Computer Science & Engineering Department

Curriculum & Syllabus 2013-14

M.E.(CSE) Full Time & Part Time

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

(An Autonomous Institute of Government of Maharashtra)

Department of Computer Science & Engineering

Teaching and Evaluation Scheme

M.E.(Full-Time) in Computer Science &Engineering

Effective from academic year 2013-14

SEMESTER-I

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
							Theory			**Term Work**	**Practical /Viva-voce**	**Total**
			L	**T**	**P**		**Test**	**TA**	**ESE**			
1	CS541	Advanced Algorithms	03	01	-	04	20	20	60	-	-	100
2	CS542	Distributed Systems	03	01	-	04	20	20	60	-	-	100
3	CS543	Advanced Database Management System	03	01	-	04	20	20	60	-	-	100
4	CS544	Advanced Computer Networks	03	01	-	04	20	20	60	-	-	100
5	CS545-CS547	Elective I	03	01	-	04	20	20	60	-	-	100
LABORATORY COURSES												
1	CS548	Seminar I	-	-	04	02	-	-	-	50	-	50
2	CS549	Software Project I	-	-	04	02	-	-	-	-	50	50
(A) Total of Semester - I			**15**	**05**	**08**	24	**100**	**100**	**300**	**50**	**50**	**600**

SEMESTER-II

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
							Theory			**Term Work**	**Practical/ Viva-voce**	**Total**
			L	**T**	**P**		**Test**	**TA**	**ESE**			
1	CS550	Advanced Data Mining	03	01	-	04	20	20	60	-	-	100
2	CS551	Parallel Processing	03	01	-	04	20	20	60	-	-	100
3	CS552	High Performance Computing	03	01	-	04	20	20	60	-	-	100
4	CS553	Information Security	03	01	-	04	20	20	60	-	-	100
5	CS554-CS556	Elective II	03	01	-	04	20	20	60	-	-	100
LABORATORY COURSES												
1	CS557	Seminar II	-	-	04	02	-	-	-	50	-	50
2	CS558	Software Project II		-	04	02	-	-	-	-	50	50
(B) Total of Semester- II			**15**	**05**	**08**	24	**100**	**100**	**300**	**50**	**50**	**600**
Grand Total = (A) + (B)			**30**	**10**	**16**	48	**200**	**200**	**600**	**100**	**100**	**1200**

L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination

Elective I		Elective II	
CS545	Computer Vision	CS554	Biometrics & Human Interface
CS546	Embedded System	CS555	Microcontroller Based System Design
CS547	Soft Computing	CS556	Wireless Sensor Network

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

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Department of Computer Science & Engineering

Proposed Teaching and Evaluation Scheme

M.E.(Full-Time) in Computer Science &Engineering

SEMESTER-III

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1		Institute Elective	03	01	-	04	20	20	60	-	-	100
2		Environmental studies & Science	03	01		04	20	20	60	-	-	100
LABORATORY COURSES												
1	CS603	Dissertation-I	-	-	12	06	-	-	-	100	-	100
(A) Total of Semester - I			**06**	02	12	14	**40**	**40**	**120**	**100**	**-**	**300**

SEMESTER-IV

LABORATORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
LABORATORY COURSES												
1	CS604	Dissertation-II	-	-	28	14	-	-	-	50	150	200
(B) Total of Semester- II			-	-	28	14	**-**	**-**	**-**	**50**	**150**	**200**
Grand Total = (A) + (B)			**03**	01	48	28	**20**	**20**	**60**	**150**	**150**	**400**

L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination

Institute Elective			
	Research Methodology		Finite Element Method
	Optimization Techniques		Intellectual Property Rights
	Disaster Management	CS559	Professional Ethics & Cyber Law
	Indian Constitution	CS560	Web Technologies
	Financial Management		Nano Technology

CS541 ADVANCED ALGORITHMS

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To expose design and analysis techniques for algorithms.
- To apply different techniques/paradigms to solve new problems that may arise in various applications,
- To identify connections between algorithmic problems and reducing them to each other,
- To solve more complex algorithms.
- To understand some pieces of current research on algorithms.
- To discuss ways to approach NP-complete problems.

