

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS701**

**Title of the Course: Digital Image Processing**

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	<b>Introduction to Image Processing:</b> Scenes And Images, Application Of Image Processing, Image Processing System ( Hardware, Software), Elements of Visual Perception, Structure of the Human Visual System, Image Sensing and Acquisition, Image Sampling and Quantization, Basic Relationship between Pixels, Adjacency, Connectivity, Regions and Boundaries, Logic Operations in Image processing, Image Enhancement in Spatial Domain, Spatial domain Methods, Point processing, Neighbourhood processing, High pass filtering, High-Boost Filtering, Zooming, Image Enhancement based on Histogram Modelling.	09
II	<b>Discrete Image Transform:</b> Linear Transformations:Representation of a Discrete Function, Sampling, One dimensional Discrete Transformations, Two dimensional Discrete Linear Transformations , FFT, DCT, DST, Walsh-Hadamard Transform, Walsh transform, Haar transform, Fast algorithm for computing Hadamard transform, Slant transform, K-L Transform, Wavelet Transform and Subband Coding.	09
III	<b>Image Enhancement in Frequency Domain:</b> Fourier Transform, One dimensional Fourier Transform, Two dimensional Fourier Transform, Properties of DFT, Low Pass Frequency Domain Filters: Ideal Low Pass Filters, Butterworth Low Pass Filters, Gaussian Low Pass Filters, High Pass Frequency Domain Filters: Ideal High Pass Filters, Butterworth High Pass Filters, Gaussian High Pass Filters, High Boost Filtering, Clipping and Thresholding, Homomorphic Filtering, Relationship between Filtering in the spatial and frequency domain.	09
IV	<b>Segmentation :</b> Point, Line and Ege Detection, Computing the Gradient, Finding Gradients using Masks: Roberts Mask, Prewitt and Sobel Operators, Compass Operators, Canny Edge Detector, Edge Linking, Connectivity, Region-based Segmentation, Thresholding, Region Extraction, Image Compression: Fidelity Criteria, Image compression Standards, Huffman Coding, LZW Coding, Run-Length Coding, Predictive Coding, Interpolative coding.	09
V	<b>Morphological Image processing:</b> Arithmetic and Logical Operation, Erosion and Dilation, Structuring Elements, Opening and Closing, Hit-or-Miss Transform, Boundary Extraction, Hole(Region) Filling, Thinning, Thickening, Pruning, Morphological reconstruction, Representation and Description: Chain Codes, Polygonal Approximations, Signatures, Medical Axis transform, Moments, Fourier Descriptors, Topological Descriptors, Texture	09
<b>Total</b>		45

### Text Books:

1. B. Chanda, D. Datta Mujumdar, "Digital Image Processing And Analysis", PHI , 5<sup>th</sup> Reprint ISBN-81-203-1618-

2. R.C. Gonzalez, R.R. Woods, "Digital Image Processing Person Education ", ISBN - 81-7808-629-8

**Reference Books:**

1. William Pratt, "Digital Image Processing", John Willey & Sons Inc. ISBN-9-814-12620-9
2. Anil K. Jain, "Fundamentals Of Digital Image Processing", PHI, ISBN-81-203-0929-4

