I (16 hours)

Background – system software machine architecture – the simplified instructional computer – traditional machines – RISC machines – assemblers – basic assembler functions – machine dependent and machine independent – assembler features – assembler design – assembler design options – implementation examples – AIX Assembler.

Module II (10 hours)

Loaders and linkers – basic loader functions – machine dependent and machine independent loader features – loader design options and implementation examples

Module III (10 hours)

Macro processors – basic macro processor functions – machine-independent macro processor features – macro processor design options and implementation examples.

Module IV (16 hours)

Introduction to operating systems – basic principles – batch processing – multiprogramming – timesharing systems and real-time systems – parallel

and distributed systems – computer system structure – computer system operation – I/O structure – structure – storage hierarchy – hardware protection – general system architecture – operating system structure – system components – OS services –system calls – system structure – virtual machines.

Text Books

1. Beck L.L., *System Software - An introduction to Systems Programming*, Pearson Education.

Reference Bo

1. Dhamdher
2. Godbole S
3. Bach, *Des*

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

IT14 406: Digital Data Communication

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To introduce the basic concepts of communication of digital data by looking at the various aspects of generation, transmission and reception.*
- *To introduce the various protocols involved in communication of digital data.*

Module I (13 hours)

Data Communications- Networks- Internet- Protocols and Standards- Network Models-Addressing- Data and Signals– Analog and Digital – Data transmission – Basics – Transmission impairment– Data rate limits – Performance – Asynchronous transmission – Synchronous transmission – signal propagation delay – transmission media.

Module II (13 hours)

Digital transmission – Analog transmission –Error detection and correction – introduction – block coding – Linear block codes- cyclic codes – Hamming codes- checksum – Data Compression.

Module III (13 hours)

Multiplexing – spread spectrum – switching – circuit switched networks – datagram networks – virtual circuit networks – structure of a switch- Telephone network – dial up modems – digital subscriber line – cable TV networks – Cable TV for data transfer.

Module IV (13 hours)

Data link control – framing – flow control – error control – protocol for noiseless channels – noisy channels – Synchronous protocols- Character oriented protocols- Bit oriented protocols- HDLC – point to point protocol – multiple access.

Text Books

1.Behrouz A Forouzan, *Data Communications and Networking, 4th Edition*, Tata McGraw Hill.

Reference Books

1. William Stallings, *Data and Computer Communications, 8th Edition*, Pearson Education
2. Irvine, *Data Communications and Networks: An Engineering Approach*, Wiley.
3. Fred Halsall, *Data Communication, Computer Networks and Open Systems*, Pearson Education.
4. Tomasi, Introduction To Datacommunication And Networking, Pearson Education

University Examination Pattern

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

IT14 407(P) : Data Structures Lab

Teaching scheme **Credits:** 2

3 hours practical per week

Objectives

- *To give hands on experience in viewing data as the central resource in computing process and to visualize the importance of structuring data.*
- *To demonstrate the impact of organizing data on the efficiency of algorithms that process the data, including static and dynamic data structures as well as linear and nonlinear data structures.*

1. Stack and Queue: Implementation using arrays and Linked lists
2. Searching Methods: Binary search and Hashing
3. Sorting: Recursive implementation of Quick Sort and Merge Sort
4. Binary Search Tree. Implementation with insertion, deletion and traversal
5. Infix Expression Evaluation: Using expression tree
6. Graph Search Algorithms: DFS and BFS on A connected directed graph
7. Minimal Spanning Tree. Implementation of Kruskal's and Prim's Algorithms
8. Shortest Path Algorithm. Dijkstra and Floyd Warshall Algorithsm
9. Disjoint Set operations: Union and Find using rank and path compression
10. Applications of Heap: Priority Queue and Heap Sort.

Reference Books

1. Cormen T.H., Lieserson C.E. & Rivest R.L., *Introduction to Algorithms*, Prentice Hall of India.
2. Sahni S., *Data structures, Algorithms & Applications in C++*, McGraw Hill.
3. G.S Baluja.,Data Structures through C,Dhanpat Rai & Co.
4. Sara Baase,Allen Van Gelder,*Computer Algorithms-Introduction to Design and Analysis*,Pearson,3rd Edition.
5. Parag Himanshu Dave,Himanshu Bhalchandra Dave, *Design and Analysis of Algorithm*, Pearson.

IT14 408(P) : Programming Environments Lab

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record

Un iversity Examination Pattern *(Maximum Marks-100)*

70% - Algorithm, Program, Output
20% - Viva voce
10% - Fair record

Teaching scheme **Credits:** 2

3 hours practical per week

Objectives

- *To teach the relevance and characteristics of different programming environments.*
- *To introduce the tools used for program development, maintenance, debugging etc.*

- Familiarization with features of an editor (for example Vi, Emacs)
- Shell programming, usage of tools like grep, awk etc
- Usage of Program development & maintenance tools (for example “make”)
- Usage of debugging tools (for example “gdb”)
- Familiarization with scripting languages (for example Perl, Tcl/Tk)
- Usage of lexical processing tools (for example Lex)
- Introduction to document formats (for example HTML, PDF). Scripting and generation of dynamic pages. Scripting languages and interaction
- Introduction to the tools providing GUI based human computer interaction (for example Qt.). Automatic generation of code for interaction using visual programming (for example Qt Designer)
- Introduction to tools for preparing documents (for example Word/Latex)

Reference Books

1. Behrouz Forouzan, *Unix and Shell Programming*, Tata McGraw Hill.
2. Martin C Brown, *The Complete Reference Perl, II edition*, Tata McGraw Hill.
3. F. Mittelbach, M. Goossens, J. Braams, D. Carlisle, C. Rowley, *The LaTeX Companion, 2nd Edition*, Addison-Wesley Professional.

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Tests
10%- Regularity in the class

University Examination Pattern *(Maximum marks: 100)*

70% - Algorithm, Program, output
20% - Viva voce
10% - Fair record

IT14 501 ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT

(Common for ME, PE, CS, IC, IT, PT and AM)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Section 1: Engineering Economics

Objective

The prime objective of the Engineering Economics course is to make students familiar with the economic way of thinking. This course provides the students with the foundations of economic theory, tools and techniques for use in the process of efficient economic decision-making in their engineering and managerial profession.

Module1 (14 Hrs)

Introduction to Engineering Economics – Technical efficiency, Economic efficiency – Cost concepts: Elements of costs, Opportunity cost, Sunk cost, Private and Social cost, Marginal cost, Marginal revenue, Profit maximisation, Break-even analysis.

Supply and Demand: Determinants of demand, Law of demand, Determinants of supply, Law of supply, Market equilibrium. Elasticity of demand – Types of elasticity, Factors affecting the price elasticity of demand.

National Income Concepts: GDP and GNP, Per capita income, Methods of measuring national income. Inflation and Deflation: Concepts and regulatory measures – Monetary policy and Fiscal policy.

Module II (13 Hrs)

Value Analysis – Time value of money – Interest formulae and their applications: Single-payment compound amount factor, Single-payment present worth factor, Equal-payment series compound amount factor, Equal-payment series sinking fund factor, Equal-payment series present worth factor, Equal-payment series capital recovery factor, Effective interest rate.

Investment criteria: Pay Back Period, Net Present Value, Internal Rate of Return, Benefit-cost ratio.

Text Books

1. Panneer Selvam, R, "*Engineering Economics*", Prentice Hall of India Ltd, New Delhi, 2001.

2. Dwivedi, D.N., "*Managerial Economics, 7/E"*, Vikas Publishing House, 2009.

Reference Books

1. Sullivan, W.G, Wicks, M.W., and Koelling. C.P., "*Engineering Economy 15/E*", Prentice Hall, New York, 2011.

2. Chan S. Park, "*Contemporary Engineering Economics*", Prentice Hall of India, 2002.

3. Prasanna Chandra, "*Financial Management: Theory & Practice, 8/E"*, Tata-McGraw Hill, 2011.

Internal Continuous Assessment *(Maximum Marks-25)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Attendance and Regularity in the class

University Examination Pattern for Section 1

University Examination Pattern – for Section 1
Note: Section 1 and Section 2 are to be answered in separate answer books
Maximum 50 marks each for Section 1 and Section 2

Section 2: Principles of Management

Objective

- *To provide knowledge on principles of management, decision making techniques, accounting principles and basic management streams*

Module I (13 hours)

Principles of management – Evolution of management theory and functions of management

Organizational structure – Principle and types. Decision making – Strategic, tactical & operational decisions, decision making under certainty, risk & uncertainty and multistage decisions & decision tree Human resource management – Basic concepts of job analysis, job evaluation, merit rating, wages, incentives, recruitment, training and industrial relations

Module II (14 hours)

Financial management – Time value of money and comparison of alternative methods. Costing – Elements & components of cost, allocation of overheads, preparation of cost sheet, break even analysis. Basics of accounting – Principles of accounting, basic concepts of journal, ledger, trade, profit &loss account and balance sheet. Marketing management – Basic concepts of marketing environment, marketing mix, advertising and sales promotion. Project management – Phases, organisation, planning, estimating, planning using PERT & CPM

Reference Books

1. F. Mazda, *Engineering management*, Addison Wesley, Longman Ltd., 1998
2. Lucy C Morse and Daniel L Babcock, *Managing engineering and technology*, Pearson, Prentice Hall
3. O. P. Khanna, *Industrial Engineering and Management*, Dhanpat

Rai and Sons, Delhi, 2003.
4. P. Kotler, *Marketing Management: Analysis, Planning, Implementation and Control*, Prentice Hall, New Jersey, 2001
5. Venkata Ratnam C.S & Srivastva B.K, *Personnel Management and Human Resources*, Tata McGraw Hill.
6. Prasanna Chandra, *Financial Management: Theory and Practice*, Tata McGraw Hill.
7. Bhattacharya A.K., *Principles and Practice of Cost Accounting*, Wheeler Publishing
8. Weist and Levy, *A Management guide to PERT and CPM*, Prantice Hall of India
9. Koontz H, O'Donnel C & Weihrich H, *Essentials of Management*, McGraw Hill.
10. Ramaswamy V.S & Namakumari S, *Marketing Management : Planning, Implementation*

Internal Continuous Assessment *(Maximum Marks-25)*

60% - Tests (minimum 2)

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

10% - Attendance and Regularity in the class

University Examination Pattern for Section 1

University Examination Pattern – for Section 2
Note: Section 1 and Section 2 are to be answered in separate answer books
Maximum 50 marks each for Section 1 and Section 2

IT14 502 Software Engineering

(Common with CS14 502)

Teaching scheme

Credits: 4

(3 hours lecture and 1 hour tutorial/lecture per week)

Objectives

1. *To introduce the software engineering techniques and background information to the students of computing sciences stream.*
2. *For adequacy this has to be complemented by exercises appearing in texts and references.*

Module 1(13 Hours)

Introduction to Software Engineering – Reasons for software project failure – Similarities and differences between software and other engineering products. Software Life Cycle – Water fall model – Prototyping – Spiral model –incremental model- pros and cons of each model.

Module II(13 Hours)

Software Design: Design Heuristics – Cohesion and Coupling Design Methodologies – Structured analysis and design, Architectural Design, Interface design, Component Level design. Process modelling – DFDs Concept of data modelling – ER diagrams –Class and component level

Module III(13 Hours)

Coding and Testing :Coding standards and Guidelines- Code Review – internal documentation and need for standards- Software Testing – Objectives of testing – Functional and Structural testing –Generation of test data – Test Plan – Unit testing –Integration testing – System testing – Test reporting.

Module IV(13 Hours)

Software Project Management – Brief study of various phases of Project Management –

Planning – Organizing – Staffing – Directing and Controlling .Software Project Cost Estimation – COCOMO model. Software Reuse and Software Maintenance issues. Methods of software licensing and introduction to Free Software.

Text Books

- Rajib Mall - Fundamentals of Software Engineering –, PHI.
- Pankaj Jalote - Software Engineering –Narosa Publications
- Roger S Pressman, Software Engineering: A Practitioner's Approach , McGraw Hill, 2008.

References

- Carlo Ghezzi-Fundamentals of Software Engineering-PHI
- Ian Sommerville-Software Engineering-Pearson
- Behferooz A. & Gydsib F.J.; Software Engineering fundamentals; Oxford University Press.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One suggestion is to consider techniques learned here while doing mini project & assignments can be given to prepare Software Engineering documents in IEEE format for a sample project.