Course Outcomes Expected:

After Completing the course student will be able to

- Identify and select appropriate techniques for problem solving.
- Analyze algorithmic complexity using different complexity measures.
- Apply various algorithms to solve real world problems

UNIT 1 Introduction: Revision of fundamental algorithms, sorting, searching, recursion, Algebraic simplification and transformation: The general method, evaluation and interpolation, FFT, modular arithmetic.

UNIT 2 Lower Bound Theory: Comparison trees for sorting and searching, techniques for algebraic problems, some lower bounds on parallel computation

UNIT 3 NP hard and NP complete problems: basic concepts, Cook's theorem, NP hard graph problems, NP hard scheduling problems, NP hard code generation problems, some simplified NP-hard problems

UNIT 4 Approximate algorithms for NP hard problems: Introduction, absolute approximation, epsilon approximation, polynomial time approximation schemes, probabilistically good algorithms.

UNIT 5 Parallel algorithms: Complexity measure for a parallel algorithm, parallel searching algorithm, parallel sorting algorithm, parallel algorithm for matrix manipulation, parallel algorithms for path problems- shortest path and related path problems

TEXT BOOKS:

1. Thomas H. Cormen. Charles E. Leiserson. Ronald L. Rivest. Clifford Stein. "Introduction to Algorithms", 3rd Edition MIT.
2. A.V. Aho, Hoperoft and J.D. Ullman,"Design analysis of computer algorithms", Addison Wesley
3. Elis Horowitz and Sahni, "Fundamentals of computer algorithms", Wiley student edition

REFERENCE BOOKS:

1. R.E. Tarjan, " Data structures and network algorithms", SIAM press
2. K. Mehlhorn ,"Data structures and algorithms", Vol II – Springer Verlag

CS542 Distributed Systems

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To expose the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- To discuss multiple levels of distributed algorithms, distributed file systems, distributed databases, security and protection.

Course Outcomes Expected:

After Completing the course student will be able to

- Create models for distributed systems.
- Apply different techniques learned in the distributed system.

UNIT 1 Introduction to Distributed Computing Systems, System Models, and Issues in Designing a Distributed Operating System, Examples of distributed systems.

UNIT 2 Features of Message Passing System, Synchronization and Buffering, Introduction to RPC and its models, Transparency of RPC, Implementation Mechanism, Stub Generation and RPC Messages, Server Management, Call Semantics, Communication Protocols and Client Server Binding.

UNIT 3 Introduction, Design and implementation of DSM system, Granularity and Consistency Model, Advantages of DSM, Clock Synchronization, Event Ordering, Mutual exclusion, Deadlock, Election Algorithms.

UNIT 4 Task Assignment Approach, Load Balancing Approach, Load Sharing Approach, Process Migration and Threads.

UNIT 5 File Models, File Accessing Models, File Sharing Semantics, File Caching Schemes, File Replication, Atomic Transactions, Cryptography, Authentication, Access control and Digital Signatures.

TEXT BOOKS:

1. Pradeep. K. Sinha: "Distributed Operating Systems: Concepts and Design", PHI, 2007.
2. George Coulouris, Jean Dollimore, Tim Kindberg: "Distributed Systems", Concept and Design, 3rd Edition, Pearson Education, 2005.

REFERENCE BOOKS:

1. A.D. Kshemkalyani, M. Singhal, "Distributed Computing: Principles, Algorithms, and Systems", ISBN: 9780521189842, paperback edition, Cambridge University Press, March

2 HagitAttiya, Jennifer Welch , "Distributed Computing: Fundamentals, Simulations, and Advanced Topics",Wiley

CS543 Advanced Database Management Systems

Teaching Scheme		Evaluation Scheme	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To describe the design of Distributed Databases and object databases.
- To discuss various concepts of long duration transaction through (nested transactions, workflows, sagas).
- To determine the process of Query processing and evaluation for distributed and parallel databases.

Course Outcomes Expected:

After Completing the course student will be able to

- Design an Object Oriented DBMS.
- Design distributed /parallel DBMS.
- Select appropriate transaction model.

UNIT 1 Object Oriented Databases: Persistent Programming Languages, Object Identity and its implementation, Clustering, Indexing, Client Server Object Bases.

