KERALA TECHNOLOGICAL UNIVERSITY

(CLUSTER - 9: CALICUT)

SCHEME AND SYLLABI FOR

M. Tech.
In

COMPUTER SCIENCE & ENGINEERING

(2015 Admission onwards)

SCHEME OF M.TECH PROGRAMME IN COMPUTER SCIENCE & ENGINEERING

Semester 1 Credits :23

Subject Code	Name of the Subject	Hours Per Week			Marks		Total Marks	End Semester Exam duration-Hrs	Credits
		L	T	P/D	Internal	End Semester			
09CS6111	Stochastic Process and Queuing Theory	4	0	0	40	60	100	3	4
09CS6121	Analysis of Algorithms and Complexity	4	0	0	40	60	100	3	4
09CS6131	Operating System Design	4	0	0	40	60	100	3	4
09CS6141	Advanced Computer Networks	3	0	0	40	60	100	3	3
	Elective- I	3	0	0	40	60	100	3	3
09CS6151	Research Methodology	0	2	0	100	0	100	-	2
09CS6161	Seminar –I	0	0	2	100	0	100	-	2
09CS6171	Web Technology Lab	0	0	2	100	0	100	-	1
Total		18	2	4	500	300	800	-	23

Elective – I

09CS61 15	Cloud Computing
09CS61 25	Knowledge Engineering
09CS61 35	XML & Web Services
09CS61 45	Database Administration & Tuning
09CS61 55	Agile Software Methodologies

Semester 2 Credits :19

Subject Code	Name of the Subject	Hours Per Week			Marks		Total Marks	End Semesters Exam duration-Hrs	Credits
		L	T	P/D	Internal	End Semester Exam			
09CS6112	Advanced Compiler Design	4	0	0	40	60	100	3	4
09CS6122	Advanced Computer Architecture	3	0	0	40	60	100	3	3
09CS6132	Software Architecture	3	0	0	40	60	100	3	3
	Elective- II	3	0	0	40	60	100	3	3
	Elective- III	3	0	0	40	60	100	3	3
09CS6162	Mini Project	0	0	4	100	0	100	-	2

09CS6172	Network Programming Lab	0	0	2	100	0	100	-	1
Total		16	0	6	400	300	700	-	19

Elective – II

09CS61 66	Data Compression
09CS6176	Social Network Analysis
09CS6186	Multicore Architecture
09CS6196	Mobile and Pervasive Computing
09CS6106	Grid Computing

Elective - III

09CS6118	Cyber Security
09CS6128	Steganography and Digital Watermarking
09CS6138	Ethical Hacking and Digital Forensics
09CS6148	Adhoc and Wireless Sensor Networks
09CS6158	Advanced Storage Area Networks

Semester 3 Credits :14

Subject Code	Name of the Subject	Hours Per Week			Marks		Total Marks	End Semester Exam duration-Hrs	Credits
		L	T	P/D	Internal	End Semester			
	Elective- IV	3	0	0	40	60	100	3	3
	Elective- V	3	0	0	40	60	100	3	3
09CS7163	Seminar-II	0	0	2	100	0	100	-	2
09CS7183	Project (Phase 1)	0	0	12	50	0	50	-	6
Total		6	0	14	230	120	350	-	14

Elective - IV

09CS7117	Machine Learning
09CS7127	Pattern Recognition
09CS7137	Soft Computing
09CS7147	Data mining and Business Analytics
09CS7157	Managing Big Data

Elective –V

09CS7167	Digital Image Processing
09CS7177	Natural Language Understanding
09CS7187	Virtualization Techniques
09CS7197	Embedded Computing System
09CS7107	Software Testing and Quality Assurance

Semester 4 **Credits :12**

Subject Code	Name of the Subject	Hours Per Week			Marks		Total Marks	End Semester Exam duration-Hrs	Credits
		L	T	P/D	Internal	End Semester			
09CS7184	Project (Phase 2)	0	0	21	70	30	100	-	12
Total		0	0	21	70	30	100	-	12

EC-Evaluation Committee, L – Lecture, T- Tutorial, P – Practical, Teaching assistance of 6 hours/week in all semesters for GATE students

SEMESTER - I

Course No: 09CS 6111 Course Title: Stochastic Process and Queuing Theory
Credits: 4-0-0: 4 Year :2015

Pre-requisites: Nil

Course Objectives:
To familiarize the students with the advanced concepts in mathematical structures like Markov models, Queuing Networks etc. These concepts will help the students in their Master research project work.

Syllabus

Theoretical distributions-Discrete, Continuous; Stochastic processes and classifications; Renewal theorems; Markov chains-Discrete and continuous ; Chapman Kolmogorov Theorem; Queuing theory; Markovian single server and multiserver queuing models**;** Time delays and blocking in queuing Networks.

Course Outcome:

Students who successfully complete this course will get an idea of the power of stochastic processes and its range of applications. They will master essential stochastic modeling tools including Markov chains and queuing theory are able to formulate and solve problems which involve setting up stochastic models.

Text Books:

1. *Richard A Johnson, C B Gupta, Miller& Freund's Probability And Statistics For Engineers, Pearson Education, Seventh Edition*
2. *Veerajan T, "Probability, Statistics and Random Processes", 3rd Edition Tata McGraw Hill, New Delhi, 2008.*

References:

1. *Kishore.S. Trivedi, "Probability & Statistics with Reliability, Queuing and Computer Science Applications", PHI, New Delhi, 2011*
2. *Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", 9th revised edition, Sultan Chand & Co., New Delhi 2003.*
3. J. Medhi, "Stochastic Process *Stochastic Processes"*, *3rd Edition*, 2009 (2010).

COURSE PLAN		
COURSE NO: 09CS 6111 COURSE TITLE: Stochastic Process and Queuing Theory (L-T-P : 4-0-0) CREDITS: 4		
MODULES	**Contact hours**	**Sem. Exam Marks%**
MODULE : 1 **THEORETICAL DISTRIBUTIONS**-Discrete: Binomial, Poisson, Negative Binomial, Geometric, Uniform Distributions. Continuous: Uniform, Exponential, Erlang and Gamma, Weibull Distributions.	12	25

MODULE : 2 **STOCHASTIC PROCESSES**- Classification of Stochastic Processes – Bernoulli process – Poisson process – Pure birth process – Birth and Death process- **FIRST INTERNAL EXAMINATION**	7	13
Reward and Cost Models -Point Process Regenerative Processes, Renewal Theorems	6	12
MODULE : 3 **MARKOV CHAINS-**Discrete-Parameter Markov Chains – Irreducible Chains-Pure Jump Continuous- Time Chains -Transition Probability Matrix – Chapman Kolmogorov Theorem – State classification and limiting distributions. **SECOND INTERNAL EXAMINATION**	13	25
MODULE : 4 **QUEUING THEORY** -Introduction – Characteristics of Markovian Single server and Multi server queuing models [(M/M/1) : (∞ / FIFO), (M/M/1) : (N / FIFO), (M/M/s) : (∞ /FIFO)] – M/G/1 Queuing System – Pollaczek Khinchin formula- Time delays and blocking in queuing Networks- Time delays in single server queue- time delays in networks of queues	14	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6121 Course Title: Analysis of algorithms and complexity
Credits: 4-0-0: 4 Year :2015

Pre-requisites: Nil

Course Objectives:

- To know the importance of studying the complexity of a given algorithm.
- To study various algorithmic design techniques.
- To utilize data structures and/or algorithmic design techniques in solving new problems.
- To know and understand basic computability concepts and the complexity classes P, NP, and NP-Complete.

Syllabus

Introduction to algorithms; Recurrence analysis, Amortized analysis; Advanced Data Structures; Graph Algorithms and complexity; Matroid Theory; Complexity classes; Approximation algorithms; Linear Programming; Randomized Algorithms; Algebraic methods; De-Randomization; Probabilistic Complexity Classes

Course Outcome:

After completion of this course, the student shall be able to describe, apply and analyze the complexity of divide and conquer, greedy, and dynamic programming algorithms. They will identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution. The student will describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete. They can explain and apply backtracking and branch and bound techniques to deal with some hard problems.

Text Books:

1. *Dexter Kozen, The Design and Analysis of Algorithms, Springer, 1992*
2. *Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to ALGORITHMS, PHI, India Second Edition,2001*

References:

1. *Dan Gusfield, "Algorithms on Strings, Trees, and Sequences", Cambridge University Press.*
2. *Michael Goodrich, Roberto Tamassia, " Algorithm Design" Wiley Student Edition.*
3. *R. Motwani and P. Raghavan, Randomized Algorithms, Cambridge University Press, 1995*

COURSE PLAN		
COURSE NO: 09CS 6121 COURSE TITLE: ANALYSIS OF ALGORITHMS AND COMPLEXITY (L-T-P : 4-0-0) CREDITS:4		
MODULES	**Contact hours**	**Sem.Exam Marks%**

MODULE : 1 Introduction to algorithms, Analysis: RAM model – Notations, Recurrence analysis –Substitution method, Recursion Tree, Master's theorem and its proof - Amortized analysis	13	25
MODULE : 2 Advanced Data Structures: B-Trees, Binomial Heaps, Fibonacci Heaps, Disjoint Sets, Union by Rank and Path Compression Graph **FIRST INTERNAL EXAMINATION** Algorithms and complexity: Topological Sorting, Matroid Theory, All-Pairs Shortest Paths, Maximum Flow and Bipartite Matching	7 6	13 12
MODULE : 3 Complexity classes - NP-Hard and NP-complete Problems - Cook's theorem NP completeness reductions. Approximation algorithms – Polynomial Time and Fully Polynomial time Approximation Schemes, Linear Programming **SECOND INTERNAL EXAMINATION**	13	25
MODULE : 4 Randomized Algorithms: Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing, De-Randomization, Probabilistic Complexity Classes	13	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6131 Course Title: Operating System Design
Credits: 4-0-0: 4 Year :2015
Pre-requisites: Nil

Course Objectives:

To provide a design oriented approach towards operating systems. A detailed study of the different functions of the operating system are given. Case studies of some of the Operating systems such as Windows NT and Linux also have to be carried out.

Syllabus

Introduction, Operating System design techniques. Implementing processes ;Parallel systems; Inter process communication patterns; mutual exclusion; Deadlocks; Design techniques; Memory management; Virtual memory; Fragmentation and compaction; I/O devices ; File systems; File system organization; Resource management and protection resources; queuing models of scheduling; real-time OS; mechanisms for software protection; Design techniques

Course Outcome:

The students should be able to: -Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system - Learn the various resource management techniques for distributed systems - Identify the different features of real time and mobile operating systems -Modify existing open source kernels in terms of functionality or features used.