University Examination Pattern

IT14 503 Operating Systems

(Common with CS14 503)

Teaching scheme
Credits: 4
(3 hours lecture and 1 hour tutorial per week)

Objectives

- *To impart the knowledge on the need and requirement of an interface between Man and Machine.*
- *To teach the features of operating systems and the fundamental theory associated with process, memory and file management components of operating systems.*

Module 1(13 Hours)

Introduction-Definition– Operating System Structure- Operating System Operations- Process Management- Memory Management- Storage Management- Protection and Security- Distributed Systems- Special-Purpose Systems- Computing Environments- Open Source Operating Systems- Operating-System Services- User Operating-System Interface- System Calls- Types of System Calls- System Programs- Operating-System Design and Implementation- Virtual Machines- System Boot- System Debugging

Module II(14 Hours)

Process Management- Process Concept- Operations on Processes-Threads- Overview- Multithreading Models- Thread Libraries- Threading Issues – CPU Scheduling- Basic Concepts- Scheduling Criteria- Scheduling Algorithms- Thread Scheduling- Multiple-Processor Scheduling- Process Synchronisation- Inter-process Communication- Examples of IPC Systems- Communication in Client-Server Systems- Deadlocks- Prevention- Detection- Avoidance- Recovery

Module III(13 Hours)

Memory Management-Swapping- Contiguous Memory Allocation- Paging- Segmentation- Virtual Memory- Demand Paging- File Management- File-System Interface- File Concept- Access Methods – Directory and Disk Structure – File-System Mounting – File Sharing- Protection- File-System Implementation- File-

System Structure- File-System Implementation- Directory Implementation- Allocation Methods Free-Space Management – Efficiency and Performance.

Module IV(12 Hours)

Mass Storage Structure- Disk Scheduling- Disk Management- RAID Structure- Stable Storage Implementation- Protection and Security- Protection- Goals of Protection- Principles of Protection- Domain of Protection- Access Matrix- Implementation of Access Matrix- Access Control- Revocation of Access Rights- Security- The Security Problem –Program Threats- System and Network Threats – Cryptography as a Security Tool – User Authentication- Firewalling to Protect Systems and Networks – Computer Security Classifications- Case Study of Linux and Windows Operating Systems

Text Books

- Silberschatz, Galvin, & Gagne, *Operating System Concepts*, 8th Ed., Wiley

References

1. Tanenbaum A.S., *Modern Operating Systems*, 3rd Ed., Prentice Hall
2. Nutt G.J., *Operating Systems, 3rd Ed.,* Pearson Education.
3. William Stallings, *Operating Systems: Internals and Design Principles,* 6th Ed., Pearson Education

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One suggestion is to consider techniques learned here while doing mini project.

University Examination Pattern

IT14 504: Database Management Systems

(Common with CS14 504)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

To introduce the fundamental concepts necessary for designing, using, and implementing database systems and applications. The syllabus includes the fundamentals of database modeling and design, the languages and facilities provided by the database management systems, and system implementation techniques

Module I (13 hours)

Introduction: Characteristics of database approach –Database Users- Advantages of using DBMS – Categories of Data Models – schemas ,instances and Database State **–**Three Schema Architecture and Data Independence – database languages and

interfaces – Database modeling using entity-relationship (ER) – entity sets, attributes and keys Relationship Types, Relationship Sets, Roles and structural constraints – weak entity types – enhanced entity-relationship (EER) and object modeling – subclasses – super classes and inheritance – specialization and generalization – modeling of union types.

Module II Module II (13 hours)

Relational model concepts – Relational model constraints and Relational Database Schemas- Relational algebra – Tuple Relational Calculus-Domain Relational Calculus –Relational Database Design using ER- ER-to –Relational mapping- -queries in SQL –DDL and DML-SQL views

Module III (13 hours)

Database design: functional dependencies – Inference Rules for Functional Dependencies – Closure – Minimal Cover **–**Normal forms –First-second and third normal forms – Boyce-Codd normal form – Properties of Relational Decompositions –Algorithms for Relational database design- Multi valued dependencies and fourth normal form(general definitions) – join dependencies and fifth normal form(general definitions) – inclusion Dependencies (general definitions)

Module IV (13 hours)

Transaction processing : desirable properties of transactions, Characterizing Schedules Based on Recoverability and Serializability – concurrency control Techniques –Two-Phase Locking – Time stamp ordering- Multi version concurrency control – Validation (Optimistic) concurrency control- Granularity of Data Items and Multiple Granularity Locking – Database recovery techniques –based on deferred update and immediate update – shadow paging – ARIES recovery algorithm - Introduction to Database security –issues- access control based on granting/revoking of privileges

Text Book

1. Elmasri & Navathe, *Fundamentals of Database Systems*, Pearson Education, Fourth edition.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 505: Introduction to Microprocessor Systems

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To familiarize the student with the internals of a microprocessor with a wide range of processing capabilities.*
- *Also to give a fair idea of various interfacing methods and devices, along with a detailed treatment of important design issues.*

Module I (11 hours)

Architecture of Microprocessors: General definitions of mini computers, microprocessors, micro controllers and digital signal processors. Overview of 8086 microprocessor. Signals and pins of 8086 microprocessor

Module II (13 hours)

Assembly Language programming: Description of Instructions for 8086 and addressing modes. Assembly directives. Assembly software programs with algorithms

Module III (15 hours)

Interfacing with 8086: Interfacing with RAMs, ROMs along with the explanation of timing diagrams. Interfacing with peripheral Ics like 8255, 8254, 8279, 8259, 8259. Interfacing with key boards, LEDs, LCDs, ADCs, and DACs etc..

Module IV (13 hours)

Reduced Instruction Set Computer (RISC) Architectures: Introduction to the ARM Microprocessors, ARM7TDMI Organization, Instruction Set, Addressing Modes Stack, Branching, Subroutines. Main characteristics of RISC architectures, RISC-CISC trade-offs.

Text Books

1. Nilesh B.Bahadure, *MICROPROCESSORS, The 8086/8088, 80186/80286,80386/80486 and the Pentium Family*, ISBN : 978 –81–203–3942–2, PHILearning
2. Embedded Systems: *Introduction to the Arm? Cortex(TM)-M3 (Volume 1);* Jonathan Valvano; 1st; 2012.

Reference Books

1. Brey B.B., *The Intel Microprocessors 8086 to Pentium: Architecture, Programming and Interface*, Prentice Hall of India
2. Ray K. & Bhurchandi K.M., *Advanced Microprocessors & Peripherals*, Tata McGraw Hill.
3. Hall D.V., *Microprocessors & Interfacing: Programming & Hardware*, Tata McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: Parts of theory classes could be explored as experiments in laboratory.

University Examination Pattern

IT14 506 Theory Of Computation

(Common with CS14 506)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach the fundamentals on computational models and computability.*
- *To introduce the introductory concepts of languages and their classification*
- *To familiarize the students on recognizers and automata.*
- *To impart knowledge on classifying algorithms into the various computability classes and proofs of some standard algorithms.*

Module I (13 hours) Introduction to formal proof – Inductive proofs – Concepts of automata theory – Deterministic finite automata – Nondeterministic finite Automata – equivalence of deterministic and nondeterministic finite automata – Nondeterministic Finite automata with ε transitions – Regular expressions – Finite automata and regular expressions – Algebraic laws for Regular expressions – Pumping lemma for regular languages – closure properties of regular languages – Decision properties of regular languages – Equivalence and minimization of automata.

Module II (13 hours) Context free Grammars – Derivations – sentential forms – The language of grammar – Parse trees – Ambiguity in grammar and languages – Inherently ambiguous languages – Context Sensitive Language-Linear Bounded Automata- Chomsky Hierarchy-Pushdown automata – Formal definition – Graphical notation – The language of a PDA – Acceptance by PDA – Empty stack – Final state – PDAs to grammars – Deterministic PDAs and CFLs – Non deterministic PDAs – Chomsky Normal Form – Greibach Normal Form – Pumping lemma for CFLs – Closure properties of CFLs – Decision properties of CFLs – CYK algorithm.

Module III (14 hours) Turing Machines – Notation – Instantaneous Description – Transition Diagram – The language of a Turing Machine – Halting of TMs – Programming techniques for Turing Machines – Extension to basic TMs – Nondeterministic TMs – Restricted TMs –Universal Turing Machine- Recursive and

Recursively Enumerable Languages –Properties of Recursively Enumerable Languages

Module IV (12 hours) Halting problem of TMs – Undecidable problem about TMs – Rice's Theorem – Post Correspondence problem – Undecidability of Post Correspondence Problem – Undecidable problems on Languages. Intractable problems – The classes P and NP – Polynomial time reducibility –NP-Complete problems

Text Books

4 Raymond Greenlaw & H. James Hoover, *Fundamentals of the Theory of Computation :*

Principles and Practice, Morgan Kaufmann Publishers.

Reference Books

4 Hopcroft J.E, Motwani R & Ullman J. D., *Introduction to Automata Theory, Languages and*

Computation, Pearson Education.

2. Misra & Chandrasekhar, PHI

3. Linz: P., *An Introduction to Formal Languages & Automata*, Narosa.

4. Martin I C, *Introduction to Languages and the Theory of Computation*, Tata McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

University Examination Pattern

IT14 507(P): Database Management Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To teach data base technology and familiarize them with issues related to data base design through hands on practice.*
- *To be able to design new and modify databases, write queries and execute them.*

Experiments

- Database Customization
- Creating Databases / Table spaces
- Creating Objects
- Moving Data
- Recovery
- Locking
- Preparing Applications for Execution using a front end tool

Reference Books

1. Elmasri, Navathe, *Fundamentals of Database Systems*, Addison Wesley.
2. Ramakrishnan R., Gehrke J., *Database Management Systems*, McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Tests
10%- Regularity in the class

University Examination Pattern *(Maximum marks: 100)*

70% - Algorithm, Program, output
20% - Viva voce
10% - Fair record

IT14 508(P) Microprocessor Programming Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To teach the relevance and characteristics of hardware and operating system components of a digital computer system through various laboratory experiments.*
- *To enable the students to develop the ability to interface devices to computer systems through various interfacing techniques.*

Lab 1: Identification of components/cards and PC assembling from components

Lab 2: Assembly language program for implementing arithmetic operations.

Lab3, 4: Implementation of a file manager using DOS/BIOS interrupts.

Lab 5: TSR (Terminate and Stay Resident) Programming.

Lab 6: ADC interface.

Lab 7: Stepper Motor interface using DAC.

Lab 8,9: Parallel Interface: Printer and HEX keyboard..

Lab 10: Serial Interface: PC to PC serial interface using MODEM.

Reference Books

1. Messmer H.P., *The Indispensable PC Hardware Book*, Addison Wesley
2. Hall D. V., *Microprocessors and Interfacing*, Tata McGraw Hill.
3. Norton P., *DOS Internals*.

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Tests
10%- Regularity in the class

University Examination Pattern *(Maximum marks: 100)*

70% - Algorithm, Program, output
20% - Viva voce
10% - Fair record

IT14 601 : Digital Signal Processing

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of continuous and discrete signals and systems*
- *To develop understanding about frequency domain approaches used for analysis of continuous and discrete time signals and systems.*

Module I (14 hours)

Signals – classification – continuous-time/discrete-time, deterministic/non-deterministic, periodic/ aperiodic, even/odd, energy/power signals – elementary signals – exponential, sinusoidal, unit step, impulse, ramp – time-shifting, scaling, folding. System – classification – continuous-time/discrete-time, static/dynamic, linear/non-linear, time-invariant/variant, deterministic/stochastic, causal/non-causal, stable/unstable. Linear Time Invariant (LTI) systems – impulse response – convolution integral – convolution-sum – condition for BIBO stability for CT and DT signals in terms of impulse response.

Module II (12 hours)

Representation of signals – Periodic signals – continuous-time fourier series (CTFS) – Trigonometric and exponential – symmetry conditions – amplitude & phase spectrum – properties of CTFS – Parserval’s theorem for power signals – power spectral density. Non-periodic signals – continuous-time Fourier transform (CTFT) – amplitude & phase spectra – gate function – sampling function – properties – convolution – Parseval’s theorem for energy signals – energy-spectral density – Frequency response.Linear Constant-Coefficient Differential equations – review of Laplace transform – transfer function – relation between Laplace transform and Fourier transform – poles and zeros – pole-zero plots – basic concept of BIBO stability.

Module III (12 hours)

Periodic signals – Discrete-time Fourier series (DTFS) – properties of DTFS – aperiodic signals – discrete-time Fourier transform (DTFT) – properties of DTFT – Parseval’s theorem – energy spectral density – – frequency response – sampling – sampling theorem – impulse train – Nyquist rate – aliasing.