UNIT 2 Parallel Databases: Parallel Architectures, performance measures, shared nothing/shared disk/shared memory based architectures

UNIT 3 Data partitioning, Intra-operator parallelism, Pipelining, Scheduling

UNIT 4 Distributed Databases: Query processing, semi-joins, query optimization, Concurrency control

UNIT 5 Advanced Transaction Models: Savepoints, Sagas, Nested Transactions

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TEXT BOOKS:

1. Korth and Silberschatz "Database System Concepts",Mcgraw hill 1991
2. R. Elmasri and S. Navathe, "Fundamentals of Database Systems", Benjamin Cummings, Second Edition, 1994.

REFERENCE BOOKS:

1. Ahmed K. Elmagarmid , "Database Transaction Models for Advanced Applications", (ed.), Morgan Kaufmann, 1993.
2. J. Gray and A. Reuter , "Transaction Processing, Concepts and Techniques", Morgan Kauffman, 1994.
3. Won Kim, MIT Press , "Introduction to Object Oriented Databases", MIT Press, 1989.

CS544 Advance computer Network

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

This module aims to provide a broad coverage of some new advanced topics in the field of computer networks (wireless networks, mobile networks, Mobile IP, etc.):

- To discuss the terminology and concepts of the reference model and the TCP-IPreference model.
- To discuss the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks
- To be familiar with wireless networking concepts.
- To distinguish between secret and public cryptography.
- To identify issues in networking technologies.

Course Outcomes Expected:

After Completing the course student will be able to

- Analyze and implement routing algorithms.
- Evaluate the performances of computer networks
- Design & use network simulators.

UNIT 1 Introduction : Overview of reference models : The OSI model, TCP/IP protocol suite, Internetworking protocols,Network Layer, Transport Layer, Applications Layer

UNIT 2 Addressing, IP versions, routing, Routing in the Internet: Intra and interdomain routing; Unicast Routing Protocols : RIP, OSPF, BGP,Socket programming

UNIT 3 Network Management and Services : SNMP : Concept, Management components, Multi-media over Internet : RTP, RSVP, IP Multicasting, VOIP

UNIT 4 VPN networks,Wireless Networks, Sensor Networks, Ad_hoc Networks, Mobile IP, Mobile TCP

UNIT 5 Cryptography, Enterprise Network Security : DMZ, NAT, Proxy

TEXT BOOKS:

1. B. A. Forouzan , “TCP/IP Protocol Suite”, Tata McGraw Hill edition, Third Edition.
2. N. Olifer V. Olifer, “Computer Networks:Principles, Technologies and Protocols for Network design”, Wiley India Edition (1st Edition).

REFERENCE BOOKS:

1. W. Richard Stevens, ”TCP/IP Volume 1, 2, 3”, Addison Wesley.
2. D. E. Comer , “TCP/IP Volume I and II”, Pearson Education.
3. W. R. Stevens, “Unix Network Programming , Vol. 1”, Pearson Education.
4. J. Walrand, P. Varaiya, “High Performance Communication Networks”, Morgan Kaufmann
5. A. S. Tanenbaum , “Computer Networks”, Pearson Education, Fourth Edition.

CS545 COMPUTER VISION

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

UNIT 1 **The image, its representations and properties –** image representations a few concepts, Image digitization, Digital image properties, Color images, Cameras : an overview.

UNIT 2 **The image, its mathematical and physical background –** Linear integral transforms, Images as stochastic processes, Image formation physics.

UNIT 3 **Segmentation II –** Mean Shift Segmentation , Active contour models – snakes, Geometric deformable model – level sets and geodesic active contours, Fuzzy connectivity, Towards 3D graph – based image segmentation, Graph cut segmentation, Optimal single and multiple surface segmentation.

UNIT 4 **Use of 3D vision –** Shape from X, Full 3D objects, 3D model-based vision, 2D view-based representations of a 3D scene, 3D reconstruction from an unorganized set of 2D views – a case study.

UNIT 5 **Texture –** Statistical texture description, Syntactic texture description methods, Hybrid texture description methods, Texture recognition method applications.

