TEACHING & EXAMINATION SCHEME FOR B TECH PROGRAMME IN COMPUTER ENGINEERING SEM VI

Sem.	Subject Code	Subject Name	Teaching Scheme				Credit			Examination Scheme(Marks)				
										Theory			Prac / TW	Total
										Int. Asse.	Sem.End			
			Lect Hrs	Tu Hrs	Prac Hrs	Total	Theory	Pra/ TW	Total		Marks	Hrs.		
TY Sem-6	2CE601	Theory of Computation	3	0	2	5	3	1	4	30	70	3	50	150
	2CE602	Network Protocols & Programming	3	0	2	5	3	1	4	30	70	3	50	150
	2CE603	Information System Security	3	0	2	5	3	1	4	30	70	3	50	150
	2CE604	Design & Analysis of Algorithms	3	0	2	5	3	1	4	30	70	3	50	150
	2CE605	Elective II	3	0	2	5	3	1	4	30	70	3	50	150
	2CE606	Seminar	0	0	2	2	0	1	1	-	-	-	50	50
	2CE607	Mini Project	0	0	2	2	0	1	1	-	-	-	50	50
	Total		**15**	**0**	**14**	**29**	**15**	**7**	**22**	150	**350**	**15**	**350**	**850**

Elective II

1) Distributed Systems
2) Embedded Systems

2CE601: Theory of Computation

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / Tw	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
3	2	5	3	1	4	30	70	3	50	150

Review Of Mathematical Background:
Sets, Functions, Logical statements, Proofs, Relations, Languages, The Principal of Mathematical induction, the strong principle of Mathematical induction, Recursive definitions, Structural Induction

Regular Languages And Finite Automata:
Regular expressions, Regular languages, Memory required to recognize a language , Finite automata, Distinguishable strings, Union, intersection and complement of regular languages.

Nondeterminism And Kleen's Theorem:
Non-deterministic finite automata, Non deterministic finite automata with ^ transitions, Kleen's theorem

Regular And Non Regular Language:
Minimization of Finite automata, Non-regular and regular languages, Pumping Lemma, Decision problems and decision algorithms, Regular languages in relation to programming languages.

Context-Free Languages and Push-Down Automata:
Context-free languages, Regular Grammars, Derivation tree and ambiguity, An Unambiguous CFG , Simplified and Normal forms, Chomsky normal form.

Pushdown Automata and CFL:
Push -Down Automata, Definition and examples, Deterministic PDA, Types of acceptances and their equivalence, Equivalence of CFG and PDA, Introduction to parsing, Top-down and bottom-up parsing, Non-CFL and CFL, Pumping Lemma for CFL, Intersection and Complement of CFL.

Turing Machine:
Models of computation, TM definition, Combining TMs, Computing a function with TMs. Variations on Turing Machines, Doubly infinite and more than one Tapes, Non-deterministic and Universal TM

Reference Books:

1. Introduction to Languages and Theory of Computation: By John C. Martin
2. Computation: Finite and Infinite: By Marvin L. Minsky, Prentice-Hall, 1967
3. Introduction to formal languages: By G. E. Reevsz, Mc-graw hill.
4. Formal language theory: By M. H. Harrison

2CE602: Network Protocols & Programming

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / Tw	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
3	2	5	3	1	4	30	70	3	50	150

Introduction:
The OSI Model and the TCP/IP Protocol Suite, Underlying Technologies

IP Addresses:
Classful Addressing, Classless Addressing, Delivery, Forwarding, and Routing of IP Packets, ARP and RARP, Internet Protocol (IP), Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP), User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Stream Control Transmission Protocol (SCTP)

Unicast Routing Protocols:
RIP, OSPF, and BGP

Multicasting and Multicast Routing Protocols, Host Configuration:
BOOTP and DHCP

Domain Name System (DNS)

Remote Login:
TELNET

File Transfer:
FTP and TFTP

Electronic Mail:
SMTP, POP, and IMAP

Network Management:
SNMP

World Wide Web:
HTTP

Reference Book:

1. TCP/IP Protocol Suite, 3/e By Behrouz Forouzan, Tata-mc-graw hill.
2. TCP/IP Illustrated, Volume I By W. Richard Stevens, Low Price Edition
3. Internetworking with tcp/ip: principles, protocols, and architecture vol. I By comer, douglas

2CE603: Information System Security

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / Tw	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
3	2	5	3	1	4	30	70	3	50	150

Introduction: Security goals, attacks, Security services, security mechanisms

Cryptographic Mathematics: Modular arithmetic, linear congruence, Algebraic structure, checking of primeness, primality testing, Chinese remainder theorem, quadratic congruence

Classical Ciphers: Symmetric cipher model, substitution ciphers, transposition ciphers, stegnography

Modern symmetric key ciphers: modern block ciphers, modern modern stream ciphers, Data Encryption standard, advanced encryption standard, Electronic code book mode, CBC, cipher feedback mode, output feedback mode

Public key cryptography: RSA, RSA proof, RSA attacks, Rabin cryptosystem, Key management: Diffie Hellman

Message Authentication and Hash functions: Authentication requirements, functions, Message authentication codes (MAC), Hash functions, security of Hash functions

Hash algorithms: SHA- 512

Digital Signatures: basics, digital signature standards

IP Security

Reference Books:

1. William Stallings: “Cryptography and Network Security – Principles and Practice”, 4/E, Pearson Education, 2005.
2. Bruce Scheneir: “Applied Cryptography”, 2/E, John Wiley, 1996.
3. Behrouz Forouzan: “Cryptography & Network Security”, 1/E, TMH, 2007.

2CE604: Design & Analysis of Algorithms

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / Tw	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
3	2	5	3	1	4	30	70	3	50	150

Elementary Algorithms:
Problems & instances, efficiency of algorithms, average & worst case analyses, elementary operation, reasons for analyzing efficiency

Asymptotic Notation:
Big 'oh' notation, other asymptotic notation, conditional asymptotic notation, asymptotic notation with several parameters, operations on asymptotic notation

Models of Computation:
Random Access Machines, computational complexity of RAM programs, a stored program model, abstractions of RAM - straight-line programs, Turing Machines, relationship between Turing Machines and RAM.

Analysis of Algorithms:
Analyzing control structures, barometer instructions, examples of their use, average-case analysis, amortized analysis.

Solving Recurrences:
Intelligent guesswork, homogeneous recurrences, inhomogeneous recurrences, change of variable, range transformations, asymptotic recurrences, substitution method, iteration method, recurrence trees, master method & master theorem.

Divide and Conquer:
Characteristics, the general template, applications: binary search, merge sort, quick sort, matrix multiplication, counting inversion.

Greedy Algorithms:
General characteristics of greedy algorithms and examples, applications: Kruskal's and Prim's algorithms, shortest path problem, knapsack problem, scheduling problem.

Dynamic Programming:
General characteristics and examples, principle of optimality, applications: binomial coefficients, making change, knapsack problem, floyd's algorithm, chained matrix multiplication. Approach using recursion, memory functions.

Graph Algorithms:
Depth-first search, breadth-first search, topological ordering & sorting, backtracking, application of backtracking: knapsack problem. Branch & bound, application: the assignment problem, general considerations.

Computational Complexity:
Introduction, information-theoretic arguments: complexity and sorting, complexity and algorithmic, introduction to NP completeness, the classes P and NP, polynomial reductions, NP complete problems.

Reference Books:

1. Fundamentals of Algorithmics by Brassard & Bratley, Prentice Hall of India
2. Introduction to Algorithms by Cormen, Leiserson, Rivest, Prentice Hall of India
3. Ellis Horowitz, Sartaj Sahni, Fundamentals of computer algorithms, Computer Science Press

2CE605: Distributed Systems (Elective - II)

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / Tw	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
3	2	5	3	1	4	30	70	3	50	150

Introduction:
Definition of a Distributed System- Types, Characteristics and Reasons for Distributed System, Goals-Connecting Users and Resources, Transparency, Openness, Scalability, Distributes Systems Vs. Centralized Systems, Hardware concepts- Multiprocessors, Homogeneous Multicomputer Systems Heterogeneous Multicomputer Systems, Software concepts- Distributed Operating Systems, Network Operating Systems, Middleware

Communication:
Architectures- Architectural Models, The Client-Server Model: Application Layering, Client-Server Addressing, Remote Procedure call, SUN RPC Operation Example - SUN RPC, LRPC Example: DCE RPC, Remote Object Invocation-The General Architecture, Steps for Developing an RMI system, Remote Interfaces and Classes, Example

Processes:
Processes and Threads-Major differences, Multithreading, Approaches of Implementing Threads, Thread Implementation, Virtualization, Code Migration, Reasons for Migrating Code, Models for Code Migration, Migration and Local Resources, Simple Solutions, Migration of Memory, Migration in Heterogeneous system, Secure Code Migration, Mobile Agent Systems- Agent – definition, Agent Types and Characteristics, Examples, Mobile Agent, IBM Aglet

Synchronization:
Clock synchronization-Physical Clocks, Clock Synchronization Algorithms, Use of Synchronized Clocks, Logical Clocks-Lamport timestamps, Vector timestamps, Election Algorithms - The Bully Algorithm, A Ring Algorithm, Mutual Exclusion- A Centralized Algorithm, Distributed Algorithm, A Token Ring Algorithm, A Comparison of the Three Algorithms

Distributed File Systems:
File system, DFS- definition, Characteristics, Goals, SUN NFS-NFS Architecture, NFS Implementation, Protocols, The CODA file system-Design Overview, An Example, Design Rational, Implementation, The GOOGLE file system-Definition, Architectures, GFS Architecture

Web Services:
Introduction, Web services architecture, Web Services Technologies

Reference Books:

1. Distributed Systems: Principles and Paradigms by Andrew S. Tanenbaum, Prentice Hall.
2. Distributed Systems: Concepts and Design By George Coulouris, Addison,Wesley.
3. Distributed Operating Systems by A S Tanenbaum, Pearson Education

2CE605: Embedded Systems (Elective - II)

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / TW	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
3	2	5	3	1	4	30	70	3	50	150

An overview of embedded systems:
Introduction to embedded systems, Categories and requirements of embeddedsystems, Challenges and issues related to embedded software development, Hardware/Software co-design, Introduction to IC technology, Introduction to design technology.

Embedded Software development:
Concepts of concurrency, processes, threads, mutual exclusion and inter process communication, Models and languages for embedded software, Synchronous approach to embedded system design, Scheduling paradigms, Scheduling algorithms, Introduction to RTOS, Basic design using RTOS.

Embedded C Language:
Real time methods, Mixing C and Assembly, Standard I/O functions, Preprocessor directives, Study of C compilers and IDE, Programming thetarget device

Hardware for embedded systems:
Various interface standards, Various methods of interfacing, Parallel I/Ointerface, Blind counting synchronization and Gadfly Busy waiting, Parallel portinterfacing with switches, keypads and display units, Memory and high speedinterfacing, Interfacing of data acquisition systems, Interfacing of controllers,Serial communication interface, Implementation of above concepts using C language.

Study of ATMEL RISC Processor:
Architecture, Memory, Reset and interrupt , functions, Parallel I/O ports,Timers/Counters, Serial communication, Analog interfaces, Implementation ofabove concepts using C language, Implementation of above concepts using C language.

Case studies and Applications of embedded systems:
Applications to: Communication, Networking, Database, Process Control.
Case Studies of: Digital Camera, Network Router, RTLinux.

Reference Books:
1. Raj Kamal, “Embedded Systems”, TMH
2. David E. Simon, “An Embedded Software Primer ", Pearson Education
3. Muhammad Ali Mazidi and Janice GillispieMazidi, “The 8051Microcontroller andEmbedded Systems", Pearson EducationReference Books:

4. Frank Vahid, Tony Givargis, “Embedded System Design: A Unified Hardware/Software Introduction", John Wiley
5. Craig Hollabaugh, “Embedded Linux", Pearson Education
6. Daniel Lewis, “Fundamentals of Embedded Software”, Pearson Education.
7. Barnett, Cox, O’Cull, “Embedded C Programming and the Atmel AVR ", ThomsonLearning
8. MykePredko, “Programming and Customizing the 8051 Microcontroller”, TMH
9. Shibu, Introduction to Embedded Systems, McGrawHill.
10. Computers As Components, Wolf, Elsevier
11. Embedded System Design, Heath, Elsevier

2CE606: Seminar

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / TW	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
-	2	2	-	1	1	-	-	-	50	50

Students have to choose seminar topic from recent trends and technology and at the end of semester they have to give presentation.

2CE607: Mini Project

Teaching Scheme			Credit			Examination Scheme(Marks)				
						Theory			Prac / TW	Total
						Int. Ass.	Sem.End			
Lect Hrs	Prac Hrs	Total	Theory	Pra/ Tw	Total		Marks	Hrs.		
-	2	2	-	1	1	-	-	-	50	50

Students have to carry out the project under the guidance of faculty member using the knowledge of subjects that he/she has learned up to 6th semester. Students have to submit project report with code at the end of the semester.