Module IV (14 hours)

Linear Constant-Coefficient Difference Equations (LCCDE) – Z-transform – Region of Convergence (ROC) – properties – inverse Z-transform – convolution – Long division method, partial fraction expansion method, residue method – one-sided Z-transform – properties – initial value & final value theorem - solution of LCCDE with initial conditions – zero input response and zero state response – system function – poles and zeros – basic concept of BIBO stability.

Text Books

1. Oppenheim A. V. & Schafer R. W., *Signals and Systems*, PMI
2. Proakis J. G. & Manolakis D. G., *Digital Signal Processing, Principles, algorithms & applications*, Pearson Education.
3. Charles L. Phillips, John M. Parr & Eve A Riskin, *Signals, Systems and Transforms*, Pearson Education

Reference Books

1. Ramesh Babu P., *Signals and Systems*, Scitech Publications (India) Pvt. Ltd.
2. Simon Haykin & Barry Van Veen, *Signals and Systems*, Wiley-India.
3. D. Ganesh Rao & Satish Tunga, *Signals and Systems*, Pearson Education.
4. M. J. Roberts, *Signals and Systems: Analysis using Transform methods and MATLAB*, Tata McGraw Hill, New Delhi, 2003.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *10 x 2 marks=20 marks*

Candidates have to answer ten questions out of twelve. There should be three questions from each module..

PART B: *Analytical/Problem solving questions* *8x 5 marks=40 marks*

All questions are compulsory. There should be two questions from each module

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

Two questions from each module with choice to answer one question.

Maximum Total Marks: 100

IT14 602 : Computer Graphics & Multimedia

(Common with CS14 602)

Teaching scheme **Credits: 4**

3 hours lecture and 1 hour tutorial per week

Objective:

- *This course is to introduce fundamental principles of computer graphics and different media formats. The subject is very relevant in view of the continuing trend of convergence of media and communication engineering. For adequacy this has to be complemented by exercises appearing in texts and references*

Module I (13 hours)

Introduction to computer graphics – programming in the simple raster graphics package – basic raster graphics algorithms for drawing 2D primitives – scan converting lines – circles – generating characters – geometrical transformations – 2D transformations – homogeneous coordinates and matrix representation of transformations – window-to-view-port transformation

Module II (12 hours)

Viewing in 3D projections – 3D transformations – basics of solid 78odelling – Input devices and interactive techniques – interaction hardware – basic interaction tasks – computer graphics programming in C/C++.

Module III (14 hours)

Introduction to multimedia – media and data streams – properties of a multimedia system – data stream characteristics – information units Multimedia building blocks – audio – basic sound concepts – music – speech – MIDI versus digital audio – audio file formats – sound for the web – images and graphics – basic concepts – computer image processing – video and animation – basic concepts – animation techniques – animation for the web

Module IV (12 hours)

Data compression – storage space and coding requirements – classification of coding/compression techniques – basic compression techniques like JPEG, H.261, MPEG and DVI

Text books

1. Foley J.D., Van Dam A., Feiner S.K., & Hughes J.F., Computer Graphics Principles and Practice, Pearson Education
2. Steinmetz R. & Nahrstedt K., Multimedia: Computing, Communications and Applications, Pearson Education

Reference books

1. Newmann W & Sproull R.F., Principles of Interactive Computer Graphics, McGraw Hill
2. Rogers D.F., Procedural Elements for Computer Graphics, McGraw Hill
3. Hearn D. & Baker P.M, Computer Graphics, Pearson Education
4. Koegel Buford J.F., Multimedia System, Pearson Education
5. Vaughan T., Multimedia: Making it Work, Tata McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 603: Compiler Design

(Common with CS14 603)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To introduce the various techniques involved in the translation of source programs into object programs by a compiler.*
- *To understand the inner working of a compiler using the various data structures used in the translation process.*

Module I (13 hours)

Introduction – analysis of the source program – phases of a compiler – compiler construction tools – lexical analysis – role of the lexical analyzer – specification of tokens – recognition of tokens – lexical analyzer generators.

Module II (13 hours)

Syntax analysis: role of the parser – context-free grammars – top-down parsing – bottom-up parsing – operator precedence parsing – LR parsers (SLR, canonical LR, LALR) – parser generators.

Module III (14 hours)

Syntax-directed translation - syntax-directed definitions – S-attributed definitions – L-attributed definitions – bottom-up and top-down translation – type checking – type systems – specification of a type checker – run-time environments – source language issues – storage organization – storage allocation strategies – access to non-local names – parameter passing – symbol tables.

Module IV (14 hours)

Intermediate code generation – intermediate languages – declarations –assignment statements – Boolean expressions – procedure calls – introduction to code optimization – sources of optimization – introduction to data-flow analysis - introduction to code generation – issues in the design of a code generator – the target machine – a simple code generator

Text Books

1. Aho A.V., Sethi R., Ullman J.D., *Compilers: Principles, Techniques and Tools*, Pearson Education.

Reference Books

1. Aho A. V., Ullman J.D. *Principles of Compiler Design*, Narosa
2. Muchnick S.S., *Advanced Compiler Design Implementation*, Harcourt Asia (Morgan Kaufman)
3. Holub A.I., *Compiler Design in C*, Prentice Hall India
4. Appel A.W., *Modern Compiler Implementation in C*, Cambridge University Press
5. Kenneth C Lauden, *Compiler Construction - Principles and practice*, Thomson Brooks/Cole - Vikas Publishing House.
6. Dick Grune, Henri E Bal, Ceriel J.H Jacobs, Koen G Langendoen, *Modern Compiler design*, Dreamtech.
7. K.D.Cooper and Linda Torczon, *Engineering a Compiler*, Morgan Kaufmann/Elsevier, 2008

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 604: Computer Networks

(Common with CS14 604)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach the mode of operation of different types of computer networks that are used to interconnect a distributed community of computers and various interfacing standards and protocols*

Module I (13 hours)

Introduction-Uses of Computer Networks, Network Hardware, Network Software, Reference Models, Example Networks, Network Standardization. The Medium Access Control Sublayer- The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth.

Module II (13 hours)

The Network Layer- Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internetworking, The Network Layer in the Internet

Module III (13 hours)

The Transport Layer- The Transport Service, Elements of Transport Protocols, A Simple Transport Protocol, The Internet Transport Protocols: UDP, The Internet

Text Book

1. A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI

Reference Books

1. Behrouz Forouzan, *Introduction to data communication and networking*, Tata McGraw- Hill Publishing Company Ltd.
2. Halsall F., Data Communication, *Computer Networks and Open Systems*, Pearson Education
3. L. Peterson & Bruce S. Davie, *Computer Networks- A systems approach*, 4/e Morgan Kaufmann publishers an imprint of Elsevier
4. Keshav S, *An Engineering Approach to Computer Networking*, Pearson Education.
5. Leon-Garcia A. & Widjaja I., *Communication Networks*, Tata McGraw Hill
6. James F Kumar, Keith W Ross;*Computer Networking A Top Down Approach* Fifth Edition Pearsom 2013-02-21
7. Barry Wilkinson, Michael Allen;*Parallel Programming Techniques and Applications using Networked Workstations and Parlle Computers* Second Edition Pearson 2007
8. Fred Halsall, Lingana Gouda Kulkarni- *Computer Networking and The Internet, Fifth Edition* , Pearson 2011
9. M L Liu- *Distributed Computing- principles and Applications*, Pearson 2013
10. Jocen Burkhaselt, Horst Henn, Stefan Hepper, Klaus Rindlorff, Thomas Sehacck- *Pervasive Computing Technology and Architecture of Mobile Internet Applications*, Pearson 2013
11. M. Barry Dumas, Morris Schwartz- *Principes of Computer Networks and Communications*, Pearson 201212. Prakash C Gupta- Data Communications and Computer Networks, PHI Learning New Delhi 2012

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 605 Human Computer Interaction

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *The course aims at how to take into account the human and contextual part of a system, which is important in creating popular applications*
- *After completing the course students should be able to explain the difference between good and bad design and know how to take into account user's needs in interaction design.*
- *Objective of the course is to introduce the well-developed models based on the cognitive and social constraints for a new IT application.*

Module I (14 hours)

Introduction to model human processor – Input-output channel – Human memory – Thinking – Emotion, Psychology and the design of interactive systems. Typical Computer – Text entry devices – Positioning: pointing and drawing – Display devices – Devices for virtual reality & 3D interaction – Physical controls, Sensors & Special devices – Printing &scanning – Memory. Introduction to interaction – Model- frameworks &HCI –Ergonomics – interactive styles, elements of WIMP interface – Paradigms for interaction.

Module II (14 hours)

Design Process – Introduction to interaction design – Process of design – User focus – Scenarios – Navigational design – Screen design & layout – Prototyping. HCI in software process – Usability engineering, Software prototyping & techniques, Principles to support usability, Golden rules sample. Implementation – Elements of windowing systems – Using toolkits, User interface management systems. Evaluation - Expert analysis – evaluation through user participation – choosing an evaluation method. Universal design - principles, Multi-modal interaction – Design for diversity. User support – Approaches to user support – Adaptive help systems.

Module III (12 hours)

Models & theories: Cognitive models – Linguistic model, Physical & device model, socio-organizational issues – Communication and collaboration model – Uses of task analysis. Dialog notation & design – Diagrammatic notation, Textual dialog notation, Dialog analysis and design.

Module IV (12 hours)

Group Ware systems – computer mediated communication – Meeting & discussion support systems – sharedapplications and artifacts. Framework for Group Ware. Ubiquitous computing &realities – Ubiquitous computing applications research – virtual and augmented reality – Information and data visualization.

Text Books

1. Alan Dix Janet Finlay, Gregory D Abowd, Russell Beale Human , *Computer Interaction*; *3rd edition*, Pearson Education Asia.

Reference Books

1.John M Carroll Hutran, *Computer Interaction in the New Millennium*, Pearson Education Asia

2.Ben Shneinderman, *Designing the User Interface: Strategies for Effective Human Computer Interaction, 3rd Edition*, Pearson Education Asia.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

Note: The understanding of concepts in HCI could be deployed in mini or main projects.

University Examination Pattern

IT14 606 : Object Oriented Modeling and Design

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives
Objectives

- *To impart ideas on building systems through the object oriented modelling approach using the Unified Modelling Language.*

Module I (13 hours)

Introduction to UML and Unified Process - Use case 89odelling: Actors and Use cases, Use case specification, Actor generalization, Use case generalization - Objects and classes, Relationships, Inheritance and Polymorphism, Packages.

Module II (14 hours)

Use case realization: Interactions, Sequence diagrams, Communication diagrams, Interaction occurrences. Activity diagrams: Activity semantics, activity partitions, Sending signals and accepting events, Interaction overview diagrams.

Module III (13 hours)

Design: Design workflow, well-formed design classes, Refining analysis relationships. Interfaces and components – State machine diagrams, Composite states, submachine states

Module IV (12 hours)

Implementation workflow, Deployment, Introduction to OCL: Why OCL? OCL expression syntax, Types of OCL expressions. Introduction to Software Architecture, Architecture description language (ADL)

Text Books

1. Jim Arlow and Ila Neustadt, *UML 2 and the Unified Process: Practical Object oriented Analysis and Design, Second Edition*, Pearson Education.

Reference Books

1. Craig Larman, *Applying UML and Patterns, 3rd Edition*, Pearson Education.
2. Grady Booch, James Rambaugh,Ivar Jacobson .A.W , *The Unified Modeling Language User Guide- Pearson Education*
3. Bruegge, *Object Oriented Software Engineering using UML patterns and Java*, Pearson Education
4. James Rambaugh et. al., *Object Oriented Modelling and Design*, Prentice Hall India
5. Ivar Jacobson, Grady Booch, James Rambaugh A.W, *The Unified Software Development Process*.
6. DeLillo, *Object Oriented Design in C++*, Thomson Learning

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

IT14 607(P): Systems Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To make the learners understand the operating system structures and the implementation aspects of various OS functions and schedulers.*

Operating systems

1. Implementation of dining philosophers problem by multiprogramming using threads, semaphores and shared memory

2. Implementation of ls/dir command of Unix/Dos to display contents of a given floppy disk.

3. Program to generate disk usage status report for a given Unix/Dos formatted floppy disk giving details like free space availability etc.