TEXT BOOKS:

1. Sonka-Hlavac-Boyle,"Digital Image processing and Computer Vision",CENGEAGE LEARNING

CS546 EMBEDDED SYSTEMS

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To discuss about real-time and quality of service system principles
- To discuss real-time operating systems and the resource management and quality of service issues that arise.
- To construct sample applications on representative platforms. Platforms range from handheld and mobile computers to media and real-time server systems.

UNIT 1 Embedded systems, Structural units, Design aspects, Real time O.S. & kernel security, Strategy for synchronization, Case study of RTOS & Embedded system

UNIT 2 Introduction to ARM7 & PIC architecture, ARM Instruction Set, Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions, Loading Constants

UNIT 3 Introduction to the Thumb Instruction Set, Thumb Register Usage ARM-Thumb Interworking, Other Branch Instructions, Data Processing Instructions, Single-Register Load-Store Instructions, Multiple-Register Load-Store Instructions, Stack Instructions, Software Interrupt Instruction

UNIT 4 Digital Signal Processing Representing a Digital Signal Introduction to DSP on the ARM FIR filters IIR Filters The Discrete Fourier Transform Exception and Interruput Handling Exception Handling Interrupts Interrupt Handling Schemes

UNIT 5 Firmware and Bootloader Example: Sandstone Embedded Operating Systems Fundamental Components Example: Simple Little Operating System Caches, The Memory Hierarchy and Cache Memory Cache Architecture Cache Policy Coprocessor Caches and Software Performance Memory Protection Units

TEXTBOOKS:

1. Raj Kamal , “Embedded systems, architecture, programming and design” , Tata McGrawhill 2003
2. Philip A Laplaute, “Real Time Systems Design & Analysis”, PHI
3. Dr.K.V.K.K. Prasad,“Embedded/Real-time Systems”,Dreamtech Publication
4. Frank Vahid/Tony Givargis,”Embedded System Design”, Wiley Student Edition

REFERENCE BOOKS:

1. Sloss, Symes, Right , “ARM System Developers’ Guide”

CS547 SOFT COMPUTING

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To use of soft computing paradigm for knowledge representation learning & adaptation & evolutionary computation.
- To identify various methodologies designed to model & enable solution to real world problems.
- To exploit the tolerance for imprecision uncertainty, approximate reasoning & partial truth in order to achieve close resemblance with human like decision making.

Course Outcomes Expected:

After Completing the course student will be able to

- Select & Apply appropriate N/W algorithm
- Apply concepts of logic designing to solve real world applications

UNIT 1 Computing with neural network: why is neural computation so important? Feedforward networks- backpropagation algorithm, radical basis functions

UNIT 2 Feedback neural network-analysis of pattern storage networks, stochastic networks and simulated annealing, boltzman machine

UNIT 3 Competitive neural networks-components, analysis. Hardware realization of ANNs.

UNIT 4 Introduction to neuro fuzzy systems, fuzzy sets and logic, fuzzy system design procedures ,Fuzzy/ANN designs and implementation

TEXT BOOKS:

1. Robert J. Schalkoff, “Artificial Neural Networks” -MGH
2. S.R.Jang,C.T.sun , “Neuro Fuzzy and Soft Computing “,E.Mizutani-Person
3. S.N.Sivanandam,S.N.Deepa,“Principles of Soft Computing”,Second Edition, Wiley India Edition

CS548 Seminar-I

Teaching Scheme		**Evaluation Scheme**	
Practical	4 Hrs/Week	Term Work	50 Marks
Credit	2		

The seminar will consist of a typewritten report covering the topic selected for the seminar. The candidate shall deliver seminar on the topic which will be judged internally in the Dept. by two examiners and the marks will be given accordingly.

CS549 Software Project-I

Teaching Scheme		**Evaluation Scheme**	
Practical	4 Hrs/Week	Term Work	
Credit	2	Practical/Viva-voce	50 Marks

A minimum of three programs/miniproject based on subjects of Part - I should be completed and a record for the same shall be submitted.

Practical examination will consist of an oral examination.

