

**BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE
IN FACULTY OF SCIENCE & TECHNOLOGY)
TEACHING AND EXAMINATION SCHEME WITH CHOICE BASED CREDIT SYSTEM**

III - SEMESTER B.E. (COMPUTER SCIENCE & ENGINEERING)

Course Code	Course Title	Teaching Scheme				Examination Scheme										
		Hours per week			No. of Credits	Theory						Practical				
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks			Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
								Sessional								
			ESE	MSE	IE		TW		POE							
3BECS01	Applied Mathematics-III	3	1	0	4	3	80	10	10	100	40	-	-	-	-	
3BECS02	Computer Architecture & Organization	3	1	0	4	3	80	10	10	100	40	-	-	-	-	
3BECS03	Advanced- C Programming	3	1	-	3	3	80	10	10	100	40	-	-	-	-	
3BECS04	Basic Electronics	3	1	-	3	3	80	10	10	100	40	-	-	-	-	
3BECS05	Digital Circuits & Fundamentals of Microprocessor	3	0	-	3	3	80	10	10	100	40	-	-	-	-	
3BECS06	Advanced- C Programming	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
3BECS07	Basic Electronics	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
3BECS08	Digital Circuits & Fundamentals of Microprocessor	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
		15	4	6	23	-										
		25			23					500					150	
						650										

**BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE)
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IV - SEMESTER B.E. (COMPUTER SCIENCE & ENGINEERING)

Course Code	Course Title	Teaching Scheme				Examination Scheme										
		Hours per week			No. of Credits	Theory						Practical				
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks			Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
								Sessional								
ESE	MSE	IE	TW	POE												
4BECS01	Applied Mathematics – IV	3	1	0	4	3	80	10	10	100	40	-	-	-	-	
4BECS02	Data Structures	3	1	-	3	3	80	10	10	100	40	-	-	-	-	
4BECS03	Database Management System	3	1	-	3	3	80	10	10	100	40	-	-	-	-	
4BECS04	Theory of Computation	3	0	0	4	3	80	10	10	100	40	-	-	-	-	
4BECS05	Object Oriented Programming	3	1	-	3	3	80	10	10	100	40	-	-	-	-	
4BECS06	Data Structures	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
4BECS07	Database Management System	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
4BECS08	Object Oriented Programming	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
		15	4	6	23											
		26			23					500				150		
						650										

**BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE)
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V - SEMESTER B.E. (COMPUTER SCIENCE & ENGINEERING)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks		Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
								Sessional							
ESE		MSE	IE	TW	POE										
5BECS01	System Programming	3	1	0	3	3	80	10	10	100	40	-	-	-	-
5BECS02	Design and Analysis of Algorithms	3	1	-	3	3	80	10	10	100	40	-	-	-	-
5BECS03	Java Programming	3	1	-	3	3	80	10	10	100	40	-	-	-	-
5BECS04	Software Engineering	3	1	-	3	3	80	10	10	100	40	-	-	-	-
5BECS05	PE-I 1. Cyber Security 2. Sensor Networks 3. Computational Intelligence	3	0	0	3	3	80	10	10	100	40	-	-	-	-
5BECS06	Design and Analysis of Algorithms	0	0	2	2	-	-	-	-	-	-	25	25	50	25
5BECS07	Java Programming	0	0	2	2	-	-	-	-	-	-	25	25	50	25
5BECS08	Software Engineering	0	0	2	2	-	-	-	-	-	-	25	25	50	25
5BECS09	Seminar	0	0	2	2	-	-	-	-	-	-	50	-	50	25
		15	4	8	23										
		27			23					500				200	
		700													

Seminar: A student is required to prepare an advanced technical topic of his/her area of interest from the stream and deliver before a seminar guide. Also he/she is required to submit seminar report.

**BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE)
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VI - SEMESTER B.E. (COMPUTER SCIENCE & ENGINEERING)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks		Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
								Sessional							
ESE		MSE	IE	TW	POE										
6BECS01	Web Technology	3	1	-	3	3	80	10	10	100	40	-	-	-	-
6BECS02	Computer Network & Communication	3	1	-	3	3	80	10	10	100	40	-	-	-	-
6BECS03	Computer Graphics	3	1	-	3	3	80	10	10	100	40	-	-	-	-
6BECS04	Principles of Management Information System	3	1	0	3	3	80	10	10	100	40	-	-	-	-
6BECS05	PE-II 1. Data Analytics 2. Natural Language Processing 3. Artificial Intelligence	3	0	0	3	3	80	10	10	100	40	-	-	-	-
6BECS06	Audit Heads	0	0	0	5	Audit Course									
6BECS07	Web Technology	0	0	2	2	-	-	-	-	-	-	25	25	50	25
6BECS08	Computer Network & Communication	0	0	2	2	-	-	-	-	-	-	25	25	50	25
6BECS09	Computer Graphics	0	0	2	2	-	-	-	-	-	-	25	25	50	25
6BECS10	Industry Exposure Program	0	0	0	2	-	-	-	-	-	-	50	-	50	25
		15	4	6	28										
		25			28					500				200	
						700									

Note: Industry Exposure Program for two weeks shall be required to be completed by every student by beginning of the semester.

**BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE)
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VII - SEMESTER B.E. (COMPUTER SCIENCE & ENGINEERING)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks		Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
								Sessional							
ESE	MSE	IE	TW	POE											
7BECS01	Operating System	3	1	0	3	3	80	10	10	100	40	-	-	-	-
7BECS02	Software Testing and Quality Assurance	3	1	0	3	3	80	10	10	100	40	-	-	-	-
7BECS03	Computer System Security	3	1	-	3	3	80	10	10	100	40	-	-	-	-
7BECS04	TCP/IP and Internet	3	0	-	3	3	80	10	10	100	40	-	-	-	-
7BECS05	CE-I 1.Neural Network & Fuzzy Logic 2.Advanced Computer Architecture 3.Enterprise Resource Planning 4.Multimedia Systems 5.Digital Image Processing	4	0	0	4	3	80	10	10	100	40	-	-	-	-
7BECS06	Computer System Security	0	0	2	2	-	-	-	-	-	-	25	25	50	25
7BECS07	TCP/IP and Internet	0	0	2	2	-	-	-	-	-	-	25	25	50	25
7BECS08	Major Project Literature Review & Presentation	0	0	2	4	-	-	-	-	-	-	25	25	50	25
		16	3	6	24										
		25			24					500				150	
						650									

**BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE)
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TEACHING AND EXAMINATION SCHEME WITH CHOICE BASED CREDIT SYSTEM
VIII - SEMESTER B.E. (COMPUTER SCIENCE & ENGINEERING)**

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks		Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
								Sessional							
ESE	MSE	IE	TW	POE											
8BECS01	Compiler Construction	3	1	-	3	3	80	10	10	100	40	-	-	-	-
8BECS02	Data Warehousing and Data Mining	3	1	-	3	3	80	10	10	100	40	-	-	-	-
8BECS03	CE-II 1.Cloud Computing 2.Advanced Database 3.Distributed System 4.E-Commerce	4	0	0	4	3	80	10	10	100	40	-	-	-	-
8BECS04	OE-I	2	0	0	2	3	80	10	10	100	40	-	-	-	-
8BECS05	Compiler Construction	0	0	2	2	-	-	-	-	-	-	25	25	50	25
8BECS06	Data Warehousing and Data Mining	0	0	2	2	-	-	-	-	-	-	25	25	50	25
8BECS07	Major Project	0	0	6	6	-	-	-	-	-	-	75	75	150	75
		12	2	10	22										
		24			22					400					250
						650									

PROGRAMME ELECTIVES

V – SEMESTER				VI - SEMESTER			
S.N.	COURSE TITLE	CODE	PARENT BOS	S.N.	COURSE TITLE	CODE	PARENT BOS
01			ELECTRICAL (EEE)	01			ELECTRICAL (EEE)
02			MECHANICAL	02			MECHANICAL
03			CIVIL	03			CIVIL
04			MINING	04			MINING
05			EN/ ECE/ EXTC	05			EN/ ECE/ EXTC
06	1. Cyber Security 2. Sensor Networks 3. Computational Intelligence	5BECS05/5BECT05	CT/CSE	06	1. Data Analytics 2. Natural Language Processing 3. Artificial Intelligence	6BECS05/6BECT05	CT/CSE
07			INFORM. TECH.	07			INFORM. TECH.
08			INSTRUMENTATION	08			INSTRUMENTATION

LIST OF AUDIT COURSES/ EVENTS

01	Business Communication Skills	07	
02	Advanced Excel	08	
03		09	
04		10	
05		11	
06		12	

PROPOSED COURSES FOR OPEN ELECTIVE

01	Financial Management	04	Project Management & Quality
02	Foundation Course in HR Mgmt.	05	Cyber laws: International Perspective
03	Entrepreneur Development	06	Corporate Ethics

Appendix A

GONDWANA UNIVERSITY, GADCHIROLI

FACULTY OF SCIENCE AND TECHNOLOGY

CONSOLIDATED STATEMENT OF VARIOUS PARAMETERS IN TEACHING & EXAMINATION SCHEME OF

B.E. (COMPUTER SCIENCE & ENGINEERING)

SR.NO.	SEMESTER	NO. OF THEORY COURSES	NO OF LABS/PRACT	TEACHING HOURS(TH) (L+T)	TEACHING HOURS (PRACT)	TOTAL CREDIT	MAX. THEORY MARKS	MAX.PRACT MARKS	MAX. MARKS TOTAL
1	III	5	3	19	6	23	500	150	650
2	IV	5	3	19	6	23	500	150	650
3	V	5	4	19	8	23	500	200	700
4	VI	6	4	19	6	28	500	200	700
5	VII	5	3	19	6	24	500	150	650
6	VIII	4	3	14	10	22	400	250	650
		30	20	109	42	143	2900	1100	4000

Course wise Board of Studies Affiliation

Board of Studies	Course Codes
APPLIED SCIENCES & HUMANITIES	3BECS01, 4BECS01
ELECTRONICS ENGINEERING	3BECS04, 3BECS05

CHOICE BASED CREDIT SYSTEM (CBCS)
V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS01