4. Implementation of banker's algorithm

5. Inter-process communication using mailboxes and pipes

6. Program to find the least common ancestor of two given nodes in a binary tree (Concurrent Programming)

7. Program for the readers and writers problem (Concurrent Programming)

Reference Books

1. Nutt G.J., *Operating Systems - A Modern Perspective*, Addison Wesley
2. Bach M.J., *The Design of the Unix Operating System*, Prentice Hall India

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Tests
10%- Regularity in the class

University Examination Pattern *(Maximum marks: 100)*

70% - Algorithm, Program, output
20% - Viva voce
10% - Fair record

Teaching scheme **Credits: 2**

3 hours practical per week

Objectives

- *To estimate the ability of the student in transforming the theoretical knowledge studied so far into a working model of a computer / information system.*
- *For enabling the students to gain experience in organisation and implementation of a small project and thus acquire the necessary confidence to carry out main project in the final year.*

In this practical course, each group consisting of three/four members is expected to design and develop a moderately complex computer / information system with practical applications; this should be a working model. The basic concepts of product design may be taken into consideration while designing the project. A committee consisting of

minimum three faculty members specialized in Information Technology or computer science and engineering will perform assessment of the mini project. Students have to submit a report on the mini project and demonstrate the mini project before the evaluation committee.

The division of the total marks is into two, namely, 60% of the total marks to be awarded by the guide / Co-ordinator and the remaining 40% by the evaluation committee.

Internal Continuous Assessment *(50 marks)*
40% - Design and development
30% - Final result and Demonstration
20% - Report
10% - Regularity in the class

End Semester Examination *(Maximum Marks-50)*

20% - Demonstration of mini project
50% - Practical test connected with mini project
20% - Viva voce
10% - Fair record

IT14 701: Design and Analysis of Algorithms

(Common with CS14 701)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To provide a sound basis of algorithm design and analysis techniques*.
- *To introduce the various computing models and their capabilities with respect to computing.*

Module I (12 hours)

Analysis: RAM Model – Cost estimation based on key operations – big Oh – big-omega – little Oh –omega and theta notations – Solution to recurrences – Substitution method, recurrence tree, Masters Theorem-Introduction to probabilistic analysis – Worst and Average case analysis of Quick Sort –Merge Sort – Heap Sort – Amortized analysis – aggregate – accounting and potential methods .

Module II (14 hours)

Design: Divide and Conquer – Strassen's algorithm, o(n) median finding algorithm – Dynamic programming – Matrix Chain Multiplication – Optimal Binary Search trees – FloydWarshall algorithm - Greedy Algorithms –Huffman coding – Knapsack, Kruskal's and Prim's algorithms for MST – Backtracking – branch and bound – travelling Salesman Problem – Matroids and theoretical foundations of Greedy algorithms

Module III (13 hours)

Complexity: Complexity classes – P, NP, Co-NP, NP Hard and NP Complete problems – Cook's theorem(Proof not expected) – NP- Completeness reductions for clique – Vertex Cover – Subset Sum-Hamiltonian Cycle – TSP - approximation algorithms – Vertex Cover – TSP-Set covering and subset sum - Graph coloring.

Module IV (13 hours)

Probabilistic algorithms: Pseudo random number generation methods – Monte Carlo algorithms –Probablistic counting – Verifying matrix multiplication – Primality testing – Miller Rabin Test – integerFacorisation – Pollard's rho heuristic – interactive proof systems – les vegas algorithms – Randomized selection and sorting – Randomized solution for eight queen problem –Universal Hashing – Derandomization.

Text Books

1. Corman T.H, Lieserson C.E & Rivest R.L, Introduction to Algorithms, Prentice Hall India, Modules I, II and III.
2. Motwani R. & Raghavan P, Randomized Algorithms, Cambridge University Press, Module IV

Reference Books

1. Basse S., Computer Algorithms: Introduction to Design And Analysis, Addison Wesley
2. Manber U., Introduction to Algorithms: A Creative Approach, Addison Wesley
3. Aho V., Hopcroft J.E. & Ullman J.D., The Design And Analysis of Computer Algorithms, Addison Wesley

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments shall be implementation of an algorithm.

University Examination Pattern

IT14 702: Cryptography and Network Security

(Common with CS14 702)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- To introduce the principles and practices of cryptography and network security
- To discuss algorithms and schemes to handle the security issues
- To introduce web security

Module I (16hours)

Introduction: Security basics – Aspects of network security – Attacks – Different types –

Security attacks –Security services and mechanisms. Cryptography: Basic Encryption & Decryption –Classical techniques – Transposition & substitution ciphers –Caesar substitution – Poly alphabetic substitutions – Symmetric key algorithms – Fiestel Networks – Confusion – Diffusion – DES Algorithm –Strength of DES – Comparison & important features of modern symmetric key, Number Theory Concepts

Module II (10 hours)

Public key cryptosystems – The RSA Algorithm – Diffie Hellman key exchange – comparison of RSA & DES – Elliptic Curve Cryptography

Module III (14 hours)

Hash Functions – Digest Functions – Digital Signatures – Authentication protocols. – Network & Application Security: Kerberos – X509 Authentication service – Electronic mail security – Pretty Good privacy –S/MIME – secure Electronic Transactions.

Module IV (12 hours)

IP security – architecture – features – Web security – Socket layer and transport layer security – Secure electronic transactions – Firewalls

Text Books

1. Cryptography and Network Security – William Stallings, Pearson Education

Reference Books

- Schneier B., Applied Cryptography: Protocols, Algorithms, and Source Code in C, John Wiley
- Wenbo Mao , Modern cryptography - Theory and Practice, Pearson Education Asia
- Niven & Zuckerman H.S., An Introduction to The Theory of Numbers, John Wiley
- Pfleeger C.P., Pfleeger S.L., Security in Computing, Pearson Education (Singapore) Pvt. Ltd.
- Michel E. Whiteman, Herbert J.Mattord, Principles of Information Security, Thomson, Vikas Publishing House.

University Examination Pattern

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

IT14 703 : Internet Technologies

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *This course introduces the algorithms and protocols implemented to have human interaction with internet with an emphasis on application layer and multimedia networking. It also introduces the techniques and methods of E-Commerce.*

Module I (14 hours)

Network Applications-Client-Server Interaction-Socket Interface-Connection Oriented Service-Simple Client and Server example-Domain Name System-Electronic Mail Representation and Transfer-VoIP-File Transfer and Remote File Access-RPC and Middleware-Initialization

Module II (12 hours)

Multimedia networking-applications-streaming stored audio and video – internet telephony – RTP – scheduling and policing mechanisms – integrated services – RSVP –differentiated services – network management – the internet network management framework – network security – integrity, Access control attacks & control measures

Module III (13 hours)

E-commerce-Difference between E-commerce and E-Business, Unique features, types – Portals – E-distributor. Emerging E-commerce areas. Technology infrastructure –Internet and web features (case study not required). Building an E-commerce websitechoosing server software-choosing hardware- E-commerce site tools. Security needs in E-commerce environment.

Module IV (13 hours)

E-commerce payment systems – credit cards, E-commerce transactions – digital payments in B2C arena – B2B payment systems, B2B E-commerce and Supply Chain Management – Evolution – Procurement process & Supply Chain Management – Trends in Supply Chain Management and collaborative commerce, Net Marketers – characteristics, types, e-distributors, e-procurement.

Text books

1. Douglas E. Comer, *Computer Networks and Internets with Internet Applications* – Pearson Education
2. Kurose J.F. & Ross K.W, *Computer Networking: A Top -Down Approach Featuring the Internet*- Pearson Education
3 Kenneth C. Laudon, Carol Guercio Traver, *E-Commerce-Business, Technology, Society*- Pearson Education

Reference books

1. Nalin K. Sharda, *Multimedia Information Networking* – Prentice Hall of India.
2. Stallings, *Computer Networking with Internet Protocols* - Pearson Education Asia.
3. Greenlaw R. & Hepp E.,*In-line / On-line: Fundamentals of the Internet and the World Wide Web*- Tata McGraw Hill
4. Goncalves M., *Firewalls: A Complete Guide* - Tata McGraw Hill
5. Kalakota R. & Whinston A.B., *Frontiers of Electronic Commerce* - Pearson Education

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments shall use a set of original RFCs (Request for Comment) as base documents.

University Examination Pattern

IT14 706(P) : Computer Graphics and Multimedia Lab

Teaching scheme
Credits:2
3 hours practical per week

Objectives

- *To implement the algorithms for drawing 2D and 3D object generation and object transformation.*
- *It also aims at familiarization of basic multimedia tools.*

LIST OF EXPERIMENTS

Lab 1: Basic raster drawing algorithms implementations (lines, circle, ellipse, polygons etc.)

Lab 2: Implementation of algorithms for 2D/3D object generation, transformations

Lab 3: Generate a 3D object, say a cube, and try to implement the following using any standard graphic library set (for example OpenGL library) on a selected OS

- Viewing transformations
- Modeling transformations
- Projection transformations
- Drawing a scene (2D picture of 3D space or a shot by camera) involving object

Lab 4: Generate a 3D object, say a sphere, based on surfaces or polygonal faces or wireframe approach and render it defining a material, light source and lighting model properties using any standard graphic library set (for example OpenGL library) on a selected OS

Lab 5: Model a scene containing several 3D objects, say table top having several objects – each object may be modeled as given in above experiment – also render the scene with hidden surfaces in mind – rendering considering a light source may also be practiced – this again is using standard graphic library set on a selected OS

Lab 6: Use source code of any freely available sound recording, encoding / decoding software – encoding / decoding portions may be removed before actual

experimentation – study any three audio formats to learn about (a) file size (b) popularity (c) quality of audio reproduced.

Do the following in a chosen OS

- Record sound for 10 secs
- Convert from one format to other
- Playback both the formats and analyze the results

Lab 7: Study any 5 popular still image formats (JPEG, BMP included) – do the following in a chosen OS

- Take a snap of face of a person using digital camera or a webcam
- Use any photo editing tools (say, Adobe Photoshop) to get desired size, desired resolution photo (both color and black and white may be generated). Paint touching may also be practiced
- Create the image of a decorated greeting card or an identity card using image creation tools and insert the photo and print it. Verify for color matching and size of the image

Lab 8: Use a MPEG decoder source code freely available from internet and do the following in a chosen OS

- Play MPEG video
- Modify the source code so that play can be done frame by frame

Lab 9: Use any web animation-authoring tool; say macromedia flash, on a chosen OS to create simple animations

Lab 10: Learn to use server and client software for streaming media – pick any freely available software on a chosen OS – create a web page with multimedia content and providing interaction in some form to a user

Reference Books

1. Foley J.D., Dam A.V., Feiner S.K. & Hughes J, *Computer Graphics: Principles and Practice*, Addison Wesley
2. Stevens R.T, *Graphics Programming In C*, BPB Publications
3. Stevens R.T. & Watkins C.D, *Advanced Graphics Programming in C & C++*, BPB Publications.
4. OpenGL Architecture Review Board, *OpenGL Programming Guide,* Pearson Education Asia
5. OpenGL Architecture Review Board, *OpenGL Reference Manual*, Pearson

University Examination Pattern *(Maximum marks: 100)*

70% - Algorithm, Program, output
20% - Viva voce
10% - Fair record

IT14 707(P) : Network Programming Lab

Teaching scheme

Credits: 2

3 hours practical per week

Objectives

- *To teach the working of various networking protocols*

Lab 1 : Implementation of PC to PC file transfer using serial port and MODEM.

Lab 2,3 : Software Simulation of IEEE 802.3, 802.4 and 802.5 protocols.

Lab.4,5 : Software Simulation of Medium Access Control protocols
1) GoBackN,
2) Selective Repeat
3) Sliding Window.

Lab 6 : Implementation of a subset of Simple Mail Transfer Protocol using UDP.

Lab 7,8 : Implementation of a subset of File Transfer Protocol using TCP/IP

Lab 9 : Implementation of “finger” utility using Remote Procedure Call (RPC)

Lab.10 : Generation and processing of HTML forms using CGI.

References

1. S Richard S.W., *Unix Network Programming*, Prentice Hall India
2. Comer D.E., *Internetworking with TCP/IP*, Vol. 1,2 & 3, Prentice Hall India
3. Campione et. Al M., *The Java Tutorial Continued*, Addison Wesley

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record 30%- Test/s 10%- Regularity in the class

University Examination Pattern *(Maximum Marks-100)* 70%-Algorithm, Program, Output 20%- Viva Voce 10%-Fair Record

IT14 708(P) : Project

Teaching scheme **Credits:4**
3 hours practical per week

Objectives

- *To judge the capacity of the students in converting the theoretical knowledge into practical systems/investigative analysis.*

Project work is for duration of two semesters and is expected to be completed in the eighth semester. Each student group consisting of not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project may be implemented using software, hardware, or a combination of both. The project work may be undertaken in computer science engineering or allied areas like –

OS platforms: relevant to the current state of the art with support for networked environment, distributed computing and development of multi-platform applications, Internet technologies: Architectural concepts, XML, Scripting languages, Middle-ware (Component) technologies, Front end / GUI: Code development or development based on tools, RDBMS/Back End: Relevant to current state with database connectivity to different platforms, Languages: Qt, Glade or any similar 4GLs, Scripting languages and C & C-Linux (under GNU gcc) etc,

Universal network applications development platforms such as JAVA, OS internals: Device
drivers, RPC, Threads, Socket programming etc., Networking: Mechanisms, protocols, security etc., Embedded systems: RTOS, Embedded hardware with software for an application,Code optimization, security etc.