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS702**

**Title of the Course: TCP/IP and Internet**

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 AND ADDRESSES: Introduction, The TCP/IP Architecture, protocol & layering, The Internet Protocol: IP Packet, IP Addressing, Subnet Addressing, IP Routing, Classless Inter-Domain Routing (CIDR), Address Resolution(ARP), Reverse Address Resolution(RARP), Internet Message Control Protols(ICMP) Error and Control Messages, Dynamic Host Configuration Protocol (DHCP), BOOTP; Domain Name System(DNS), NAT	09
II	NETWORK LAYER PROTOCOLS: Router functionality, Dynamic versus Static routing, Routing tables, Unicast routing: Routing Information Protocol (RIP), Border Gateway Protocol (BGP), Open Shortest Path First (OSPF), Routing algorithms (link state, distance vector), Multicast Routing: Routing protocols (MOSPF, DVMRP, CBT, and PIM), MBONE, IGMP, End-to-end datagram delivery, and Flow control	09
III	TRANSPORT LAYER PROTOCOLS & NEXT GENERATION IP: Transmission Control Protocol (TCP): TCP Reliable Stream Service, TCP Operation, TCP Protocol, User Datagram Protocol (UDP), Stream Control Transmission Protocol (SCTP), IPv6, ICMPv6, Transitioning from IPv4 to IPv6.	09
IV	APPLICATION LAYER PROTOCOLS: Client-Server Interaction: The Client-Server Paradigm, The Socket Interface. Naming With The Domain Name System, Electronic Mail Representation And Transfer, File Transfer And Remote File Access, World Wide Web Pages And Browsing,	09
V	MULTIMEDIA INFORMATION & NETWORKING: Introduction to Digital Audio, Audio compression, Streaming Audio, Internet Radio, Voice over IP, Introduction to video, Video compression, Video on demand The Real time transport Protocol: RTP Scenarios and terminology, RTP Packet format, RTP Control Protocol(RTCP) Session control Protocols: Session initiation Protocol, H.323 Multimedia communication systems, Media Gateway Control Protocols	09
<b>Total</b>		<b>45</b>

### Text Book/s:

1. TCP/IP Protocol Suite, 4th Edition, by Behrouz A Forouzan (Tata Mcgraw Hill 2010).

### Reference Book/s:

1. Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architecture, by Douglas Comer, 5th edition, Prentice Hall.
2. Computer Networking with Internet Protocols and Technology, 1/e -- © 2003 William Stallings
3. Communication networks, Leon-Gracia& Widjaja,2001, TMH
4. TCP/IP Illustrated, Volume 1 : The Protocols, 1/e -- © 2000, W. Richard Stevens, Person education
5. TCP/IP Illustrated, Volume 2 : The Implementation, 1/e -- © 1996, Gary R. Wright
6. An Engineering approach to computer networking, S. Keshav, Addison Wesley, 2001

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS703**

**Title of the Course: Data Warehousing and Mining**

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	<b>Data Warehousing:</b> Basic Concepts, Data Warehouse Design: Architecture, data marts, meta data repository, introduction to ETL process, Multidimensional data analysis, Data Warehouse Modeling: Data Cube, OLAP and OLAP operations, Different OLAP Servers, Data Warehouse Usage.	09
II	<b>Data Mining :</b> Need of data mining technique, Introduction to KDD process , A Multi-Dimensional View of Data Mining, Data Mining Functionalities Applications of data mining, classification of data mining techniques, Major Issues in Data Mining,	09
III	<b>Data objects and Preprocessing :</b> Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization Measuring Data Similarity and Dissimilarity. Data Preprocessing : Data Cleaning , Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.	09
IV	<b>Classification and association rule mining:</b> Classification basics, supervised Vs unsupervised learning, and Prediction. Issues Regarding Classification and Prediction. Classification by Decision Tree Introduction: what is decision tree? Algorithm for Decision Tree Induction, Attribute Selection Measure, Extracting Classification Rules from Trees, Approaches to Determine the Final Tree Size, Enhancements to basic decision tree induction. Association rule mining : Basics, Mining single-dimensional Boolean association rules from transactional databases, Mining multilevel association rules from transactional databasesMining multidimensional association rules from transactional databases and data warehouse.	09
V	<b>Cluster analysis:</b> Cluster Analysis: Introduction, applications of clustering, examples of clustering, requirements of clustering in data mining, A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density: Based Methods – Grid: Based Methods – Model: Based Clustering Methods – Clustering , Outlier Analysis.	09
<b>Total</b>		45

### Text Book/s:

1. Jiawei Han and Micheline Kamber —Data Mining Concepts and Techniques, Third Edition, Elsevier,
2. P. S. Deshpande, Chaudhari, “ Multidimensional data analysis and datamining”, DreamTech Press
3. Paul Raj Punniyah – Data Warehousing Fundamentals for IT professionals. Second edition, WIELLY, John-Wielly and sons.

### Reference Book/s:

1. Alex Berson and Stephen J. Smith —Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Arun K.Pujari, Data mining techniques , second edition,Universities Press.2010.
3. G. K. Gupta —Introduction to Data Mining with Case Studies||, Easter Economy Edition, Prentice Hall of India, 2006.

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS704**

**Title of the Course: Advanced Computer Architecture (Elective-I)**

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

Unit	Contents	Hours
I	Trends towards parallel processing, parallelism in uniprocessor systems, parallel computer structures, architectural classification schemes, parallel processing applications, memory hierarchy in parallel processing systems, addressing schemes. Pipeline concept, linear pipelining and space time diagram, classification of pipeline processors, nonlinear pipeline and reservation table, interleaved memory organization, arithmetic pipelines, principles of designing pipeline processors, vector processing.	09
II	SIMD array processors, organization, masking and routing mechanisms, inter PE communications, SIMD inter connection networks, single stage and multi stage networks, mesh connected Illiac networks, parallel shifter, shuffle exchange and omega networks, parallel algorithms for array processors, matrix multiplication, polynomial evaluation, parallel sortings, fast fourier transform computation, associative array processor.	09
III	Multiprocessor architecture, loosely coupled and tightly coupled multiprocessor systems, processor characteristics, inter connection networks crossbar switch and multi port memories, multi stage networks, banyan and delta networks parallel memory organization, multiprocessing operating systems, classification and requirements, software requirements for MPS, language features to exploit parallelism, multi processor scheduling strategies, parallel algorithms.	09
IV	Data flow computers, control flow versus data flow, data flow computer architectures, data flow graphs, data flow languages, Dennis and Irvine machines, dataflow design alternatives, dependence driven and multi level event driven approaches, VLSI computing structures, systolic array architecture, VLSI matrix arithmetic processor.	09
V	Performance evaluation of computers, measurements and parameters, stochastic model simulation model, study of architecture of Cray and Cyber super computers, massively parallel processor systems, image processing on MPP, C.mmp multiprocessor system, crazy X MP super computer.	09
<b>Total</b>		<b>45</b>

### Text Books

1. Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing" McGraw-Hill international Edition

### Reference Books

1. Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill
2. William Stallings, "Computer Organization and Architecture, Designing for performance" Prentice Hall, Sixth edition.
3. Kai Hwang, Scalable Parallel Computing .
4. Harrold Stone, High performance computer Architecture .
5. Richard Y. Kain, Advanced Computer Architecture
6. <http://www.intel.com/products/processor> (for Intel Itanium Processor)

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS704**

**Title of the Course: Multimedia Systems (Elective-I)**

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

Unit	Contents	Hours
I	Multimedia Authoring and Data Representations: Introduction to Multimedia, Multimedia Authoring and Tools, Graphics and Image Data Representations. Color in Image and Video, Fundamental Concepts in Video, Basics of Digital Audio.	09
II	Multimedia Data Compression: Lossless Compression Algorithms, Run-Length Coding, Variable-Length Coding (VLC), Huffman Coding, Adaptive Huffman Coding, Lossy Compression Algorithms, Quantization, Uniform Scalar Quantization, Nonuniform Scalar Quantization, Vector Quantization, Transform Coding, Discrete Cosine Transform (DCT), Image Compression Standards.	09
III	Basic Video Compression Techniques, MPEG Video Coding I - MPEG-1 and 2, MPEG Video Coding II — MPEG-4, 7 and Beyond, MPEG Audio Compression.	09
IV	Multimedia Communication: Computer and Multimedia Networks, Multimedia Network Communications and Applications, Interactive TV (ITV) and Set-Top Box (STB), Broadcast Schemes for Video-on-Demand, Buffer Management, Further Exploration , Wireless Networks , Multimedia over Wireless Networks , Trends in Wireless Interactive Multimedia	09
V	Multimedia Retrieval: Content-Based Retrieval in Digital Libraries, Minimum three Case studies	09
<b>Total</b>		<b>45</b>