Title of the Course: System Programming

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Background Machine Structure, Assemblers, Loaders, Macros, Compilers, Formal System, Operating system User Viewpoint: Functions, Operating System User Viewpoint: Batch Control Language, Operating System User Viewpoint: Facilities.	09
II	Machine Structure, Machine Language, And Assembly Language General Machine Structure, General Approach to a New Machine.	10
III	Assemblers General Design Procedure, Design of Assembler. Macro Language and the Macro processor Macro instructions, features of Macro Facility, Macro Instruction Arguments, Conditional Macro Expansion, Macro Calls within Macros, Macros Instructions Defining Macros, Implementation, Implementation of a restricted Facility A Two pass Algorithm, A Single pass Algorithm, Implementation of Macro Calls within Macros, Implementation within an Assembler.	09
IV	Loaders Loader schemes, "Compile and go" Loaders, general Loader scheme, absolute loaders, subroutine linkages, relocating loaders, direct linking loaders, other loader schemes-Binders, linking loaders; Overlays, Dynamic Binders, Design of and absolute Loaders, Design of a Direct-Linking loaders	09
V	Introduction to Device Drivers. Device drivers for Windows, Linux/Unix. Lexical Analysis in Compiler Design. Role of lexical analysis, recognition of tokens.	08
Total		45

Text Book/s:

1. System Programming by Leland Beck, Pearson Ed.
2. Unix device drives by George Pajani, Pearson Ed.
3. Device Drives for Windows by Norton, Add Wesley
4. Assembly & Assemblers by Gorshine, Prentice Hall.

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS02

Title of the Course: Design and Analysis of Algorithms

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction: Analyzing and Designing algorithm, Asymptotic notations: Big Oh, Omega, Theta notation, Average, Best and Worst case analysis of algorithms for Time and Space complexity, Amortized Analysis, Solving Recurrence Equations using Substitution method, Recursion-Tree Method and Master method.	09
II	Divide-and-Conquer and Greedy Strategy: Binary Search, Merge and Quick Sort, The maximum-subarray problem, Strassen's algorithm for matrix multiplication. Greedy Method-General Strategy, Knapsack problem, Job sequencing with deadlines problem, minimum cost spanning trees: Prim's algorithm, Kruskal's algorithm, Single source shortest path: Bellman-Ford algorithm, Dijkstra's algorithm, Difference constraints and shortest paths, Huffman Coding etc.	09
III	Dynamic Programming: Basic strategy, all pair shortest path: Shortest paths and matrix multiplication, Floyd-Warshall algorithm, Single source shortest paths, optimal binary search trees, Matrix-chain Multiplication, Elements of dynamic programming, traveling salesman problem.	09
IV	Backtracking and Hash tables: The general method, 8-Queen's problem, Sum of subsets, Graph Coloring, Hamiltonian Cycle, Graph Coloring, Hash tables, Hash functions, Open addressing.	09
V	NP-Hard And NP-Complete Problems: Basic concepts, Non-Deterministic algorithm, The Classes NP-Hard and NP-complete. NP-Complete problems-Satisfiability problem, vertex cover problem. NP-Hard graph problem, scheduling problem, code generation problems, Simplified NP Hard Problems.	09
Total		45

Text Book/s:

1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Third Edition, PHI.
2. Ellis Horowitz, Sartaj Sahani, Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press.

Reference Book/s:

1. V. Aho and J.D. Ullman, "Design and Analysis of Algorithms", Addison Wesley
2. Brassard, Bratley, "Fundamentals of Algorithms", PHI

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS03

Title of the Course: Java Programming

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Object oriented programming concept, comparing JAVA with C, JAVA programming language syntax, variables, data types, statements and expressions, control statements ifelse, for, while and do-while loops, switch statements, named structures, functions , parameter passing, static modifier, console programming.	09
II	Features of JAVA: classes and interfaces, Threads and multithreaded programming, Synchronization of threads, dead locks, Exception handling, Introduction to packages, math package, lang package, util package.	09
III	Applets programming: Events, Even driven programs, handling events like buttons, mouse, keyboards etc., Applets and Applets package, fonts, colors, Graphics, Images, Sounds, AWT components, Layout managers, writing event driven programs using components.	09
IV	Streams: I/O in JAVA, I/O packages, handling files random access files, chaining streams.	09
V	Network programming: net package, TCP/IP programming, UDP programming, client/server model implementation, getting information from internet. Advanced concepts of JAVA: CORBA, BEANS, JAVADOC ,RMI, Servelets.	09
Total		45

Text Book/s:

1. Introduction to Java programming:, Daneal/Yong PHI
2. Introduction to Java Programming, a primar, Balaguruswamy.

Reference Book/s:

1. The Complete Reference- JAVA 2, Third Edition , by Patrick Naughton, TMH Publications
2. Java 2 Complete Reference – 5th Edition – Herbert Schildt (TMGH).
3. Object oriented programming with JAVA – E. Balguruswamy

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS04

Title of the Course: Software Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction to Software Engineering, Software, Software Myths, Software Engineering- A Layered Technology, A Process Framework, CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Process Models: Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models.	09
II	Managing Software Projects: The People, The Product, The Process, W ⁵ HH Principle, Metrics in the Process and Project Domains, Software Measurements, Metrics for Software Quality, Establishing a Software Metrics Program, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object Oriented Projects, The Make/Buy Decision, Project Scheduling, Risk Management, Quality Management, Software Reengineering: Software Maintenance, A Software Reengineering Process Model, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.	09
III	Software Engineering Practice: The Essence of Practice, Core Principles, Communication Practices, Planning Practices, Modeling Practices, Construction Practice, Deployment, System Engineering: Computer-Based Systems, System Engineering Hierarchy, Business Process Engineering, Product Engineering, System Modeling: Hatley-Pirbhai Modeling and System Modeling with UML.	09
IV	Requirements Engineering: Requirements Engineering Tasks, Initiating the Requirements Engineering process, Eliciting Requirements, Developing Use-Cases, Building the Analysis Model, Requirements Analysis, Analysis Modeling approaches, Data Modeling Concepts, Object-Oriented Analysis, Scenario-Based Analysis, Flow-Oriented Modeling, Class-Based Modeling, Creating a Behavioral Model. Design Engineering: Design Concepts, Design Model, Pattern-Based Software Design.	09
V	Testing Strategies And Tactics: A Strategic approach to Software Testing, Strategic Issues, Testing Strategy for Conventional Software and Object-Oriented Software, Validation Testing, System Testing, Validation and Verification Testing Tactics: Software Testing Fundamentals, Black Box and White Box Testing, Basis Path Testing, Control Structure Testing, Object-Oriented Software Testing Methods	09
Total		45

