UNIVERSITY OF CALICUT

SCHEME OF STUDIES, EXAMINATION AND DETAILED SYLLABUS

BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE AND ENGINEERING

FOR 2014 ADMISSION ONWARDS

2014 Scheme for B. Tech. Computer Science and Engineering (CS) Branch for 3rd to 8th Semesters

SCHEME OF III SEMESTER B.Tech COURSE

Code	Subject	Hours/ Week			Marks		Duration of End Semester Examination	Credits
		L	T	P/D	Internal	End Semester		
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
CS14 303	Computer Organization & Design	3	1	0	50	100	3	4
CS14 304	Discrete Computational Structures	3	1	0	50	100	3	4
CS14 305	Electronic Circuits	3	1	0	50	100	3	4
CS14 306	Switching Theory & Logic Design	3	1	0	50	100	3	4
CS14 307 (P)	*Programming Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
CS14 308 (P)	*Electronics Circuits 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 examination	Credits
		L	T	P/D	Internal	End Semester		
EN14 401B	Engineering Mathematics IV	3	1	0	50	100	3	4
EN14 402	Environment Science	3	1	0	50	100	3	4
CS14 403	Data Structures and Algorithms	3	1	0	50	100	3	4
CS14 404	Object Oriented Programming in Java	3	1	0	50	100	3	4
CS14 405	Systems Programming	3	1	0	50	100	3	4
CS14 406	Microprocessor Based Design	3	1	0	50	100	3	4
CS14 407 (P)	*Data Structures Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
CS14 408 (P)	*Digital Systems 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		
CS14 501	Engineering Economics and Principles of Management	3	1	0	50	100	3	4
CS14 502	Software Engineering	3	1	0	50	100	3	4
CS14 503	Operating Systems	3	1	0	50	100	3	4
CS14 504	Database Management Systems	3	1	0	50	100	3	4
CS14 505	Digital Data Communication	3	1	0	50	100	3	4
CS14 506	Theory of Computation	3	1	0	50	100	3	4
CS14 507 (P)	*Object Oriented Programming Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
CS14 508 (P)	*Hardware 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 examination	Credits
		L	T	P/D	Internal	End Semester		
CS14 601	Embedded System	3	1	0	50	100	3	4
CS14 602	Computer Graphics & Multimedia	3	1	0	50	100	3	4
CS14 603	Compiler Design	3	1	0	50	100	3	4
CS14 604	Computer Networks	3	1	0	50	100	3	4
CS14 605	Graph Theory and Combinatorics	3	1	0	50	100	3	4
CS14 606	Management Information Systems	3	1	0	50	100	3	4
CS14 607 (P)	*Systems Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
CS14 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 examination	Credits
		L	T	P/D	Internal	End Semester		
CS14 701	Design & Analysis of Algorithm	3	1	0	50	100	3	4
CS14 702	Cryptography & Network Security	3	1	0	50	100	3	4
CS14 703	Artificial Intelligence	3	1	0	50	100	3	4
CS14 704	Elective I	3	1	0	50	100	3	4
CS14 705	Elective II	3	1	0	50	100	3	4
CS14 706 (P)	*Compiler Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
CS14 707 (P)	*Network Programming Lab*	*0*	*0*	*3*	*50*	*100*	*3*	*2*
CS14 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 examination	Credits
		L	T	P/D	Internal	End Semester		
CS14 801	Computer Architecture & Parallel Processing	3	1	0	50	100	3	4
CS14 802	Distributed Systems	3	1	0	50	100	3	4
CS14 803	Data Mining and Warehousing	3	1	0	50	100	3	4
CS14 804	Elective III	3	1	0	50	100	3	4
CS14 805	Elective IV	3	1	0	50	100	3	4
CS14 806 (P)	*Seminar*	*0*	*0*	*3*	*100*	-	-	*2*
CS14 807 (P)	*Project*	*0*	*0*	*7*	*150*	-	-	*4*
CS14 808 (P)	*Viva Voce*	*0*	*0*	*0*	-	*100*	*3*	*4*
	TOTAL	**15**	**5**	**10**	**500**	**600**	**18**	**30**

Total Credits =210

CS14 704 Elective I

CS14 704 (A)	Object Oriented Modeling and Design
CS14 704 (B)	Digital Image Processing
CS14 704 (C)	Grid Computing
CS14 704 (D)	Queuing Theory
CS14 704 (E)	**Simulation and Modelling (Global)**

CS14 705-Elective II

CS14 705(A)	Soft Computing
CS14 705(B)	E-Commerce
CS14 705(C)	Software Architecture and Project Management
CS14 705(D)	Advanced Data Structures
CS14 705 (E)	**Computer Based Numerical Methods (Global)**

CS14 804-Elective III

CS14 804 (A)	Advanced Topics in Operating Systems
CS14 804 (B)	Information Retrieval
CS14 804 (C)	Cyber Security
CS14 804 (D)	Mobile Computing
CS14 804 (E)	**Speech and Language Processing (Global)**

CS14 805-Elective IV

CS14 805 (A)	Advanced Database Design
CS14 805 (B)	Cloud Computing
CS14 805 (C)	Machine Learning
CS14 805 (D)	Web Programming
CS14 805 (E)	**Pattern Recognition (Global)**

EN14 301: ENGINEERING MATHEMATICS III

(Common for all branches)

Teaching scheme **Credits**: 4

3 hours lectures 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 wealth 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 (13 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 (13 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 Mathematics*, 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

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 (13 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 (13 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 (14 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 (12 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% - Fair Record

10% - Regularity in the class

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 303: Computer Organization and Design

(Common with IT14 303)

Teaching scheme **Credits**: 4

3 hours lectures 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 Wesely

2. Hamacher, Vranesic & Zaky, Computer Organization, 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% - Attendance and Regularity in the class

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 304 : Discrete Computational Structures

(Common with IT14 304)

Teaching scheme **Credits**: 4

3 hours lectures 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% - Attendance and Regularity in the class

University Examination Pattern

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 305 : Electronic Circuits

(Common with IT14 305)

Teaching scheme **Credits**: 4

3 hours lectures and 1 hour Tutorial per week

Objectives

1. *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 hysterisis - 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 306 Switching Theory and Logic Design

(Common with IT14 306)

Teaching scheme **Credits**: 4

3 hours lectures and 1 hour Tutorial per week

Objectives

1. *To introduce the principles, features and properties of digital devices and circuits.*
2. *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

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

Reference 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

University Examination Pattern

PART A: Analytical/problem solving SHORT questions 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions 4 x 15 marks=60 marks

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

Maximum Total Marks: 100

CS14 307(P) : Programming Lab

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

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

CS14 308(P) : Electronics Circuits Lab

Objectives

- *To give a hands on experience to students in the static and dynamic characteristics of the electronics components and systems.*

1. Silicon, germanium and zener diode characteristics
2. Characteristics of UJT and UJT relaxation oscillator
3. Static transistor characteristics in CE and CB configurations
4. Clipping, clamping, differentiating and integrating circuits
5. Series voltage regulator
6. Frequency response of CE amplifier with and without feedback
7. Emitter follower: measurement of input and output impedance
8. RC phase shift oscillator
9. Op amp: inverting and non-inverting amplifier, voltage follower
10. Op amp: differential amplifier.