Text Books:

1. *Charles Crowley, Operating systems- a design oriented approach, Tata Mcgraw-hill edition, New Delhi, 2009.*

References:

1. Silberschatz and Galvin, *Operating system concepts*, Addison Wesley, 2010.
2. Tanenbaum Andrew S, *Modern Operating system* , Eaglewood Cliffs, NJ: Prentice Hall, 1992
3. Gary J.Nutt, *Operating systems- A modern perspective*, 2nd edition, Addison wesley, 2000.
4. Stallings William, Operating systems- Internals and design principles, 4th Edn, PHI, 2002
5. A.S. Tanenbaum, Distributed Operating system, Pearson Education Asia, 2001

COURSE PLAN		
COURSE NO: 09CS 6131 COURSE TITLE: OPERATING SYSTEM DESIGN (L-T-P : 4-0-0) CREDITS:4		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Introduction- Hardware interface, Operating system interface. design problems, Operating System design techniques. Implementing processes – The system call interface, system initialization, process switching, system call interrupt handling, program error interrupts, disk driver system, implementing waiting, flow of control through OS, signaling and interrupts, event table managers, process	12	25

implementation. Parallel systems- Parallel hardware, OS for two processor systems, race conditions with shared processes, atomic actions, multiprocessor OS, threads		
MODULE : 2 Inter process communication patterns- competing and co-operating, problems, race conditions and atomic actions, new message passing system calls, IPC pattern: mutual exclusion, signaling and rendezvous models, producer-consumer and client server models. Deadlocks- Conditions for deadlock, dealing with deadlocks, two-phase locking, message variations, synchronization, semaphores. Design techniques- some example design techniques. **FIRST INTERNAL EXAMINATION** Memory management- levels of memory management, linking and loading process, memory management design, dynamic memory allocation, keeping track allocation of blocks, multiprogramming issues, memory protection, memory management system calls.	7 6	13 12
MODULE : 3 Virtual memory- Fragmentation and compaction, dealing with fragmentation- paging, swapping, overlay, page replacement- global and local page replacement algorithms, thrashing and load control, dealing with large page tables, sharing memory. Design techniques- examples of multiplexing and late binding. I/O devices - devices and controllers, terminal devices, communication devices, disk devices, disk controllers, SCSI interfaces, tape devices, CD devices. I/O subsystems- I/O system software, disk device driver access strategies, modeling disks, unification of files and device, generalized disk device drivers, disk caching. File systems- File abstraction, naming, file system objects and operations. – case study in Windows NT and Linux **SECOND INTERNAL EXAMINATION**	14	25
MODULE : 4 File system organization- organization, file descriptors, locating file blocks on disks, implementation of logical to physical block mapping, file sizes, Booting the OS, file system reliability, file security and protection. Resource management and protection resources in an OS, resource management issues, types of resources, integrated scheduling, queuing models of scheduling, real-time OS, protection of resources, user authentication, mechanism for protecting hardware resources, representation of protection information, mechanisms for software protection, Design techniques- Caching, hierarchical names and naming of objects. – case study in Windows NT and Linux.	13	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6141 Course Title: Advanced Computer Networks Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Syllabus

Data communication- Past and future-Standard protocols; Layered reference models; Physical Layer Protocols and Access Technologies; The OSIRM; Introduction to Transmission Technologies; Common Protocols and Interfaces in the LAN environment; VoFR; Frame Relay; Common WAN Protocol; ATM; Mature Packet Switched Protocol; Requirements Definition; Technology Comparisons; speed LAN protocols comparisons; Access Network Design

Course Outcome:

Student will be able to understand data Communications System and its components. They will be able to identify different types of network topologies and protocols and enumerate the layers of the OSI model and TCP/IP. The student can explain the functions of each layer and identify different types of network devices and their functions within a network. They understand and build the skills of subnetting and routing mechanisms

Text Books:

1. *.Darren L Spohn, Data Network Design, TMH*
2. *James F. Kurose and Keith W. Ross. Computer Networking: A Top-Down Approach. Addison-Wesley, 6/E edition, 2013*

Reference Books

1. *D.Bertsekas, R. Gallager, DataNetworksî, PHI*
2. *W.R. Stevens, ìUnix Network Programming, Vol.1, Pearson Education*
3. *J.Walrand, P. Varaiya, High Performance Communication Networks, Morgan Kaufmann*
4. *Y. Zheng, S. Akhtar, Networks for Computer Scientists and Engineers, Oxford*
5. *A.S. Tanenbaum, ComputerNetworks*

COURSE PLAN		
COURSE NO : 09CS 6141 COURSE TITLE : Advanced Computer Networks **(L-T-P : 3-0-0) CREDITS:3**		
MODULES	**Contact Hours**	**Sem. Exam Marks%**
MODULE : 1 Data communication Past and future-Standard protocols, Layered reference models-Physical Layer Protocols and Access Technologies: Physical Layer Protocols and Interfaces, Accessing the Network, Copper access technologies, Cable Access Technologies, Fiber Access Technologies, Air Access Technologies. The OSIRM, Standard computer architectures. Introduction to Transmission Technologies: Hardware selection in the design process.	9	25
MODULE : 2 Common Protocols and Interfaces in the LAN environment: Data link layers protocols, LLC and MAC sub layer protocol, Ethernet, Token Ring, Token Bus and FDDI, Bridge protocols, Switching in the LAN environment. Frame Relay: FR specification and design, VoFR: Performance and Design considerations, Advantages and disadvantages of FR. **FIRST INTERNAL EXAMINATION** Common WAN Protocol: ATM: Many faces of ATM, ATM protocol operation (ATM cell and Transmission), ATM networking basics, Theory of operations, BISDN protocol reference model PHY layer, ATM layer (Protocol model)	6 4	13 12
MODULE : 3 Mature Packet Switched Protocol: ITU Recommendation X.25, User connectivity, Theory of Operation, Network layer functions, X.75 Internetworking protocol, switched multimegabit data service (SMDS), SMDS and IEEE 802.6. Requirements Definition: User requirements, Traffic sizing, Traffic characteristics, Protocols, Time and Delay considerations, Connectivity, Availability, Reliability and Maintainability, Traditional Traffic engineering, Queued data and packet switched traffic modeling, Designing for peaks, Delay or Latency, Availability and reliability **SECOND INTERNAL EXAMINATION**	11	25
MODULE : 4 Technology Comparisons: Circuits-message-packet and cell switching methods, Packet switching service aspects, Generic packet switching network characteristics, Private versus public networking, Public network service selection, High speed LAN protocols comparisons, Application performance needs. Access Network Design: Network design layers, Access layer design, Access network capacity, network topology and hardware, completing the access network design.	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

ELECTIVE I

Course No: 09CS6115 Course Title: Cloud Computing
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives

- To learn fundamental concepts in the area of cloud computing
- To impart knowledge in applications of cloud computing

Syllabus

Cloud Computing; Types of Cloud Service Development; Centralizing Email Communications; Cloud Computing for the Community; Collaborating on Calendars; Schedules and Task Management; Collaborating on Word Processing; Collaborating via Web-Based Communication Tools; Collaborating via Social Networks and Groupware

Course Outcomes

- Understand the systems, protocols and mechanisms to support cloud computing
- Develop applications of cloud computing

Text books :
Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, 2008.

References
1. Dan C. Marinescu , Cloud computing: Theory and Practice, Morgan Kaufmann, 2013
2. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed and Cloud Computing,: From Parallel Processing to the Internet of Things, 1/e, Morgan Kaufmann , 2011

COURSE NO: 09CS6115 COURSE TITLE: CLOUD COMPUTING
(L-T-P : 3-0--0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.	10	25

MODULE : 2 Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – **FIRST INTERNAL EXAMINATION** Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.	4 5	12 13
MODULE : 3 Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis.	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6125 Course Title: Knowledge Engineering Credits: 3-0-0: 3
Year :2015

Pre-requisites: Nil

Course Objectives:

- To develop skills in the area of knowledge engineering
- To be able to understand the knowledge representation schemes.

Syllabus

The Language of first order Logic , Expressing Knowledge ,Resolution, Reasoning with horn clauses, Inheritance, Defaults, Explanation and Diagnosis, Actions, Planning

Course Outcome:

Students who successfully complete this course have knowledge about the major areas in artificial intelligence. They can use the idea of knowledge engineering in developing different applications.

Text Books:

1. Ronald Brachman, Hector Levesque "Knowledge Representation and Reasoning ", The Morgan Kaufmann Series in Artificial Intelligence 2005
2. David W.Rolston" Principles of Artificial Intelligence and Expert systems development", McGraw Hill Book Company

References:

1. John F. Sowa, " Knowledge Representation: Logical, Philosophical, and Computational Foundations", 2000*Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", 9th revised edition, Sultan Chand & Co., New Delhi 2005.*

2. Arthur B. Markman, "Knowledge Representation", Lawrence Erlbaum Associates

COURSE NO: 09CS6125 COURSE TITLE: Knowledge Engineering
(L-T-P : 3-0-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 Key concepts – Language of first order Logic – Syntax, Semantics Pragmatics – Expressing Knowledge – Levels of Representation – Knowledge Acquisition and Sharing –Sharing Ontologies – Language Patterns – Tools for Knowledge Acquisition	10	25
MODULE : 2 Resolution-Reasoning with horn clauses-	4	12
FIRST INTERNAL EXAMINATION Procedural control of reasoning- Rules in Production systems	5	13

MODULE : 3 Object Oriented Representations – Frame Formalism – Structured Descriptions–Taxonomies and Classification–Inheritance–Networks –Strategies for Defeasible Inheritance – Formal Account of Inheritance Networks. Closed World Reasoning – Circumscription **SECOND INTERNAL EXAMINATION**	9	25
MODULE : 4 Defaults – Fuzzy Logic – Nonmonotonic Logic – Theories and World –Semiotics – Auto epistemic Logic - Vagueness – Uncertainty and Degrees of Belief – Noncategorical Reasoning – Explanation and Diagnosis – Purpose – Syntax, Semantics of Context – First Order Reasoning – Modal Reasoning in Context – Encapsulating Objects in Context – Agents – Actions – Situational Calculus – Frame Problem – Complex Actions – Planning – Strips – Planning as Reasoning – Hierarchical and Conditional Planning.	11	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6135 Course Title: XML And Web Services Credits: 3-0-0: 3
Year :2015

Pre-requisites: Nil

Course Objectives:

- To understand the basic concepts of web services.
- To understand evolution of web services and their architecture
- To study various web service technologies.
- To develop applications using XML and various web service technologies.

Syllabus

Role of XML, Revolutions of XML , Design principles, XML technologies, SOAP, Web Services: Overview , XML security: security overview , XML digital signature , XML in practice

Course Outcome:

After completion of this course, the student shall be able develop web service enabled applications and be able to use SOAP.

Text Books:

1. Robert W.Sebesta , "Programming the world wide web" , Third edition, Pearson education,2006.
2. Frank. P. Coyle, XML, "Web Services and The Data Revolution", Pearson Education, 2002.

References:

1. Ramesh Nagappan , Robert Skoczylas and Rima Patel Sriganesh, "Developing Java Web Services", Wiley Publishing Inc., 2005.
2. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", Pearson Education 2005.

COURSE NO: 09CS6135 COURSE TITLE: XML And Web Services
(L-T-P : 3-0-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 XML: Role of XML – XML language basics - XML and the Web – SOAP – Web Services –.NET and J2EE - Revolutions of XML – Design principles -The W3C XML Technology family: XML technologies – Name Spaces ,Structuring with schemas – Presentation technologies –Transformation – XML Infrastructure technologies.	10	25

MODULE : 2 SOAP: Overview of SOAP – HTTP – XML-RPC – SOAP: protocol –overview- **FIRST INTERNAL EXAMINATION** message structure – message paths - intermediaries – actors – design patterns - faults – SOAP with attachments.	5 5	12 13
MODULE : 3 Web Services: Overview – web services technologies - UDDI – WSDL – ebXML – ebXML technologies - SOAP, web services, and e-commerce – .NET and J2EE - .NET – J2EE **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 XML security: security overview – canonicalization – XML security framework – XML encryption – XML digital signature – XKMS - guidelines f or signing XML documents – XML in practice: The dimensions of XML in practice – XML application spectrum – wave one – wave two	9	25
END SEMESTER EXAMINAITON		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6135 Course Title: Database Administration and Tuning
Credits: 3-0-0: 3 Year: 2015

Pre-requisites: Database Management Systems

Course Objectives:

- To learn the database administration concepts.
- To design and normalize different databases.
- To learn the basic principles of tuning.

Syllabus

Database Administration, DBA Tasks **,** Database Security and Authorization Types of DBAs, Data modeling and normalization, Database design- Database Integrity, Database security, Database backup and recovery, Tuning, Tuning Relational systems

Course Outcome:

The students should be able to manage and maintain the database management systems, study the different problems encountered during construction of database, and to overcome the security problems. The students should also be able to optimize and homogenize thee performance of a database system.

Text Books:

1. Craig S. Mullins, Database Administration: The Complete Guide to Practices and Procedures, Addison- Wesley Professional, 2005.
2. Dennis Shasha and Philippe Bonnet, Database Tuning, Principles, Experiments and Troubleshooting Techniques, Elsevier Reprint 2005.

References:

1. Silberschatz, Korth, Database System Concepts, McGraw hill, 6th edition, 2010.
2. Thomas Connoly and Carlolyn Begg, Database Systems, A Practical Approach to Design, Implementation and Management, Fourth Edition, Pearson Education 2008

COURSE PLAN		
COURSE NO: 09CS6145 COURSE TITLE: Database Administration and Tuning (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Database Administration-DBA Tasks- Database Design - Performance Monitoring and Tuning – Availability - Database Security and Authorization - Backup and Recovery - Data Integrity- DBMS Release Migration - Types of DBAs - Creating the Database Environment - Installing the DBMS	11	25
MODULE : 2 Data modeling and normalization-Database design **FIRST INTERNAL EXAMINATION**	6	13

-Application design	4	12
MODULE : 3 Database Integrity- Database security-Database backup and recovery **SECOND INTERNAL EXAMINATION**	9	25
MODULE : 4 Tuning-Basic Principles-Tuning the guts-Index tuning- Tuning Relational systems	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6155 Course Title: Agile Software Methodologies
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Objectives

- Explains how an iterative, incremental development process leads to faster delivery of more useful software
- Discusses the essence of agile development methods
- Explains the principles and practices of extreme programming

Syllabus

Software - new product development; Early "Top Ten" high-level requirements and skilful analysis; Agile development; Specific agile methods; Method overview; Adoption strategies; Project management; Agile testing; Nine principles and six concrete practices for testing on agile teams.

Outcomes

- There will be improved outcomes for software development projects when compared to more traditional approaches
- The roles of prototyping in the software process will be well understood

Text Book:

1.Craig Larman "*Agile and Iterative Development – A Manager's Guide*" Pearson Education – 2004.

References:

1.Elisabeth Hendrickson, "*Agile Testing*" Quality Tree Software Inc 2008.
2.Alistair "*Agile Software Development series*" Cockburn - 2001.
3.www.agileintro.wordpress.com/2008
4.www.serena.com/docs/repository/solutions/intro-to-agile-devel.pdf

COURSE PLAN		
COURSE NO: 09CS6155 OURSE TITLE: AGILE SOFTWARE METHODOLOGIES (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Software is new product development – Iterative development – Risk-Driven and Client-Driven iterative planning – Time boxed iterative development – During the iteration, No changes from external stakeholders – Evolutionary and adaptive development - Evolutionary requirements analysis – Early "Top Ten" high-level requirements and skilful analysis – Evolutionary and adaptive planning – Incremental delivery – Evolutionary delivery – The most common mistakes –Specific iterative and Evolutionary methods.	11	25
MODULE : 2 Agile development – Classification of methods – The agile manifesto and principles – Agile project management – Embrace	5	13

communication and feedback – Simple practices and project tools – Empirical Vs defined and prescriptive process – Principle-based versus Rule-Based – Sustainable discipline: The human touch – Team as a complex adaptive system – Agile hype – Specific agile methods. **FIRST INTERNAL EXAMINATION** The facts of change on software projects – Key motivations for iterative development – Meeting the requirements challenge iteratively – Problems with the waterfall. Research evidence – Early historical project evidence – Standards-Body evidence – Expert and thought leader evidence	4	12
MODULE : 3 Method overview – Lifecycle – Work products, Roles and Practices values – Common mistakes and misunderstandings – Sample projects – Process mixtures – Adoption strategies – Fact versus fantasy – Strengths versus "Other" history. **SEOCOND INTERNAL EXAMINATION**	9	25
MODULE : 4 Project management – Environment – Requirements – Test – The agile alliances – The manifesto – Supporting the values – Agile testing – Nine principles and six concrete practices for testing on agile teams.	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09 CS 6151 **Course Title: Research Methodology Credits: 0-2-0: 2**
Year :2015

Course objectives:

- To formulate a research problem
- To understand about research design and different methods of data collection.
- To impart knowledge on processing and analysis of data and to understand how to prepare a research report.

Syllabus:

Research Methodology, Conceptualizing a research design, Processing and Analysis of Data, Writing a Research Report, Interpretation of Data and Paper Writing.

Course outcomes:

- Students are exposed to the research concepts in terms of identifying the research problem, collecting relevant data pertaining to the problem, to carry out the research and writing research papers/thesis/dissertation.

Text Books:

1. Ranjit Kumar, "Research Methodology: A Step-by-step Guide for Beginners", Pearson, Second Edition
2. Kothari, C.R, "Research Methodology : Methods and Techniques", New age International publishers

References:

1. Sanjit K. Mitra, "Digital Signal Processing Laboratory Using MATLAB" , Mcgraw-Hill College, ISBN-13: 978-0073108582
2. Rudra Pratap, "Getting Started with MATLAB: Version 6: A Quick Introduction for Scientists and Engineers", 2001, Oxford University Press
3. Wayne Goddard and Stuart Melville, "Research Methodology : An Introduction", 2nd Edition, 2001, Juta & Co Ltd

COURSE PLAN			
COURSE NO: 09 CS 6151	**COURSE TITLE: RESEARCH METHODOLOY**	**(L-T-P : 0-2-0)**	**CREDITS:2**

MODULES	Contact hours	Sem. exam Marks%
MODULE : 1 **Research Methodology: An Introduction** Meaning of Research,, Objectives of Research, Motivation in Research, Applications of Research Definition of Research, Characteristics of Research, Types of Research, Steps in Research Process Formulating a Research Problem Reviewing the Literature, Formulating a Research Problem, Identifying Variables, Constructing Hypothesis	7	25

MODULE : 2 **Conceptualizing a research design** Definition of a Research Design, Need for Research Design, Functions of Research Design, Features of a Good Design **FIRST INTERNAL EXAMINATION** Methods of Data Collection Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules.	4 3	13 12
MODULE : 3 **Processing and Analysis of Data** Processing Operations, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness) **Writing a Research Report** Research writing in general, Referencing, Writing a Bibliography, Developing an outline, Writing about a variable **SECOND INTERNAL EXAMINATION**	7	25
MODULE : 4 Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish, Ethical issues related to publishing, Plagiarism and Self-Plagiarism. **A study of the use of the following tools:** Matlab / Simulink , Software for paper formatting like LaTeX/ MS Office	5	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 100 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

Course No: 09 CS 6161 **Course Title: Seminar -I Credits: 0-0-2: 2 Year: 2015**

Course Objective:

To assess the debating capability of the student to present a technical topic. Also to impart training to a student to face audience and present his/her ideas and thus creating self esteem and courage that are essential for an engineer.

Each student is expected to present a seminar on a topic of current relevance in Computer Science and Engineering. They are expected to refer current research and review papers from standard journals like ACM, IEEE, JPDC, IEEE etc. – at least three cross references must be used - the seminar report must not be the reproduction of the original paper. The seminar shall be of 30 minutes duration and a committee with the Head of the department as the chairman and two faculty members from the department as members shall evaluate the seminar based on the coverage of the topic, presentation and ability to answer the questions put forward by the committee. Each student shall submit two copies of a writeup of the seminar topic. One copy shall be returned to the student after duly certifying it by the chairman of the assessing committee and the other will be kept in the departmental library. Internal continuous assessment marks are awarded based on the relevance of the topic, presentation skill, quality of the report and knowledge.

Internal Continuous Assessment-*100 marks*

Course No: 09CS 6171 Course Title: Web Technology Laboratory Credits: 0-0-2: 1 Year :2015

Pre-requisites: Nil

Course Objectives:

- To understand the various steps in designing a creative and dynamic website.
- Learn programming languages and tools for software development.

Course Outcomes:

- Demonstrate an understanding of the components of a computer information networked system, including application and software, communication protocols, and networking hardware and software.
- Create, install and update sophisticated web sites.
- Install and manage server software and other server side tools.
- Demonstrate critical thinking in the understanding, evaluation and application of technology solutions to a variety of real-life situations.
- Articulate ethical and professional standards as they apply to the use of the computer systems and computer based data.

List of Experiments

1. **Scripting Languages- 2 Experiments**
   Dynamic HTML with JavaScript –VB Script– Cascading Style Sheets-XML Basics-ASP/JSP
2. **CGI Applications- 4 Experiments**
   Perl Programming – Cookies – Database Applications – XML and Web Applications – PHP – MySql Database – Apache Web Server –Simple URL method using GET/POST
3. **Java Network Programming -4 Experiments**
   I/O Streaming Models in Java – Socket Programming – Client/Server Model Protocol Simulation -Applets– Ping Simulation – Web Page Retrieval – RMI Single Call and Singleton
   Models – Content Handlers – RMI-IIOP and CORBA Distributed Applications.
4. **Java and XML- 4 Experiments**
   Client/Server Applications – Document Object Models – SAX Models – XML and Databases – XML Parsers – Document Type Definitions – XSL – SOAP Protocol. AJAX Programming.
5. **Multi Tier Applications -4 Experiments**
   Web Servers – Deployment of Servlets – Java Server Pages – Real Time Applications – Session Tracking Models – e-Business Applications – Handling Multimedia Data – Database Applications – Deployment of Enterprise Java Beans.

References:

1. Programming the **world wide web**-ROBERT W.SEBESTA
2. ASP Internals *Jon Flanders.*
3. XML and PHP *Vikram Vaswani*

Internal Continuous Assessment: 100 marks

SEMESTER -II

Course No: 09CS6112 Course Title: Advanced Compiler Design
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives

- To introduce students the concepts underlying the design and implementation of language processors.
- Apart from providing a theoretical background, the course places a special emphasis in practical issues in designing language processors.

Syllabus

Principles Of Compiler; Compiler Structure; Intermediate representation; Control flow analysis; Data Flow Analysis; Redundancy Elimination; Dependency analysis, Alias analysis; Register allocation and assignment; Code Scheduling; Case Studies

Course Outcomes

- Familiarization with the major concept in the area of language translation, compiler design and the function / complexity of modern compilers.

Text books:

1. Steven S Muchnik, "Advanced Compiler Design and Implementation", Morgan Kaufmann publishers, Elsevier Science, India, Indian Reprint 2003.

References:

1.Keith D Cooper and Linda Torczon, "Engineering a Compiler", Elsevier Science, India.
2.Sivarama P. Dandamudi, "Introduction to Assembly language programming: for Pentium and RISC processors".
3.Allen Holub "Compiler Design in C", Prentice Hall of India, 1990.
4.Alfred Aho, Ravi Sethi V., Jeffery Ullman D., "Compilers Principles, Techniques and Tools", Addison Wesley, 1988.
5.Charles N. Fischer, Richard J. Leblanc, "Crafting a compiler with C", Benjamin-Cummings Publishing Co., Inc. Redwood City, CA, USA.

COURSE PLAN

COURSE NO: 09CS6112 COURSE TITLE: ADVANCED COMPILER DESIGN
(L-T-P : 3-1-0) CREDITS:4

MODULES	Contact hours	Sem.Exam Marks%

MODULE : 1 Principles Of Compiler – Compiler Structure – Properties of a Compiler – Optimization –Importance of Code optimization – Structure of Optimizing compilers – placement of optimizations in optimizing compilers – ICAN – Introduction and Overview – Symbol table structure – Local and Global Symbol table management. Intermediate representation – Issues – High level, medium level, low level intermediate languages – MIR, HIR, LIR – ICAN for Intermediate code	14	25
MODULE : 2 Control flow analysis-Data Flow Analysis – reaching definitions, available expressions, live variable information. Dependency analysis, Alias analysis. Review of Optimizations – constant folding, constant and copy propagation, dead code elimination. **FIRST INTERNAL EXAMINATION** Redundancy Elimination – common sub expression elimination, loop invariant codemotion, partial redundancy elimination. Value numbering. Loop Optimizations – induction variable elimination. Procedure Optimization, Static Single Assignment(SSA) form.	7 7	12 13
MODULE : 3 Register allocation and assignment – graph coloring – control flow and low level optimizations -Inter-procedural analysis and optimization – call graph — register allocation – global References: – Optimization for memory hierarchy. Code Scheduling – Instruction scheduling – peculative scheduling – Software pipelining – trace scheduling – percolation scheduling. **SECOND INTERNAL EXAMINATION**	12	25
MODULE : 4 Case Studies – Sun Compilers for SPARC – IBM XL Compilers – Alpha compilers – PA –RISC assembly language – COOL – (Classroom Object oriented language) - Compiler testing tools –SPIM	12	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6122 Course Title: Advanced Computer Architecture
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives

- Describes the principles of computer design and classifies instruction set architectures.
  Describes the operation of performance enhancements such as pipelines, dynamic scheduling, branch prediction, caches, and vector processors.

Syllabus

Basics of Computer Design & Performance Evaluation; CPU Performance & its factors **;** Dynamic Scheduling; Data level parallelism; Superscalar Processors; Register Renaming; The Memory System; Distributed Systems

Course Outcomes

At the end of this course students should

- know the classes of computers, and new trends and developments in computer architecture
- Understand pipelining, instruction set architectures, memory addressing.
- Understand the performance metrics of microprocessors, memory, networks, and disks

Text book:

1. John L. Hennessy and David A. Patterson, Morgan Kaufmann / Elsevier, "Computer Architecture-A Quantitative Approach", 4th edition,2007

References:

1. John L. Hennessy and David A. Patterson, Elsevier, "Computer Architecture-Hardware & Software Approach", 3rd Edition,2005.
2. Sima, Fauntain, Kscucle, "Advanced Computer Architecture a design space approach", Pearson Edition, 7th edition, 2009.
3. Kai Hwang, "Advanced Computer Architecture", McGraw Hill publication, Edition, 2001

COURSE PLAN

COURSE NO: 09CS6122 COURSE TITLE: ADVANCED COMPUTER ARCHITECTURE
(L-T-P : 3-0-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 Basics of Computer Design & Performance Evaluation:-Defining Computer Architecture, Dependability, Quantitative Principles of Computer Design, CPU Performance & its factors, SPEC Benchmarks. Computational model:- Basic computational models, von-Neumann Computation Model	9	25

MODULE : 2 Dynamic Scheduling- Tomasulo's approach, Hardware based speculation, ILP using multiple issue and static scheduling, ILP using dynamic scheduling, multiple issue and speculation, case study- Intel Core i7. **FIRST INTERNAL EXAMINATION** Data level parallelism-Vector architecture-Vector instruction types, Vector-Access memory schemes , Graphic processing units.	6 5	13 12
MODULE : 3 Superscalar Processors:-Introduction, Parallel decoding, Superscalar instruction issue, Shelving, Register Renaming, Case Study- Pentium Pro, Power PC 620. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 The Memory System:- Memory hierarchy, Cache Coherence, Memory Consistency, Cache Performance Issues, Shared Memory Organization. Distributed Systems: Parallel Virtual Machine, Architecture of PVM, Programming model of PVM. Case Study-Intel Duo Core Architecture	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6132 Course Title: Software Architecture
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

- To study the fundamental concepts of software architecture.
- To understand theories, methods, and technologies applied for professional software development
- To study the concepts of designing and documenting software architecture.
- To discuss the concepts of software products and processes.

Syllabus

Software architecture, Context of Software architecture, Quality attributes, Interoperability, Modifiability, Performance, Architecture in the life cycle, Designing architecture, Architecture Implementation and testing.

Course Outcome:

After the completion of this course student understands the process to be followed in the software development life cycle. Students also will be able to manage a project from beginning to end work independently as well as in teams. Students will be able to define, formulate and analyze a problem.

Text Books:

1.Len Bass, Paul Clements, and Rick Kazman, Software Architecture in Practice, second Edition, Pearson Education, 2004.
2. Richard N.Taylor, Nenad M. —Software Architecture Foundation Theory and practice, Wiley ISBN: 978-81-265-2802-8.

Reference Books

1. Clements, P., Bachmann, F., Bass, L, Garlan, D., Ivers, J., Little, R., Nord, R., and Stafford J, Documenting Software Architectures: Views and Beyond, Addison Wesley, 2000.
2. Shaw Mary , Garlan David , Software architecture perspectives on an emerging discipline, PHI publications 1996
3. Vasudev Verna, Software Architecture :A case based approach, Pearson Education, 2009

COURSE PLAN		
COURSE NO: 09CS6132 COURSE TITLE: Software Architecture (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**

MODULE : 1 What is Software architecture, Why software architecture important, Context of Software architecture	11	25
MODULE : 2 Quality attributes,- Understanding quality attributes-Availability-Interoperability- Modifiability- **FIRST INTERNAL EXAMINATION** Performance- Testability-Usability-Quality Attribute Modeling and analysis	5 5	12 13
MODULE : 3 Architecture in the life cycle-Architecture and requirements – Designing an architecture-Documenting Software architecture **SECOND INTERNAL EXAMINATION**	9	25
MODULE : 4 Architecture Implementation and testing- Architecture evaluation-Management and governance	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

ELECTIVE II

Course No: 09CS6166 Course Title: Data Compression Credits: 3-0-0: 3

Year :2015

Pre-requisites: Nil

Course Objectives:

- To familiarize the students with the different data compression techniques for image compression, audio compression, video compression etc.
- It also gives a comparison of different compression algorithms and their implementation.