1. The assessment in the oral examination
2. Record of programs/ projects submitted by the candidate.

CS550 Advanced Data Mining

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To provide advanced principles required for solving data mining problem.
- To discuss principles required for the design, implementation and analysis of complex data mining experiments.
- To be familiar with advanced concepts of data mining .
- To formulate and solve problems using fundamental data mining methodologies.
- To select a suitable model for a given statistical problem and dataset.
- To expose students to the cutting-edge of research in these areas.

Course Outcomes Expected:

After Completing the course student will be able to

- Describe and utilize a range of techniques for designing data mining.
- Appreciate the strengths and limitations of various data mining models.
- Appreciate the practical implications and limitations of data mining analyses applied to real-life situations.
- Demonstrate functionality of the various web mining and web search components and appreciate the strengths and limitations of various web mining and web search models.
- Apply tools and techniques employed in data mining for different application domains.
- Describe different types of research and understand alternative research paradigms.

UNIT 1 Data Preprocessing,Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage.

UNIT 2 Statistical principles and tools for supervised learning from data, Classification and prediction models, including generalized additive models, support vector machines,Ensemble methods, including bagging and boosting, Bayes' theorem to combine data information with other prior information, Bayesian hypothesis testing. Bayesian belief networks.

UNIT 3 Principles and tools for dividing objects into groups and discovering relationships hidden in large data sets, Partitional methods and hierarchical clustering, Density-Based Methods, Outlier Analysis,Cluster evaluation, Association analysis ,using item sets and association rules, Evaluation of association patterns.

UNIT 4 Time series decomposition, Autocorrelation and partial autocorrelation, Forecasting using time series regression, ARIMA models and transfer functions, Intervention

analysis, Trend detection, Mining Spatial Databases,Bio-medical databases.

UNIT 5 Mining the World Wide Web, link analysis (HITS, PageRank),large-scale systems (MapReduce), clustering of Web search results, Web 2.0,social networks,Semantic Web

TEXT BOOKS:

1. JiaweiHan,MichelineKamber, "DataMining:Concepts and Techniques", Morgan Kauffman,second edition
2. Margaret dunham," Data Mining -Introductory and advanced topics", Pearson education
3. Antony scime, Web mining:applications and techniques
4. GalitShmueli, Nitin R.Patel,PeterC.Bruce,"Data Mining for Business Intelligence",Wiley India Edition
5. Michael J.A.Berry, Gordon S.Linoff, "Mastering Data Mining", Wiley Student Edition

REFERENCE BOOKS:

1. Robert Nisbet, John Elder, Gary Miner, Handbook of Statistical Analysis and Data Mining Applications, Elsevier, 2009
2. SoumenChakrabartI, Mining the Web: Discovering Knowledge from Hypertext Data

CS551 PARALLEL PROCESSING

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

1. To discuss parallel Architectures.
2. To design & describe parallel models and organizations.

UNIT1 **Parallel computer models**: The state of computing , Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks

Program and network properties : Conditions of parallelism, Data and resource dependences,Hardware and software parallelism,Program partitioning and scheduling, Grain size and latency, Program flow mechanisms,Control flow versus data flow,Dataflow architecture,Demand drive Mechanisms,Comparisons of flow mechanisms

UNIT 2 **System Interconnect Architectures:** Network properties and routing, Static interconnection networks,Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems,Crossbar switch and multiport memory,Multistage and combining network.Processors and Memory Hierarchy : Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors Memory Technology :Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

UNIT 3 **Backplane Bus System:** Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches. Pipelining :Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines

UNIT 4 **Vector Processing Principles:** Vector instruction types, Vector-access memory schemes.Synchronous Parallel Processing : SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement

TEXT BOOKS:

1. Kai Hwang, **"**Advanced computer architecture**";** TMH, 2000.
2. J.P.Hayes, **"**computer Architecture and organization**",** MGH, 1998.

REFERENCES BOOKS:

1. M.J Flynn, **"**Computer Architecture, Pipelined and Parallel Processor Design**",**Narosa Publishing,1998.
2. D.A.Patterson, J.L.Hennessy, **"**Computer Architecture :A quantitative approach**",** MorganKauffmann, 2002.
3. Hwang and Briggs, **"**Computer Architecture and Parallel Processing**";** MGH, 2000.