Text Book/s:

1. Software Engineering- A Practitioner's Approach (Sixth Edition)- Roger S. Pressman (TMH)

Reference Book/s:

1. Software Engineering (Seventh Edition)- Ian Sommerville, Pearson Education.
2. Software Engineering Theory and Practice by Pfleeger, Pearson Education.
3. Software Engineering- Schaum's Series (TMH).

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS05

Title of the Course: PE-I: Cyber Security

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction to Cyber Security: Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.	09
II	Cyber Security Vulnerabilities and Cyber Security Safeguards Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Poor Cyber Security Awareness. Cyber Security Safeguards-Overview, Access control Authentication: Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.	09
III	Securing Web Application, Services and Servers Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.	09
IV	Intrusion Detection and Prevention Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.	09
V	Cryptography and Network Security Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.	09
Total		45

Reference Books:

1. Cybersecurity For Dummies, Palo Alto, Network edition
2. Introduction to Cyber Security by Jeetendra Pande, Uttarakhand Open University
3. Fundamentals of Network Security, John E. Canavan, Artech House, London
4. Digital Forensics, DSCI- Nasscom 2012
5. Cyber Crime Investigation, DSCI-Nasscom 2013

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS05

Title of the Course: PE-I: Sensor Networks

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction: Overview, Broad application areas of WSN, Speciality and constrains	09
II	Hardware and software: Overview of hardware architecture of the sensor motes, Types of operating systems for WSN, TinyOS and Contiki, Basic programming in TinyOS, Concepts of protothreads, Basic programming in Contiki, Network stack overview;	09
III	MAC layer issues: Types of MAC protocols for WSN, Contention-based and reservation based protocols. Detailed study of specific protocols such as SMAC, RMAC, TMAC, DW-MAC, DMAC, Aloha, CSMA-CA, BMAC, LPL, LPP, AMAC, TICER, RICER, RC-MAC, ZMAC, Y-MAC etc.;	09
IV	Network layer issues: Routing, classification of the protocols, specific protocols such as SPIN, LEACH etc. Transport layer issues: TCP/IP for WSN and other related issues, Study of specific transport layer protocols.	09
V	Application layer protocols: Data collection, Data dissemination, Data aggregation, Time synchronization. Standard based protocols: IEEE 802.15.4	09
Total		45

Text Books:

1. Holger Karl, Andreas Willig, Protocols and Architectures for Wireless Sensor Network, John Wiley & Sons, 2005

Reference Books:

6. Ibrahiem M. M. El Emary, S. Ramakrishnan, Wireless Sensor Networks: From Theory to Applications, CRC Press, 2013
7. Ian F. Akyildiz, Mehmet Can Vuran, Wireless Sensor Networks, John Wiley & Sons, 2010
8. J Zheng, and A Jamalipour. Wireless sensor networks: a networking perspective, John Wiley & Sons, 2009
9. Anna Hac, Wireless Sensor Network Designs, John Wiley & Sons, 2003

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS05

Title of the Course: PE-I: Computational Intelligence

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Soft Computing: Artificial Neural Network: Artificial neuron, single layer and multilayer architecture, nonlinear function like sigmoid function, back propagation learning algorithm.	09
II	Functional link artificial neural network, trigonometric, Chebyshev and Legendre polynomial. Radial basis function neural network, its learning algorithm, recurrent neural network and its learning algorithm;	09
III	Fuzzy Logic: Types of fuzzy logic, membership functions, fuzzification and defuzzification, rule-based fuzzy inference engine, Type-1 and Type-2 fuzzy logic, typical applications	09
IV	Evolutionary Computing: Derivative based and derivative free optimization, multivariable and multiconstraint optimization. Genetic algorithm and its variants, Differential evolution and its variants.	09
V	Swarm Intelligence: Particle swarm optimization and its variants, Cat swarm optimization, bacterial foraging optimization, Artificial immune system, multi-objective optimization like NSGA-II	09
Total		45

Reference Book/s:

1. S. Haykin, '*Neural Networks and Learning Machines*', Prentice Hall, 2009.
2. Y.H. Pao, '*Adaptive pattern recognition and neural networks*', Addison-Wesley, 1989.
3. Jang, J.S.R., Sun, C.T. and Mizutani, E., '*Neuro-fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence*', Prentice Hall, 2009.
4. Hagan, M., '*Neural Network Design*', Nelson Candad, 2008.
5. K.A.D. Jong, '*Evolutionary Computation – A Unified Approach*', PHI Learning, 2009.

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS06

Title of the Course: Design and Analysis of Algorithms

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

List of Practicals	
	The student is expected to perform 10 practicals based on following topics.
I	Practical No. 1 & 2 should be based on Unit No.I
II	Practical No.3 & 4 should be based on Unit No. 2
III	Practical No. 5 & 6 should be based on Unit No. 3
IV	Practical No. 7 & 8 should be based on Unit No. 4
V	Practical No. 9 & 10 should be based on Unit No. 5

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS07

Title of the Course: Java Programming

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

List of Practicals	
Practical: Students should perform 10-12 Experiments from the given list.	
I	Programs illustrating overloading and overriding method in JAVA.(Use any application)
II	Programs illustrating the implementation of various forms of inheritance (Ex. Single, Hierarchical, Multilevel inheritance etc.,).
III	Programs which illustrates the implementation of multiple inheritance using interfaces in JAVA.
IV	Programs which illustrates the Implementation of Inheritance by Method overriding, Super constructor and super keyword, abstract class (Use any application)
V	Programs which illustrate the manipulation of strings: 1) Sorting an array of strings in ascending order. 2) Frequency count of words and characters in a text file. Etc.,
VI	Programs for sorting and searching a list of elements.
VII	Programs for addition and multiplication of matrices.
VIII	Programs to create packages in JAVA.
IX	Programs to create multiple threads in JAVA.
X	Programs to write applets to draw the various shapes: a) Cylinder b) Cube c) Square inside a circle d) Circle inside a square e) Polygons etc.,
XI	Create and manipulate labels, lists, text fields, text areas and panels.
XII	Understand and handle mouse events and keyboard events.
XIII	Client/Server interaction with stream socket connections (Use NET packages).
XIV	Exception Handling for – (a) Divide by zero error (b) Null values (c) Data entry
XV	Program to read the data from user and save it to two different files, display the contents and exchange the contents of those two files using IO package.
XVI	Develop an animation program using Multithreading viz. Bouncing Ball.
XVII	Program to scroll the banner using applet.
XVIII	Design 8-digit calculator using AWT package and layout managers.
XIX	Implementation of Client / Server mechanism using Socket classes.
XX	Design Database program for Employee details and implement INSERT, SELECT, DELETE, UPDATE queries using JDBC

XXI	Design concurrent server that will handle multiple clients using multithreading.
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V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS08
Title of the Course: Software Engineering

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

List of Practicals	
	Practical: Students should develop a mini project to a group of 3 - 4 students and Perform following Software Engineering principles. Students also required to submit a hard copy of project report.
	<ol style="list-style-type: none"> 1. Software Requirements Analysis and Specification 2. ER Diagrams 3. Class Diagrams 4. Apply All Framework Activities <ol style="list-style-type: none"> a. Communication b. Planning c. Software design d. Software implementation e. Software testing and maintenance f. Communication skills and teamwork g. Modeling techniques and CASE tools h. Software project planning and management, Study and usage of software project management tools for cost estimation and scheduling i. Data modeling using automated tools j. Exposure towards test plan generators, test case generators, test coverage and software metrics. k. Documentation generators - Study and practice of Documentation generators

V-Semester B. E. (Computer Science & Engineering)

Course Code: 5BECS09

Title of the Course: Seminar

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	50	--	50

Activity	
	The Student shall select the topic of his/her interest from the areas of core and latest technologies or concepts in Computer Science & Engineering. The student is supposed to study the topic in detail and present a Seminar using power point presentation in front of students and faculties. The student is also supposed submit a Report after successful completion of activity.

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS01

Title of the Course: Web Technology

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction to XML: What is XML, XML versus HTML, XML terminology, XML standards, XML syntax checking, The idea of markup, XML Structure, Organizing information in XML, Creating Well-formed XML, XML Namespaces. DTD- Introduction to DTD, Document Type Declaration, Element Type Declaration, Attribute Declaration, Conditional Section, Limitations of DTD, Parsing XML: Introduction to Parser, Parsing approaches, JAXP, JAXP and SAX, JAXP and DOM., Extensible Stylesheet Language (XSL): Introduction to XSL, overview, XPATH, XSLT – templates, creating elements and attributes, looping and sorting, conditional processing, defining variables.	09
II	Introduction to Servlet: History of web applications, support for web application, power of servlet, a Servlet's job, basic servlet code, configuration of apache tomcat server, set up Development Environment, Compiling and Deploying Servlet, Web Application - directory structure, Deployment descriptor, Assigning custom URLs to servlet., Structure of Servlet: HTTP basic, The servlet API, Page Generation, The Servlet Life Cycle – The Service method, doGet and doPost methods, Init method, destroy method, The Single Thread Model Interface	09
III	Retrieving Information: Servlet Init Parameters and Parameter Names, Information about server, Context Init Parameters, The Client Information – information about client machine, Restricting Access, Information about user, The Request – Request Parameter, path information, Serving files, Serving Resources, Request Headers, Handling Post Request Creating Response in Servlet: The Structure of response, sending normal response, using persistent connection, response buffering, controlling response buffer, status codes, setting status code, HTTP headers, setting HTTP headers, Redirecting request, client pull, configuring error pages, logging, Exceptions. Session Management in servlet: Session tracking, Session tracking Mechanisms – Hidden Form Fields, URL Rewriting, cookies, Session Tracking APIs, session life cycle, Setting session timeout, life cycle methods, manually invalidating session, Session ID, non cookie fallbacks.	09
IV	JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing - Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Data between Pages - Sharing Session and Application Data	09
V	Database Access: Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application - Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.	09
Total		45

Text Book/s:

1. XML and Related Technologies – Atul Kahate , Pearson Education.
2. Java Servlet Programming – Jason Hunter, SPD O'REILLY.
3. Core-Servlet and Java Server Pages Volume -1 2nd Edition – Marty Hall, Larry Brown, Pearson Education.
4. Pro ASP.NET 3.5 in C# 2008, Matthew MacDonald, Wiley-APRESS publication.
5. Beginning PHP5, WROX Publications

Reference Book/s:

1. The XML Handbook – Charls Goldfarb.
2. Learning XML – Erik Ray, SPD O'REILLY 2nd Edition.
3. XML in Nutshell – Elliotte RustyHarold, SPD O'REILLY, 3rd Edition.
4. Head First – Servlet and JSP - Bryan Basham, SPD O'REILLY, 2nd Edition.

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS02

Title of the Course: Computer Network & Communication

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	<p>Introduction to Computer Networks: Uses of Computer Networks, Types of Networks, Network Hardware, network software, network design issues, network design tools. ISO's OSI Reference Model & TCP/IP Reference model, Example Networks: Internet, X.25, Frame Relay, ATM, Ethernet, Wireless LANs, Network standardization, Switching, Buffering and Multicasting, MODEM, cable media.</p> <p>Data Link Layer: Design issues, Services, framing, error and flow control, elementary data link protocols: Simplex stop & wait protocol, simplex protocol for noisy channel. Sliding window protocols: Using GO back-N ARQ, using selective repeat ARQ, HDLC. Protocol performance, protocol specification & verification. The Data Link Layer in the Internet & ATM.</p>	09
II	<p>Point-to-Point-Access (PPP): Frame format, Transition states, PPP Stack: LCP, NCP</p> <p>Network Hardware Components: Connectors, Transceivers and Media Converters, Repeaters, NICs, Bridges and Switches.</p> <p>The Medium Access Control Sublayer: Static and dynamic channel allocation, multiple access protocols: ALOHA, CSMA/CD, Collision-free protocols. Limited-contention Protocols, WDMA, wireless LAN protocols.</p> <p>Ethernet: Cabling, encoding, MAC sub-layer protocol, Switched, fast and Gigabit Ethernet, Logical link control, Wireless LANs and Digital Cellular Radio, Broadband Wireless, Virtual LANs, Bluetooth, Virtual Circuit. Switching: Frame Relay and ATM, IEEE 802.3, 802.4, 802.5 standards, FDDI, fast Ethernet & satellite networks.</p>	09
III	<p>Network Layer: Design Issues, Packet switching, Connectionless and Connection-oriented Services, Virtual Circuits and Datagram Subnets, Router, Configuring Router Routing Algorithms, Internetworking, Firewalls.</p>	09
IV	<p>Transport Layer: The transport services, elements of transport protocols: Addressing establishing & releasing a connection, flow control and buffering, multiplexing and crash recovery, simple transport protocol, the Internet transport protocol TCP & UDP. Performance issues. Concept of socket and socket programming (TCP/IP, SPX/PX, WINSOCK).</p>	09
V	<p>Application Layer: Domain Name Systems (DNS), and DNS server, Electronic Mail Architecture and services, Message Formats, MIME, message transfer, SMTP, Mail Gateways, Relays, Configuration 50Mail Servers, DHCP, NetBios, File Transfer Protocol, General Model commands, TFTP.</p>	09

	World Wide Web: Introduction, Architecture overview, static and dynamic web pages, WWW pages and browsing HTTP, LDAP, Browser Architecture, Caching in Web Browser remote login, Wireless web.	
Total		45

Reference Book/s:

1. Tanenbaum A, "Computer Networks", 4 Edition, PHI
2. Fourauzan B., "Data Communications and Networking", 3 edition, Tata McGtaw Hill
3. Keshav S., "An Engineering Approach to Computer Networking", Perason Education, ISBN 981-235-9869
4. Comer D., "Computer Networks and Internet", 2140 Edition, featson Education, ISBN 81 -7808-086-9
5. Gallo M., Hancock W., "Computer Communications and networking Technologies", Thomson Brooks/Cole

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS03

Title of the Course: Computer Graphics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction: Introduction to Computer Graphics & its application. interactive computer graphics. Overview of Graphics System. Graphics Input and Output Devices, Display Devices: Common display devices, storage Tube, Calligraphic, Raster refresh display, CRT, LCD, LED Technology, Basic Concept: Refresh, Flicker, Scan Rate, Screen Size, Aspect Ratio, Interlacing and Non-Interlacing techniques. Raster color graphics, Frame Buffer, Addressing a Raster. Adapters: Basic Function, Video BIOS, Video RAM, operating Modes, Introduction to real time scan conversion, cell and runlength encoding. Introduction & basic function of MGA, CGA, VGA, EGA, SVGA.	09
II	Point Pixel Plotting. Line Generation Algorithms: DDA, Bresenham's Algorithm, Bresenham's Parallel Line generation algo. For multiprocessor system, thick line generation, dotted & dashed line generation algo. Circle Generation: Bresenham's Algorithm, Trigonometric method. Aliasing & Antialiasing techniques. Polygons, Polygon representation, Polygon Filling: Simple ordered edge list algorithm. Edge fill algorithm, Edge flag algo, seed fill algo.	09
III	Graphics Primitives: Display devices, Normalized device coordinates, display files structure. Segments: The segment table, segment creation, closing a segment, detecting a segment, renaming a segment, visibility, image transformation, saving and showing segments, other display file structures, some master techniques. Transformation 2-Dimension Transformation: Basic Transformation: Scaling, Rotation, Translation, Matrix representation, Homogeneous Coordinates & Composite transformations, rotation about an arbitrary point, other transformation: Reflection Shear.	09
IV	Windowing & Clipping: The viewing transformations. Line Clipping: Sutherland-Cohen algo, Midpoint Subdivision algo, Cyrus Beck algo. Polygon Clipping: Sutherland-Hodgman algo.	09
V	3-Dimension Transformation - 3D geometry, 3D primitives, Scaling, Translating, Rotation about an arbitrary axis, parallel Projection, Viewing Parameters, Special Projections. Curves: Bezier & B-spline Curves.	09
Total		45