Syllabus

Introduction - Basic Techniques - Image Compression - Video compression, Audio Compression, Fractal techniques - compression algorithms

Course Outcome:

The student get a detailed introduction to data compression audio ,video compression techniques and algorithms

Text Books:

1. David Solomon, Data compression: the complete reference, 2nd edition, Springer-verlag, New York. 2000.

2. Khalid Sayood, Introduction to data compression, Morgan Kaufmann Publishers, 2003.

References:

1. Stephen Welstead, Fractal and wavelet Image Compression techniques, PHI, 1999.

COURSE PLAN		
COURSE NO: 09CS6166 COURSE TITLE: Data Compression (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Introduction, Basic Techniques, Dictionary Methods	9	25
MODULE : 2 Image Compression, Transform based techniques,	5	12
FIRST INTERNAL EXAMINATION Wavelet Methods, adaptive techniques	5	13
MODULE : 3 Video compression, Audio Compression, Fractal techniques. **SECOND INTERNAL EXAMINATION**	10	25

MODULE : 4 Comparison of compression algorithms. Implementation of compression algorithms.	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6176 Course Title: Social Network Analysis
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

- To be competitive in the marketplace by leveraging cutting-edge technologies
- To Offer students the opportunity to obtain practical exposure to modern Information Technology problems
- To Familiarize students with the expected level of professionalism in IT and Business project delivery

Syllabus

Introduction to Web , Ontology and their role in the Semantic Web, Extracting evolution of Web Community from a Series of Web Archive, Understanding and Predicting Human Behavior for Social Communities

Course Outcome:

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- Obtain knowledge of current and emerging concepts in Information Systems
- Apply cutting-edge technologies to real life business problems
- Demonstrate teamwork abilities and outcome-oriented deliverables

Text Books:

1. Peter Mika, "Social networks and the Semantic Web", Springer, 1 st edition 2007.

References

2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1 st edition, 2010

COURSE PLAN		
COURSE NO: 09CS6176 COURSE TITLE: SOCIAL NETWORK ANALYSIS (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web - Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis - Electronic discussion networks, Blogs and online communities, Web-based networks - Applications of Social Network Analysis	10	25
MODULE : 2 Ontology and their role in the Semantic Web - Ontology-based Knowledge Representation - Ontology languages for the Semantic Web – RDF and OWL - Modelling and aggregating social network data **FIRST INTERNAL EXAMINATION**	5	12

State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data, Advanced Representations	5	13
MODULE : 3 Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Tools for Detecting Communities Social Network Infrastructures and Communities - Decentralized Online Social Networks- Multi Relational Characterization of Dynamic Social Network Communities. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Understanding and Predicting Human Behavior for Social Communities - User Data Management, Inference and Distribution - Enabling New Human Experiences - Reality Mining - Context-Awareness - Privacy in Online Social Networks - Trust in Online Environment - Trust Models Based on Subjective Logic - Trust Network Analysis - Trust Transitivity Analysis - Combining Trust and Reputation - Trust Derivation Based on Trust Comparisons - Attack Spectrum and Countermeasures	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

No: 09CS6186 Course Title: Multi Core Architecture
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

- This paper proposes and evaluates single-ISA heterogeneous multi-core architectures as a mechanism to reduce processor power dissipation.
- Study the design of super scalar processor
- Familiarize students with the power pc architecture.

Syllabus

Fundamentals of Superscalar Processor Design, Symmetric shared memory architectures, Homogeneous and Heterogeneous Architectures, PowerPC architecture

Course Outcome:

- Obtain knowledge of current and emerging concepts in multicore architecture
- Apply cutting-edge technologies to design of power pc

Text Books:

1. Hennessey & Paterson, "Computer Architecture A Quantitative Approach", Harcourt Asia, Morgan Kaufmann, 1999.

References:

1. Kai Hwang, "Advanced Computer Architecture: Parallelism, Scalability and Programmability" McGraw-Hill,1993

COURSE PLAN		
COURSE NO: 09CS6186 COURSE TITLE: MULTICORE ARCHITECTURE (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Fundamentals of Superscalar Processor Design- Limitations of ILP, Super Scalar Processor Design, Multi Threading, Thread Level Parallelism – Introduction to Multicore Architecture –Multicore Vs Multi Threading	9	25
MODULE : 2 Symmetric shared memory architectures, distributed shared memory architectures,	4	12
FIRST INTERNAL EXAMINATION Issues related to multicore caches, Design of mutlicore core caches, levels of caches, cache optimization, Models of memory consistency, Virtual Memory	6	13

MODULE : 3 Homogeneous and Heterogeneous Architectures – Intel Multicore Architectures – SUN CMP architecture – IBM Cell Architecture – GPGPU Architectures. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management Power5 Multicore architecture design, Power 6 Architecture. Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element) Interconnection Network Design - Interconnection topologies, routing techniques, flow control mechanisms, router architecture, arbitration logic	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS6196 Course Title: Mobile And Pervasive Computing
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

- To make the students understand the basics of pervasive computing, its applications, and the devices used.

Syllabus

Differences between Mobile Communication and Mobile Computing, Migration to 3G Networks, User Equipment – Radio Network Subsystem, Sensor Networks, Adaptability – Mechanisms for Adaptation

Course Outcome:

- Obtain knowledge of current and emerging concepts mobile computing.
- Apply cutting-edge technologies of pervasive computing

Text Books:

1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing: Technology, Applications and Service Creation", Second Edition, Tata McGraw Hill, 2010.

References:

2. Reto Meier, "Professional Android 2 Application Development", Wrox Wiley, 2010.
3. Pei Zheng and Lionel M Li, 'Smart Phone & Next Generation Mobile Computing', Morgan Kaufmann Publishers, 2006

COURSE PLAN		
COURSE NO: 09CS6196 COURSE TITLE: : MOBILE AND PERVASIVE COMPUTING (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Differences between Mobile Communication and Mobile Computing – Contexts and Names – Functions – Applications and Services – New Applications – Making Legacy Applications Mobile Enabled – Design Considerations – Integration of Wireless and Wired Networks – Standards Bodies – Pervasive Computing – Basics and Vision – Principles of Pervasive Computing – Categories of Pervasive Devices	10	25
MODULE : 2 Migration to 3G Networks – IMT 2000 and UMTS – UMTS Architecture – User Equipment – Radio Network Subsystem – UTRAN – Node B – RNC functions – USIM – Protocol Stack – CS and PS Domains – **FIRST INTERNAL EXAMINATION** IMS Architecture – Handover – 3.5G and 3.9G a brief discussion –	5 4	13 12

4G LAN and Cellular Networks – LTE – Control Plane – NAS and RRC – User Plane – PDCP, RLC and MAC – WiMax IEEE 802.16d/e		
MODULE : 3 Sensor Networks – Role in Pervasive Computing – In Network Processing and Data Dissemination – Sensor Databases – Data Management in Wireless Mobile Environments – Wireless Mesh Networks – Architecture – Mesh Routers – Mesh Clients – Routing – Cross Layer Approach **SECOND INTERNAL EXAMINATION**	9	25
MODULE : 4 Adaptability – Mechanisms for Adaptation - Functionality and Data – Transcoding – Location Aware Computing – Location Representation – Localization Techniques – Triangulation and Scene Analysis – Delaunay Triangulation and Voronoi graphs – Types of Context – Role of Mobile Middleware	11	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6106 Course Title: Grid Computing
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

- understand the evolution of Grids in the context of processor- and data-intensive applications
- be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery
- be able to design and implement Grid computing applications using Globus or similar toolkits
- be able to justify the applicability, or non-applicability, of Grid technologies for a specific application

Syllabus

Grid Computing Organizations, Grid Monitoring Architecture, Grid Security, OGSA-Platform Components, Open Grid Services Infrastructure ,Data Management-Categories and Origins of Structured Data ,Grid Portals, Globus Toolkit and gLite

Course Outcome:

Upon completion of this course, students should be able to:

- Understand and explain the basic concepts of Grid Computing;
- Explain the advantages of using Grid Computing within a given environment;
- Prepare for any upcoming Grid deployments.

Text Books:

1. Maozhen Li, Mark Baker, The Grid Core Technologies, John Wiley & Sons ,2005.
2. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education 2004.

References:

1. Ian Foster & Carl Kesselman, The Grid 2 – Blueprint for a New Computing Infrastructure , Morgan Kaufman – 2004.
2. Vladimir Silva—Grid Computing for Developers, DreamtechPress,2006.

COURSE PLAN		
COURSE NO: 09CS6106 COURSE TITLE: GRID COMPUTING (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Introduction-The Grid-Past, Present and Future. Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing-Anatomy and Physiology of Grid. . Grid Computing Organizations and Their Roles: Developing Grid Standards & Best	9	25

Practice Guidelines, Developing Grid Computing Toolkits &Frameworks.		
MODULE : 2 Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems. Grid Computing Anatomy: The Grid Problem **FIRST INTERNAL EXAMINATION** The Grid Computing Roadmap, Comparison of Grid Services Architecture and Web Services Architecture.	5 5	12 13
MODULE : 3 Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management -OGSA: Introduction, Sample Use Cases that Drive the OGSA, OGSA-Platform Components, Open Grid Services Infrastructure (OGSI), OGSA Basic Services. **SECOND INTERNAL EXAMINATION**	9	25
MODULE : 4 Data Management-Categories and Origins of Structured Data - Data Management Challenges - Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals - First -Generation GridPortals-Second-Generation - Recent version of Globus Toolkit and gLite – Architecture	11	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

ELECTIVE - III

Course No: 09CS 6118 Course Title: Cyber Security Credits: 3-0-0: 3
Year :2015

Pre-requisites: Nil

Course Objectives:

Provide students with a high-level understanding of how information security functions in an organization. Topics will be both business and technology-centric.

Syllabus

Concepts of Network Security, Cyber Crime security, Copy Right, Proxy Servers and Anonymizers, SQL Injection, Security Challenges Posed by Mobile Devices, General law and Cyber Law-a Swift Analysis, Digital Forensics Science

Course Outcome:

Students who successfully complete this course will be able to

- To be exposed to original research in network security,
- To be exposed to the importance of integrating people and processes ,
- To master fundamentals of secret and public cryptography,
- To master protocols for security services.

Text Books:

1. *Jonathan Rosenoer,"Cyber Law: The law of the Internet", Springer-erlag,1997.*
2. *Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, New Delhi.*

References:

1. Nina Godbole, Information Systems Security, Wiley India, New Delhi
2. Mark F Grady, Fransesco Parisi, "*The Law and Economics of Cyber Security*", Cambridge University Press, 2006.

COURSE PLAN

COURSE NO: 09CS 6118 COURSE TITLE: : Cyber Security
(L-T-P : 3-0-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 Concepts of Networking-Network security-TCP/IP-Introduction to cryptography- Information Security Concepts- Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime. Copy Right-source of risks, Fair Use, postings, Criminal liability, First Amendments, Data Loss.	9	25
MODULE : 2 Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Steganography	4	12

FIRST INTERNAL EXAMINATION DoS DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft)	4	13
MODULE : 3 Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Organizational Measures for Handling Mobile-Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts & Digital Signatures-Ethics, Legal Developments, Late 1990 to 2000,Cyber security in Society, General law and Cyber Law-a Swift Analysis **SECOND INTERNAL EXAMINATION**	12	25
MODULE : 4 Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody Concept, Network Forensics-Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to the Computer Forensics and Social Networking Sites.	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6128 Course Title: Steganography and Digital Watermarking
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

To give the Student:-

- A good knowledge with Basic principles of Steganography and watermarking.
- Learn the basic mathematical concept behind watermarking theory and its main applications.
- The mathematical limits of Watermarking and different analysis techniques for such limits.
- Different attacks on digital watermarking and benchmarks used.