Project evaluation committee consisting of the guide and three/four faculty members specialised in computer science & engg. Will perform the screening and evaluation of the projects.

Each project group should submit project synopsis within three weeks from start of seventh semester. Project evaluation committee shall study the feasibility of each project work before giving consent. Design is to be completed in the seventh semester.

Students should execute the project work using the facilities of the institute. However, external projects can be taken up in reputed industries, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work and there must be an internal guide for such projects.

Each student has to submit an interim report of the project at the end of the 7th semester. Members of the group will present the project details and progress of the project before the committee at the end of the 7th semester.

50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

Internal Continuous Assessment *(Maximum Marks-100)*

20% - Technical relevance of the project
20% - Literature survey and data collection
40% - Design of the project
10% - Report
10% - Regularity in the class

IT14 704 (A) : Advanced Topics in Database Systems

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart knowledge on the advancements in database management systems. This covers ideas on the latest methodologies such as object oriented, distrib-*

uted and deductive database systems along with comparisons and some case studies.

- *To enable the student to analyze, design and implement modern database systems, especially for a distributed environment*

Module I (11 hours)

Overview of relational database concept – object oriented database – overview of object oriented concepts – object definition language – object query languages – object database conceptional design – Object relational and extended relational systems.

Module II (13 hours)

Distributed database concepts – data fragmentation replication and allocation – types of distributed database system – query process – concurrency control for distributed database – overview of client – server architecture and its relationship to distributed database

Module III (13 hours)

Deductive database – introduction to deduction database prolog/datalog notation – interpretation of rules – basic inference mechanism for logic programs – datalog programs and their evaluation – deduction database systems – data Warehousing and data mining – database on World Wide Web – multimedia database – mobile database – geographic information system – digital libraries

Module IV (15 hours)

Oracle - basic structure of the oracle system – database structures and its manipulation in oracle – storage organization programming oracle applications – oracle tools – distributed databases in oracle

MySQL – features of SQL queries with MySQL

Text Books

1. Elmasri & Navathe, *Fundamentals of Database Systems*, Pearson Education, fourth edition.
2. MySQL Reference Manual (online version 5.1), Oracle Inc.

Reference Books

1. Ramakrishnan R. & Gehrke J., *Database Management Systems*, McGraw Hill
2. O'neil P. & O'neil E., *Database Principles, Programming, And Performance*, Harcourt Asia (Morgan Kaufman)
3. Silberschatz, Korth H.F. & Sudarshan S., *Database System Concepts*, Tata McGraw Hill
4. Theory T.J., *Database Modelling And Design*, Harcourt Asia (Morgan Kaufman)
5. G.K.Gupta – *Database Management Systems*, Tata McGraw Hill – New Delhi
6. Shiv Kumar Singh – *Database System*, Pearson 2013
7. Chhanda Ray – *Distributed Database Systems*, Pearson 2013
8. M.Tamer Ozsu, Patrick Valduriez – *Principles of Distributed Database Systems*, Second Edition, Pearson 2013

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 704 (B) : Digital Image Processing

(Common with CS14 704 B)

Teaching scheme

Credits: 4

(3 hours lecture and 1 hour tutorial per week)

Objectives

- *To impart the introductory concepts of image processing.*
- *To understand all the elements of image processing beginning from formation and digitization to enhancement, restoration, edge detection, segmentation, and compression .*

Module 1(15 Hours)

Introduction – digital image representation – fundamental steps in image processing – elements of digital image processing systems – digital image fundamentals – elements of visual perception – a simple image model – sampling and quantization – basic relationship between pixels – image geometry – image transforms – introduction to Fourier transform – discrete Fourier transform (DFT) – properties DFT- other separable image transforms – Walsh, Hadamard and Discrete Cosine transforms. Hotelling transform.

Module II(12 Hours)

Image enhancement – basic grey level transformation – histogram equalization – image subtraction – Image averaging – spatial filtering – smoothing, sharpening filters – Laplacian filters. Enhancement in the frequency domain – frequency domain filters – smoothing, sharpening filters – homomorphic filtering.

Module III (12 hours)

Image restoration – model of Image degradation/restoration process – noise models – inverse filtering – least mean square filtering – constrained least mean square filtering. Edge detection – thresholding – region based segmentation – Boundary representation.

Module IV (13 hours)

Image compression – fundamental concepts of image compression – compression models – information theoretic perspective. Lossless compression – Huffman coding – arithmetic coding – bit plane coding – run length coding. Lossy compression – transform coding – Image compression standards.

Text Book

R.C. Gonzalez and R.E. Woods, *Digital Image Processing - 2nd ed.*, Prentice Hall of India, New Delhi.

References

1. B. Chanda and D.D. Majumder, *Digital Image Processing and Analysis*, PHI
2. A.K. Jain, *Fundamentals of Digital Image Processing*, PHI
3. W.K. Pratt, *Digital Image Processing*, John Wiley, 2006
4. M. Sonka, V. Hlavac and R. Boyle, *Image Processing Analysis and Machine Vision*, Brooks/colic, Thompson Learning, 1999.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 704 (C) : Grid Computing

(Common with CS14 704 C)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To understand the genesis of grid computing and tool kits for facilitating grid computing*
- *To know the application of grid computing*

Module 1 (14)

Grid Computing Technology – An Overview: High Performance computing – cluster Computing – Peer-to-peer Computing – Internet Computing – Grid Computing – Grid Computing Models – Grid protocols – Types of Grids: Desktop Grids – Cluster Grids – HPC Grids – Data Grids. Early Grid Activities-Current Grid Activities-Business Value of Grid Computing: Grid Computing Business Value Analysis – Risk Analysis – Grid Marketplace. Grid Applications-Grid Infrastructure

Module 2 (12)

The Open Grid Services Architecture – Creating and Managing Grid Services,security- Desktop Supercomputing: Native Programming for Grids – Grid-Enabling Software – Applications. Grid-Enabling Network Services – Managing Grid Environments.

Module 3 (12)

The Open Grid Services Infrastructure- Technical details of OSGI specification, Introduction-Grid Services-A High-Level Introduction to OGSI – Introduction to Service Data Concepts – Grid Service: Naming and Change Management Recommendations – OGSA basic services

Module 4 (14)

Resource management and scheduling, Setting up Grid, deployment of Grid software and

tools, and application execution . Grids in Life Sciences – Grids in the Telecommunications Sector – Hive Computing for Transaction Processing Grids Case Studies: GLOBUS GT3 Toolkit: - Architecture, Programming model, High level services

Text Books

1. Ahmar Abbas, “Grid Computing: A Practical Guide to Technology and Application”, Charles River Media, 2005.
2. Joshy Joseph and Craig Fellenstein, “Grid Computing”, Pearson Education, 2003

Reference Books

1 Ian Foster and Carl Kesselman, “The Grid2: Blueprint for a New Computing Infrastructure”, Morgan Kaufman, 2004.
2. Fran Bermn, Geoffrey Fox, Anthony Hey J.G., "Grid Computing: Making the Global Infrastructure a Reality", Wiley, USA, 2003
3. Dan C Marinescu; Gabriel A Marinescu; Approaching Quantum Computing ;Pearson-2009

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

IT14 704 (D) : Graph Theory & Combinatorics

Teaching scheme **Credits: 4**
3 hours lectures and 1 hour Tutorial per week

Objectives

- *This course introduces the basics of graph theory as a 115odelling and analysis tool in computer science and engineering. It introduces the structures such as graphs and trees and several combinatorial techniques, which are needed in number theory based computing and network security studies in Computer Science.*

Module I (13 hours)
Introduction to graphs – definitions – subgraphs – paths and cycles – matrix representation of graphs – Euler tours – Chinese postman problem – planar graphs – Euler's formula – platonic bodies – applications of Kuratowski's theorem – Hamiltonian graphs – graph colouring and chromatic polynomials – map colouring

Module II (14 hours)
Trees – definitions and properties – rooted trees – trees and sorting – weighted trees and prefix codes – biconnected components and articulation points – the max-flow min-cut theorem – maximum bipartite matching – Matchings – matchings and augmenting paths –the personal assignment problem – Networks – flows and cuts – ford and Fulkerson algorithm – separating sets

Module III (11 hours)
Fundamental principles of counting – permutations and combinations – binomial theorem – combinations with repetition – combinatorial numbers – principle of inclusion and exclusion – derangements – arrangements with forbidden positions

Module IV (14 hours)
Generating functions – partitions of integers – the exponential generating function – the summation operator – recurrence relations – first order and second order – non-homogeneous recurrence relations – method of generating functions

Text Books
1. Grimaldi R.P, Discrete and Combinatorial Mathematics: An Applied Introduction, Addison Wesley.
Reference Books
1. Clark J. & Holton D.A, A First Look at Graph Theory, Allied Publishers (World Scientific).
2. Corman T.H., Leiserson C.E. & Rivest R.L, Introduction to Algorithms, Prentice Hall India
3. Mott J.L., Kandel A. & Baker T.P, Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India.
4. Liu C.L, Elements of Discrete Mathematics, McGraw Hill.
5. Rosen K.H, Discrete Mathematics And Its Applications, McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 704 (E): Software Quality Management

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *This course explains the role of standards and measurements used in accessing software quality.*
- *It helps students to learn how to test a system and find the system defects and inconsistencies.*

Module I (14 hours)

INTRODUCTION: Software Process assessment overview – Quality management – Quality assurance plan – Considerations – Verification and Validation – Concepts of Quality Control, Quality Assurance, Quality Management – Total Quality

Management; Cost of Quality; QC tools – 7 QC Tools and Modern Tools; Other related topics – Business Process Re-engineering – Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.

Module II (13 hours)

CONFIGURATION MANAGEMENT: The need for configuration Management – Software product nomenclature – Basic configuration management functions – Baselines – Responsibilities – Need for automated tools – Configuration management plan – SCM support functions – The requirement phase Design control – The implementation phase – Test phase – SCM for Tools – Configuration accounting and audit.

Module III (12 hours)

SOFTWARE STANDARDS AND INSPECTION: Definitions – The Reason for software standards – Benefits of standards – Establishing standards – Guidelines – Types of reviews – Inspection of objectives – Basic inspection principles – The conduct of inspection – Inspection training Models for Quality Assurance-ISO-9000 – Series, CMM, SPICE, Malcolm Baldrige Award – quality management models.

Module IV (13 hours)

TESTING AND MANAGING SOFTWARE QUALITY: Testing principles – Types of tests – Test planning – Test development – Test execution and reporting – Test tools and methods – Real Time testing – quality management paradigm – Quality motivation – Measurement criteria – Establishing a software quality program – Estimating software quality.

DEFECT PREVENTION: Principles of software defect prevention – Process changes for defect prevention – Defect prevention considerations – Managements role – Framework for software process change – Managing resistance to software process change – Case studies

Text Books

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments shall be a comparison study on how software quality and related topics varies in different standards organisations.

University Examination Pattern

IT14 705 (A) : Soft Computing

(Common with CS14 705 A)

Teaching scheme

Credits: 4

(3 hours lecture and 1 hour tutorial per week)

Objectives

- *To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.*
- *To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.*
- *To provide the mathematical background for carrying out the optimization associated with neural network learning.*
- *To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations .*
- *To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.*

Module I (13 hours)

Introduction to Genetic Algorithm, Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues – systems

Module II (13 hours)

Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Backpropagation, Associative Learning, Competitive Networks, Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Module III (13 hours)

Introduction to Fuzzy Sets, Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

Text Books

1. J.S.R.Jang, C.T.Sun and E.Mizutani, *Neuro-Fuzzy and Soft Computing*, Pearson Education, 2004.

References

1. M. Mitchell, *An Introduction to Genetic Algorithms*, Prentice-Hall, 1998.
2. D. E. Goldberg, *Genetic Algorithms in Search, Optimization, and Machine Learning*, Addison-Wesley, 1989.
3. S. V. Kartalopoulos, *Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications*, IEEE Press - PHI, 2004.
4. S. Rajasekaran & G. A. Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications*, PHI, 2003.

