JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)
Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)
Scheme of Study and Examination (w.e.f. July 2010)

B.E. Fourth Year Branch: Computer Science & Engg. SEM: Eighth

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
CS-37	Distributed System & Cloud Computing	3	1	-	10	20	30	70	100	4
CS-39	Soft Computing	3	1	-	10	20	30	70	100	4
CS-41	Network & Cyber Security	3	1	-	10	20	30	70	100	4
Refer Table	Elective-II	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
CS-38L	Distributed System & Cloud Computing Lab	-	-	2	20	-	20	30	50	2
CS-`54L	Soft Computing Lab	-	-	2	20	-	20	30	50	2
CS-50L	Network & Cyber Security Lab	-	-	2	20	-	20	30	50	2
CS-52L	Major Project	-	-	08	80	-	80	120	200	8
CS-53L	Seminar / Group Discussion			2	50	-	50	-	50	2
	Total	12	4	16	230	80	310	490	800	32

T.A. = Teachers Assessment, CT= Class Test, ESE= End Semester Examination
Total Marks= 800, Total Periods= 32, Total Credits= 32

Elective-II					
CS-051A	1.Human Computer Interaction	CS-051B	2.Software Project Management	CS-051C	3.Natural Language Processing

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**DISTRIBUTED SYSTEM & CLOUD COMPUTING**	**CS-37**	Min "D"	Min "D"	5.0

DISTRIBUTED SYSTEM AND CLOUD COMPUTING

Unit–I : Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models

Theoretical Foundation for Distributed System : Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms

Unit–II : Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem

Unit–III : Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.

Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System,

Unit–IV : Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. **Case Study**: CORBA RMI,

Unit –V : Cloud Computing Fundamental: Data Centre foot prints & Concepts . Introduction To cloud Virtualization concepts. Types of Virtualization & its benefits Introduction to Various Virtualization OS Cloud Building Blocks

Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

Books Reference :

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
3. Ramakrishna,Gehrke," Database Management Systems", Mc Grawhill
4. Tenanuanbaum, Steen," Distributed Systems", PHI
5 Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications
6. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach
7. Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**SOFT COMPUTING**	CS-39	Min "D"	Min "D"	5.0

SOFT COMPUTING

Unit – I : Soft Computing : Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.
Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

Unit – II : Neural Network : Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN.Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA,

Unit – III : Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfieldv/s Boltzman machine.Adaptive Resonanceheory: Architecture,classifications, Implementation and training.Associative Memory.

Unit – IV : Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations,Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions,Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Unit – V : Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

References :

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication.
- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications Rich E and
- Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH Kosko:
- Neural Network & Fuzzy System, PHI Publication
- Klir & Yuan ,Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
- Hagen, Neural Network Design, Cengage Learning

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**NETWORK & CYBER SECURITY**	CS-41	Min "D"	Min "D"	5.0

NETWORK & CYBER SECURITY

UNIT- I : Introduction to Network Security, Computer Securit y and Cyber Security. Security Terminologies and Principle, Security Threats, Types of attacks. Introduction to Intrusion, Terminologies, Intrusion Detection System (IDS), Types of Intrusion Detection Systems, System Integrity Verifiers (SIVS).

UNIT- II : Cryptography, Classical Cryptographic Techniques, Encryption, Decryption, Code Breaking: Methodologies, Cryptanalysis, Cryptography Attacks, Brute-Force Attack, Use of Cryptography. Public key cryptography, Principles of Public key Cryptosystems, Cryptographic Algorithms RSA, Data Encryption Standard (DES), RC4, RC5, RC6, Blowfish, Key Management, Diffie-Hellman key exchange, elliptic curve cryptography.

UNIT- III : Hash Functions, One-way Hash Functions, SHA (Secure Hash Algorithm), Authentication Requirements, Authentication Functions, Kerberos. Message Authentication codes ,Message Digest Functions, MD5, SSL (Secure Sockets Layer), SSH (Secure Shell), Algorithms and Security, Disk Encryption, Government Access to Keys (GAK)
Digital Signature: Analysis, Components, Method, Applications, Standard, Algorithm: Signature Generation/Verification, ECDSA, EIgamal Signature Scheme, Digital Certificates.

UNIT- IV : Trojans and Backdoors: Overt and Covert Channels, Working, Types (Remote Access Trojans, Data-Sending Trojans, Destructive Trojans, Trojans, Proxy Trojans, FTP Trojans, Security Software Disablers).
Viruses and Worms: Characteristics, Working, Infection Phase, Attack Phase. Sniffers: Definition, spoofing, Sniffing, Vulnerable Protocols, Types.
Phishing: Methods, Process, Attacks Types (Man-in-the-Middle Attacks, URL Obfuscation Attacks, Hidden Attacks, Client-side Vulnerabilities, Deceptive Phishing, Malware-Based Phishing, DNSBased Phishing, Content-Injection Phishing, Search Engine Phishing).
Web Application Security- Secured authentication mechanism, secured session management, Cross-site Scripting, SQL Injection and other vulnerabilities
Denial-of Service Attacks: Types of Attacks (Smurf Attack, Buffer Overflow Attack, Ping of Death Attack, Teardrop Attack, SYN Attack, SYN Flooding), DDoS Attack(Distributed DoS Attack.), Session Hijacking, Spoofing v Hijacking, TCP/IP hijacking, CAPTCHA Protection

UNIT- V : IP Security, Web Security, Firewalls: Types, Operation,Spam filters, Design Principles, Trusted Systems. Computer Forensics, Need, Objectives,Stages & Steps of Forensic Investigation in Tracking Cyber Criminals, Incident Handling. Hacking, Classes of Hacker (Black hats, grey hats, white hats, suicide hackers), Footprinting, Scanning (Types-Port, Network, Vulnerability), E-Mail Spiders, Overview of System Hacking Cycle.

Suggested Reading:

1. William Stallings, "Cryptography and Network Security: Principles and Practice" Pearson
2. Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, " Network Security - Private communication in a public world" TMH
3. Fourozon, "Cryptography & Network Security" TMH
4. Joseph Migga Kizza, Computer Network Security, , Springer International Edition
5. Atul Kahate,"Cryptography and Network Security" Mc Graw Hill
6. Carl Endorf, Eugene Schultz, Jim Mellander **"**INTRUSION DETECTION & PREVENSION**"** TMH
7. Neal, Krawetz, Introduction to Network Security,Cengage

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**HUMAN COMPUTER INTERACTION**	CS-051A	Min "D"	-	5.0

HUMAN COMPUTER INTERACTION

UNIT-I

Introduction to Human-computer Interaction: Methodology for Designing User-computer, Interfaces Conceptual, semantic, syntactic, and lexical levels of the design of an interactive system, importance of good design. Benefits of good design, A brief history of Screen design.

UNIT-II

Interaction Styles: Form-based Command language, Menus, Natural language, Direct manipulation, Virtual Reality, Augmented Reality, Other emerging interaction styles

UNIT-III

Design and Evaluation Process: Prototyping Testing and evaluating interface design, Guidelines and criteria for designing user interfaces. User Interface Software and Specifications Languages and tools for specifying and building interfaces Dialogue independence UIMS (user interface management system) approach Languages and software abstractions for user interfaces Programming support tools.

UNIT-IV

Basic Interaction Task: Techniques, and Devices Interaction Tasks -Input Devices Interaction Techniques Models and theories Human Performance Scientific foundations for designing user interfaces Visual presentation of information Graphical design Designing experiments

UNIT-V

Introduction to Research in Human-Computer: Interaction Research prototypes Interdisciplinary nature of HCI research Examples of HCI research New Interaction Techniques New modes of human-computer communication Voice Gesture Eye movement Tangible user interfaces.

Textbooks

1)B. Shneiderman, C. Plaisant, M. Cohen, and S. Jacobs, Designing the User Interface: Strategies for Effective Human-Computer Interaction, Addison-Wesley, Reading, Mass. (any recent edition)

2) The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**SOFTWARE PROJECT MANAGEMENT**	CS-051B	Min "D"	-	5.0

SOFTWARE PROJECT MANAGEMENT

UNIT-I: Introduction and Software Project Planning
Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

UNIT-II: Project Organization and Scheduling
Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

UNIT-III: Project Monitoring and Control
Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

UNIT-IV: Software Quality Assurance and Testing
Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

UNIT-V: Project Management and Project Management Tools
Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Books:

1. Software Project Management by M. Cotterell
2. Information Technology Project Management
3. Management Information and Control by
4. Software Engineering – A Practitioner's approach, Roger S. Pressman (5^{th} edi), 2001, MGH
5. Software Project Management, Walker Royce, 1998, Addison Wesley.
6. Project Management 2/c. Maylor
7. Managing Global software Projects, Ramesh, 2001, TMH.
8. Software Project Managemnet by S. A. Kelkar

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**NATURAL LANGUAGE PROCESSING**	CS-051C	Min "D"	-	5.0

NATURAL LANGUAGE PROCESSING

Unit-I: Components of natural language processing: lexicography, syntax, semantics, pragmatics: word level representation of natural languages prosoty & natural languages.

Unit-II : Formal languages and grammars: chomsky hierarchy, Left-Associative grammars, ambiguous grammars, resolution of ambiguities.

Unit-III : Computation linguistics: recognition and parsing of natural language structures: ATN & RTN,General techniques of parsing: CKY, Earley & Tomitas algorithm.

Unit-IV : Semantics-knowledge representation semantic networks logic and inference pragmatics, graph models and optimization, prolog for natural language semantic.

Unit-V: Application of NLP: intelligent work processors: Machine translation, user interfaces, Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

Text Book:

- "Natural Language Understanding" James Allen ,Benjamin-1995, cummings Pub. Comp. Ltd.,

Reference Books:

1. Terry Winograd, "Language as a cognitive process", AW, 1983
2. G. Gazder,,"Natural Language processing in prolog", Addison Wesley 1989,.
3. Mdlj Arbib & Kfaury, "Introduction of Formal Language Theory" , Springer Verlog,, 1988,
4. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, *NLP: A Paninian Perspective*, Prentice Hall, New Delhi
5. James Allen," *Natural Language Understanding"*, 2/e, Pearson Education, 2003
6. D. Jurafsky, J. H. Martin, "*Speech and Language Processing"*, Pearson Education, 2002
7. L.M. Ivansca, S. C. Shapiro, "*Natural Language Processing and Language Representation".*
8. T. Winograd," *Language as a Cognitive Process"*, Addison-Wesley

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**DISTRIBUTED SYSTEM AND CLOUD COMPUTING LAB**	CS-38L	Min "D"	Min "D"	5.0

DISTRIBUTED SYSTEM LAB

List of Experiment :

The following programs should be developed preferably on '**UNIX'** platform:-

1. Simulate the functioning of Lamport's Logical Clock in 'C'.
2. Simulate the Distributed Mutual Exclusion in 'C'.
3. Implement a Distributed Chat Server using TCP Sockets in 'C'.
4. Implement RPC mechanism for a file transfer across a network in 'C'
5. Implement 'Java RMI' mechanism for accessing methods of remote systems.
6. Simulate Balanced Sliding Window Protocol in 'C'.
7. Implement CORBA mechanism by using 'C++' program at one end and 'Java' program on the other

8.Performance evaluation of services over cloud.

9. Case Study: Google App Engine, Microsoft Azure, Amazon.10. Installation and configuration of Hadoop / Eucuiptus etc.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**SOFT COMPUTING LAB**	CS-54 L	Min "D"	Min "D"	5.0

SOFT COMPUTING LAB

List of experiment:

1. Write a program to implement Artificial neruron using thresh hold function as activation function.
2. Write a program to implement Artificial neruron using hyperbolic tanzant function as activation function.
3. Write a program to implement adaline function
4. Write a program to implement madaline function
5. Write a program to implement perceptron windrrawhebbs learning rule using MATLAB NN Toolbox
6. Write a program to implement back propagation network in forward pass using MATLAB NN Toolbox
7. Write a program to implement back propagation network in reverse pass using MATLAB NN Toolbox
8. Write a program to implement AND gate using ANN.
9. Write a program to implement OR gate using ANN.
10. Write a program to implement NOR gate using ANN.
11. Write a program to implement counter progation network
12. Write a program to triankohonen layer neurons of cpn
13. Write a program to triangrossberg layer neurons of con.
14. Write a program to implement ART-1 network.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**NETWORK & CYBER SECURITY LAB**	CS-50L	Min "D"	Min "D"	5.0

NETWORK & CYBER SECURITY LAB

List of Experiments to be performed:

1. Networking Security Programming with TCP/IP for Application layer, Transport layer, Network layer, Datalink layer protocols.
2. Socket Security Programming for address structures, byte manipulation & address conversion functions, elementary socket system calls.
3. APIs security Programming for windows socket API, window socket & blocking I/O model, blocking sockets, blocking functions, timeouts for blocking I/O.
4. Web Security Programming for firewall and others.
5. Web databases security programming.
6. Component Security Programming for CORBA.
7. CGI Security programming and Firewall
8. Programming for Cryptography and Digital Signature.
9. Java network Security programming.
10. Client Server Security Programming.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**MAJOR PROJECT**	CS-52L	-	Min "D"	5.0

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**SEMINAR /GROUP DISCUSSION**	CS-53L	-	Min "D"	5.0