Syllabus

Digital Watermarking; Classification, Spatial and frequency domain water marking ,Watermarking attacks and Tools; Genetic algorithm based digital water marking; Digital Steganography; Steganalysis, Genetic algorithm based Steganography.

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Course Outcome:

Students who successfully complete this course will have demonstrated an ability to understand how to protect Data Alteration; Understand how to provide a Confidential Communication; Provide Owner Identification - The embedded watermark will identify the owner of the media files as a way of copyright protection; Understand how to provide Content Authentication.

Text Books:

- *Frank Y. Shih, "Digital Watermarking and Steganography: Fundamentals and techniques.*

References:

- *Katzenbeisser, F. Petitcolas, "Information hiding techniques for steganography and digital watermarking", Artech House Books.*

COURSE PLAN		
COURSE NO: 09CS 6128 COURSE TITLE: Steganography and Digital Watermarking (L-T-P : 3-1-0) CREDITS:4		
MODULES	**Contact Hours**	**Sem.Exam Marks%**
MODULE : 1 Digital Watermarking- Digital Steganography, Difference between Watermarking and Steganography-Classification in Digital Watermarking- based on characteristics- based on application- Least significant bit substitution- Discrete Fourier Transform- Discrete Cosine Transform- Discrete Wavelet Transform.	9	25
MODULE : 2 Digital Watermarking fundamentals-Spatial and frequency domain	4	12

water marking-Fragile watermark- Robust water mark- **FIRST INTERNAL EXAMINATION** Watermarking attacks and Tools: image processing attacks-Geometric transformation- Cryptographic attack- protocol attack-Water marking tools-Combinational digital water marking in spatial and frequency domain.	6	13
MODULE : 3 Genetic algorithm based digital water marking- Genetic algorithm-Operation-Fitness function- An application for medical image water marking-Adjusted-purpose and Robust high capacity Digital water marking-Introduction to digital Steganography- Application-Embedding security and imperceptibility. **SECOND INTERNAL EXAMINATION**	11	25
MODULE : 4 Steganalysis-Statistical properties of image-Visual steganalytic system-IQM- based steganalytic system-Frequency domain steganalytic system- Genetic algorithm based steganography-Fitness function- Reproduction- Cross over-Mutation-GA based breaking algorithm on SDSS and FDSS.	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6138 Course Title: Ethical Hacking and Digital Forensics
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

To give the Student:-

- Knowledge of key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft.
- Determine computer technologies, digital evidence collection, and evidentiary reporting in forensic acquisition.
- Incorporate approaches to secure networks, firewalls, intrusion detection systems, and intrusion prevention systems.
- Understand principles of web security and security attacks .
- Incorporate approaches for incident analysis and response.
- Incorporate approaches for risk management and best practices.

Syllabus

Hacking; Types; Study on various attacks; TCP / IP; UDP flooding; Firewalls; Fundamentals of Computer Fraud; Strategic Planning Process; Neural networks; Intrusion detection system; Web Services.

Course Outcome:

Students who successfully complete this course will Defend a computer against a variety of different types of security attacks using a number of hands-on techniques; Defend a LAN against a variety of different types of security attacks using a number of hands-on techniques; Practice and use safe techniques on the World Wide Web .

Text Books:

1. *Kenneth C.Brancik, "Insider Computer Fraud", Auerbach Publications Taylor & Francis, Group.*

References:

2. *Ankit Fadia, "Ethical Hacking", Second Edition Macmillan India Ltd, 2006.*

COURSE PLAN		
COURSE NO: 09CS 6138 COURSE TITLE: Ethical Hacking and Digital Forensics (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact Hours**	**Sem.Exam Marks%**
MODULE : 1 Hacking windows – Network hacking – Web hacking – Password hacking - A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.	8	25
MODULE : 2 TCP/IP – Checksums – IP Spoofing port scanning, DNS	5	12

Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. **FIRST INTERNAL EXAMINATION** Firewalls – Packet filter firewalls - Packet Inspection firewalls – Application Proxy-Firewalls - Batch File Programming.	5	13
MODULE : 3 Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process- Architecture strategies for computer fraud prevention – Protection of Web sites - Neural networks – Misuse detection and Novelty detection. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Intrusion detection system –NIDS, HIDS – Penetrating testing process – Web Services – Reducing transaction risks. Key Fraud Indicator selection process customized taxonomies – Key fraud signature selection process –Accounting Forensics – Computer Forensics – Journaling and it requirements – Standardized logging criteria – Journal risk and control matrix .	11	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6148 Course Title: Ad-hoc and Wireless Sensor Networks
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

To give the Student:-

- Knowledge of mobile ad hoc networks, design and implementation issues, and Available solutions.
- Knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
- Knowledge of sensor networks and their characteristics.
- Knowledge of design of MAC layer protocols, understanding of power management.

Syllabus

Ad-hoc Networks; MAC protocols for Ad-hoc wireless networks; Routing protocols; QoS in Ad hoc wireless networks; Energy Management; Wireless Sensor Networks; MAC protocol for Sensor Network; QoS in Sensor Network.

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Course Outcome:

Students who successfully complete this course will have demonstrated an ability to understand the principles of mobile ad hoc networks; Understanding of the principles and characteristics of wireless sensor networks; Familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs.; Understanding of the current topics in MANETs and WSNs **.**

Text Books:

1. *C. Siva Ram Murthy, B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice Hall PTR.*
2. Holger Karl, Andreas Wiley, "Protocols& Architectures for Wireless Sensor Networks", 2005.

References:

1. *Feng Zhao, LeonidesGuibas, "Wireless Sensor Networks ", Elsevier.*
2. *Jochen Schiller, "Mobile Communications ", 2/e, Pearson Education.*
3. *William Stallings, "Wireless Communications and Networks ", Pearson Education.*

COURSE PLAN		
COURSE NO: 09CS 6148 COURSE TITLE: Ad-hoc and Wireless Sensor Networks (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact Hours**	**Sem.Exam Marks%**
MODULE : 1 Ad-hoc Networks: Introduction - Application – Issues, MAC protocols for Ad-hoc wireless networks -Issues - design goals, classification, Routing protocols for Ad-hoc wireless networks - Issues - Classification - Table driven - On-demand -hybrid,	10	25

Multicast routing in ad-hoc wireless network - Issues - Operation - Classification -Tree based - Mesh based.		
MODULE : 2 QoS in Ad hoc wireless networks - Issues and Challenges - Classifications - QoS frameworks, **FIRST INTERNAL EXAMINATION** Energy Management- need for energy management- classification, battery, transmission power, and system power management schemes.	5 5	12 13
MODULE : 3 Wireless Sensor Networks: Introduction - Application - Comparison with wireless Ad hoc networks - Issues and Challenges in designing Sensor networks - Sensor Network Architecture- Data dissemination - Data gathering. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 MAC protocol for WSN- Location discovery- Quality of Sensor network- Naming and Addressing- Time synchronization- Localization- positioning- Routing protocols - Data centric and Content based networking - QOS in Sensor networks.	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS 6158 Course Title: Advanced Storage Area Network
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

To give the Student:-

- Ability to understand the necessity for storage area networks.
- Ability to understand the appropriateness of the different networked storage options for different application environments.
- Ability to understand the architecture of SAN and its management.

Syllabus

Storage Area Network; Designing the SAN; Advanced SAN Features; SAN-Based Backup; SAN Management and Troubleshooting; Using Data De-Duplication to Lighten the Load; Continuous Data Protection.

Course Outcome:

- Students who successfully complete this course will be able to state the need for storage area networks; will be able to choose best option for any given application environment; will able to state architecture of SAN and its management.

Text Books:

- *Storage Area Networks For Dummies, 2nd Edition, Christopher Poelker, Alex Nikitin*

References:

1. *Storage Area Network Essentials: A complete Guide to Understanding and Implementing SANs(Hard Cover) By Richard Barker, Paul Massigliar By Wiley.*
2. *Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS iSCSI and InfiniBandBy Ulf Troppens, Rainer Erkens, Wolfgang Miiller Wiley*

COURSE PLAN		
COURSE NO: 09CS 6158 COURSE TITLE: Advanced Storage Area Network **(L-T-P : 3-0-0) CREDITS:3**		
MODULES	**Contact Hours**	**Sem.Exam Marks%**
MODULE : 1 The Storage Area Network-SAN Building Blocks- Designing the SAN-SANs and Disaster Recovery.	10	25
MODULE : 2 Advanced SAN Features- Networking SANs-	5	12
FIRST INTERNAL EXAMINATION SAN-Based Backup-Mirror, Mirror: Point-in-Time Copies.	5	13

MODULE : 3 SAN Management and Troubleshooting-Approaches to SAN Management-Troubleshooting SANs. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Using Data De-Duplication to Lighten the Load-Continuous Data Protection-Virtualization-Ten Reasons to Use a SAN-Ten Reasons NOT to Use a SAN.	9	25
END SEMSESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

COURSE NO: 09CS 6162 **COURSE TITLE: Mini Project**
Credits 0-0-4: 2 Year :2015

Course Objective

In this practical course, each group consisting of maximum 2 members is expected to design and develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the industry, academic institutions and computer science research. Students can take up any application level/system level project pertaining to a relevant domain. Projects can be chosen either from the list provided by the faculty or in the field of interest of the student. First review would highlight the topic, objectives, methodology and expected results. In the second review, the complete assessment the thesis is to be evaluated. Both the reviews should be conducted by guide and Evaluation committee

Internal Continuous Assessment: 100 marks

Internal continuous assessment is in the form of evaluation, demonstration, presentation etc. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

Course No: 09CS 6172 Course Title: Network Programming Laboratory
Credits: 0-0-2: 1 Year :2015

Pre-requisites: Nil

Course Objectives:

To impart a solid foundation of the state of the art trends in computer networking and to provide a hands on experience of the same. The lab aims to give an insight to all arenas of networking. The experiments may be taken up with the intention to solidify the foundations of the basic networking course

List of Experiments

1. Socket Programming
    a. TCP Sockets
    b. UDP Sockets
    c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. Development of applications such as DNS/ HTTP/ E – mail/ Multi - user Chat
5. Simulation of Network Management Protocols
6. RMI Applications
7. Study of Network Simulator Packages – such as opnet, ns2, etc.
8. Study of UDP performance.