Advanced Topics: Support Vector Machines, Evolutionary computation (EC)-Evolutionary algorithms, Harmony search, Swarm intelligence

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 705 (B) : E-Commerce

(common with CS14 705 B)

Teaching scheme **Credits: 4**
3 hours lecture and 1 hour tutorial per week

Objectives

- *To learn the basic concepts of e commerce*
- *To introduces the techniques and methods of E-Commerce. .*

Module1(13hours)

Introduction to Electronic Commerce –Unique Features, Types of Ecommerce. E-commerce business models,B2C models,B2B models. Emerging Ecommerce areas. Technology infra structure- Internet & Web features. Building an E-commerce website-choosing server software-choosing hardware.

ModuleII(13hours)

Electronic Payment Systems – Types of Electronic Payment Systems – Digital Token Based Electronic Payment System – Smart Cards – Credit Cards – Risk in Electronic Payment Systems – Designing Electronic Payment Systems.

ModuleIII(13 hours)

Electronic Data Interchange – EDI Application in Business- EDI-Legal – Security and Privacy Issues – EDI standardization – EDI Envelope for Message Transport – Internet based EDI – Internal Information System- Work-flow Automation and Coordination- Supply Chain Management- Document Library- Types of Digital Documents- Corporate Data Warehouses.

ModuleIV(13 hours)

Security needs in needs in E commerce environment. E commerce marketing communications- Understanding the costs and benefits of online marketing communications. Ethical , Social & Political issues in E-commerce. Online content & media: Media convergence. Online content revenue models & business processes. Key challenges facing content producers & owners.

Text Books

1. Kenneth C. Laudon, Carol Guercio Traver, *E-Commerce-Business, Technology, Society,* Pearson Education.(Module I & IV)
2. Ravi Kalakota & Andrew B Whinston, *Frontiers of Electronic Commerce* , Pearson Education.(Module II & III)

References

1. Kamlesh K Bajaj & Debjani Nag, *E- Commerce The cutting edge of Business*, TMH
2. David Whiteley,*E-Commerce Strategy Technologies and Applications*, TMH.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 705 (C) : Machine Learning

Teaching scheme

Credits: 4

(3 hours lecture and 1 hour tutorial per week)

Objectives

- *To teach the fundamental concepts of Machine Learning,*
- *To equip the learners with techniques and methods using which machines mimic the human learning process.*

Module I (10 hours)

Preliminaries - Introduction - Learning Input-Output Functions - Learning and Bias - Sample applications - Boolean Functions - Representation - Classes of Boolean Functions - Introduction to Neural Networks

Module II (14 hours)

Using Version Spaces for Learning - Version Spaces and Mistake Bounds - Version Graphs - Learning as Search of a Version Space - The Candidate Elimination Method - Neural Networks - Threshold Logic Units - Linear Machines - Networks of TLUs - Training Feedforward Networks by Backpropogation - Synergies Between Neural Network and Knowledge-Based Methods - Statistical Learning - Using Statistical Decision Theory - Learning Belief Networks - Neighest-Neighbor Methods

Module III (14 hours)

Decision Trees - Definitions - Supervised Learning of Univariate Decision Trees - Networks Equivalent to Decision Trees - Overfitting and Evaluation - The Problem of Replicated Subtrees - The problem of Missing Attributes - Comparisions - Inductive Logic Programming - Notations and Definitions - A Generic ILP Algorithm - Inducing Recursive Programs - Choosing Literals to Add - Relationship Between ILP and Decision Tree Induction - Computational Learning Theory - Notation and Assumptions for PAC Learning Theory - PAC Learning - The Vapnik-Chervonenkis Dimension - VC Dimension and PAC Learning

Module IV (14 hours)

Unsupervised Learning - Clustering Methods - Hierarchical Clustering Methods - Temporal-Difference Learning - Temporal Patterns and Prediction Problems - Supervised and Temporal-Difference Methods - Incremental computation of the (delta w)i - An experiment with TD Methods - Theoretical Results - Intra-Sequence Weight Updating - Delayed-Reinforcement Learning - The General Problem - Temporal Discounting and Optimal Policies - Q-Learning - Discussion, Limitations, and Extensions of Q-Learning - Explanation-Based Learning - Deductive Learning - Domain Theories - Evaluable Predicates - More General Proofs - Utility of EBL - Applications

Text Books

1. Ethem Alpaydın, *Introduction to Machine Learning (Adaptive Computation and Machine Learning)*, MIT Press, 2004.

References

1. Mitchell. T, *Machine Learning*, McGraw Hill, 1997.
2. Christopher M. Bishop, *Pattern Recognition and Machine Learning*, Springer,

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note : One of the assignments could be to undertake explorative studies on mapping protests to artificial genetic modification.

University Examination Pattern

IT14 705 (D) Advanced Data Structures

(Common with CS14 705 D)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objective

- *To impart the advanced concepts of data structures*
- *To develop understanding about advanced searching and sorting techniques.*

Pre-requisite: IT14 403 Data Structures

Module I (12 Hours)

Review of Basic Concepts: Abstract data types –List ADT- Doubly Linked Lists – Circularly Linked List - Application of linked lists Debugging pointers - dangling pointers- memory leaks-Recursion-Algorithm Analysis-Big Oh, Small Oh, Omega and Theta notations- Solving recurrence equations- Masters Theorem.

Module II (13 Hours)

Trees-Binary Search Trees- Threaded binary trees -Splay trees - Amortized analysis - 2-3 trees- 2-3-4 trees- Red-black trees-B Tree- B+ Tree- Trie -AVL Trees- Randomized structures - Skip lists - Treaps – Hashing- Collision Resolution: Separate Chaining: Open Addressing- Linear Probing- Quadratic Probing- Double Hashing- Rehashing- Universal Hash Functions

Module III (14 Hours)

Graph Algorithms: DFS- BFS- Topological Sort- Bi-connected components- Cut vertices- Matching-Network flow- Advanced Structures for Priority Queues and Their Extensions- Binomial heaps- Leftist heaps -Skewed heaps- Fibonacci heaps and its amortized analysis - Applications to minimum spanning tree algorithms

Module IV (13 Hours)

External and internal sorting algorithms - Insertion Sort-Shell sort- Heap Sort- Merge Sort- Quick Sort- Radix Sort- Algorithm Analysis-Sorting Large Structures – Decision Trees- Memory Management -Managing Equal Sized Blocks – Garbage Collection Algorithms for Equal Sized Blocks – Storage Allocation for Objects with Mixed Sizes – Buddy Systems – Storage Compaction

Text Books

1. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C*, Pearson Education.

Reference Books

1. Robert L. Kruse, *Data Structures and Program Design*, PHI
2. Robert Kruse, C L Tondo, Bruce Leung, Shashi Mogalla , *Data Structures And Program Design In C*, Pearson Education
3. Debasis Samanta, *Classic Data Structures*, PHI
4. Yedidyah Lansam, Moshe J. Augenstein, Aaron M. Tenenbaum, *Data Structures Using C and C++*, PHI
5. Ellis Horowitz, Sartaj Sahni, *Fundamentals of Data Structures*, Cambridge University Press

Internal Continuous Assessment *(Maximum Marks-50)*
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz,
literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 705 (E) : Artificial Intelligence

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *AI is the study of how to make computers do things which, at the moment people do better.*
- *This course introduces AI problems and Search techniques, Knowledge Representations, Neural networks, LISP, Prolog and various approaches of AI problems solving.*
- *This leads the students to design their own systems of artificial Intelligence and expert systems.*

Module I (10 hours)

Introduction - definition and basic concepts - aims - approaches - Problems in AI - AI applications - perception and action - representing and implementing action functions- production systems - networks - search in state spaces - state space graphs - uninformed search – breadth first search - depth first search - heuristic search - using evaluation functions – general graph-searching algorithm - algorithm A* - admissibility of A* - the consistency condition - iterative deepening A* - heuristic functions and search efficiency

Module II (13 hours)

Knowledge representation - the propositional calculus - using constraints on feature values - the language - rules of inference - definition of proof - semantics - soundness and completeness - the PSAT problem - meta-theorems - associative and distributive laws - resolution in propositional calculus - soundness of resolution - converting arbitrary wffs to conjunctions of clauses - resolution refutations – horn clauses - the predicate calculus - motivation - the language and its syntax - semantics - quantification - semantics of quantifiers - resolution in predicate calculus - unification - converting arbitrary wffs to clause form - using resolution to prove theorems – answer

Module III (12 hours)

Neural networks - introduction - motivation - notation - the back propagation method - generalization and accuracy - communication and integration - interacting agents - a modal logic of knowledge - communication among agents – speech acts - understanding language strings - efficient communication - natural language processing

Module IV (12 hours)

Programming in LISP - basic LISP primitives - Predicates – conditionals and Binding - association lists - lambda expressions - macros - I/O in LISP- Introduction to Prolog- Representing facts-Recursive Search- Abstract Data types- Meta Predicates, Matching and Evaluation, Meta Interpreters- Semantic nets & frames in prolog

Text book

1. Nilsson N.J., *Artificial Intelligence - A New Synthesis*, Harcourt Asia Pte. Ltd.

Reference books

1. Luger G.F. & Stubblefield W.A., *Artificial Intelligence*, Addison Wesley
2. Elain Rich & Kevin Knight, *Artificial Intelligence*, Tata McGraw Hill
3. Tanimotto S.L., *The Elements of Artificial Intelligence*, Computer Science Press
4. Winston P.H., *LISP*, Addison Wesley
5. George F. Luger, *Artificial Intelligence – Structures and strategies for complex problem solving,* Pearson Education
6. Stuart Russell, Peter Norvig, *Artificial Intelligence – A modern approach,* Pearson Education

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz,
literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note : One assignment could be related to a coding example in LISP.

University Examination Pattern

IT14 801 : Computer Architecture and Parallel Processing

(Common with CS14 801)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach ideas on parallel computing based computer architectures with a quantitative approach.*
- *To impart concepts in new design paradigms to achieve parallelism, memory hierarchy design and inter-connection networks..*

Module I (13 hours)

Fundamentals - task of a computer designer - trends in technology usage and cost - performance measurement - quantitative principles of computer design - instruction set architectures - classification - addressing and operations - encoding an instruction set - role of compilers - case study - the DLX architecture - pipelining - pipeline for DLX - pipeline hazards - data and control hazards - implementation difficulties - pipelining with multicycle operations.

Module II (12 hours)

Instruction level parallelism - concepts and challenges - dynamic scheduling -dynamic hardware prediction - multiple issue of instructions - compiler and hardware support for ILP - vector processing - vector architecture – vector length and stride - compiler vectorization - enhancing vector performance

Module III (14 hours)

Memory hierarchy design - reducing cache misses and miss penalty, reducing hit time - main memory - virtual memory and its protection - case study - protection in the Intel Pentium - crosscutting issues - I/O systems - performance measures - reliability and availability - designing an I/O system - case study - performance of Unix file system.

Module IV (13 hours)

Interconnection networks - simple networks - connecting more than two computers - practical issues - multiprocessors - introduction – application domains -

centralised-shared memory and distributed-shared memory architectures - synchronisation - models of memory consistency

Text Books

1. Hennesy J.L. & Pattersen D.A., *Computer Architecture: A Quantitative approach*, Harcourt Asia Pte Ltd. (Morgan Kaufman).

Reference Books

1. C. Pattersen D.A. & Hennesy J.L., *Computer Organisation and Design: The Hardware/Software Interface*, Harcourt Asia Pvt. Ltd. (Morgan Kaufman)
2. Hwang K., *Advanced Computer Architecture: Parallelism, Scalability and Program-mability*, McGraw Hill
3. Kai Hwang & Faye A. *Briggs*, *Computer architecture and parallel processing,* McGraw-Hill Inc.
4. P.Pal Chaudhari, Computer Prganization & Design PHI
5. M.Morris Mano, Computer System Architecture- Pearson, Third Edition
6. Rob Williams: Computer System Architecture, Pearson 2013

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments could be related to mapping theoretical knowledge with most recent multi-core microprocessor environments.

University Examination Pattern

IT14 802 : Mobile Communication Systems

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *This course is an introduction to the field of mobile communications and focuses on the aspects of digital data transfer in wireless and mobile environments. The students require a basic understanding of communication and a rough knowledge of the Internet or networking in general.*

Module I (13 hours)

Principles of cellular networks, organisation, operation, hand off First Generation Analog ,Second generation TDMA,GSM architecture, GSM Signaling protocol Architecture, IS-95 channel structure, Forward Link transmission, Reverse Link transmission ,Second generation CDMA, Third generation systems, TMT-2000 terrestrial radio interfaces ,CDMA 2000 1 x EV-DO

Module II (14 hours)

Modulation techniques - Spread Spectrum: Concept, Frequency hopping, Direct Sequence, CDMA – DECT protocol architecture , WLL: IEEE 802.16 Architecture , MAC layer, Bluetooth technology: IEEE 802.15 Overview, protocol architecture Radio Specification, Baseband Specification, Link Manager Specification, Logical Link Control and Adaptation Protocol,L2 CAP formats ,Trellis coded modulation .

Module III (13 hours)

Mobile IP: Goals, Assumptions, requirements, IP packet delivery, Tunneling and encapsulation, Optimization, Reverse tunneling, IPv6, Dynamic host configuration protocol – Ad hoc networking: Routing, destination sequence distance vector, dynamic source routing, hierarchical routing, Alternative metrics – Mobile TCP: – WAP: Architecture, Protocol description. IEEE 802.16e and Mobile Wimax, IEEE 802.16m

Module IV (12 hours)

Android Application life cycle, Application class, overriding application life cycle events, Activity life cycles, stacks, states, activity life time, Layouts linear, relative, grid. Fragments, Intents. Creating and controlling Services. Binding services to Activities. Supported android sensors. creating map based activities. Application widgets, SMS and MMS in android application

Text Books

1. W. Stallings, *Wireless Communications and Networks*, *Second edition*, Prentice Hall, 2009
2. Reto Meier, *Professional Android 4 Application Developmen*t, Wrox publishers
3. 4G/LTEC LTE/ LTE-Advanced for mobile broadband

Reference Books

1. Schiller J., *Mobile Communications*, Addison Wesley

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments could be related to mapping of deployment of some of these technologies in contemporary equipment.

University Examination Pattern

I

IT14 803 : Natural Language Processing

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *The course is intended to impart the use of computers to process written and spoken language for the practical and useful purposes: to translate languages, to get information from the web on text data .The course also gives a sound idea on knowledge based systems.*

Module I (13 hours)

Introduction: Issues and difficulties in NLP – Evaluating Language understanding Systems – The different levels of language representations – Organization of NLP Systems – Types of NLP Systems.

Module II (13 hours)

Grammars and Parsing: Grammars and sentence structures – Top down parser – Bottom up chart parser – Top down chart parsing – Augmented grammars – A simple Grammar with features – Parsing with features – Augmented Transition Networks (ATN)– Efficient parsers – Shift reduce parsers – deterministic parsers.

Module III (13 hours)

Knowledge Based System: Introduction - Definition-Architecture – Knowledge Representation and Formal Logic: Knowledge components –Levels of representation –Knowledge representation schemes –formal logic – Knowledge engineering and Inference – Process – Semantic networks-frames – Scripts – Production systems.

Module IV (13 hours)

Problem Solving Strategies: Exhaustive search – Large search spaces – Planning – Least commitment – Principle and constraint propagation- Classification and black board Models.

Text Books

1. Ralston, D.W., *Principles of Artificial and Expert Systems Development*, McGraw Hill Book Company International
2. James Allen, *Natural Language Understanding*, Pearson Education Inc., 2003

Reference Book

1. A. Gonzalez and D. Dankel, *The Engineering of Knowledge-Based Systems Second Edition*, Prentice Hall, 2004.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments shall be on exploring features of existing free and open source utilities in the area.

University Examination Pattern

IT14 806 (P) : Seminar

Teaching scheme **Credits:** 2
3 hours presentation per week

Objectives

- *To assess the ability of the student to study and present a seminar on a topic of current relevance in computer science engineering or allied areas*

It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring to papers that are related to the topic and those which are published in reputed journals and conferences. Each student has to submit a seminar report, based on these papers without plagiarizing any parts. A committee consisting of three/four faculty members will evaluate the seminar.

Internal Continuous Assessment (Max. Marks : 100)

20% - Relevance of the topic and literature survey
50% - Presentation and discussion
20% - Report
10% - Regularity in the class and Participation in the seminar

IT14 807 (P) : Project

Teaching scheme **Credits:** 4
7 hours practical per week

Objectives

- *To estimate the ability of the student in transforming the theoretical knowledge studied so far into a working model of a computer / information system.*

This project work is the continuation of the project initiated in seventh semester. The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation committee through progress seminars and demonstrations conducted during the semester. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc.

There shall be at least an Interim Evaluation and a final evaluation of the project in the 8th semester. Each project group has to submit an interim report in the prescribed format for the interim evaluation.

Each project group should complete the project work in the 8th semester. Each student is expected to prepare a report in the prescribed format, based on the project work. Members of the group will present the relevance, design, implementation, and results of the project before the project evaluation committee comprising of the guide, and three/four faculty members specialized in computer science and engineering.

50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

Internal Continuous Assessment (Max. Marks : 100)

40% - Design and development/Simulation and analysis
30% - Presentation & demonstration of results
20% - Report
10% - Regularity in the class

IT14 808 (P) : Viva Voce

Credits: 4

Objectives

To examine the knowledge acquired by the student during the B.Tech. course, through an oral examination

The students shall prepare for the oral examination based on the theory and laboratory subjects studied in the B.Tech. Course, mini project, seminar, and project. There is only university examination for viva-voce. University will appoint two external examiners and an internal examiner for viva-voce. These examiners shall be senior faculty members having minimum five years teaching experience at engineering degree level. For final viva-voce, candidates should produce certified reports of mini project, seminar, and main project. If he/she has undergone industrial training/industrial visit/educational tour or presented a paper in any conference, the certified report/technical paper shall also be brought for the viva-voce.

Allotment of marks for viva-voce shall be as given below.

Assessment in Viva-voce (Max. Marks : 100)

50% - Subjects
25% - Project and Mini Project
15% - Seminar
10% - Industrial training/industrial visit/educational tour or Paper presented at National-level

IT14 804(A): Advanced Topics in Operating Systems

(Common with CS14 804 A)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach advanced concepts related to operating systems including various categories and the complex algorithms in their management functions.*

Module I (13 hours)

Introduction – Functions – Design approaches – Types of advanced operating systems – Synchronization mechanisms – concept of a process – threads – critical section problems – synchronization problems.

Module II (13 hours)

Architecture – Mutual exclusion – Deadlock detection – Resource management – File systems

Module III (13 hours)

Shared memory – Scheduling – Failure recovery – Fault tolerance.

Module IV (13 hours)

Multiprocessor system architecture – intercommunication networks – caching – hypercube architectures – structure of multiprocessor operating system – design issues – threads – process synchronization – processor scheduling – memory management – reliability – fault tolerance

Text Books

1. Mukesh Singal, *Advanced Topics in Operating Systems*, Tata McGraw Hill.

Reference Books

1. Nutt G.J, *Operating Systems – A Modern Perspective*, Pearson Education.
2. Schilberschatz & Galvin, *Operating System Concepts*, Wiley.
3. Tanenbaum A.S., *Modern Operating Systems*, PHI.
4. Pramod Chandra P Bhatt- An Introduction to Operating Systems, Concepts and Practice, PHI Learning, New Delhi 2012, Third Edition
5. Dhananjay M Dhamdhere- Operating Systems A Concepts Based Approach- Tata McGraw Hill Edition, New Delhi 2012, Third Edition
6. Harvey M Deitel, Paul J Deitel, David R Choffnes- Operating System Third Edition, Pearson 2013
7. Gary Nutt, Nabendu Chaki, Sarmistha Neogy- Operating Systems- Third Edition, Pearson 2013
8. William Stallings- Operating Systems- Sixth Edition, Pearson

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments could be on how any of these topics gets implemented in a free and open source operating system.

University Examination Pattern

IT14 804(B) : Information Retrieval

(Common with CS14 804 B)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To familiarize the students with tools and techniques for deriving the right information at the right time, in the current scenario of information explosion*
- *To present the techniques for storage of many forms of information, such as text, image, audio and video formats, and to present several issues related to different IR tasks.*

Module I (11 hours)

Introduction: Information versus Data Retrieval, IR: Past, present, and future. Basic concepts: The retrieval process, logical view of documents. Modeling: A Taxonomy of IR models, ad-hoc retrieval and filtering. Classic IR models: Set theoretic, algebraic, probabilistic IR models, models for browsing.

Module II (13 hours)

Retrieval evaluation: Performance evaluation of IR: Recall and Precision, other measures, Reference Collections, such as TREC, CACM, and ISI data sets. Query Languages: Keyword based queries, single word queries, context queries, Boolean Queries, Query protocols, query operations.

Module III (13 hours)

Text and Multimedia Languages and properties, Metadata, Text formats, Markup languages, Multimedia data formats, Text Operations. Indexing and searching: Inverted files, Suffix trees, Suffix arrays, signature files, sequential searching, Pattern matching.

Module IV (15 hours)

Multimedia IR: Spatial access methods, Generic multimedia Indexing approach, Distance functions, feature extraction, Image features and distance functions. Searching the Web: Characterizing and measuring the Web. Search Engines:

Centralized and Distributed architectures, user Interfaces, Ranking, Crawling the Web, Web directories, Dynamic search and Software Agents.

Text Book

1. R. Baeza-Yates and B. R. Neto, *Modern Information Retrieval*, Pearson Education, 2004.

Reference Books

1. C.J. van Rijsbergen, *Information Retrieval*, Butterworths, 1979.
2. R.R.Korfhage, Information Storage and Retrieval, Wiley Student Edn, 2006.
3. C.D. Manning and H. Schutze, *Foundations of Statistical natural Language Processing* (Chapters 13, 14, and 15 only), The MIT Press, Cambridge, London.2001.
4. D. Hand, H. Mannila, P. Smyth, *Data Mining*, Prentice Hall of India, 2004.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

IT14 804 (C) Distributed Systems

(Common with CS14 802)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart basic knowledge of the issues concerning distributed systems, from both software and hardware viewpoints.*

Module I (12 hours)

Introduction: Goals – Types of Distributed systems – Architecture styles – System Architecture. Architectures Versus Middleware – Self Management in distributed systems - Processes – Threads – Virtualization – Clients – Servers – Code Migration.

Module II (13 hours)

Communication: Fundamentals - Remote Procedure Call – Stream oriented communication – Message oriented communication – Multicast communication. Naming – Names, Identifiers, and addresses – Flat Naming - Structured Naming – Attribute based Naming.

Module III (13 hours)

Synchronization: Clock Synchronization – Logical clocks - Mutual Exclusion – Global positioning of nodes - Election Algorithms. Consistency and Replication: Introduction – Data centric consistency models – Client centric consistency models – Replica management – Consistency protocols.

Module IV (14 hours)

Fault Tolerance: Introduction – Process resilience – Reliable client server communication – Reliable group communication – Distributed commit - Recovery Distributed File Systems – Distributed web based systems – Distributed object based systems.

Text Book

1. Andrew S. Tanenbaum and Maarten Van Steen, “Distributed Systems – Principles and Paradigms”, Prentice- Hall of India, Pvt. Ltd, Second edition, 2008.

Reference Books

1. Pradeep K Sinha, “Distributed Operating Systems, Prentice-Hall of India, NewDelhi, 2001.
2. Jean Dollimore, Tim Kindberg, George Coulouris, “Distributed Systems -Concepts and Design”, Pearson Education, Fourth edition, 2005.
3. M.L. Liu, “Distributed Computing Principles and Applications”, Pearson Education, 2004.
4. Hagit Attiya & Jennifer Welch, *Distributed Computing*, Wiley India

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 804 (D): Management Information Systems

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To introduce the methods and the influence of the information systems in management milieu*
- *To enable the students to use MIS as an effective tool in management and decision making*

Module I (14 hours)

Information Systems-functions of management-levels of management-framework for information systems-systems approach-systems concepts-systems and their environment-effects of systems approach in information systems design-using systems approach in problem solving - strategic uses of information technology.

Module II (14 hours)

Computer Fundamentals, Telecommunication and Networks - Communication, Media, Modems & Channels - LAN, MAN & WAN - Network Topologies, Internet, Intranet and Extranet. Wireless technologies like Wi-Fi, Bluetooth and Wi-Max.

Module III (10 hours)

Kinds of Information Systems - Transaction Processing System (TPS) - Office Automation System (OAS) - Management Information System (MIS) - Decision Support System (DSS) and Group Decision Support System (GDSS) - Expert System (ES) - Executive Support System (EIS or ESS).

Module IV (14 hours)

Information systems planning - critical success factor - business system planning - ends/means analysis - organizing the information systems plan - system analysis and design - alternative application development approaches - organization of data processing - security and ethical issues of information systems.

Reference Books

1. Schultheis R. & Mary Summer, *Management Information Systems-The Manager's View*, Tata McGraw Hill.
2. Kenneth J Laudon, Jane P.Laudon, *Management Information Systems-Organization and Technology*, Pearson/PHI,10/e, 2007
3. W. S. Jawadekar, *Management Information Systems*, Tata McGraw Hill Edition, 3/e, 2004.
4. Alter S., *Information Systems:A Management Perspective*, Pearson Education.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 804(E) : High Speed Networks

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *This course covers all aspects of high-speed networking and their impact on the overall network performances*.

Module I (9 hours)

High speed lans: fast ethernet, switched fast ethernet –Fddi, sonet / sdh: frame structure, architecture layers, pay Loads – frame relay: protocols and services, congestion Control.

Module II (9 hours)

ISDN: Overview, Standards, Interfaces and functions, ISDN Layers: Physical, Data link, Network, - Services – BISDN Architecture and Protocols.

Module III (11 hours)

ATM Networks: Protocol Architecture, ATM Layer, Cell Structure, Cell header, ATM Adaptation Layer, Various types, Segmentation and Reassembly, Convergence sub-layers ATM Traffic and Congestion Control: Service categories, Traffic related attributes, Traffic management framework, Traffic management, ABR traffic management, Signaling, Protocol signaling, Meta signaling, TCP/IP over ATM.

Module IV (10 hours)

Optical Networks: Wavelength Division Multiplexing, Optical Networking evolution, Network Architectures, Enabling Technologies, Various issues in Wavelength Routed Networks, Optical Circuit switching, IP over ATM over SONET over WDM, IP over SONET over WDM, IP over WDM – Various Models.

Text Books

1. William Stallings, *ISDN and broadband ISDN with Frame Relay and AT'*, Fourth edition, Pearson Education 2000
1. Rainer Handel, Manfred N. Huber, and Stefan Schroder, *ATM Networks –Concepts*, *Protocols*, *Applications*, Second edtion, Addison Wesley, 1994

Reference Books

1. C.Siva Ram Murthy and G. Mohan, *WDM optical Networks – Concepts*,*Design*,*and Algorithms*, Printice Hall India, 2002

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Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note: One of the assignments could be to explore which companies are manufacturing or deploying ISDN or ATM technologies.

University Examination Pattern

IT14 805 (A) : Industrial Psychology

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *The course is expected to expose to the students various techniques in analyzing and improving relationships that are expected by people employed all industries while conducting within an organization. It looks at various psychological issues and attempts to solve them.*

Module I I (13 hours)

Introduction – psychology as a science – areas of applications – steady of individual – individual differences – steady of behavior – stimulus – response behavior – heredity and environment – human mind – cognition – character – thinking – attention – memory - emotion – traits – attitude – personality.

Module II (13 hours)

Organizational behavior – definition – development – fundamental concepts – nature of people – nature of organization – an organizational behavior system – models – autocratic model – hybrid model – understanding a social – system social

culture – managing communication – downward, upward and other forms of communications.

Module III (13 hours)

Motivation – motivation driver – human needs – behavior modification – goal setting – expectancy model – comparison models – interpreting motivational models – leadership – path goal model – style – contingency approach

Module IV (13 hours)

Special topic in industrial psychology – managing group in organization – group and inter group dynamic – managing change and organizational development – nature planned change – resistance – characteristic of OD-OD processes.

Reference Books

1. Davis K & Newstrom J W, *Human Behavior At Work*, McGraw Hill International.
2. Schermerhorn J.R Jr., Hunt J.G & Osborn R.N, *Managing Organizational Behavior*, John Willy.
3. Luthans, *Organizational behavior*, McGraw Hill International.
4. Morgan C.T, King R.A, Rweisz J & Schoples J, *Introduction to Psychology*, McGraw Hill.
5. Blum M.L & Naylor J.C, *Industrial Psychology*, CBS Publisher, Horper & Row

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

IT14 805 (B) Optical Communication Network

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *. The course aims to provide the students in the fundamentals of present optical communication systems and Discusses both theoretical and applied issues of fiber optics operations.*
- *By the end of this course, students will be able to analyze and design optical networks by studying the optical network elements needed for the implementation of all optical network nodes*

Module (14 hours)

Introduction, First generation and second generation optical networks, Optical Layer, All- Optical Networks, Transmission Basics, Fibers and Amplifiers. Wavelength Division Multiplexing (WDM) Network Elements: Optical Line Terminals, Optical Line Amplifiers, Optical Add/drop Multiplexers. Optical Cross Connects - Enabling Technologies - WDM Optical Network Architectures: Broadcast and Select Networks, Wavelength Routed Networks – MAC protocols for Broadcast and select networks.

Module II (14 hours)

Wavelength routing algorithms: Classification, RWA algorithms, Fairness and Admission control, Distributed Protocols – Wavelength Convertible Networks: Need and Structure, Routing in Convertible Networks – Rerouting Algorithms: Benefits, Issues, Light path Migration, Rerouting Schemes, AG and MWPG methods.
Virtual Topology Design: Sub-problems, Problem formulation, Design Heuristics, Regular Topology Design, Graph coloring – Virtual topology reconfiguration: Need, Reconfiguration due to traffic changes.

Module III (12 hours)

Control and Management: Network Management Functions, Optical Layer Services, Layers, Fault Management, Configuration Management, Connection Management –

Network Survivability: Basic concepts, Protection in SONET and IP Networks, Optical Layer Protection Schemes, Multiplexing Techniques, Provisioning.

Module IV (12 hours)

Optical Internets: Optical Circuit Switching, Burst Switching, Packet Switching, Access Networks: FTTC, Optical Multicast Routing: Node Architecture, Source based and Steiner Tree based Multicast tree generation.

Text Books

1. Rajiv Ramaswami and Kumar N. Sivarajan, *Networks – A Practical Perspective*, Morgan Kauffmann Publishers, 2002.
2. C. Siva Ram Murthy and G. Mohan, *WDM Optical Networks – Concepts, Design, and Algorithms*, Printice Hall India, 2002.

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

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Note : One assignment could be pertaining to exploration of a real life example involving optical communication network.

University Examination Pattern

IT14 805 (C) : Neural Networks and Fuzzy Logic

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *This course is intended to introduce some of the methods and techniques by means of which it is possible to incorporate human like performance in machine. At the end of this course students will be able to design and develop such systems using neural networks and fuzzy logic.*

Module (13 hours)

Introduction to artificial neural networks - biological neurons - Mc Culloch and Pitts modals of neuron - types of activation function - network architectures - knowledge representation - learning process - error-correction learning - supervised learning - unsupervised learning - single unit mappings and the perceptron - perceptron convergence theorem (with out proof) - method of steepest descent - least mean square algorithms - adaline/medaline units - multilayer perceptrons - derivation of the back-propagation algorithm

Module – II (13 hours)

Radial basis and recurrent neural networks - RBF network structure - covers theorem and the separability of patterns - RBF learning strategies - K-means and LMS algorithms - comparison of RBF and MLP networks - recurrent networks - Hopfield networks - energy function - spurious states - error performance - simulated annealing - the Boltzman machine - Boltzman learning rule - the mean field theory machine - MFT learning algorithm - applications of neural network - the XOR problem - traveling salesman problem - image compression using MLPs - character retrieval using Hopfield networks

Module – III (13 hours)

Fuzzy logic - fuzzy sets - properties - operations on fuzzy sets - fuzzy relations - operations on fuzzy relations - the extension principle - fuzzy measures - membership functions - fuzzification and defuzzification methods - fuzzy controllers - Mamdani and Sugeno types - design parameters - choice of membership functions - fuzzification and defuzzification methods – applications

Module – IV (13 hours)

Introduction to genetic algorithm and hybrid systems - genetic algorithms - natural evolution - properties - classification - GA features - coding - selection - reproduction - cross over and mutation operators basic GA and structure

Introduction to Hybrid systems - concept of neuro-fuzzy and neuro-genetic systems

University Examination Pattern

Text books

1. Simon Haykins, *Neural Network A - Comprehensive Foundation*, Macmillan College, Proc, Con, Inc
2. Zurada J.M, *Introduction to Artificial Neural Systems*, Jaico publishers.

Reference Books

1. Driankov D., Hellendoorn H. & Reinfrank M, *An Introduction to Fuzzy Control*, Narosa
2. Ross T.J, *Fuzzy Logic with Engineering Applications*, McGraw Hill.
3. Bart Kosko, *Neural Network and Fuzzy Systems*, Prentice Hall, Inc., Englewood Cliffs
4. Goldberg D.E, *Genetic Algorithms in Search Optimisation and Machine Learning*, Addison

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

IT14 805(D) : Web Programming

(Common with CS14 805 D)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach the various technologies available for programming the web applications.*

Module I (13 hours)

Introduction to Web programming – Introduction to SGML features – HTML, XHTML, DHTML, XML – HTML Vs XML – Creating XML documents – Parsing an XML document – Writing well formed documents – Organizing elements with namespaces – Defining elements in a DTD – Declaring elements and attributes in a DTD.

Module II (13 hours)

CGI/Perl: Creating link to a CGI Script – Using a link to send data to a CGI Script – parsing data sent to a Perl CGI script – Using CGI script to process form data – Using scalar variables in Perl – Using variables in Perl – Using arithmetic operators in Perl – Associating a form with a script.

Module III (13 hours)

Event driven programming using Java applets – Java Server Pages – JSP scripting elements – Linking to external files – JSP declarations – JSP Expressions – JSP Scriplets – Processing client requests – Java Beans : features – designing Java Beans – Properties of beans – creation of events – EJB basics – types of beans – development of session beans – steps in creation and implementing interfaces – Accessing a database from JSP.

Module IV (13 hours)

PHP : Defining PHP variables – variable types – operators – control flow constructs in PHP – Establishing connection with MySQL database – managing system data – parsing data between pages – Introduction to AJAX programming.

Text Books

1. Robert W. Sebesta, *Programming with World Wide Web*, 4th edition, Pearson Education, 2009.

Reference Books

1. Xue Bal et. al, *The Web Warrior Guide to Web programming*, Thomson Learning.
2. Chris Bates, *Web Programming : Building Internet Applications, 3rd ed*, Wiley Academic Catalog.
3. H.M. Deitel, P.J. Deitel, A.B. Goldberg, *Internet and World Wide Web : How to Program, 3rd edition*, Pearson Education.
4. Kalata, *Internet Programming with VBScript and JavaScript*, Thomson Learning.
5. Joseph L Weber, *Using JAVA 2 Platform – Special Edition*, Prentice Hall India.
6. Larne Pekowsky, *Java Server Pages*, Pearson Asia.
7. Barry Burd, *JSP*, IDG Books India.
8. Ed Roman, *Mastering Enterprise Java Beans and the Java 2 platform Enterprise Edition*, Wiley Computer Publishing.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A

IT14 805(E) : Network Administration and Management

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *At the end of the course, the student will understand major functional areas of network management, remote network monitoring, web page management, security network monitoring and control.*
- *The various topics in this course material covers the extend breadth and depth of a complete network management plan for a moderate to large network enterprise*

Module (13 hours)

Network Management goals, organization, and functions- Network monitoring-Network control-Network management tools-network statistics measurement systems-Network management systems-Commercial network management systems-System management- Enterprise management solutions.

Module II (13 hours)

SNMPv1 Network management organization and communication function models structure of SNMP management information-stanadards-SNMPv2 system architecture protocol- protocol specification-SNMPv3 architecture.

Module III (13 hours)

Remote network monitoring concepts-Group management-RMON alarms-practical issues-ARM network management-Telecommunication network management-TMN conceptual model-architecture-Network management applications.

Module IV (13 hours)

Administering windows NT systems- startup-shutdown and server configuration-user accounts-managing process-risk and file system-backups-Network configuration-Print services-Security-

Linux Administration- Routing-Network hardware-Domains Name Systems-Sharing system files-E-mail-Network management and debugging-Security

Text Books

1. Evi Nemeth, *Linux Administration Handbook*, Prentice Hall 2002
2. Aelean Frisch, *Essential Windows NT system Administration* first edition,Jan 1998, O'Reilley & Associates Inc
3. Mani Subramanian, *Network Management, Principles and Practice,* Addison Wesley, 2000.

Reference Books

1. William Stallings, *Network Security essentials, Applications and Standards* Pearson Education Asia,2001
2. Ulyess Black, *Network management standards*, McGraw Hill 1995
3. William Stallings, *SNMP, SNMP v2, SNMP v3 and RMON1*", 2 and 3rd Edition, Pearson Education Asia 1999.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
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