CS552 HIGH PERFORMANCE COMPUTING

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To discuss need for the design of HPC System.
- To provide vision for how computing can seamlessly scale from single processor to limitless computing power.
- To expose analysis of current issues including parallel, cloud computing.

Course Outcomes Expected:

After Completing the course student will be able to

- Design HPC System.
- Apply different computing techniques.

UNIT 1 Overview of Grid Computing Technology, History of Grid Computing, High Performance Computing, Cluster Computing. Peer-to-Peer Computing, Internet Computing, Grid Computing Model and Protocols, Types of Grids: Desktop Grids, Cluster Grids, Data Grids, High- Performance Grids, Applications and Architectures of High Performance Grids, High Performance Application Development Environment.

UNIT 2 Open Grid Services Architecture, Introduction, Requirements, Capabilities, Security Considerations, GLOBUS Toolkit.

UNIT 3 Overview of Cluster Computing, Cluster Computer and its Architecture, Clusters Classifications, Components for Clusters, Cluster Middleware and SSI, Resource Management and Scheduling, Programming, Environments and Tools, Cluster Applications, Cluster Systems,

UNIT 4 Beowulf Cluster: The Beowulf Model, Application Domains, Beowulf System Architecture, Software Practices, Parallel Programming with MPL, Parallel Virtual Machine (PVM).

UNIT 5 Overview of Cloud Computing, Types of Cloud, Cyber infrastructure, Service Oriented Architecture Cloud Computing Components: Infrastructure, Storage, Platform, Application, Services, Clients, Cloud Computing Architecture.

TEXT BOOKS:

1. Ahmar Abbas, “Grid Computing: Practical Guide to Technology & Applications”, Firewall
Media, 2004.
2. Joshy Joseph and Craig Fellenstein , “Grid Computing” Pearson Education, 2004.
3. lan Foster, et al.,“The Open Grid Services Architecture”, Version 1.5 (GFD.80). Open Grid
Forum, 2006. (available at http://www.ogf.org)

REFERENCE BOOKS:

1. Ian Foster. *Globus Tool kit Version 4: Software for Service-Oriented Systems*. IFIP

International Conference on Network and Parallel Computing, Springer-Verlag LNCS 3779, pp 2-13,2006. (available athttp://www.globus.org/)

2. RajkumarBuyya. High Performance Cluster Computing: Architectures and Systems. Prentice-Hall India, 1999.

CS553 Information Security

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To Discuss the importance of IS security
- To demonstrate protecting the privacy and confidentiality of data
- To Know/understand the security and privacy and how to apply them
- To identify management, technical, personnel, operational, and physical security controls
- To expose students to the security requirements for protecting workstations and the information processed on them
- To discuss general physical/environmental security requirements
- General understanding of network security

Course Outcomes Expected:

After Completing the course student will be able to

- Identify external and internal threats to an organization
- Aware about information security and its importance
- Identify how threats to an organization are discovered, analyzed, and dealt with
- Discuss fundamentals of secret and public cryptography
- Develop protocols for security services
- Analyze network security threats and countermeasures
- Discuss & design security solutions for network using available secure solutions (such as PGP, SSL, IPSec, etc)
- To be exposed to original research in network security

UNIT 1 General security concepts, Cryptography, Network security.

UNIT 2 Information Security: Introduction to information hiding, information hiding in noisy data, a survey of steganographic techniques, watermarking.

UNIT 3 Biometrics security: biometric identification, verification, authentication, different biometric techniques.

UNIT 4 Intrusion detection systems, security on the Internet and the World Wide Web, Attack Techniques.

UNIT 5 Security in OS: Security in Windows, Linux.

TEXT BOOKS:

1. William stalling “Network security essential”.
2. Katzendbisser, Peticolas, “Information Hiding techniques for Steganography and Digital Watermarking” Artech House.
3. Bolle, Connel, **“**Guide to Biometrics**”,** Springer

4.Nina Godbole,**"**Information Systems Security**",**Wiley India Edition

5.Deven N.Shah**,"**Mark Stamp's Information Security principles and Practice**",** Wiley India Edition

REFERENCE BOOKS:

1.RickLehtinen, Deborah Russel**"**Computer security basics**"** O'Reilly.