Course Outcomes:

- To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
- To master 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 be familiar with contemporary issues in networking technologies,
- To be familiar with network tools and network programming

References:

1. Mastering Networks and internet lab manual-Jorg Liebeherr, Magda El Zarki
Applied Networking Labs –Randall J.Boyle, Jeffrey A. Clements
2. Applied Networking Labs –Randall J.Boyle, Jeffrey A. Clements

Internal Continuous Assessment: 100 marks

SEMESTER III

ELECTIVE- IV

Course No: 09CS7117 Course Title: Machine Learning
Credits:3 Year :2015

Pre-requisites: Nil

Course Objectives:

- This course introduces several fundamental concepts and methods for machine learning.
- The objective is to familiarize the audience with some basic learning algorithms and techniques and their applications, as well as general questions related to analyzing and handling large data sets.
- Several software libraries and data sets publicly available will be used to illustrate the application of these algorithms. The emphasis will be thus on machine learning algorithms and applications, with some broad explanation of the underlying principles.

Syllabus

Machine learning-Linear Models for Classification –Neural Networks- Ensemble methods- Graphical methods

Course Outcome:

Students who successfully complete this course will have a broad introduction to machine learning.

Text Books: *A Course in Machine Learning*. by *Hal Daumé III*

References:

1. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
2. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.
3. Stephen Marsland, “Machine Learning –An Algorithmic Perspective”, CRC Press, 2009
CP8251

COURSE PLAN

COURSE NO:09CS7117 COURSE TITLE: MACHINE LEARNING (L-T-P : 3-0-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 Machine Learning - Machine Learning Foundations –Overview – applications - Types of machine learning - basic concepts in machine learning Examples of Machine Learning -Applications - Decision Trees-Geometry and Nearest neighbours-The Perceptron-Beyond binary Classification	10	25

MODULE : 2 Linear Models for Classification - Discriminant Functions - Probabilistic Generative Models - Probabilistic Discriminative Models – **FIRST INTERNAL EXAMINATION** Neural Networks - Kernel Methods - Learning Theory	6 5	13 12
MODULE : 3 Ensemble methods-Efficient Learning-Unsupervised Learning-Exception Maximization-Semi supervised Learning **SECOND INTERNAL EXAMINATION**	9	25
MODULE : 4 Graphical methods-Online Learning-Structured Learning Tasks-Bayesian Learning	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS7127 Course Title: Pattern Recognition
Credits:3 Year :2015

Pre-requisites: Nil

Course Objectives:

This course introduces fundamental concepts, theories, and algorithms for pattern recognition. Topics to be covered include linear regression, linear classification, support vector machines, dimensionality reduction, clustering, boosting, and probabilistic graphical models

Syllabus

Classifiers based on Bayes Decision- Probability Distributions- Feature Selection- Clustering: Basic Concepts

Course Outcome:

- Student understands the fundamental pattern recognition and machine learning theories.
- Student gets the ability to design and implement certain important pattern recognition techniques.
- Student gets the capability of applying the pattern recognition theories to applications of interest.

Text Books: .S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009

COURSE PLAN		
COURSE NO:09CS7127 COURSE TITLE: PATTERN RECOGNITION (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Introduction-. Classifiers based on Bayes Decision-. Linear Classifiers-. Nonlinear Classifiers	10	25
MODULE : 2 Probability Distributions- Binary Variables-The beta distribution- Multinomial Variables- **INTERNAL EXAMINATION** The Gaussian Distribution- The Exponential Family - Nonparametric Methods	5 5	13 12
MODULE : 3 Feature Selection- Feature Generation I: Data Transformation and Dimensionality Reduction- Feature Generation II- Template Matching - Context Dependant Clarification- System Evolution. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Clustering: Basic Concepts- Clustering Algorithms: Algorithms L Sequential - Clustering Algorithms II: Hierarchical - Clustering Algorithms III: Based on Function Optimization - Clustering Algorithms IV: Clustering- Cluster Validity	9	25

MODULE : 4

Clustering: Basic Concepts- Clustering Algorithms: Algorithms L Sequential - Clustering Algorithms II: Hierarchical - Clustering Algorithms III: Based on Function Optimization - Clustering Algorithms IV: Clustering- Cluster Validity

END SEMESTER EXAMINATION

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

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Course No: 09CS7137 Course Title: Soft Computing
Credits:3 Year :2015

Pre-requisites: Nil

Course Objectives:

The objective of this course is to teach basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations.

Syllabus
Biological and artificial neurons, perceptron and multilayer perceptron. ANN models and learning algorithms. Fuzzy sets, and fuzzy logic. Basic fuzzy mathematics. Fuzzy operators. Fuzzy systems: fuzzifier, knowledge base, inference engine, and various inference mechanisms such as Sugeno, Mamdani, Larsen etc., composition, and defuzzifie

Course Outcome:
Implement numerical methods in soft computing .Explain the fuzzy set theory .Apply derivative based and derivative free optimization .Discuss the neural networks and supervised and unsupervised learning networks .Comprehend neuro fuzzy modeling .Demonstrate some applications of computational intelligence

Text Books: .
1. Principles of Soft Computing,2nd ED,S.N.Sivanandam,S.N.Deepa
2. Rajkumar Roy, Mario Koppen "Soft Computing and Industry: Recent Applications", Springer.

References:
1 **.** PravirChawdhry, Rajkumar Roy, Raj Pant, "Soft Computing in Engineering Design and Manufacturing", Springer.
2..Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall

COURSE PLAN		
COURSE NO:09CS7137 COURSE TITLE: SOFT COMPUTING(L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Introduction- Artificial Neural Network: An Introduction- Supervised Learning Network- Associative Memory Networks- Unsupervised Learning Networks- Special Networks	9	25
MODULE : 2 Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets-	5	12
FIRST INTERNAL EXAMINATION Classical Relations and Fuzzy Relations- Membership Functions- Defuzzification	6	13

MODULE : 3 Fuzzy Arithmetic and Fuzzy Measures- Fuzzy Rule Base and Approximate Reasoning- Fuzzy Decision Making- Fuzzy Logic Control Systems **SECOND INTERNAL EXAMINATION**	11	25
MODULE : 4 Genetic Algorithm- Hybrid Soft Computing Techniques- Applications of Soft Computing	8	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS7147 Course Title: Data Mining and Business Analytics
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

- Use modern spreadsheet software to import data from various data sources (files, databases, etc.)
- Manipulate and transform data to conform to specified requirements
- Create simple macros for procedural data manipulation

Syllabus

Introduction, Processing the Information and Getting to Know Your Data , Logistic Regression, Fisher's Linear Discriminant Function , Market Basket Analysis

Course Outcome:

. • Obtain knowledge of current and emerging concepts data mining .
• construct meaningful reports and charts from data using multi-dimensional "pivot" features

Text Books:

1.Data Mining and Business Analytics with R, Johannes Ledolter

References:

1.Introduction to Data Mining with Case Studies ,G.K. Gupta
2. Data Mining: Examples and Case Studies , Yanchang Zhao

COURSE PLAN		
COURSE NO: 09CS7147 COURSE TITLE: DATA MINING AND BUSINESS ANALYTICS (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Introduction, Processing the Information and Getting to Know Your Data, Standard Linear Regression Local Polynomial Regression: a Nonparametric Regression Approach, Importance of Parsimony in Statistical Modeling	9	25
MODULE : 2 Logistic Regression, Binary Classification, Probabilities, and Evaluating Classification Performance, **FIRST INTERNAL EXAMINATION** Classification Using a Nearest Neighbor Analysis, The Naýve Bayesian, Multinomial Logistic Regression	5 5	12 13

MODULE : 3 Fisher's Linear Discriminant Function, Examples on German Credit Data, Fisher Iris Data, Forensic Glass Data, MBA Admission Data, Decision Trees, R Packages for Tree Construction ,Chi-Square Automatic Interaction Detection (CHAID) ,Ensemble Methods: Bagging, Boosting, and Random Support Vector Machines (SVM), Neural Networks, The R Package Rattle: A Useful Graphical User Interface for Data Mining, Clustering **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Market Basket Analysis: Association Rules and Lift, Dimension Reduction, Reducing the Dimension in Regressions with Multicollinear Inputs, Text as Data, Network Data	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS7157 Course Title: Managing Big Data
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

Study handling the tremendous flow of data in the future computing continuum.

Syllabus

Big data- Grid Computing- NoSQL – aggregate data models- partitioning and combining- Hadoop – open source technologies – HDFS concepts – Java interface- MapReduce workflows – unit tests with MRUnit

Course Outcome:

- Define and describe Big Data and its role in the corporate world
- Recognize the phases of development of a Big Data strategy within a corporation
- Should Understand why a Big Data Platform is required to bring together what would otherwise be separate silos of data and analytics
- Identify the importance of data governance for managing Big Data

Text books:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley,2013

2. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.

References:

1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.

2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the EmergingWorld of Polyglot Persistence", Addison-Wesley Professional, 2012.

COURSE NO:09CS7157 COURSE TITLE: Managing Big Data
(L-T-P : 3-1-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 What is big data – why big data –.Data!, Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System , Grid Computing, Volunteer Computing, convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies	9	25
MODULE : 2		

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships – graph databases – **FIRST INTERNAL EXAMINATION** schema less databases – materialized views – distribution models – sharding — version – Map reduce – partitioning and combining – composing map-reduce calculations	5 5	12 13
MODULE : 3 Introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics -Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

ELECTIVE- V

Course No: 09CS7167 Course Title: Digital Image Processing

Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

To introduce the students with the concepts of digital image processing fundamentals, Image enhancement techniques, segmentation, feature analysis and their applications..

Syllabus

Introduction - Image Acquisition – Sampling and Quantization – Pixel Relationships –File Formats, Image operations – Spatial Domain Gray level Transformations- Histogram Processing- Spatial Filtering - Filtering in Frequency Domain - Edge Linking and Boundary Detection - Image .Compression - Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Composting – Mosaics – Colour Image Processing..

Course Outcome:

By the end of the course the student must be able to know the basic concepts of image processing and utilize them in practical applications.

Text Books:

1. 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

3. M. Sonka, V. Hlavac and R. Boyle, Image Processing Analysis and Machine Vision, Brooks/colic, Thompson Learning, 1999

COURSE PLAN		
COURSE NO:09CS7167 COURSE TITLE: DIGITAL IMAGE PROCESSING (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**

MODULE : 1 Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic& Geometric	9	25
MODULE : 2 Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. **FIRST INTERNAL EXAMINATION** Frequency Domain : Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.	6 5	12 13
MODULE : 3 Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation Image .Compression: Fundamentals – Models – Elements of Information Theory– Error Free Compression –Lossy Compression – Compression Standards. **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Composting – Mosaics – Colour Image Processing..	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS7177 Course Title: Natural Language Understanding
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

To give the Student:-

- Study the algorithms necessary for the development of applications in the field of natural language information processing.

