SCHEME AND SYLLABI

FOR

THIRD TO EIGHTH SEMESTERS

OF

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

SCHEME OF STUDIES AND EXAMINATION FOR B. TECH DEGREE COURSE
2009 ADMISSION

COMPUTER SCIENCE AND ENGINEERING

Combined I & II Semesters (Common for all branches)		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
EN09 101	Engineering Mathematics I	2	1		30	70	3	4
EN09 102	Engineering Mathematics II	2	1		30	70	3	4
EN09 103	Engineering Physics	2			30	70	3	3
EN09 103(P)	Physics Lab			1	50	50	3	1
EN09 104	Engineering Chemistry	2			30	70	3	3
EN09 104(P)	Chemistry lab			1	50	50	3	1
EN09 105	Engineering Mechanics	2	1		30	70	3	4
EN09 106	Basics of Civil and Mechanical Engineering	2	1		30	70	3	4
EN09 107	Basics of Electrical, Electronics and CommunicationEngineering	2	1		30	70	3	4
EN09 108	Engineering Graphics			3	30	70	3	3
EN09 109(P)	ComputerProgramming in C	1		1	50	50	3	3
EN09 110A(P)	Mechanical Workshop			2	50	50	3	2
EN09 110B(P)	Electrical and Civil Workshops			2	50	50	3	2
	Total	15	5	10				38
	Total Marks							

Semester III		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
EN09 301	Engineering Mathematics III	3	1		30	70	3	4
CS09 302	Data structures	4	1		30	70	3	5
CS09 303	Discrete Computational Structures	3	1		30	70	3	4
EN09 304	Humanities and Communication Skills	2	1		30	70	3	3
CS09 305	Electronic Circuits	3	1		30	70	3	4
CS09 306	Switching Theory and Logic Design	3	1		30	70	3	4
CS09 307(P)	Electronic Circuits Lab			3	50	50	3	2
CS09 308(P)	Programming Lab			3	50	50	3	2
	Total	18	6	6				28
	Total Marks							

Semester IV		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
EN09 401B	Engineering Mathematics IV	3	1		30	70	3	4
EN09 402	Environmental Studies	2	1		30	70	3	3
CS09 403	Computer Organization and Design	4	1		30	70	3	5
CS09 404	Programming paradigms	3	1		30	70	3	4
CS09 405	Systems Programming	3	1		30	70	3	4
CS09 406	Microprocessor Based design	3	1		30	70	3	4
CS09 407(P)	Data Structures Lab			3	50	50	3	2
CS09 408(P)	Digital Systems Lab			3	50	50	3	2
	Total	18	6	6				28
	Total Marks							

Semester V		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
CS09 501	Software Architecture and Project Management	3	1		30	70	3	4
CS09 502	Industrial Economics and Principles of Management	2	1		30	70	3	3
CS09 503	Signal Processing	3	1		30	70	3	4
CS09 504	Operating Systems	4	1		30	70	3	5
CS09 505	Digital Data Communication	3	1		30	70	3	4
CS09 506	Theory of Computation	3	1		30	70	3	4
CS09 507(P)	Programming Paradigm Lab			3	50	50	3	2
CS09 508(P)	Hardware Lab			3	50	50	3	2
	Total	18	6	6				28
	Total Marks							

Semester VI		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
CS09 601	Embedded Systems	3	1		30	70	3	4
CS09 602	Compiler Design	4	1		30	70	3	5
CS09 603	Computer Networks	3	1		30	70	3	4
CS09 604	Database Management Systems	3	1		30	70	3	4
CS09 605	Computer Graphics	2	1		30	70	3	3
CS09 606	Elective I	3	1		30	70	3	4
CS09 607(P)	Systems Lab			3	50	50	3	2
CS09 608(P)	Mini Project			3				2
	Total	18	6	6				28
	Total Marks							

Semester VII		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
CS09 701	Wireless Networks and Mobile Communication Systems	2	1		30	70	3	3
CS09 702	Design and Analysis of Algorithms	4	1		30	70	3	5
CS09 703	Internet Technology	2	1		30	70	3	3
CS09 704	Cryptography and Network Security	3	1		30	70	3	4
CS09 705	Elective II	3	1		30	70	3	4
CS09 706	Elective III	3	1		30	70	3	4
CS09 707(P)	Compiler Lab			3	50	50	3	2
CS09 708(P)	Network Programming Lab			3	50	50	3	2
CS09 709(P)	Project			1				1
	Total	17	6	7				28
	Total Marks							

Semester VIII		Hours / Week			Marks		Semester-end duration-hours	Credits
Code	Subject	L	T	D/P	Inte-rnal	S emes ter-end		
CS09 801	Computer Architecture and Parallel Processing	4	1		30	70	3	5
CS09 802	Data mining and Warehousing	2	1		30	70	3	3
CS09 803	Elective IV	3	1		30	70	3	4
CS09 804	Elective V	3	1		30	70	3	4
CS09 805(P)	Project			11				7
CS09 806(P)	Seminar			3				2
CS09 807(P)	Viva – Voce							3
	Total	12	4	14				28
	Total Marks							

Code	Elective I
CS09 L01	Information Security
CS09 L02	Computational Intelligence
CS09 L03	Queuing Theory
CS09 L04	Object Oriented Modeling and Design
CS09 L05	Management Information Systems
Electives for 7th and 8th semester	
CS09 L06	Artificial Neural Networks
CS09 L07	Distributed Systems
CS09 L08	Fuzzy Logic and Applications
CS09 L09	Speech and Language Processing
CS09 L10	Advanced Topics in Operating Systems
CS09 L11	Advanced Database Design
CS09 L12	Digital Image Processing
CS09 L13	VLSI Design
CS09 L14	Information Theory and Coding
CS09 L15	Multimedia
CS09 L16	Web Programming
CS09 L17	Graph Theory and Combinatorics
CS09 L18	Machine Learning
CS09 L19	Soft Computing

CS09 L20	Information Retrieval
CS09 L21	Digital Design Using VHDL
CS09 L22	Computational Geometry
CS09 L23	Simulation and Modeling (Global Elective 1 from CSE)
CS09 L24	Computer Based Numerical Methods (Global Elective 2 from CSE)
CS09 L25	Pattern Recognition (Global Elective 3 from CSE)
	Global Electives from other departments
EE09 L23	Process Control and Instrumentation
EE09 L25	Robotics & Automation
ME09 L24	Marketing Management
AN09 L24	Project Management
EC09 L25	Biomedical Instrumentation
IC09 L23	Bio-Informatics
PE09 L23	Total Quality Management
CE09 L24	Remote Sensing and GIS
CE09 L25	Finite Element Methods
BT09 L24	Bio-ethics and Intellectual Property Rights

CS09 501: Software Architecture and Project Management

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

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 (11 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 (15 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. Ian Gorton Springer, Essential Software Architecture, 1st edition, 2006.
2. Bob Hughes, Mike Cotterell, Software Project Management, 4th edition, Tata McGraw Hill, 2006.
3. Christine Hofmeister, Robert Nord, Deli Soni , Applied Software Architecture, Addison-Wesley Professional; 1st edition, 1999.
4. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley Professional; 1st edition.
5. Martin Fowler, Patterns of Enterprise Application Architecture, Addison- Wesley Professional, 2003.

Internal Continuous Assessment (Maximum Marks-30)

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

University Examination Pattern

PART A:	Short answer questions (one/two sentences) All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	5 x 2 marks=10 marks
PART B:	Analytical/Problem solving questions Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	4 x 5 marks=20 marks
PART C:	Descriptive/Analytical/Problem solving questions Two questions from each module with choice to answer one question.	4 x 10 marks=40 marks

Maximum Total Marks: 70

CS09 502: Industrial Economics and Principles of management

(Comman for CS and IT)

Teaching scheme
2 hours lecture and 1 hour tutorial per week

Credits: 3

Section A : Industrial Economics

Objectives

- To provide knowledge on fundamentals of economics, forms of business organisations, trade and taxation.

Module I (14 hours)
Nature and scope of economics – definitions of macro and micro economics – basic terminologies – goods – utility – value – wealth – factors of production – land – labour – division of labour – capital and capital formation – consumption – wants – characteristics and classification – law of diminishing marginal utility – demand – law of demand – elasticity of demand – types of elasticity – factors determining elasticity – measurement – its significance – supply – law of supply – market price – perfect competition – monopoly – monopolistic competition.

Module II (13 hours)
Forms of business – proprietorship – partnership – joint stock company – cooperative sector – state enterprises. National income – concepts – GNP – theory of money – nature and functions of money – inflation and deflation – taxation – theory of international trade – free trade v/s protection – balance of trade and balance of payments – trade of policy of the Government of India.