Reference Books

1. Millman & Halkias, *Integrated Electronics*, Tata McGraw Hill.

2. Bhargava etal., Basic *Electronic Circuits and Linear Circuits*, Tata McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record

30%- Test/s

10%- Regularity in the class

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University Examination Pattern *(Maximum Marks-100)*

70% - Procedure, conducting experiment, results, tabulation, and inference

20% - Viva voce

10% - Fair record

EN14 401B: Engineering Mathematics IV

(Common for IC, EC, EE, AI, BM, CS, and IT)

Teaching scheme **Credits**: 4

3 hours lectures 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 (13 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 (13 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

PART A:	*Analytical/problem solving 8x 5 marks=40 marks* *SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.
PART B:	*Analytical/Problem solving 4 x 15 marks=60 marks* *DESCRIPTIVE questions* Two questions from each module with choice to answer one question.

Maximum Total Marks: 100

EN14 402 ENVIRONMENT 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 (13 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 (13 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 (13 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 (13 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,field work 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

PART A: Analytical/problem solving SHORT questions 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions 4 x 15 marks=60 marks

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

Maximum Total Marks: 100

CS14 403 : Data Structures and Algorithms

(Common with IT14 403)

Teaching scheme **Credits:** 4

3hours 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 Horowitz, Sartaj Sahni, Susan Anderson-Freed, Fundamentals of *Data Structure in C,* University Press
2. Cormen T.H, Leiserson C.E & Rivest R.L, *Introduction to Algorithms., PHI Learning*

Reference Books

1. Aho A.V, Hopcroft J.E. & Ullman J.D, *Data Structures and Algorithms*, Pearson Education
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% - Attendance and Regularity in the class

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 404 : Object Oriented Programming In Java

(Common with IT14 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% - Attendance and Regularity in the class

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 405: Systems Programming

(Common with IT14 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 - multi-programming - timesharing systems and real-time systems - parallel and distrib-uted 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. 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.
1. Timothy Budd, “Understanding Object-oriented programming with Java”, Pearson Education.
2. Doug Lea, Concurrent programming in Java Design Principles and Patterns, Pearson Education.
3. George Reese, " Database programming, with JDBC and Java", O'Reilly.
4. Bruce Eckel,”Thinking in java”, Pearson- 4th Edition.
5. Mahesh P. Matha-Core Java, A Comprehensive Study, PHI Learning-2011.
6. Dr.G.T.Thampi,Object Oriented Programming in Java,Dream-tech press
7. Hari Mohan Pandey, *Java Programming,* Pearson Education
8. 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,field work etc.

10% - Attendance and Regularity in the class

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 406: Microprocessor Based Design

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 8086 **-** Internal Block Diagram, The Execution Unit - Register Organization, Bus Interface Unit- Memory segmentation, Addressing Modes, Hardware Specification-Pin Configuration, Signal descriptions of 8086—Common function signals, Minimum and Maximum Mode - Signals, Hardware Features of 80386, Memory Management- Features 80486-Enhanced, Pentium processor.

Module II (12 hours)

Programming model-The Assembly Process, Assemblers for x86 , Memory Models**-** Approaches to Programming, Data Transfer Instructions , Branch Instructions, Arithmetic Instructions, Logical Instructions, Shift and Rotate Instructions, String Instructions , Procedures ,Macros, Input / Output Programming, I/O Instructions, Modular Programming .

Module III (14 hours)

The Hardware Structure of 8086 **-**, Clock, , Instruction Cycle. Memory and I/O Decoding **-**Memory Device Pins, Memory Address Decoding, I/O Address Decoding .The Interrupt Structure of 8086 **-**Dedicated Interrupt , Software Interrupts ,Hardware Interrupts, Priority of Interrupts **,**Dos 21 H and BIOS 10H Functions , Keyboard Interfacing.

Module IV (15 hours)

Peripheral Interfacing **-**Programmable Peripheral Interface (PPI)-8255A, Modes of Operation, Centronics Printer Interface ,Interfacing an Analog-to-Digital Converter, Interfacing to a Digital-to-Analog Converter. Interfacing a Stepper Motor to the 8086 , Hex Keyboard Interfacing ,The Programmable Interval Timer 8253/8254 ,The

Programmable Keyboard Display Interface – 8279 ,The Programmable Interrupt Controller (PIC) 8259 , Direct Memory Access -The DMA Controller – 8237.

Text Books

1. Brey B.B., *The Intel Microprocessors 8086 to Pentium: Architecture, Programming and Interface*, Pearson-2013.

2. Lyla B Das.,The X86 Microprocessors Architecture, Programming and Interfacing (8086 to Pentium), Pearson-2010

Reference Books

1. Hall D.V., *Microprocessors & Interfacing: Programming & Hardware*, Tata McGraw Hill.

2. A.K Ray,K M Bhurchandi .,Advanced Microprocessors and Peripherals , Tata McGraw Hill.

3. Krishna Kant, Microprocessors And Microcontrollers- PHI Learning-NewDelhi-2012.

4. Walter A Triebel, Avatar Singh- The 8086 and 8088 Microprocessors- 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,field work etc.

10% - Attendance and Regularity in the class

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 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

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

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

CS14 408(P) : Digital Systems Lab

Teaching scheme **Credits:** 2

3 hours practical per week

Objectives

- *To give a hands on experience on digital electronics components and systems; which are*

  fundamental building blocks of the Computer systems.

- *To deal extensively with the characteristic and features of indispensable digital electronic circuits*

  and systems through structured experiments.

1. Verification of truth tables of AND, OR, NOT, NAND, NOR and XOR gates, used for gating

digital signals.

2. TTL characteristics

3. Verification of the postulates of Boolean algebra and DeMorgan's theorem using logic gates.

4. Half and full adders, half and full subtractors.

5. Digital comparator, parity gererator and checker, and code converter

6. Characteristics and operations of RS, gated RS, D, T, and JK master slave flipflops

7. Multiplexer and demultiplexer using gates

8. Shift register, ring counter, and twisted ring counter.

9. Decade counter and variable modulo asynchronous counter

10. Astable multivibrator and schmitt trigger using gates, astable and monostable

rnultivibrator and frequency divider using 555.