Text Books:

1. Procedural Elements for Computer Graphics : David F. Rogers, Me Graw Hill.
2. Principles of Interactive Graphics : Newman Sproull, Me Graw Hill, International Student Publication.

3. Mathematical Elements fro Computer Graphics by David F Rogers and Adams

Reference Books:

1. Computer Graphics 2nd edition : Donald Heam, M. Pauline Beker, Prentice Hall of India
2. Computer Graphics A programming approach : Steven Harrington,Mc Graw Hill,
3. International student edition.
4. IBM PC and PS/2 Graphics Hand Book : E. Keja & Johns, Asian Edition.
5. Micro Computer Hardware Design : D. Protopapus, Prentice Hall Editions.

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS04

Title of the Course: Principles of Management Information System

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Nature and Functions of Management, Management yesterday and today, Planning and Decision making.	09
II	Management Information System: Introduction, Conceptual Foundations, Information System Requirement.	09
III	Marketing Management: Marketing concept, Indian Marketing Environment, Market segmentation, Market Planning, International Marketing, Financial Management	09
IV	Human Resource Management: Human Resource Planning, Recruitment, Selection, Training and development, Security, Safety and Health.	09
V	Organization Behavior: Organization Structure and design. Designing Effective Organization, Managing Job Stress, Organization Development.	09
Total		45

Text Book/s:

1. Principles of Management , P C Tripathi and P N Reddy
2. Management Information System, Gordon Davis and H. Olson Tata McGraw Hill Pub.
3. Human Resources and Personal Management, William Werther and Keith Davis
4. Marketing Management, V S Ramaswamy and S Namakumari
5. Organization Behavior, High Arnold and Daniel Feldman Tata McGraw Hill
6. Financial Management, Khanna.

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS05

Title of the Course: PE-II: Data Analytics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction: Sources, modes of availability, inaccuracies, and uses of data. Data Objects and Attributes: Descriptive Statistics; Visualization; and Data Similarity and Dissimilarity.	09
II	Pre-processing of Data: Cleaning for Missing and Noisy Data; Data Reduction – Discrete Wavelet Transform, Principal Component Analysis, Partial Least Square Method, Attribute Subset Selection; and Data Transformation and Discretization.	09
III	Inferential Statistics: Probability Density Functions; Inferential Statistics through Hypothesis Tests Business Analytics: Predictive Analysis (Regression and Correlation, Logistic Regression, In-Sample and Out-of-Sample Predictions), Prescriptive Analytics (Optimization and Simulation with Multiple Objectives);	09
IV	Mining Frequent Patterns: Concepts of Support and Confidence; Frequent Item-set Mining Methods; Pattern Evaluation. Classification: Decision Trees – Attribute Selection Measures and Tree Pruning; Bayesian and Rule-based Classification; Model Evaluation and Selection; Cross-Validation;	09
V	Clustering: Partitioning Methods – k-means Hierarchical Methods and Hierarchical Clustering Using Feature Trees; Probabilistic Hierarchical Clustering; Introduction to Density-, Grid-, and Fuzzy and Probabilistic Model-based Clustering Methods; and Evaluation of Clustering Methods.	09
Total		45

Reference Books:

1. Han, J., M. Kamber, and J. Pei, Data Mining: Concepts and Techniques, Elsevier, Amsterdam. Textbook. Year of Publication 2012.
2. James, G., D. Witten, T. Hastie, and R. Tibshirani, An Introduction to Statistical learning with Application to R, Springer, New York. Year of Publication 2013
3. Jank, W., Business Analytics for Managers, Springer, New York. Year of Publication 2011
4. Williams, G., Data mining with Rattle and R: The Art of Excavating Data for Knowledge Discovery, Springer, New York. Year of Publication 2011

5. Witten, I. H., E. Frank, and M. A. Hall, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann. Year of Publication 2011
6. Wolfgang, J., Business Analytics for Managers, Springer. Year of Publication 2011
7. Montgomery, D. C., and G. C. Runger, Applied Statistics and Probability for Engineers. John Wiley & Sons. Year of Publication 2010
8. Samueli G., N. R. Patel, and P. C. Bruce, Data Mining for Business. Intelligence, John Wiley & Sons, New York. Year of Publication 2010
9. Hastie, T., R. T. Jerome, and H. Friedman, The Elements of Statistical Learning: Data Mining, Inference and Prediction, Springer. Year of Publication 2009

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS05

Title of the Course: PE-II: Natural Language Processing

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction to Natural Language Processing, Finite-state automata and transducers	09
II	Computational morphology, N-gram language models; smoothing; interpolation; backoff Part-of-speech tagging	09
III	Syntactic parsing: rule-based parsing; CYK algorithm; Earley's algorithm, Computational semantics and lexical semantics,	09
IV	Computational lexicons: WordNet Word Sense Disambiguation and Induction,	09
V	Roles and frames: FrameNet, Semantic Role Labeling, Discourse and dialogue, Statistical Machine Translation.	09
Total		45

Text Book/s:

1. Jurafsky and Martin, "Speech and Language Processing", Prentice Hall, 2009.
2. Manning and Schütze. Foundations of Statistical Natural Language Processing, MIT Press, 1999.
3. Larry Wall, Tom Christiansen, Jon Orwant. Programming Perl. O'Reilly. 1996. ISBN 1-56592-149-6.

V-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS05

Title of the Course: PE-II: Artificial Intelligence

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	INTRODUCTION TO AI AND PRODUCTION SYSTEMS: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized production system- Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms.	09
II	REPRESENTATION OF KNOWLEDGE: Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.	09
III	KNOWLEDGE INFERENCE: Knowledge representation -Production based system, Frame based system. Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian Theory-Bayesian Network-Dempster – Shafer theory.	09
IV	PLANNING AND MACHINE LEARNING: Basic plan generation systems – Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.	09
V	EXPERT SYSTEMS: Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOON, Expert systems shells.	09
Total		45

Text Book/s:

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill- 2008. (Units-I,II,VI & V)
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III)

Reference Book/s:

1. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.
3. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.

VI-Semester B. E. (Computer Science & Engineering)**Course Code: 6BECS06****Title of the Course: Audit Heads**

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	00	00	05	25	25	50

List of Audit Heads:

1. **Business Communication Skills**
2. **Advanced Excel:**

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS07

Title of the Course: Web Technology

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

List of Practicals

Practical: Students should perform 10-12 Experiments from the given list.

1. At least six practical experiments based on above syllabus.
2. A mini project is desirable to be completed by a group of three that cover following tools.
 - XML
 - Java Server Pages
 - Servlet
 - ASP.NET
 - PHP
3. Applets, Swings.
4. I/O, AWT.
5. Database connectivity.
6. Session Management

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS08

Title of the Course: Computer Network & Communication

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

List of Practicals

Practical: Students should perform 10 Experiments from the given list.

1. Programs on Error detection and correction: CRC, Hamming Code, Checksum, etc
Use network simulators like NS2 to implement:
2. Monitoring traffic for the given topology
3. Analysis of CSMA and Ethernet protocols
4. Network Routing: Shortest path routing, DVR, LSR.
5. Analysis of congestion control (TCP and UDP).
6. Write a program in C/C++ to implement an Client-Server program, using Socket programming with both TCP and UDP protocols
7. Write a program in C/C++ to implement a Client-Server program, using Socket programming with Stop and Wait protocol.
8. Write a program in C/C++ to implement a Client-Server program, using Socket programming with Sliding Window Protocols.
9. Study of existing LAN and understand the design and various components. Set up a small network of 3 to 4 computers and Hub/Switch as directed by the instructor. Use LAN Card, UTP Cables and Connectors. Install LAN Cards and Crimp the connectors. Assign unique IP addresses and share C drive on each machine. Test the network by using PING command. Use protocol analyzer Software. Repeat the assignment by installing two LAN Cards in one of the machines. Repeat the same assignment by adding a router. Configure the router and use RIP.
10. Study of Network monitoring software like ETHREAL software. Assignment to examine TCP/IP and non-TCP/IP protocols (IPX/SPX) and capture them using protocol analyzer Software
11. Study of Linux and/or Novel Netware Network configurations and commands
12. Installation and configuration of US /PWS/Apache server.
13. File transfer using RS-232
14. File transfer using Stop and Wait Protocol / Go back n / Selective Repeat Protocol
15. Implementation of Shortest Path algorithm
16. File transfer using TCP
17. File Transfer using UDP
18. Data transfer application using TCP/IP protocol suite.

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS09

Title of the Course: Computer Graphics

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

List of Practicals
Practical: Students should perform 10-12 Experiments from the given list.
<ol style="list-style-type: none">1. Installation of computer graphics devices and adapters.2. Implementation of Bresenham's Algorithm – Line, Circle, Ellipse.3. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.4. Composite 2D Transformations5. 2D Clipping and Windowing6. Three dimensional transformations - Translation, Rotation, Scaling7. Composite 3D transformations8. Construction of simple pictures by drawing line, polylines, polygons using OpenGL.9. Filling algorithms10. Cubic Spline / Parabolic Blended curves11. Bezier / B-Spline curves12. File format conversion (like Bitmap, PCX)13. Animation (Moving of object)14. 2D Animation – To create Interactive animation using any animation software.15. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.

VI-Semester B. E. (Computer Science & Engineering)

Course Code: 6BECS10

Title of the Course: Industry Exposure Program

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	00	00	02	50	--	50

Activity
The student is expected to perform one or more following activities related to core industry.
<ol style="list-style-type: none">1. Shall visit industry and understand work culture and work environment.2. Shall undertake internship in the industry.3. Shall undertake industry based live project under the supervision of industry person who will regularly monitor the progress of the project.