### Text Book/s:

1. Fundamentals of Multimedia 1st Edition by Mark S. Drew & Ze-Nian Li, Pearson Education

### Reference Book/s:

1. Multimedia Fundamentals, Volume 1: Media Coding and Content Processing, 2nd Edition by Ralf Steinmetz,
2. Klara Nahrstedt, Pearson Education.
3. Multimedia Making Work (TMH Pub.) by Tay Vaughan.
4. Advanced Multimedia Programming (McGraw Hill Pub.) - Steve Rimmer
5. Digital Image Processing – Gonzalez and Woods, Pearson Education

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS704**

**Title of the Course: Mobile Computing (Elective-I)**

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

Unit	Contents	Hours
I	Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.	09
II	(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).	09
III	Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP. Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.	09
IV	Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques. Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.	09
V	Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.	09
<b>Total</b>		<b>45</b>

### Text Book/s:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley. (Chapters 4, 7, 9,10, 11), second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

### Reference Book/s:

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.
4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS704**

**Title of the Course: Cloud Computing (Elective-I)**

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

Unit	Contents	Hours
I	INTRODUCTION: Cloud Computing Introduction, Form, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.	09
II	CLOUD COMPUTING FOR EVERYONE: Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping schedules managing projects, presenting on road.	09
III	USING CLOUD SERVICES: Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.	09
IV	OUTSIDE THE CLOUD: Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating on line groupware, collaborating via blogs and wikis	09
V	STORING AND SHARING: Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.	09
<b>Total</b>		<b>45</b>

### Text Book/s:

1. Enterprise Cloud Computing by Gautam Shroff, Cambridge
2. Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009

### Reference Book/s:

1. Google Apps by Scott Granneman Pearson
2. Cloud Security & Privacy by Tim Malhar, S. Kumaraswamy, S. Latif (SPD 'O'-REILLY)
3. Cloud Computing: A Practical Approach, Antohy T Velte, et.al McGraw Hill
4. Cloud Computing Bible by Barrie Sosinsky, Wiley India
5. Stefano Ferretti et.al. QoS aware Clouds", 2010 IEEE 3rd International Conference on Cloud Computing

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS705**

**Title of the Course: Enterprise Resource Planning (Elective-II)**

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

Unit	Contents	Hours
I	ERP – Curtain Raiser: An overview, Accommodating variety, Integrated Management Information, Seamless Integration, Supply Chain Management, Resource Management, Integrated data model, Scope, Technology, Benefits of ERP, Evolution, ERP revised, ERP & Modern Enterprise, problems.	09
II	ERP & Related Technologies: MAn overview, Business Process Reengineering(BPR), Management Information System(MIS), Decision Support Systems(DSS), Executive Information Systems (EIS), Data Warehousing, Data Mining, OLAP	09
III	Business Engineering & ERP: An overview, What is Business Engineering (BE)? ERP Implementation and the Competitive Advantage: Significance of BE, Principles of BE, BPR, ERP & IT, BE with IT, ERP and Management concerns, problems. Business Modeling: An overview, Building the Business Model, problems.	09
IV	The ERP Market & Making of ERP: An overview, Role of consultants, vendors & users, customization, precautions, ERP: Post-implementation options, ERP implementation Lifecycle, Guidelines for ERP implementation, problems. ERP & competitive strategy, problems.	09
V	An overview, SAP AG, SAP R/3 Applications, Baan, Oracle, PeopleSoft, JD Edwards, Examples of Indian ERP packages, problems. An overview, Market Dynamics & Competitive Strategy, problems. Future Directions in ERP. Various ERP Case studies.	09
<b>Total</b>		<b>45</b>