CS554 Biometrics and human Interface

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To Provide an in-depth survey of the state-of-the-art in biometric recognition.
- To Present in detail recent advances in techniques for biometric recognition.

Course Outcomes Expected:

After Completing the course student will be able to

- Design a biometric system with enhanced performance than present techniques.
- Develop various applications using biometric concepts

UNIT-1 **Pattern Recognition:** Nonparametric decision making – Kernel and window estimator, nearest neighbor classification techniques, Adaptive decision boundaries, adaptive descriminant functions, minimum squared error descriminant functions, clustering – Hierarchical clustering, partitional clustering.

UNIT 2 **Biometric systems:** Biometric systems, comparison of biometric systems, biometric system errors

UNIT 3 **Fingerprint recognition:** Fingerprint sensing, fingerprint analysis and representation, matching, classification and clustering, securing fingerprint systems

UNIT 4 **Face recognition & Iris recognition:** Component based, geometric based and appearance based methods, 3-D face recognition, image acquisition, feature – PCA, ICA, FLD, SIFT, problems, recognition by thermal, face variation, Iris recognition system

UNIT 5 **Multimodal biometrics:** Image fusion, classification modes, Comparison of unimodal and multimodal.

TEXTBOOKS:

1. Earl Gose, Steve Jost, **"**Pattern recognition and image analysis**"**, PHI.
2. Anil K Jain , **"**Fundamentals of Digital Image Processing**"**

REFERENCE BOOKS:

1. A.K.Jain, **"**Handbook of fingerprint recognition", Springer.

2. A.K.Jain, “Encyclopedia of biometrics”, Springer.

3. Willbert O. Galitz, ”The Essentiall Guide to User Interface”, Second edition

CS555 Microcontroller Based System Design

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To discuss the basic building blocks of a microcontroller device in general.
- To define terminologies like embedded and external memory devices, CISC and RISC processors etc.
- To discuss the architecture and silent features of 8051 microcontrollers.
- To discuss the architecture of ARM.
- To expose to Real time operating system concepts.

Course Outcomes Expected:

After Completing the course student will be able to

- Design ARM controller

UNIT 1 Introduction to PIC architecture, Data memory organization, Basic Architecture and control Instructions, PIC18 assembly language program, clock and instruction execution

UNIT 2 Unsigned Arithmatic, logical conditional operations, Extended Precision and signed operations, subroutines and pointers, Fixed point and saturating Arithmatic

UNIT 3 System startup and parallel i/o, c compilation, startup schematic for PIC, Data sheet reading skill, Experimenting with Reset, Sleep, Watchdog timers, parallel port . LED/Switch I/O, Asynchronous Serial i/o, PIC USART, Synchronous serial I/O, I2C Bus

UNIT 4 PIC Interrupt basics, Interrupt driven I/O, PIC ADC, Timers, Using capture mode for Frequency Measurement, External Memory Interfacing, CAN and USB, Serial bootloaders, RTOS & PIC

TEXTBOOK:

1. Robert B. Reese, Da Vinci , “ Microprocessors From Assembly Language to C Using the PIC18Fxx2”, Engineering Press

CS556 Wireless sensor network

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorials	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	4	End-Semester Examination	60 Marks

Total Hours required for this course: 60 Hours.

Course Educational Objectives:

- To provide awareness about challenges wireless sensor networks
- To acquire knowledge of various networking sensors
- To comprehend the infrastructure establishment
- To discuss sensor network platforms and tools

UNIT 1 OVERVIEW OF WIRELESS SENSOR NETWORKS

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless SensorNetworks.

UNIT 2 ARCHITECTURES

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios.

UNIT 3 NETWORKING SENSORS

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC.

UNIT 4 INFRASTRUCTURE ESTABLISHMENT

Topology Control , Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT 5 SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms.

TEXT BOOK:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.

REFERENCE BOOK:

1. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

CS557 Seminar-II

Teaching Scheme		**Evaluation Scheme**	
Practical	4 Hrs/Week	Term Work	50 Marks
Credit	2		

The seminar will consist of a typewritten report covering the topic selected for the seminar. The candidate shall deliver seminar on the topic which will be judged internally in the Dept. by two examiners and the marks will be given accordingly.