Syllabus

Regular Expressions and Finite State Automata - Computational Phonology - Hmms And Speech Recognition –Parsing- Machine Translation - Speech Recognition Architecture

Course Outcome:

By the end of the course, the student must be able to:

- Assess Evaluate NLP based systems
- Describe the typical problems and processing layers in NLP .
- Choose appropriate solutions for solving typical NLP problems
- Analyze NLP problems to decompose them in adequate independent components

Text Books:

1. D. Jurafsky and J. Martin , "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education, 2004

2. C. Manning and H. Schutze , "Foundations of Statistical Natural Language Processing", Massachusetts Institute of Technology, 2003.

References:

1. James Allen "Natural Language Understanding" ,The Benajmins/Cummings Publishing Company Inc. 1994

COURSE PLAN		
COURSE NO:09CS7177 COURSE TITLE: Natural Language Understanding (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks%**
MODULE : 1 Regular Expressions and Finite State Automata – Morphology and Finite State Transducers ,Computational Phonology and Text to speech - N-grams: Counting words in Corpora – Simple N-grams – Smoothing – Entropy	9	25
MODULE : 2 HMMS and Speech Recognition: Speech Recognition Architecture – Overview of HMM – Advanced Methods for decoding – Training a speech Recognizer – Human Speech Recognition - Part of Speech Tagging: Rule Based, Stochastic	6	13

Part-of-Speech Tagging – Transformation Based Tagging- **FIRST INTERNAL EXAMINATION** Context Free Grammars for English – Context Free Rules and Trees – Sentence Level Constructions- Coordination – Agreement – Grammars and Human Processing	4	12
MODULE : 3 Parsing with Context Free Grammars – Top down Parser – Problems with Basic Top Down Parser – Finite State Parsing Methods - Representing Meaning: Computational Desiderata for Representations – Meaning Structure of Language – First Order Predicate Calculus- Semantic Analysis: Syntax driven Semantic Analysis – Attached for a Fragment of English- Integrating Semantic Analysis into the Earley Parser, Robust Semantic Analysis **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Dialogue and Machine Translation - Dialogue Acts – Automatic, Plan inferential, Cue based Interpretation of Dialogue Acts – Dialogue Structure and coherences – Dialogue Managers - Language Similarities and differences – The Transfer Metaphor – The Interlingua Idea- Direct Translation– Using Statistical Techniques – Usability and System Development	10	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS7187 Course Title: Virtualization Techniques
Credits:3 Year :2015

Pre-requisites: Nil

Course Objectives:

The objective of this course is to teach basic virtualization techniques, tools, understanding configuration options, how virtualization software operates; hypervisor products; how to manage CPU, memory, storage, and networking; and much more.

Syllabus

Describing Virtualization- Describing a Virtual Machine- Loading Windows into a Virtual Machine- Understanding Applications in a Virtual Machine

Course Outcome:

Covers the fundamental concepts and skills, including how virtualization software operates within a computing environment

Text Books:

1. Virtualization Essentials, Matthew Portnoy

References:

1 Virtual Machines: Versatile Platforms for Systems and Processes (1st Ed): Jim Smith, Ravi Nair; Morgan Kaufmann (2005)

2.Applied Virtualization Technology - Usage models for IT professionals and Software Developers (1st Ed): Sean Campbell Intel

COURSE PLAN

COURSE NO:09CS7187 COURSE TITLE: VIRTUALIZATION TECHNIQUES (L-T-P : 3-0-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 Describing Virtualization-Microsoft Windows Drives Server Growth -Explaining Moore's Law-Understanding the Importance of Virtualization -Examining Today's Trends - Virtualization and Cloud Computing -Understanding Virtualization Software Operation -Virtualizing Servers – Virtualizing Desktops -Virtualizing Applications.	10	25
MODULE : 2 Describing a Virtual Machine -Examining CPU in a Virtual Machine -Examining Memory in a Virtual Machine -Examining Network Resources in a Virtual Machine -Examining Storage in a Virtual Machine –	5	12
FIRST INTERNAL EXAMINATION Understanding How a Virtual Machine Works -Working with Virtual Machines-Understanding Virtual Machine Clones - Understanding OVF	5	13

MODULE : 3 Loading Windows into a Virtual Machine-Installing Windows-Installing VMware Tools -Understanding Configuration Options-Optimizing a New Virtual Machine - Managing Networking for a Virtual Machine- Installing Linux on a Virtual Machine -Loading Linux into a Virtual Machine-Installing Linux into a Virtual Machine-Installing VMware Tools-Understanding Configuration Options -Optimizing a New Linux Virtual Machine **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Understanding Applications in a Virtual Machine -Examining Virtual Infrastructure Performance Capabilities -Deploying Applications in a Virtual Environment -Understanding Virtual Appliances and vApps	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS7197 Course Title: Embedded Computing System
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

To give the Student:-

- A foundation in the fundamentals of embedded computing;
- An introduction to system design techniques

Syllabus

Introduction to Embedded Computing , Bus-Based Computer Systems, Program Design and Analysis, Processes and operating Systems, System Design Techniques.

Course Outcome:

- Students who successfully complete this course will have demonstrated an ability to understand the fundamental concepts of Embedded Computing.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

Text Books:

Wayne Wolf: Computers as Components, Principles of Embedded Computing Systems Design, 2nd Edition, Elsevier, 2008.

References:

- *Shibu K V: Introduction to Embedded Systems, Tata McGraw Hill, 2009*
- *James K. Peckol: Embedded Systems, A contemporary Design Tool, Wiley Student Edition, 2008*
- *Tammy Neorgaard: Embedded Systems Architecture, Elsevier, 2005. Text Books*

COURSE NO: 09CS7197 COURSE TITLE: EMBEDDED COMPUTING SYSTEM (L-T-P : 3-0-0) CREDITS:3		
MODULES	**Contact hours**	**Sem.Exam Marks;%**
MODULE : 1 Introduction to Embedded Computing Instruction Sets CPU's	10	25
MODULE : 2 Bus-Based Computer Systems **FIRST INTERNAL EXAMINATION** Program Design and Analysis	5 5	12 13

MODULE : 3 Processes and operating Systems Hardware Accelerators **SECOND INTERNAL EXAMINATION**	10	25
MODULE : 4 Networks System Design Techniques	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09CS7107 Course Title: Software Testing and Quality Assurance
Credits: 3-0-0: 3 Year :2015

Pre-requisites: Nil

Course Objectives:

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
4. To study software quality and maturity models
5. To learn how to write software testing documents, and communicate with engineers in various forms.

Syllabus

Basic Concepts and Preliminaries, System Integration, System Test Categories, System Test, Design, System Test Planning And Automation, Software Quality, Maturity Models

Course Outcome:

- Students who successfully complete this course will have demonstrated an ability to understand the fundamental concepts of software testing and quality assurance

Text Books:

Kshirasagar Naik, Priyadarshi Tripathy, Software Testing and Quality Assurance: Theory and Practice , Wiley, August 2008.

COURSE NO: 09CS7107 COURSE TITLE: SOFTWARE TESTING AND QUALITY ASSURANCE (L-T-P : 3-0-0) CREDITS:3

MODULES	Contact hours	Sem.Exam Marks%
MODULE : 1 Basic Concepts and Preliminaries, Theory Of Program Testing, Unit Testing Control Flow Testing, Data Flow Testing, Domain Testing	10	25
MODULE : 2 System Integration, System Test Categories, Functional Testing,	5	13
FIRST INTERNAL EXAMINATION		
Test Generation from FSM Models	5	12
MODULE : 3 System Test Design, System Test Planning And Automation System Test Execution, Acceptance Testing	10	25

SECOND INTERNAL EXAMINATION		
MODULE : 4 Software Reliability, Test Team Organization Software Quality, Maturity Models	9	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks

Course No: 09 CS 7163 **Course Title: Seminar- II Credits: 0-0-2: 2 Year: 2015**

Course Objectives: To assess the debating capability of the student to present a technical topic. Also to impart training to a student to face audience and present his ideas and thus creating in him / herself esteem and courage that are essential for an engineer. Individual students are required to choose a topic of their interest from engineering related topics preferably from outside the M.Tech syllabus and give a seminar on that topic about 30 minutes. A committee consisting of at least three faculty members shall assess the presentation of the seminar and award marks to the students. Each student shall submit two copies of a write up of his / her seminar topic. One copy shall be returned to the student after duly certifying it by the Chairman of the assessing committee and the other will be kept in the departmental library. Internal continuous assessment marks are awarded based on the relevance of the topic, presentation skill, quality of the report and participation.

Internal Continuous Assessment-100 marks

Course No: 09CS 7183 Course Title: Master Research Project (Phase –I)
Credits: 0-0-12: 6 Year: 2015

Course Objective:

To improve the professional competency and research aptitude by touching the areas which otherwise not covered by theory or laboratory classes. The project work aims to develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.

The project work should be a project in computer science & engineering stream. The project work is allotted individually on different topics. The students shall be encouraged to do their project work in the parent institute itself. If found essential, they may be permitted to do their project outside the parent institute. Department will constitute an Evaluation Committee to review the project work. The Evaluation committee consists of at least three faculty members of which internal guide and another expert in the specified area of the project shall be two essential members.

The student is required to undertake the masters research project phase-I during the third semester and the same is continued in the 4^{th} semester.(Phase-II). Phase-I consists of preliminary thesis work, two reviews of the work and the submission of preliminary report. First review would highlight the topic, objectives, methodology and expected results. Second review evaluates the progress of the work, preliminary report and scope of the work which is to be completed in the 4th semester.

Internal Continuous Assessment :50 marks

SEMESTER IV

Course No: 09 CS7184 Course Title: Master Research Project (Phase-II)
Credits: 0-0-21: 12 Year: 2015

Course Objective

Project phase-II is a continuation of project phase-I started in the third semester before the end of the fourth semester, there will be two reviews, one at middle of the fourth semester and other towards the end. In the first review, progress of the project work done is to be assessed. In the second review, the complete assessment (quality, quantum and authenticity) of the Thesis is to be evaluated. Both the reviews should be conducted by guide and Evaluation committee. This would be a pre qualifying exercise for the students for getting approval for the submission of the thesis. At least one technical paper is to be prepared for possible publication in journal or conferences. The technical paper is to be submitted along with the thesis.

Internal Continuous assessment: 70 Marks

End Semester Exam: 30 Marks