Reference Books

1. C Nagarath J., *Electronics Analog & Digital*, Prentice Hall India

2. Millman & Halkias, *Integrated Electronics*, Tata McGraw Hill.

Internal Continuous Assessment *(Maximum Marks-50)*
60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

Un iversity Examination Pattern *(Maximum Marks-100)*
70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

CS14 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 (13 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

PART A: Analytical/problem solving SHORT questions 4x 5 marks=20 marks

Candidates have to answer FOUR questions out of FIVE. There shall be minimum of TWO and maximum of THREE questions from each module with total FIVE questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions 2 x 15 marks=30 marks

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

Maximum Total Marks: 50

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 (13 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

PART A: Analytical/problem solving SHORT questions *4x 5 marks=20 marks*

Candidates have to answer FOUR questions out of FIVE. There shall be minimum of TWO and maximum of THREE questions from each module with total FIVE questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *2 x 15 marks=30 marks*

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

Maximum Total Marks: 50

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

CS14 502 :Software Engineering

(Common with IT14 502)

Teaching scheme
Credits:4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To introduce the software engineering techniques and background information to the students of computing science stream.*
- *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- feasibility study- Requirements gathering and analysis- SRS- formal specification methods.

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 – Object oriented design- Design Verification.

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- Overview of SQA- Software Configuration Management- Quality Standards.

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- CASE Tools- Risk f

Text Books

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

References

1. Carlo Ghezzi, *Fundamentals of Software Engineering,*PHI
2. Ian Sommerville, *Software Engineering,*Pearson Education
3. 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

CS14 503 : Operating Systems

(Common with IT14 503)

Teaching scheme **Credits:4**

3hours 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

1. 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

University Examination Pattern

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 504: Database Management Systems

(Common with IT14 504)

Teaching scheme **Credits**: 4

3 hours lectures 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 (13 hours)

Relational model concepts – Relational model constraints and Relational Database Schema- 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.

Reference Books

1. Ramakrishnan R. & Gehrke J., *Database Management Systems*, Tata McGraw Hill
2. Silberschatz A., Korth H.F., & Sudarshan S., *Database System Concepts*, Tata McGraw Hill
3. Ullman J.D., *Principles of Database Systems*, Galgotia Publications

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:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 505: Digital Data Communication

Teaching scheme **Credits**: 4

3 hours lectures and 1 hour Tutorial per week

Objectives

1. *To introduce the basic concepts of communication of digital data by looking at the various aspects of generation, transmission and reception.*
2. *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.

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:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 506: Theory Of Computation

(Common with IT14 506)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

1. *To teach the fundamentals on computational models and computability.*
2. *To introduce the introductory concepts of languages and their classification*
3. *To familiarize the students on recognizers and automata.*
4. *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

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

Principles and Practice, Morgan Kaufmann Publishers.

Reference Books

1. 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

PART A: *Analytical/problem solving SHORT questions* *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: *Analytical/Problem solving DESCRIPTIVE questions* *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 507(P) : Object Oriented Programming Lab

Objectives

- *To impart the working experience on object oriented concept of programming*
- *To teach the student to write programs in popular object oriented programming languages (C++/Java)*

Lab1: Familiarization with classes, objects and constructors- Implementation of Stack/Queue

Lab 2: Implementation of abstract data type -Binary tree

Lab 3: Concept of abstract class and Inheritance-Define an abstract class “shape” and derive classes for rectangle, square, ellipse, circle with proper class hierarchy.

Lab 4: Polymorphism - Define base class for vectors and use inheritance to define complex and real vector with standard operations and use base class object to display different type objects.

Lab 5:Concurrent programming using Threads - program for the readers and writers problem

Lab 6: Applets: W rite a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result

Lab 7: GUI programming : Define Point class and an Arc class. Define a Graph class which represents graph as a collection of Point objects and Arc objects. Write a method to find a minimum cost spanning tree in a graph and display it.

Lab 8 : Random Access Files : Create student database . Design a GUI with provision for insertion Deletion and search of a record and create reports.

Lab 9 : Java Packages : Define a Scanner package to read different data types and use the Scanner to compute the average of a list of comma separated values.

Lab 10 : Java Collections : Use Java collection frame work to perform set operations.

Reference Books

1. Sethi R., *Programming Languages: Concepts and Constructs*, Pearson Education India.

2. E Balagurusamy*, Programming with Java, a Primer,* Fourth Edition, Tata McGraw Hill, 2011

3. T.V. Suresh Kumar, B.Eswara Reddy, P.Raghavan, *Programming with Java*, Pearson Education

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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

CS14 508(P): HARDWARE LAB

Objectives

- *To teach the relevance and characteristics of hardware 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 2,3: Assembly language program for implementing arithmetic and string operations

Lab 4: Assembly Language programs for display /video manipulation

Lab 5 : Implementation of a file manager using DOS/BIOS interrupts

Lab 6: TSR (Terminate and Stay Resident) Programming

Lab 7 : Stepper Motor interface

Lab 8, 9: Parallel Interface: Printer and Hex keyboard

Lab 10: LED Matrix Board Display

Reference Books

1. P. Messmer, *The Indispensable PC Hardware Book, 3/e*, Addison Wesley, 1997

2. Douglas V. Hall, *Microprocessors and Interfacing, 2/e*, Tata McGraw Hill, 1988

3. Ytha Yu and Charles Marut , *Assembly Language Programming and Organization of IBM PC, International Edition*, McGraw Hill Inc.,1992

4. Barry B. Brey , *The Intel Microprocessors 8086 to Pentium 4- Architecture Programming and Interfacing*, 6/e Pearson Education ,2003

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Laboratory Practical and record

30% - Tests.

10% - Regularity in the class

20% - Viva voce

10% - Fair Record

CS14 601 : Embedded System

Teaching scheme **Credits**: 4

3 hours lectures and 1 hour Tutorial per week

Objectives

- *To teach students about architecture, hardware and software elements, programming models and practices and tools for embedded system design and implementation.*
- *To focus on the hardware and real time operating systems used for the embedded systems design.*

Pre-requisites: *Knowledge of digital design, computer organization*

Module I (14 hours)

Embedded systems: Overview, Design challenges-Optimising design metrics, Common design metrics- Processor technology-General purpose processors, Single purpose processors and Application specific processors.

IC technology: Full-custom/VLSI, Semi-custom ASIC, Compilation/Synthesis, libraries/IP, Test/Verification, Custom Single-purpose processors: Hardware-Combinational Logic, Transistors and logic gates, Basic combinational and Sequential logic design, Custom single purpose processor design and optimisation.

General-purpose processors: Software: Basic architecture, Datapath, Control unit, Memory, Instruction execution, Pipelining, Superscalar and VLIW architectures, Instruction set, Program and data memory space, Registers, I/O, Interrupts, Operating Systems, Development environment, Design flow and tools, Testing and debugging.

Application-specific instruction-set processors, Microcontrollers, Digital signal processors

Standard single-purpose processors: Peripherals-some examples such as Timers, counters, Analog-digital converters, etc.

Module II (13 hours)

Memory: Write-ability and storage permanence. Common memory types, Composing memories, memory hierarchy and cache- Cache mapping techniques: replacement, write techniques, Cache impact on system performance, Advanced RAM, the basic DRAM, types of DRAMS, DRAM integration problem, Memory management unit (MMU)

Interfacing: Basic protocol concepts, Microprocessor interfacing: I/O addressing, interrupts, DMA, Arbitration methods, Multi-level bus architectures, Advanced communication principles, Parallel, Serial and Wireless communication, Error detection and correction, Bus standards and protocols.

An example: Digital camera-User's perspective, Designer's perspective, Specification, Informal functional specification, Non-functional specification, Executable specification Design, Implementation alternatives

Module III (13 hours)

State machine and concurrent process models: Models vs. languages, text vs. graphics, A basic state machine model: finite-state machines, FSM with datapath model FSMD, Hierarchical/Concurrent state machine model (HCFSM) and the State charts language, Program-state machine model (PSM),The role of an appropriate model and language

Concurrent process model: Concurrent processes, create, terminate suspend, resume and join, Interprocess Communication and synchronization methods and their implementation

Case studies:Windows CE, QNX

Module IV (12 hours)

Design technology: Automation-The parallel evolution of compilation and synthesis, Synthesis levels, Logic synthesis, Two-level and, Multi-level logic minimization, FSM synthesis, Technology mapping, Integration logic synthesis and physical design, Register-transfer synthesis, Behavioural synthesis, System synthesis and hardware/software codesign, Intellectual property cores, New challenges posed by cores to processor providers and users.

Text Books

1. Frank Vahid and Tony Givargis, *Embedded System Design: A Unified Hardware/Software Introduction,* Wiley India, 2002.

Reference Books

1. Jack Ganssle, *The Art of Designing Embedded Systems,* 2nd ed., Elsevier, 2008.
2. Raj Kamal, *Embedded systems - architecture, programming and design*, Tata McGraw Hill, 2007.
3. Steve Heath, *Embedded Systems Design*, 2nd ed., Elsevier, 2006.
4. Tammy Noergaard, *Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers,* Elsevier, 2008.
5. A.N.Sloss, D. Symes, and C. Wright, *Arm System Developer's Guide: Designing and Optimizing System Software*, Morgan Kaufmann Publishers/Elsevier, 2008.
6. Lyla. B. Das,Embedded Systems-An Integrated Approach,Pearson.
7. James K Peckol, *Embedded Systems – A Contemporary Design Tool,* Wiley India.
8.

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:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 602 : Computer Graphics & Multimedia

(Common with IT14 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 (13 hours)

Viewing in 3D projections - 3D transformations - basics of solid modelling - 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

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 603: Compiler Design

(Common with IT14 603)

Teaching scheme **Credits**: 4

3 hours lectures 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 (13 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 (13 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

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 604: Computer Networks

(Common with IT14 604)

Teaching scheme **Credits**: 4

3 hours lectures 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 Transport Protocols: TCP, Performance Issues.

Module IV (13 hours)

The Application Layer- DNS-The Domain Name System, Electronic Mail, The World Wide Web, Multimedia

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 Pearson 2013-02-21
7. Barry Wilkinson, Michael Allen;*Parallel Programming Techniques and Applications using Networked Workstations and Parallel 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- *Princilpes of Computer Networks and Communications*, Pearson 201212.
12. 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

PART A:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 605 : 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 modeling 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, Pearson Education
2. Clark J. & Holton D.A., A First Look at Graph Theory, Allied Publishers (World Scientific)

Reference books
1. Corman T.H., Leiserson C.E. & Rivest R.L., Introduction to Algorithms, Prentice Hall India
2. Mott J.L., Kandel A. & Baker T.P., Discrete Mathematics for Computer Scientists And Mathematicians, Prentice Hall of India
3. Liu C.L., Elements of Discrete Mathematics, McGraw Hill
4. Rosen K.H., Discrete Mathematics and Its Applications, McGraw Hill
5. S Pirzada, An Introduction Graph Theroy, Universities 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 606: Management Information Systems

Teaching scheme **Credits**: 4

3 hours lectures 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 System Resources- Computer Hardware- Computer Software- File and Database Management Systems- Communications systems- office communications- Applications of Operational Information Systems to Business

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

CS14 607(P) : Systems Lab

Objectives

- *To make the learners understand the operating system structures and the implementation aspects of various OS functions and schedulers.*
- *To teach data base technology and familiarize them with issues related to data base design through hands on practice.*

Operating systems

1. Implementation of dining philosophers problem by multiprogramming using threads, semaphores and shared memory
2. Implementation of banker's algorithm
3. Inter-process communication using mailboxes and pipes
4. Simulation of any two CPU Scheduling Algorithms. (FCFS, RR, SJF, SPN, SRTF, Priority, Multilevel Queuing)
5. Program for FIFO, LRU, and OPTIMAL page replacement algorithm

Database management systems

1. Implementation of a database stored in an RDBMS accessible through a web browser.
2. Implementation of optimistic concurrency control algorithm
3. Familiarization of any one RDBMS software and writing SQL queries to retrieve information from the stored database

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
3. Elmasri, Navathe, *Fundamentals of Database Systems*, Addison Wesley
4. Ramakrishnan R., Gehrke J., *Database Management Systems*, McGraw Hill
5. John Day, Craig Van Slyke., *Starting out with Oracle*, Scott Jones Publishers

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% - Tests.

10% - Regularity in the class

CS14 608(P): Mini Project

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-100)*

25% - Demonstration of mini project
50% - Practical test connected with mini project
25% - Viva voce

CS14 701: Design and Analysis of Algorithms

(Common with IT14 701)

Teaching scheme **Credits**: 4

3 hours lectures 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
4. Kenneth A Berman, Jerome L. Paul, Fundamentals of sequential and parallel algorithms, Vidya Vikas Publications
5. Horowitz,Sahni,Rajasekaran, *Computer Algorithms/C++,* 2nd Ed., 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

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 702: Cryptography and Network Security

(Common with IT14 702)

Teaching scheme **Credits**: 4

3 hours lectures 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. William Stallings, *Cryptography and Network Security* , Pearson Education

Reference Books

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

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:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 703: 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 (13 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 (15 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*, Pearson Education India.
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*, Pearson Education India.
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

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 706(P) : Compiler Lab

Teaching scheme **Credits:2**

3 hours practical per week

Objectives

- *To familiarize the design of all phases of compilers up to a stage of intermediate code generation.*
- *To enable the students to design and implement modern compilers for any environment.*

Lab 1,2 : Generation of lexical analyzer using tools such as LEX.

Lab 3,4 : Generation of parser using tools such as YACC.

Lab 5,6 : Creation of Symbol tables.

Lab 7,8 : Creation of type checker.

Lab 9,10 : Generation of intermediate code.

References

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

2.Holub A.I., Compiler Design in C, Prentice Hall India

3. Doug Brown, John Levine, Tony Mason, Lex & Yacc, 2nd Edition ,O'Reilly Media

4.G Sudha Sadasivam, Compiler Design , Scitech Publications

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

CS14 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

CS14 708(P) : Project

Teaching scheme **Credits**: 4

3 hours Practicals 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.

CS14 704(A) : Object Oriented Modelling and Design

Teaching scheme **Credits**: 4

3 hours lectures and 1 hour Tutorial per week

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 modeling: 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

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 704 (B) : Digital Image Processing

(Common with IT14 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

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 704 (C) : Grid Computing

(Common with IT14 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

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 704 (D) : Queuing Theory

Teaching scheme **Credits: 4**

3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach the fundamental queuing models and the various parameters involved with performance*

Module 1(13 Hours)

Description of the Queuing problem - Characteristics of Queuing processes - Notation – Measuring System Performance - Some General Results - Simple Bookkeeping for Queues - Poisson process and the Exponential Distribution - Markovian property of the Exponential Distribution - Stochastic Processes and Markov Chains - Steady-state Birth-Death Processes - Simple Markovian Birth-Death Queuing Models

Module II(14 Hours)

Steady-state solution for the M/M/1 Model - Methods of Solving Steady-state Difference Equations - Queues with parallel channels (M/M/c) - Queues with Parallel Channels and Truncation (M/M/c/K) - Erlang's Formula (M/M/c/c) - Queues with Unlimited Service - Queues with Impatience – Transient Behaviour - Busy-Period analyses for M/M/1 and M/M/c - Bulk input (M[x]/M/1) - Bulk Service (M/M[Y]/1) - Erlang's Models (M/Ek/1, Ek/M/1, Ej/Ek/1) - Priority Queue disciplines

Module III(12 Hours)

Series Queues - Open Jackson Networks - Closed Jackson Networks - Cyclic Queues - Extensions of Jackson Networks - Non-Jackson Networks - Single-server Queues with Poisson Input and General Service (M/G/1) - Multi server Queues with Poisson input and General Service - General Input and Exponential service

Module IV(13 Hours)

G/Ek/1, G(k)/M/1 and G/PHk/1 - General Input, General Service (G/G/1) - Multichannel Queues with Poisson input and Constant Service (M/D/c) - Semi-Markov and Markov Renewal Processes in Queueing - Other Queueing Disciplines - Design and Control of Queues - Statistical Inference in Queueing - Bounds,

Approximations, Numerical Techniques and Simulation. - Bounds and Inequalitites - Approximations - Numerical Techniques - Discrete-Event Stochastic Simulation Problems

Text Books

1. Donald Gross & Carl M Harris, *Fundamentals of Queuing Theory, 3rd edition*, Pearson Education India.,1997.

References

1. Trivedi K S, *Probability and Statistics with Reliability, Queuing and Computer Science Applications*, Prentice Hall of India, 1984.
2. Allen A O, Probability, *Statistics and Queuing Theory*, Academic Press, 1981.
3. Balaguruswamy E, *Reliability Engineering* , Tata McGraw Hill Publishers, New Delhi, 1984.
4. Sanjay K Bose, *An Introduction to Queuing Systems*, Kulwer Academic Plenum Publishers

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: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 704 (E): Simulation and Modeling (Global)

Teaching scheme **Credits: 4**

3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach the students how to reproduce real-world events or process under controlled laboratory conditions, using mainly mathematical models.*

Module I (13 hours)

Introduction - systems and models - computer simulation and its applications -continuous system simulation - modeling continuous systems - simulation of continuous systems - discrete system simulation - methodology – event scheduling and process interaction approaches - random number generation -testing of randomness - generation of stochastic variates - uniform distribution - exponential distribution -Erlang distribution - gamma distribution - normal distribution – beta distribution - random samples from discrete distributions - Bernoulli - discrete uniform -binomial - geometric and poisson

Module II (13 hours)

Evaluation of simulation experiments - verification and validation of simulation experiments - statistical reliability in evaluating simulation experiments -confidence intervals for terminating simulation runs - simulation languages -programming considerations - general features of GPSS - SIM SCRIPT and SIMULA.

Module III (12 hours)

Simulation of queuing systems - parameters of queue - formulation of queuing problems - generation of arrival pattern - generation of service patterns -Simulation of single server queues - simulation of multiserver queues -simulation of tandom queues.

Module IV (14 hours)

Simulation of stochastic network - simulation of PERT network - definition of network diagrams – forward pass computation - simulation of forward pass -backward pass computations - simulation of backward pass - determination of float and slack times determination of critical path - simulation of complete network - merits of simulation of stochastic networks.

Reference Books

1. C. Deo N., *System Simulation And Digital Computer*, Prentice Hall Of India.
2. Gordan G., *System Simulation*, Prentice Hall Of India.
3. Law A.M. & Ketton W.D., *Simulation Modelling And Analysis*, Mcgraw Hill.
4. Banks,Carsonii,Nelson,Nicol, Discrete-Event System Simulation, 5th 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 705 (A) : Soft Computing

(Common with IT14 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.*
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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.

Module IV (13 hours)

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

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.

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:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 705 (B) : E-Commerce

(Common with IT14 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 705(C): Software Architecture and Project Management

Teaching scheme **Credits**: 4

3 hours lectures and 1 hour Tutorial per week

Objectives

- *To impart the basic concepts of software architecture and design patterns.*
- *To develop an understanding about development of complex software systems in a methodical manner.*

Module I (13 hours)

Software Architecture - Foundations - Software architecture in the context of the overall software life cycle - Architectural Styles - CASE study of Architectures Designing, Describing, and Using Software Architecture - IS2000: The Advanced Imaging Solution - Global Analysis - Conceptual Architecture View - Module Architecture View - Styles of the Module Viewtype - Execution Architecture View, Code Architecture - View. Component-and-Connector Viewtype - Styles of Component-and-Connector Viewtype - Allocation Viewtype and Styles - Documenting Software Interfaces, Documenting Behavior - Building the Documentation Package.

Module II (13 hours)

Archetypes and Archetype Patterns, Model Driven Architecture with Archetype Patterns. Literate Modeling, Archetype Pattern. , Customer Relationship Management (CRM) Archetype Pattern, Product Archetype Pattern, Quantity Archetype Pattern, Rule Archetype Pattern. Design Patterns, Creational Patterns, Patterns for Organization of Work, Access Control Patterns, Service Variation Patterns, Service Extension Patterns

Module III (13 hours)

Object Management Patterns Adaptation Patterns, Communication Patterns, Architectural Patterns, Structural Patterns, Patterns for Distribution, Patterns for Interactive Systems Adaptable Systems, Frameworks and Patterns, Analysis Patterns Patterns for Concurrent and Networked Objects, Patterns for Resource Management, Pattern Languages, Patterns for Distributed Computing.

Module IV (13 hours)

Defining EAI, Data-Level EAI, Application Interface-Level EAI., Method- Level EAI., User Interface-Level EAI, The EAI Process - An Introduction to EAI and Middleware, Transactional Middleware and EAI, RPCs, Messaging, and EAI, Distributed Objects and EAI, Database- Oriented Middleware and EAI, Java Middleware and EAI,

Implementing and Integrating Packaged Applications—The General Idea, XML and EAI, Message Brokers—The Preferred EAI Engine, Process Automation and EAI. Layering, Organizing Domain Logic, Mapping to Relational Databases, Web Presentation, Domain Logic Patterns, Data Source Architectural Patterns, Object-Relational Behavioral Patterns, Object-Relational Structural Patterns, Object-Relational Metadata Mapping Patterns, Web Presentation Patterns, Distribution Patterns, Offline Concurrency Patterns.

Reference Books

1. Mary Shaw, David Garlan, "Software Architecture", Prentice Hall
2. Ian Gorton Springer, *Essential Software Architecture*, 1st edition, 2006.
3. Bob Hughes, Mike Cotterell, *Software Project Management, 4th edition,* Tata McGraw Hill, 2006.
4. Christine Hofmeister, Robert Nord, Deli Soni , *Applied Software Architecture*, Pearson Education, Professional; 1st edition, 1999.
5. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *Design Patterns: Elements of Reusable Object-Oriented Software*, Addison-Wesley Professional; 1st edition.
6. Martin Fowler, *Patterns of Enterprise Application Architecture*, Addison-Wesley Professional, 2003.
7. Pankaj Jalote, *Software Project Management in Practice*, Pearson
8. Walker Royce, *Software Project Management- A Unified Framework*, 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

University Examination Pattern

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 705 (D) Advanced Data Structures

(Common with IT14 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: CS14 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

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 705(E) : Computer Based Numerical Methods (Global)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of mathematical modelling of problems in science and engineering and to know procedures for solving different kinds of problems.*
- *To understand the various numerical techniques which provide solutions to non linear equations, partial differential equations etc that describe the mathematical models of problems*

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Module I (13 hours)

Errors in numerical computation - mathematical preliminaries - errors and their analysis - machine computations -computer software. Algebraic and Transcendental Equations - bisection method - iteration method - method of falseposition - rate of convergence - method for complex root - Muller's method - quotient difference method - Newton-Raphson method.

Module II (13 hours)

Interpolation – introduction - errors in polynomial interpolation - finite differences - decision of errors - Newton's formula for interpolation. Gauss, Sterling, Bessel's, Everett's Formula - interpolation by unevenly spaced points -Lagrange interpolation formula - divided difference - Newton's general interpolation formula.

Module III (13 hours)

Numerical Integration and Differentiation – introduction - numerical differentiation - numerical integration -trapezoidal rule - Simpson 1/3 rule - Simpson 3/8 rule - Boole's and Weddle's rules - Euler-Maclariaun formula -Gaussian formula - numerical evaluation of singular integrals.

Module IV (13 hours)

Statistical Computations - frequency Chart - method of least square curve fitting procedures - fitting a straight line -curve fitting by sum of exponential - data fitting with cubic splines - approximation of functions. Regression Analysis - linear and nonlinear regression - multiple regression - statistical quality control methods.

Text Books

1. E. Balaguruswamy, *Numerical Methods*, Tata McGraw- Hill Pub. Co. Ltd, New Delhi, 1999
2. C. F. Gerald and P O Wheatley, Applied Numerical Analysis, 6th Ed., Pearson Education Asia, New Delhi, 2002

Reference Books

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, Numerical Methods, S. Chand Co. Ltd., New Delhi, 2003
2. R. L. Burden and T. D. Faires, Numerical Analysis, 7th Ed. , Thomson Asia Pvt. Ltd., Singa[pore, 2002
3. Shastri, Introductory methods of Numerical Analysis, PHI
4. V. Rajaraman, Introduction to Numerical Methods, 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

PART A:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 801 : Computer Architecture and Parallel Processing

(Common with IT14 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 Programmability*, 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 2012
7. Rob Williams; Computer System Architecture, Pearson 2012
8. William Stallings, Computer Organization and Architecture- Designing for Performance, Pearson, Eighth 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 802 Distributed Systems

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

PART A: Analytical/problem solving SHORT questions 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions 4 x 15 marks=60 marks

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

Maximum Total Marks: 100

CS14 803 : Data Mining and warehousing

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

To give only a broad, yet in-depth overview of the field of data mining and warehousing, a multi-disciplinary field of study.

Module I (14 hours)

Fundamentals of data mining -Basic data mining tasks, Issues, DM versus KDD, Data preprocessing: data cleaning, data integration and transformation, data reduction, discretization and concept - hierarchy generation. Introduction to Data warehouse and OLAP Technology, Multidimensional data model, Star and Snowflake schema, Data warehouse architecture and implementation.

Module II (12 hours)

Classification- decision tree-performance evaluation of the classifier, comparison of different classifiers, Rule based classifier, Nearest-neighbor classifiers-Bayesian classifiers-support vector machines, Class imbalance problem

Module III (14 hours)

Association analysis –frequent item generation rule generation, evaluation of association patterns Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases-mining multidimensional Association rules –association mining to correlation analysis-constraint based association mining.

Module IV (12 hours)

Cluster analysis,-types of clusters, K means algorithm, cluster evaluation, application of data mining to web mining and Bio-informatics

Text Books

1. Jiawei Han and Micheline Kamber .,Data Mining:Concepts and Techniques, Morgan Kaufmann Publishers

2. Margaret H.Dunham and S.Sridhar., Data Mining:Introductory and Advanced Topics, Pearson Education

Reference Books

1. K.P.Soman, Shyam Diwakar, and V. Ajay, *Insight into Data Mining: Theory and Practice*, Prentice Hall of India, 2006.

2. S. Sumathi, S. N. Sivanandam, *Introduction to data mining and its applications,(Illustrated Edn)*, Springer Publishers, 2006

3. P.M.Tan, N.Stenbach and V.Kumar, *Introduction to Data Mining*, Pearson Education, London, 2007

4. K.Mehmed, *Data Mining: Concepts,Models, Methods, and Algorithms*, John Wiley and Sons, 2003.

5. Paulraj Ponniah, *Data Warehousing Fundamentals: A Comprehensive Guide for IT Professional*, Wiley Student Edition, 2007

6. S. Anahary and D. Murray, *Data Warehousing in the Real World,:A Practical Guide for Building Decision Support Systems*, Pearson Education, 2000.

7. Pieter Adriaans, Dolf Zantinge- Data Mining, Pearson Education

8. Thomas N Miller- Data and Text Mining: A Business Applications Approach, Pearson 2013

9. Richard Roiger, Michael Geatz- Data Mining: A Tutorial Based Primer, Pearson 2011

10. George M Marakas- Modern Data Warehousing, Mining and Visualization: Core Concepts, Pearson 2012

11. David Hand, Heikki Mannila, Padhraic Smyth- Principles of Data Mining, PHI Learning, New Delhi 2012

12. Arun K Pujari, Data Mining Techniques, Second Edition, Universities 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 of the assignments shall be simulation of continuous systems using any technical computing software

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 806 (P) : Seminar

Teaching scheme
Credits: 2

3 hours practical 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:

20%- Relevance of the topic and Literature Survey

50%- Presentation & Discussion

20%- Report

10%- Regularity in the class and participation in the seminar

CS14 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:

40%- Development/ Simulation and Analysis

30%- Presentation & Demonstration of results

20%- Report

10%- Regularity in the class

CS14 808 (P) : Viva Voce

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.

40%- Subject Knowledge

30% - Project and Mini Project

20% - Seminar

10%- Industrial Training/Industrial Visit/ Educational Tour/ Paper presented

CS14 804(A): Advanced Topics in Operating Systems

(Common with IT14 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

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100

CS14 804(B) : Information Retrieval

(Common with IT14 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

University Examination Pattern

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 804C: Cyber Security

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

- To build a comprehensive understanding of the theory behind cyber security.

Develop an awareness of the challenges that sophisticated hackers and criminal organizations currently and potentially pose to the world's computer systems.

- To Gain knowledge in the theory and techniques of providing IP and Web security, e-mail security and system security.

Module I (13 Hours)

INTRODUCTION: Network concepts – Threats in networks – Network security controls – Importance of security – Threat models – Security concepts – Common mitigation methods.

AUTHENTICATION: Overview of authentication – Authentication of people – Security Handshake pitfalls – Strong password protocols – Kerberos – Public key infrastructure.

Module II (13 Hours)

IP & WEB SECURITY: IP security: Overview - Architecture – Authentication Header - Encapsulating Security Payload - Key management – Web security: Web security considerations – Secure Socket Layer and Transport Layer Security – Secure electronic transaction – Web issues

Module III (13 Hours)

ELECTRONIC MAIL SECURITY: Store and forward – Security services for e-mail – Establishing keys – Privacy – Authentication of the Source – Message Integrity – Non-repudiation – Proof of submission and delivery - Pretty Good Privacy – Secure/Multipurpose Internet Mail Extension.

Module IV (13 Hours)

SYSTEM SECURITY: Intruders – Intrusion detection – Password management – Malicious software: Viruses and related threats – virus countermeasures – Firewalls: Firewall design principles – Firewall configurations – Trusted systems

REFERENCES:

Charles P. Fleeger, "Security in Computing", Prentice Hall, New Delhi, 2009

Neal Krawetz, “Introduction to Network Security”, Thomson Learning, Boston, 2007.

Behrouz A.Forouzan, “Cryptography & Network Security”, Tata McGraw Hill, India, New Delhi, 2009.

William Stallings, “Cryptography and Network Security, Prentice Hall, New Delhi, 2006.

Chalie Kaufman, Radia Perlman, Mike Speciner, “Network Security: Private Communication in a Public Network”, Pearson Education, New Delhi, 2004.

Bruce Schneier, “Applied Cryptography”, John Wiley & Sons, New York, 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

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 804(D) : MOBILE COMPUTING

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach advanced concepts related to mobile communication including various technologies and protocols.*

Module I (13 hours)

Review of wireless and mobile communication (covered in Advanced Computer Networks)-Mobile computing architecture-Pervasive Computing-Voice oriented data Communication, Operating System for Mobile Computing, Mobile Devices, cards and sensors, Mobile computing applications: messaging-SMS-MMS-GPRS applications- Mobile agents.

Module II (13 hours)

Wireless Internet-Mobile IP- wireless web- Web services and mobile web services-Wireless middle ware- wireless gateway and mobile application servers-Wireless Access Protocol(WAP)-WAP protocol layers. Mobile database management:-data caching, transaction models, processing queries, Data recovery, QoS .Mobile Transport Layer

Module III (13 hours)

Cellular network- First Generation Networks-Second generation (2G): GSM-CDMA network data over cellular network-2.5G network-GPRS-GPRS System Architecture and Protocol layers. EDGE. Third generation network(3G) network-MMS-introduction to 4Gand 5G systems-Emerging wireless networks: Ultra wide band(UWB)-Free space optics(FSO)-Mobile ad-hoc network(MANET)-Wireless sensor networks-OFDM and Flash OFDM

Module IV (13 hours)

Wireless security-WLAN security-cellular wireless network security-Mobile ad-hoc network security-Internet security protocols: VPNs and IPSec-Wireless middleware security-SSL for wireless web security-WAP security and WTLS. Client programming tools-using XML and UML for mobile computing –J2ME.

Text Book

1. Raj Kamal, Mobile Computing, Oxford University Press, 2007

Reference Books

1. Amjad Umar, Mobile Computing and Wireless Communications,NGE Solutions,2004
2. Asoke Talukder,Roopa Yavagal, Mobile Computing,McGrawhill,2006
3. Reza Behravanfar, Phillip Lindsay, Reza B'Far, Mobile Computing Principles: designing and developing mobile applications with UML and XML,Cambridge University Press,2006.
4. U. HansMann, L Merk, M.S. Nicklous and T. Stober, Principles of Mobile Computing, 2/e, Spniyer, 2003
5. Schiller J, Mobile Communications, 2/e- Pearson Education, 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:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 804(E) : Speech and Language Processing (Global)

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To teach the fundamental concepts in speech processing and natural language processing through which human-computer dialog systems may be developed.*

Module I (13 hours)

Introduction: Words, Regular Expressions and Automata, Words and Transducers, N-grams, Part-of-Speech Tagging, Hidden Markov and maximum Entropy Models

Module II (13 hours)

Speech: Phonetics, Speech Synthesis, Automatic Speech, Recognition, Speech Recognition : Advanced Topics, Computational Phonology

Module III (13 hours)

Syntax: Formal Grammars of English, Syntactic Parsing, Statistical Parsing, Features and Unification, Language and Complexity

Module IV (13 hours)

Semantics and Pragmatics: The Representation of Meaning, Computational Semantics, Lexical Semantics, Computational Lexical Semantics, Computational Discourse Applications : Information Extraction, Question Answering and Summarization, Dialog and Conversational Agents, Machine Translation

Text Books

1. Daniel Jurafsky and James H. Martin, *Speech and Language Processing : An Introduction to Natural Language Processing*, Computational Linguistics, and Speech Recognition (Second Edition), Pearson Education, 2009

Reference Books

1. C.D.Manning and H. Schutze, *Foundations of Statistical Natural Language Processing*, MIT Press, London, 2001.
2. James Allen, *Natural Language Understanding*, 2nd Edn, 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 805 (A) : Advanced Database Design

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, distributed 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 and microsoft access - basic structure of the oracle system - database structures and its manipulation in oracle - storage organization programming oracle applications - oracle tools - an overview of Microsoft access features and functionality of access - distributed databases in oracle

Text Books

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

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

PART A: Analytical/problem solving SHORT questions 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions 4 x 15 marks=60 marks

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

Maximum Total Marks: 100

CS14 805 (B) Cloud Computing

Teaching scheme

Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To understand the new way of computing obtaining services in information technology.*
- *To familiarize of the Concepts of virtualisation and tools used in cloud space*

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Module I (13 hours)

Introduction- Grid Computing- Grid - The Way to Cloud- Emerging Through Cloud-Benefits-Business and IT Perspective- Cloud and Virtualization- Cloud Services Requirements- Cloud and Dynamic Infrastructure- Cloud Computing Characteristics-Measured Service- Cloud Models - Security in a Public Cloud -Public versus Private Clouds

Module II (13 hours)

Cloud as a Service-Gamut of Cloud Solutions- Platform-as-a-Service-Software-as-a-Service- Infrastructure-as-a-Service-Principal Technologies-Cloud Strategy-Cloud Design and Implementation using SOA- Architecture Overview - Conceptual Cloud Model - Cloud Services definitions and Scope -Platform Integration and Deployment Component Services-Cloud Application Planning- Cloud Business Process Management-Computing on Demand

Module III (13 hours)

Cloud Management-Cloud Virtualization Technology-Virtualization Defined -Virtualization Benefits-Server Virtualization -Virtualization for x86 Architecture-Hypervisor Management Software-Logical Partitioning (LPAR)-VIO Server-Virtual Infrastructure Requirements-Cloud Virtualization -Storage virtualization-Storage Virtualization Benefits-Network-Attached storage-Cloud Server Virtualization-Virtualized Data Centre -Cloud Performance Monitoring Commands

Module IV (13 hours)

Cloud Offerings**-**Information Storage, Retrieval, Archive and Protection-Information Security-Virtual Desktop Infrastructure-Storage Cloud-Cloud Management-

Provisioning-Service-Based Model-Provisioning-Asset Management-Cloud Governance-High Availability and Disaster Recovery-Charging Models, Usage Reporting, Billing and Metering -Cloud Performance Monitoring Commands-Case studies using Google web services, Amazon web services.

Text Books

1. Kumar Saurabh, *Cloud Computing*, Wiley India

Reference Books

1. Venkata Josyula, M Orr,Greg Page, *Cloud Computing- Automating The Virtualized Data Centre*, Pearson Education
2. Linthicum*, Cloud Computing And Soa Convergence In Your Enterprise*, Pearson Education.
3. Sosinsky, *Cloud Computing*, Wiley India
4. Gautam Shroff, *Enterprise Cloaud Computing-Technology, Architecture, Applications,* 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 805 (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.

Reference Books

1. Mitchell. T, *Machine Learning*, McGraw Hill, 1997.
2. Christopher M. Bishop, *Pattern Recognition and Machine Learning*, Springer, 2006.
3. Ryszard S. Michalski, Jaime G. Carbonell, Tom M. Mitchell, *Machine Learning : An Artificial Intelligence Approach*, Tioga Publishing Company, 1983.
4. David E Goldberg, *Genetic Algorithms- in Search, Optimization and Machine Learning*, 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

University Examination Pattern

PART A:	*Analytical/problem solving SHORT questions*	*8x 5 marks=40 marks*
	Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	
PART B:	*Analytical/Problem solving DESCRIPTIVE questions*	*4 x 15 marks=60 marks*
	Two questions from each module with choice to answer one question.	

Maximum Total Marks: 100

CS14 805(D) : Web Programming

(Common with IT14 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 ea*, 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, *JSF*, IDG Books India.
8. Ed Roman, *Mastering Enterprise Java Beans and the Java 2 platform Enterprise Edition*, Wiley Computer Publishing.
9. Floyd Marinescu, *EJB Design Patterns*,
10. Steven Holzner, *Ajax Bible*, Wiley Student 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

PART A: Analytical/problem solving SHORT questions *8x 5 marks=40 marks*

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions *4 x 15 marks=60 marks*

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

Maximum Total Marks: 100

CS14 805(E) : Pattern Recognition (Global)

Teaching scheme **Credits: 4**

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart a basic knowledge on pattern recognition and to give a sound idea on the topics of parameter estimation and supervised learning, linear discriminant functions and syntactic approach to PR.*
- *To provide a strong foundation to students to understand and design pattern recognition systems.*

Module I (12 hours)

Introduction - introduction to statistical - syntactic and descriptive approaches - features and feature extraction - learning - Bayes Decision theory - introduction - continuous case - 2-category classification - minimum error rate classification - classifiers - discriminant functions - and decision surfaces - error probabilities and integrals - normal density - discriminant functions for normal density

Module II (12 hours)

Parameter estimation and supervised learning - maximum likelihood estimation - the Bayes classifier - learning the mean of a normal density - general Bayesian learning - nonparametric technic - density estimation - parzen windows - k-nearest neighbour estimation - estimation of posterior probabilities - nearest-neighbour rule - k-nearest neighbour rule

Module III (13 hours)

Linear discriminant functions - linear discriminant functions and decision surfaces - generalised linear discriminant functions - 2-category linearly separable case - non-separable behaviour - linear programming procedures - clustering - data description and clustering - similarity measures - criterion functions for clustering

Module IV (15 hours)

Syntactic approach to PR - introduction to pattern grammars and languages - higher dimensional grammars - tree, graph, web, plex, and shape grammars - stochastic grammars - attribute grammars - parsing techniques - grammatical inference

Text Books

1. Duda & Hart P.E, *Pattern Classification And Scene Analysis*, John Wiley
2. Gonzalez R.C. & Thomson M.G., *Syntactic Pattern Recognition - An Introduction*, Addison Wesley.

Reference Books

1. Fu K.S., *Syntactic Pattern Recognition And Applications*, Prentice Hall, Eaglewood cliffs
2. Rajjan Shinghal, *Pattern Recognition: Techniques and Applications*, Oxford University Press, 2008.
3. Johnsonbangh, *Pattern Recognition & Analysis*, PHI
4. Anil K Jain, *Fundamentals of Digital Image Processing,* PHI
5. Pakhira, *Digital Image Processing & Pattern Recognition,* PHI
6. V Susheela Devi & M Narasimha Murty, *Pattern Recognition – An Introduction*, 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

PART A:	*Analytical/problem solving SHORT questions* Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.	*8x 5 marks=40 marks*
PART B:	*Analytical/Problem solving DESCRIPTIVE questions* Two questions from each module with choice to answer one question.	*4 x 15 marks=60 marks*

Maximum Total Marks: 100