### Text Book/s:

1. Enterprise Resource Planning – Concepts & Practice (Second Edition) By V. K. Garg & N.K. Venkitakishnan (PHI)
2. Enterprise Resource Planning- Alexis Leon (TMH)

### Reference Book/s:

1. ERP Demystified – By Alexis Leon (TMH)

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS705**

**Title of the Course: Real Time Operating System (Elective-II)**

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

Unit	Contents	Hours
I	Introduction : Issues in real time systems and Structure of a Real time system. Hard versus soft real time systems: Jobs & processors, release times, deadlines, timing, constraints, Hard & Soft timing constraints, Hard real time systems , soft real time systems. A Reference model of Real-time systems : processors and resources, temporal parameters of real-time workload, periodic Task model, precedence constraints & data dependencies other types of dependencies, functional parameters, resource parameters of Jobs & parameters of resources, scheduling Hierarchy	09
II	Effective release times and deadlines, Optimality and non optimality of EDF & LST, Challenges in validating timing constraints in priority-driven systems, off-line versus on-line scheduling. Clock-driven scheduling, Priority driven scheduling of periodic tasks.	09
III	Scheduling aperiodic & sporadic jobs in priority-driven systems : Deferrable servers, Sporadic servers, Constant utilization, total bandwidth and weighted fair-queuing servers, scheduling of sporadic jobs. Resources and resource access control: assumption on resources and their usage, effects of resource contention & resource access control, non preemptive critical sections, basic priority-inheritance protocol, basic priority-ceiling protocol, stack-based priority-ceiling protocol, use of priority-ceiling protocol in dynamic-priority systems, preemption-ceiling protocol, controlling accesses to multiple unit resources.	09
IV	Model of multiprocessor & distributed systems, Task assignment, Multiprocessor priority-ceiling protocol, Elements of scheduling algorithms for end-to end periodic tasks, Scheduability of fixed priority end-to-end periodic tasks, end-to-end tasks in heterogeneous systems. Programming Languages and Tools : Desired language characteristics, Data typing, Control structures, Facilitating hierarchical decomposition , packages, Run time error handling, Overloading and generics, Multitasking, Low level programming, Task scheduling, Timing specifications, Programming environments, Run time support.	09
V	Real Time Databases : Introduction, Basic definitions, real time vs. general purpose databases, main memory databases, Transaction priorities, Transaction aborts, concurrency control issues, disk scheduling algorithms, maintaining serialization consistency, databases for hard real time systems. Real Time Communication: Introduction, Network Topologies, Contention based protocol, token based protocol, Stop and go protocol, Polled bus protocol, Hierarchical round robin protocol, Deadline based protocols, Fault tolerant routing.	09
<b>Total</b>		<b>45</b>

### Text Book/s:

1. Real-Time Systems : Jane W.S. Liu, Pearson Education.
2. Phillip A. Laplante, "Real-Time Systems Design and Analysis", Prentice Hall of India, Second Edition, 2001, ISBN NO: 81-203-1684-3.
3. Real Time Systems : C.M.Krishna & Kang G. Shin [TMH]

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS705**

**Title of the Course: Robotics(Elective-II)**

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

Unit	Contents	Hours
I	<b>Introduction to Robotics:</b> Robot Classification, Robot Specification, notation, Direct and Inverse Kinematics: Co-ordinates Frames, Rotations, Homogeneous Coordinates, Arm Equation of four Axis SCARA Robot, TCV, Inverse Kinematics of Four Axis SCARA Robot.	11
II	<b>Intelligent Agents :</b> Concept of Rational Agent, Structure of Intelligent agents, Agent Environments. Common Sensing Techniques for reactive robots: Overview, Logical sensors, Attributes of a sensor, Pro-prioceptive Sensors, GPS, Proximity Sensors, Sonar, Infrared, CCD Cameras, Stereo camera pairs, Light stripers, Laser.	08
III	<b>Problem Solving:</b> Solving problems by searching, Problem formulation, Search Strategies, Uninformed Search Techniques-DFS, BFS, Uniform cost search, Iterative Depending, Comparing Different Techniques, Informed search methods-Best First Search, heuristic Functions, Hill Climbing, A*,IDA*. Crypt Arithmetic, backtracking for CSP. Knowledge and Reasoning: A knowledge Based Agent, WUMPUS WORLD Environment, Propositional Logic, First Order Predicate Logic Syntax and Semantics, PROLOG, Unification, Forward and backward chaining, Resolution., General Ontology.	11
IV	<b>Uncertain Knowledge and Reasoning:</b> Uncertainty, Representing knowledge in an Uncertain Domain, Belief Networks, Simple Inference in Belief Networks. <b>Learning:</b> Learning from Observations, General Model of Learning Agents, Inductive learning, Learning Decision Trees	08
V	<b>Planning:</b> A Simple Planning Agent, Planning in Situation calculus, Basic representation for planning, A Partial Order Planning example, A partial order planning algorithm, Knowledge engineering foe planning, Blocks world Shaky, s world Metric Path Planning: Configuration Space, Representation, Graph based planners. Introduction and overview of Robotics paradigms: Reactive Paradigms Designing a Reactive Implementation: Overview, Behaviors as objects in OOP, Steps in Designing a Reactive Behavioral System, Case Study: Unmanned Ground Robotics Competition , Assemblages of Behaviors	07
<b>Total</b>		<b>45</b>

### Text Book:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2<sup>nd</sup> Edition, Pearson Publication.
2. Robin R Murphy, Introduction to AI Robotics ISBN-81-203-2458-7 PHI Publication.
3. Robert J. Schilling, Fundamentals of Robotics: Analysis and Control PHI Publication.

### Reference Book:

1. George Lugar, .AI-Structures and Strategies for and Strategies for Complex Problem solving., 4/e, 2002, Pearson Educations.
2. Fu, Gonzales and Lee, Robotics, McGraw Hill.
3. Patrick H. Winston, Artificial Intelligence, 3rd Edition, Pearson.
4. Nils J. Nilsson, Principles of Artificial Intelligence, Narosa Publication.
5. Dan W. Peterson, Introduction to Artificial Intelligence and Expert System, PHI.

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS705**

**Title of the Course: Ad-hoc Network(Elective-II)**

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

Unit	Contents	Hours
I	<b>Introduction</b> -Cellular and Ad Hoc wireless networks, Applications, Issues in Ad Hoc wireless networks. <b>MAC Protocols for ad hoc wireless networks</b> - Introduction, Issues in designing MAC protocol, Design goals of MAC protocol, Classification of MAC protocols, Contention based protocols.	12
II	<b>Routing protocols for ad hoc wireless networks</b> – Introduction, Issues in designing a routing protocol for ad hoc wireless networks, Classification of routing protocols, Table driven, on-demand Hybrid routing protocols.	08
III	<b>Multicast Routing in Ad hoc wireless networks</b> – Introduction, Issues in designing a multicast routing protocol, Operation of multicast routing protocols, An architecture reference model for multicast routing protocols, Classification of multicast routing protocols, Tree-based, Mesh-based multicast routing protocols.	08
IV	<b>Transport layer and security protocols for ad hoc wireless networks – Introduction</b> , Design issues and goals, Classification of transport layer solutions, TCP over ad hoc wireless networks, Security in ad hoc wireless networks, Network security requirements, Issues and challenges in security provisioning, Network security attacks, Key management, Secure routing.	08
V	<b>Quality of service</b> – Introduction, Issues and challenges, Classification of QoS solutions, MAC layer solutions, Network layer solutions, QoS framework. <b>Energy management</b> – Introduction, Need, Classification of energy management schemes, Battery Management, Transmission Power Management, System Power Management schemes.	09
<b>Total</b>		45

**Text Book:**

1. Ad Hoc wireless Networks – Architecture and Protocols by C.S.R.Murthy & B.S. Manoj, Pearson Education.

**Reference Books:**

1. Ad Hoc Wireless Networks – A communication Theoretic perspective by O.K.Tonguz & G.Ferrari, Wiley India.

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS706**

**Title of the Course: Digital Image Processing**

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

List of Practical's	
	<b>Practical:</b> Students should perform 10-12 Experiments from the given list.
1	Write C++/ Matlab Program for convolution and correlation.
2	Write C++/ Matlab Program to create a simple image and save the same as bitmap image in bmp file.
3	Write C++/ Matlab Program for thresholding images.
4	Write C++/ Matlab Program for Image Gray level Slicing without background and with background
5	Write C++/ Matlab Program for low pass filter used on an image with Gaussian noise
6	Write C++/ Matlab Program to calculate for DFT
7	Write C++/ Matlab Program to calculate DCT of a square image
8	Write C++/Matlab Program to calculate DST of a square image.
9	Write C++/Matlab Program to calculate 1-D Fourier Transform using the DFT Matrix
10	Write C++/Matlab Program to calculate 2D Fourier transform using the 1-D Fourier Transform on actual square image
11	Write C++/Matlab Program for Edge detection.
12	Write C++/Matlab Program for Histogram Processing
13	Write C++/Matlab Program for Dilation and Erosion of a real image.

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS707**

**Title of the Course: TCP/IP and Internet**

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

List of Practicals	
	<b>Practical:</b> Students should perform 10-12 Experiments from the given list.
1	Study of TCP/IP Protocol Suit
2	Study of ARP & RARP
3	Study of DNS
4	Study of Routing Protocol, Routing algorithm
5	Study of TCP, IP and UDP Protocol
6	To study addressing, subnetting, and forwarding techniques
7	To build and Configure TCP/IP LAN topology
8	To build and configure the DHCP
9	To configure DNS Server
10	To study Client-Server concepts using Socket programming
11	To study File Transfer Protocol
12	To Study Remote File Access Protocol
13	To assign fixed length IP subnet address using IP address 192.168.0.0 and Subnet Mask 255.255.224.0

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS 708**

**Title of the Course: Data Warehousing and Mining**

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

List of Practical's	
	Practical's of Data warehousing and data mining shall be based on syllabus. Software's like Oracle, MatLab and open source tools like Weka can be used for implementation of practicals. <b>Practical:</b> Students should perform 08-10 Experiments from the given list.
I	Practical 1 and 2 will be on unit I (Data Warehousing )
II	Practical 3 will be on unit II ( Study of Open source tools like Weka)
III	Practical 4, 5 and 6 will be on unit III ( Study of any data set, Data similarity dissimilarity, statistical analysis of data.)
IV	Practical 7 and 8 will be on unit IV (Classification algorithm and association rule mining algorithm)
V	Practical 9 and 10 will be on unit V (clustering algorithms)

## VII-Semester B. E. (Computer Science & Engineering)

**Course Code: CS709**

**Title of the Course: Project Seminar**

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

<b>Project Seminar</b>	
	<p><b>Objectives:</b></p> <p>I) Student is expected to choose the topic for the project and it should be based on recent technology trends. The scope of proposed project work must be in the Computer Science &amp; Engineering discipline/area, study the feasibility of it and plan the project properly for two terms of the year. The number of students per group for a project has to be decided by the college/ department/ project guides. The group will select a project with the approval of project coordinator /guide and submit the name of the project with synopsis of not more than 2 to 3 pages.</p> <p>The student is expected to do following in project seminar-</p> <ol style="list-style-type: none"><li>1. Selection of a project title</li><li>2. Problem definition</li><li>3. Overall system study.</li><li>4. Literature survey</li><li>5. Introductory project seminar presentation</li></ol> <p>After delivering a seminar the student has to submit a seminar report of 20-25 pages in spiral bound. Evaluation of a seminar should be based on performance in the presentation and preparation level.</p>