Text Books

1. K.K. Dewtt, J.D. Varma, Elementary Economic Theory, S. Chand Publishers
2. Barthwal R.R., Industrial Economics – An Introductory Text Book, New Age publishers

Reference Books

1. G. Narendrababu, Elements of Economic Analysis
2. K. P. M. Sundaran, Money, Banking, Trade & Finance
3. M.L. Jhingan, Micro Economic Theory, Konark.

Internal Continuous Assessment (Maximum Marks-30)

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

University Examination Pattern

PART A:	Short answer questions (one/two sentences) All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	2 x 2 marks= 4 marks 1 x 1mark = 1 mark
PART B:	Analytical/Problem solving questions Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	2 x 5 marks=10 marks
PART C:	Descriptive/Analytical/Problem solving questions Two questions from each module with choice to answer one question.	2 x 10 marks=20 marks

Maximum Total Marks: 35

Note : Section A (Engineering Economics) and Section B (Principles of Management) should be written in separate answer sheets.

Section B : Principles of Management

Objectives

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

Module III (13 hours)
Principles of Management – Evolution of management theory and functions of management
Organizational structure – Principles and types.
Decision making – Strategic, tactical and operational decisions, decision making under certainty, risk and uncertainty and multistage decisions and decision tree. Human resource management – Basic concepts of job analysis, job evaluation, merit rating, wages, incentives, recruitment, training and industrial relations.

Module IV (14 hours)
Financial management – Time value of money and comparison of alternative methods.
Costing – Elements and 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 and loss and balance sheet.
Marketing management – Basic concepts of marketing environment, marketing mix, advertising and sales promotion.
Project management – Phases, organization, 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 Bobcock, 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, NewJersey, 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, Prentice 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 and Control, MacMillan.

Internal Continuous Assessment (Maximum Marks-30)

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

University Examination Pattern

PART A: Short answer questions (one/two sentences) — 2 x 2 marks=4 marks; 1 x 1mark = 1 mark

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions — 2 x 5 marks=10 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions — 2 x 10 marks=20 marks

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

Maximum Total Marks: 35

Note : Section A (Engineering Economics) and Section B (Principles of Management) should be written in separate answer sheets.

CS09 503: Signal Processing

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

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

Module I (14 hours)
Signals – classification – continuous-time/discrete-time, deterministic/non-deterministic, periodic/ aperiodic, even/odd, energy/power signals – elementary signals – exponential, sinusoidal, unit step, impulse, ramp – time-shifting, scaling, folding.
System – classification – continuous-time/discrete-time, static/dynamic, linear/non-linear, time-invariant/variant, deterministic/stochastic, causal/non-causal, stable/unstable.
Linear Time Invariant (LTI) systems – impulse response – convolution integral – convolution-sum – condition for BIBO stability for CT and DT signals in terms of impulse response.

Module II (12 hours)
Representation of signals – Periodic signals – continuous-time fourier series (CTFS) – Trigonometric and exponential – symmetry conditions – amplitude & phase spectrum – properties of CTFS – Parserval's theorem for power signals – power spectral density.
Non-periodic signals - continuous-time Fourier transform (CTFT) – amplitude & phase spectra - gate function – sampling function – properties – convolution – Parseval's theorem for energy signals – energy-spectral density - Frequency response.
Linear Constant-Coefficient Differential equations - review of Laplace transform – transfer function - relation between Laplace transform and Fourier transform - poles and zeros – pole-zero plots - basic concept of BIBO stability.

Module III (12 hours)
Periodic signals - Discrete-time Fourier series (DTFS) – properties of DTFS – aperiodic signals – discrete-time Fourier transform (DTFT) – properties of DTFT - Parseval's theorem – energy spectral density – – frequency response - sampling – sampling theorem – impulse train - Nyquist rate - aliasing.

Module IV (14 hours)
Linear Constant-Coefficient Difference Equations (LCCDE) - Z-transform – Region of Convergence (ROC) – properties – inverse Z-transform – convolution - Long division method, partial fraction expansion method, residue method – one-sided Z-transform – properties – initial value & final value theorem - solution of LCCDE with initial conditions – zero input response and zero state response - system function – poles and zeros – basic concept of BIBO stability.

Text Books

1. Oppenheim A.V. & Schafer R.W., Signals and systems, Pearson Education
2. Proakis J.G. & Manolakis D.G., Digital signal processing, principles, algorithms & applications – Pearson Education
3. Gurung, Signals and Systems – Printice Hall India, New Delhi

Reference Books

1. Bandyopadhyay M N , Introduction to Signals and Systems and DSP, PHI
2. Ramesh Babu P., Signals and Systems, Scitech Publications (India) Private Limited
3. Sanjit K. Mitra, Digital Signal Processing – A computer based approach, Tata McGraw-Hill.
4. Dr. D. Ganesh Rao, Digital Signal Processing, Sanguine Technical Publishers.
5. Dr. D. Ganesh Rao, Signals and Systems, Sanguine Technical Publishers.

Internal Continuous Assessment (Maximum Marks-30)

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:	Short answer questions (one/two sentences) All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	5 x 2 marks=10 marks
PART B:	Analytical/Problem solving questions Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	4 x 5 marks=20 marks
PART C:	Descriptive/Analytical/Problem solving questions Two questions from each module with choice to answer one question.	4 x 10 marks=40 marks

Maximum Total Marks: 70

CS09 504: Operating Systems

Teaching scheme
4 hours lecture and 1 hour tutorial per week

Credits: 5

Objectives

- To impart the knowledge on the need and requirement of an interface between Man and Machine; to enable the learners to identify the difference between the system software and the application software and their design requirements.
- To teach the features of operating systems and the fundamental theory associated with process, memory and file management components of operating systems.

Module I (16 hours)
Review of operating system strategies - resources - processes - threads - objects, -operating system organization - design factors - functions and implementation considerations - devices - characteristics - controllers - drivers – device management - approaches - buffering - device drivers - typical scenarios such as serial communications - storage devices etc.

Module II (14 hours)
Process management - system view - process address space - process and resource abstraction - process hierarchy - scheduling mechanisms - various strategies - synchronization - interacting & coordinating processes - semaphores - deadlock - prevention - avoidance - detection and recovery.

Module III (17 hours)
Memory management - issues - memory allocation - dynamic relocation various management strategies - virtual memory - paging - issues and algorithms segmentation - typical implementations of paging & segmentation systems.

Module IV (18 hours)
File management - files - implementations - storage abstractions - memory mapped files - directories and their implementation - protection and security - policy and mechanism - authentication - authorization - case study of Unix kernel and Microsoft windows NT (concepts only).

Text Books

1. Nutt G.J., Operating Systems - A Modern Perspective, Addison Wesley.

Reference Books

1. Silberschatz & Galvin, Operating System Concepts, Addison Wesley
2. Crowley C, Operating Systems- A Design Oriented Approach, Tata McGrawHill
3. Tanenbaum A.S., Modern Operating Systems, Prentice Hall, Pearson Education.

Internal Continuous Assessment (Maximum Marks-30)

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

University Examination Pattern

PART A:	Short answer questions (one/two sentences) All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	5 x 2 marks=10 marks
PART B:	Analytical/Problem solving questions Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	4 x 5 marks=20 marks
PART C:	Descriptive/Analytical/Problem solving questions Two questions from each module with choice to answer one question.	4 x 10 marks=40 marks

Maximum Total Marks: 70

CS09 505: Digital Data Communication

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

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

Module I (13 hours)
Data and Signals – Analog and Digital – Data transmission – Basics – Transmission impairments – Data rate limits – performance – Digital transmission – Analog transmission – Bandwidth utilization – channel capacity – multiplexing – spread spectrum – asynchronous transmission – synchronous transmission – signal propogation delay – transmission media - guided media – unguided media

Module II (13 hours)
Digital to analog conversion – analog to digital conversion – transmission modes – error detection and correction – introduction – block coding – cyclic codes – checksum – data compression.

Module III (13 hours)
Telephone network – dial up modems – digital subscriber line – cable TV networks for data transfer switching – switching – circuit switched networks – datagram networks – virtual circuit networks – structure of a switch.

Module IV (13 hours)
Data link control – framing – flow control – error control – protocol basics – character oriented protocols – bit oriented protocols – noiseless channels – noisy channels – HDLC – point to point protocol.

Text Books

1. Behrouz Forouzan, Data Communication and Networking, Tata McGraw Hill.

Reference Books

1. William Stallings, Data and Computer Communications, Prentice Hall International Pvt. Ltd.
2. Fred Halsall, Data Communication, Computer Networks and Open Systems, Pearson Education.
3. Harold Kolimbris, Digital Communication Systems, Pearson Education

Internal Continuous Assessment (Maximum Marks-30)

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

University Examination Pattern

PART A:	Short answer questions (one/two sentences) All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	5 x 2 marks=10 marks
PART B:	Analytical/Problem solving questions Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	4 x 5 marks=20 marks
PART C:	Descriptive/Analytical/Problem solving questions Two questions from each module with choice to answer one question.	4 x 10 marks=40 marks

Maximum Total Marks: 70

CS09 506: Theory of Computation

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

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

Module I (13 hours)
Introduction to formal proof - Inductive proofs - Concepts of automata theory - Deterministic finite automata - Nondeterministic finite Automata - equivalence of deterministic and nondeterministic finite automata - Nondeterministic Finite automata with a 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 - 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 - Recursive and Recursively Enumerable Languages - Halting problem of TMs - Undecidable problem about TMs - Rice's Theorem - Post Correspondence problem - Undecidability of Post Correspondence Problem - Undecidable problems on Languages.

Module IV (12 hours)
Intractable problems - The classes P and NP - Polynomial time reducibility -NP-Complete problems - The Satisfiability problem - NP-Completeness of the satisfiability problem - NP-Completeness of CSAT - NP-Completeness of 3SAT - Node cover problem - Directed Hamiltonian circuit problem - The class of languages Co-NP - Problems solvable in polynomial space.

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. Hopcroft J. E. & Ullman J. D., Introduction to Automata Theory, Languages and Computation, Narosa.
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-30)

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

University Examination Pattern

PART A:	Short answer questions (one/two sentences) All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	5 x 2 marks=10 marks
PART B:	Analytical/Problem solving questions Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	4 x 5 marks=20 marks
PART C:	Descriptive/Analytical/Problem solving questions Two questions from each module with choice to answer one question.	4 x 10 marks=40 marks

Maximum Total Marks: 70

CS09 507(P) : Programming Paradigms Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

- To impart the working experience on paradigms of programming.
- To focus on teaching the paradigms not the platforms. However, adequate knowledge about platform is a need for successful experimentation.

Lab. 1: (object-oriented programming in - Java /C+ +) - programming to bring out the concept of classes and objects- for example the abstract data type binary tree.

Lab 2: (object-oriented programming) - programming to demonstrate inheritance and class hierarchy - for example define a base class "shape" and derived classes for rectangle, square, ellipse, circle with proper class hierarchy.

Lab.3: (object oriented programming) programming to demonstrate polymorphism, virtual functions - for example define base class for vectors and use inheritance to define complex and real vector with standard operations.

Lab.4: (functional programming - in Lisp) - programming to demonstrate functional specification for a solution - for example implementation of quick sort.

Lab.5: (functional programming) - programming to demonstrate implementation of conventional data structures - for example implementation of binary search tree with insertion, deletion and search operations.

Lab.6: (functional programming) - programming to demonstrate the use of available data structures in functional programming languages - for example implementation of set with membership, union and intersection operations

Lab.7: (logic programming - in prolog) - programming to demonstrate ready implementation of propositional logic statements- for example to find the gcd of two given integers.

Lab.8: (logic programming) - programming to demonstrate language specific features - for example implementation of a logic program to check whether a given NFA accepts the given string.

Lab.9: (concurrent programming- in Java) - demonstration of concurrency support - for example programming to find the least common ancestor of two given nodes in a binary tree.

Lab.10: (concurrent programming- in Java) - demonstration of synchronized concurrency - for example programming for the readers and writers problem.

Reference Books

1. Sethi R., Programming Languages: Concepts and Constructs, Addison Wesley
2. Appleby D. & Vandekopple J.J., Programming Languages: Paradigm and Practice, Tata McGraw Hill
3. Luger & Stubblefield, Artificial Intelligence, Addison Wesley
4. Samuel A. Rebelsky, Experiments in Java, Pearson Education.

Internal Continuous Assessment (Maximum Marks-50)

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

CS09 508(P) Hardware Lab

Teaching scheme
3 hours practical per week

Credits: 2

Objectives

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

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

Lab 2 : Assembly language program for implementing arithmetic operations.

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

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

Lab 6: ADC interface.

Lab 7: Stepper Motor interface using DAC.

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

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

Reference Books

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

Internal Continuous Assessment (Maximum Marks-50)

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

Semester End Examination (Maximum Marks-50)

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

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