CS558 Software Project-II

Teaching Scheme		**Evaluation Scheme**	
Practical	4 Hrs/Week	Term Work	
Credit	2	Practical/Viva-voce	50 Marks

A minimum of three programs/miniproject based on subjects of Part - I should be completed and a record for the same shall be submitted.

Practical examination will consist of an oral examination.

1. The assessment in the oral examination
2. Record of programs/ projects submitted by the candidate.

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Effective from academic year 2013-14

SEMESTER-I

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	CS541	Advanced Algorithms	03	01	-	04	20	20	60	-	-	100
2	CS542	Distributed System	03	01	-	04	20	20	60	-	-	100
3	CS543	Advanced Database Management System	03	01	-	04	20	20	60	-	-	100
LABORATORY COURSES												
1	CS548	Seminar I	-	-	04	02	-	-	-	50	-	50
(A) Total of Semester - I			**09**	**03**	**04**	**14**	**60**	**60**	**180**	**50**	**50**	**350**

SEMESTER-II

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	CS550	Advanced Data Mining	03	01	-	04	20	20	60	-	-	100
2	CS551	Parallel Processing	03	01	-	04	20	20	60	-	-	100
3	CS552	High Performance Computing	03	01	-	04	20	20	60	-	-	100
LABORATORY COURSES												
1	CS557	Seminar II	-	-	04	02	-	-	-	50	-	50
(B) Total of Semester- II			**09**	**03**	**04**	14	**60**	**60**	**180**	**50**	**50**	**350**
Grand Total = (A) + (B)			**18**	**06**	**08**	28	**120**	**120**	**360**	**100**	**100**	**700**

L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination

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SEMESTER-III

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	CS544	Advanced Computer Networks	03	01	-	04	20	20	60	-	-	100
2	CS545-CS547	Elective I	03	01	-	04	20	20	60	-	-	100
3	-	Institute Elective	03	01	-	04	20	20	60	-	-	100
LABORATORY COURSES												
1	CS549	Software Project I	-	-	04	02	-	-	-	-	50	50
(A) Total of Semester - I			**09**	**03**	**04**	**14**	**60**	**60**	**180**	**-**	**50**	**350**

SEMESTER-IV

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	CS553	Information Security	03	01	-	04	20	20	60	-	-	100
2	CS554-CS556	Elective II	03	01	-	04	20	20	60	-	-	100
LABORATORY COURSES												
1	CS558	Software Project II	-	-	04	02	-	-	-	-	50	50
(B) Total of Semester- II			**06**	**02**	**04**	10	**60**	**60**	**180**	**-**	**50**	**250**
Grand Total = (A) + (B)			**18**	**05**	**08**	24	**120**	**120**	**360**	**-**	**100**	**550**

L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination

Elective I		Elective II	
CS545	Computer Vision	CS554	Biometrics & Human Interface
CS546	Embedded System	CS555	Microcontroller Based System Design
CS547	Soft Computing	CS556	Wireless Sensor Network

Institute Elective			
	Research Methodology		Finite Element Method
	Optimization Techniques		Intellectual Property Rights
	Disaster Management	CS559	Professional Ethics & Cyber Law

	Indian Constitution	CS560	Web Technologies
	Financial Management		Nano Technology

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SEMESTER-V

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
LABORATORY COURSES												
1	CS603	Dissertation-I	-	-	20	10	-	-	-	100	-	100
(A) Total of Semester - I			**-**	-	20	10	**-**	**-**	**-**	**100**	**-**	**100**

SEMESTER-VI

LABORATORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical /Viva-voce**	**Total**
							Test	**TA**	**ESE**			
LABORATORY COURSES												
1	CS604	Dissertation-II	-	-	28	14	-	-	-	50	150	200
(B) Total of Semester- II			-	-	28	14	**-**	**-**	**-**	**50**	**150**	**200**
Grand Total = (A) + (B)			**-**	-	48	28	**-**	**-**	**-**	**150**	**150**	**300**

L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination