With Effect from the Academic Year 2017 - 2018

SCHEME OF INSTRUCTION

BE (INFORMATION TECHNOLOGY)

Proposed scheme with effect from the academic year 2017-2018

IV/IV-**SEMESTER-I**

S.No.	Syllabus Ref.No.	Subject	Scheme of Instruction Periods Per Week		Scheme of Examination		
			L	D/P	Duration in Hrs	Maximum Marks	
						Univ. Exam	Sessionals
		THEORY					
1	BIT 401	VLSI Design	4	-	3	75	25
2	BIT 402	**Middleware Technologies**	4	-	3	75	25
3	BIT 403	Information Security	4	-	3	75	25
4		Elective-II	4	-	3	75	25
5		Elective-III	4	-	3	75	25
		PRACTICALS					
1	BIT 431	VLSI Design Lab	-	3	3	50	25
2	BIT 432	Middleware Technologies	-	3	3	50	25
3	BIT 433	Project Seminar	-	3	-	-	25
		Total	**20**	**9**	**-**	**475**	**200**

ELECTIVE - II
BIT 404 Wireless and Mobile Communications
BIT 405 Ad - Hoc and Sensor Networks
BIT 406 Distributed Systems
LA 473 Intellectual Property Rights

ELECTIVE - III
BIT 408 Digital Image Processing
BIT 409 Grid Computing
BIT 410 CPLD & FPGA Architectures
BIT 411 Software Reuse Techniques
BIT 412 Semantic Web

Dean,
Faculty of Informatics,
Osmania University.

BIT 401 VLSI DESIGN

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Moore's law ,VLSI Design Hierarchy, MOSFET as switches, pass characteristics, Basic logic gates and complex logic gates using CMOS, Bubble pushing, XOR and XNOR gates, AOI and OAI logic gates, Transmission gates-TG based 2-to-1 MUX, XOR, XNOR circuits.

Electrical Characteristics of MOSFETs, Threshold voltage, nFET Current-Voltage equations, trans-conductance and drain characteristics of nFET, RC model of a FET, MOS capacitances, gate-source and gate- drain capacitances, junction capacitances in a MOSFET, scaling concept of MOSFETs

UNIT-II

Integrated Circuit definition and layers, Top and side view of IC layers, CMOS Layers-MOSFET layers in an n-well process. Silicon patterning for series and parallel connected FETs. Layouts of NOT gate, transmission gate, non-inverting buffer, NAND2, NOR2, Complex logic gate, 4 input AOI gate. Stick diagram representation of NOT, NAND2 and NOR2 .

Fabrication of CMOS ICs, CMOS process flow, Design rules: minimum space width, minimum spacing, surround, extension.

UNIT-III

Layouts of Basic Structure: nwells, active area definition, design of n^+, p^+ regions, masks for the nFET, pFET,active contact cross section and mask set, metal1 line with active contact, poly contact: cross section and layout,. Latchup and its prevention.

DC characteristics of the CMOS inverter , Expression for midpoint voltage of CMOS inverter, Symmetrical inverter, Inverter switching characteristics, fan-out, input capacitance and loading due to fan-out, RC switch model equivalent for the CMOS inverter, rise time and fall time expressions, propagation delay of CMOS inverter.

UNIT-IV

Pseudo nMOS logic gates, tri-state inverter circuit, Clocked CMOS circuit, charge leakage in C^2MOS circuit, Dynamic CMOS logic circuits : pre-charge and evaluation modes of operation, Domino logic, Dual rail logic networks- Differential Cascade Voltage Switch Logic (DCVSL) AND/NAND, OR/NOR gates, Complementary Pass Transistor Logic (CPL) structures.

SRAM – General SRAM cell, 4T & 6T SRAM cell design parameters, Writing to SRAM, resistor model, SRAM arrays. Dynamic RAMs: 1T DRAM cell, charge leakage and refresh in a DRAM cell

UNIT-V

VLSI Design flow, structural gate level modeling, gate primitives, gate delays, switch level modeling, behavioral and RTL operators, timing controls, blocking and non blocking assignments, conditional statements, Data flow modeling and RTL, Comparator and priority

encoder , D latch and Master-Slave D flip-flop- verilog code. Arithmetic circuits: half adder, full adder, ripple carry adder, carry look ahead adder- verilog code.
Interconnect modeling; Interconnect resistance and capacitance ,sheet resistance R_s, time delay, single and multiple rung ladder circuits, simple RC inter connect model, modeling inter connect lines with a series pass FET, Crosstalk, Floor planning and routing.

Suggested Reading

1. John P. Uyemura, "Introduction to VLSI circuits and Systems", John Wiley & Sons, 2002
2. John P. Uyemura, "Chip design for submicron VLSI: CMOS layout and simulation" IE, Cengage learning, 2006.
3. Douglas A. Pucknell, Kamran Eshraghian, "Basic VLSI Design" 3rd Edition, PHI, 2000.
4. Jan M. Rabey and others "Digital Integrated Circuits A design perspective", Pearson Education

BIT 402 MIDDLEWARE TECHNOLOGIES

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

CLIENT/SERVER CONCEPTS: Client – Server – File Server, Database server, Group server, Object server, Web server. Middleware – General middleware – Service specific middleware.

CGI & SERVLETS: PERL Introduction, CGI Programming using PERL, CGI vs Servlets, Servlet Lifecycle, JDBC API, Applications.

UNIT-II

EJB ARCHITECTURE: EJB –EJB Architecture – Overview of EJB software architecture – View of EJB – Conversation – Building and Deploying EJBs – Roles in EJB.

EJB APPLICATIONS: EJB Session Beans – EJB entity beans – EJB clients – EJB Deployment – Building an application with EJB.

UNIT-III

Enterprise Application Integration: Introduction, Barriers to Effective EAI, Types of Integration-Integration Models, Effective EAI Development-SAIM Principles.

CORBA: CORBA – Distributed Systems – Purpose – Architecture overview – CORBA object model – IDL – ORB – Building an application with CORBA.

UNIT-IV

COM: COM – Proxy and stub – Marshalling – Interface pointers – Object Creation, Invocation, Destruction – Comparison COM and CORBA – Introduction to .NET – Overview of .NET architecture–Marshalling – Remoting

UNIT-V

Python and Middleware:

An Introduction to Python Frameworks-Django, Installing Python, Installing Django, Setting Up a Database, Basics of Dynamic Web Pages, Django Template System.

Suggested Reading:

1. Robert Orfali, Dan Harkey and Jeri Edwards, “The Essential Client/server Survival Guide”, Galgotia publications Pvt. Ltd., 2002.
2. Robert W. Sebesta, “Programming the World Wide Web”, 8th Edition, PHI
3. Tom Valesky, “Enterprise Java Beans”, Pearson Education, 2002.
4. William A. Ruh, Francis X. Maginnis, William J Brown, “Enterprise Application Integration: A Wiley Tech Brief”, 1st Edition.
5. Jason Pritchard. “COM and CORBA side by side”, Addison Wesley,2000
6. Holovaty, Adrian, Kaplan-Moss, “The Definitive Guide to Django, Web Development Done Right” , Jacob publishers, 2009.

BIT 403 INFORMATION SECURITY

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT- I

Introduction: History, critical characteristics of information, NSTISSC security model, Components of an information system, Securing the components, balancing security and access, The SDLC, The security SDLC

Need for Security: Business needs, Threats, Attacks-secure software development

UNIT-II

Legal, Ethical and Professional Issues: Law and ethics in information security, relevant U.S laws-international laws and legal bodies, Ethics and information security

Risk Management: Overview, Risk Identification, risk assessment, Risk Control strategies, selecting a risk control strategy, Quantitative versus qualitative risk control practices, Risk management discussion points, recommended risk control practices

UNIT-III

Planning for Security: Security policy, Standards and practices, Security blue print, Security education, Continuity strategies.

Security Technology: Firewalls and VPNs: Physical design, firewalls, protecting remote connections.

UNIT-IV

Security Technology: Intrusion detection, Access control and other security tools: Intrusion detection and prevention systems, Scanning and analysis tools, Access control devices.

Cryptography: Foundations of cryptology, cipher methods, crypryptographic Algorithms, Cryptographic tools, Protocols for secure communications, Attacks on cryptosystems

UNIT-V

Implementing Information Security: information security project management, technical topics of implementation , Non- technical aspects of implementation, Security certification and accreditation

Security and Personnel: Positioning and staffing security function, Employment policies and practices, internal control strategies.

Information security Maintenance: Security management models. The maintenance model, Digital forensics

Suggesting Reading

1. Michael E. Whitman and Hebert J Mattord, Principles of Information Security, 4th edition Ed. Cengage Learning 2011

2. Thomas R Peltier, Justing Peltier, John Blackley, Information Security. Fundamentals, Auerbacj Publications 2010

3. Detmar W Straub, Seymor Goodman, Richard L Baskerville, Information Security. Policy proceses and practices PHI 2008

4. Marks Merkow and Jim Breithaupt, Information Security. Principle and Practices, Pearson Education, 2007.

BIT 404 WIRELESS AND MOBILE COMMUNICATIONS
(ELECTIVE –II)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT –I

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communications, Examples of Wireless Communication Systems. Modern Wireless Communication Systems : Second Generation (2G) Cellular Networks, Third Generation (3G) Wireless Networks, Wireless local Loop, Wireless Local Area Networks.The Cellular Concept: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and Systems Capacity, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems.

UNIT –II

Mobile Radio Propagation : Large Scale - :Path Loss : Introduction to Radio Wave Propagation, Free Space Propagation Model, Three Basic Propagation Mechanisms, Reflection, Ground Reflection, Diffraction, Scattering, Outdoor Propagation Models, Indoor Propagation Models, Signal Penetration into Buildings.

UNIT –III

Modulation Techniques for Mobile Radio : Digital Modulation, Linear Modulation Techniques, Constant Envelop Modulation, Spread Spectrum Modulation Techniques.

UNIT –IV

Multiple Access Techniques for Wireless Communications : FDMA, TDMA, Spread Spectrum Multiple Access, Space Division Multiple Access, Capacity of Cellular Systems. Wireless Networking : Introduction, Difference between Wireless and Fixed Telephone Networks, Development of Wireless Networks. Wireless Systems and Standards: Global System for Mobile (GSM), GPRS, CDMA Digital Cellular Standard

UNIT –V

Mobile Network Layer: Mobile IP : Goals & Requirements, Terminology, IP Packet Delivery, Agent Advertisement & Discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse Tunneling. Dynamic Host Configuration protocol. Mobile Transport Layer: Traditional TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Time-Out Freezing, Selective retransmission, Transaction oriented TCP

Suggested Reading

1. Theodore S. Rappaport, "Wireless Communications Principles and Practice", 2nd Edition, Pearson Education, 2003.
2. Jochen Schiller, "Mobile Communication", 2nd Edition, Pearson Education.

BIT 405 **ADHOC AND SENSOR NETWORKS**
(ELECTIVE –II)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To provide students with an understanding of wireless ad-hoc and sensor networks
2. To enable them to recognize the wide range of applicability of these networks
3. To provide an understanding of the major design issues, including topics such as protocol mechanisms and resource constraints.

UNIT-I

Wireless Transmission Technology and Systems: Introduction, Radio Technology Primer, Available Wireless Technologies. Medium Access Control Protocols for Wireless Networks: Introduction, Background, Fundamentals of MAC Protocols.

UNIT-II

Adhoc Networks: Introduction and Definitions, Adhoc Network Applications, Design Challenges. Evaluating Adhoc Network Protocols -the Case for a Test bed. Routing in Mobile Adhoc Networks: Introduction, Flooding. Proactive Routing. On Demand Routing. Proactive Versus On Demand Debate. Location based Routing.

UNIT-III

Multicasting in Adhoc Networks: Introduction, Classifications of Protocols, Multicasting Protocols, Broadcasting. Protocol Comparisons, Overarching Issues. Transport layer Protocols in Adhoc Networks: Introduction, TCP and Adhoc Networks, Transport Layer for Adhoc Networks: Overview, Modified TCP, TCP-aware Cross-Layered Solutions. Adhoc Transport Protocol.

UNIT-IV

QoS Issue in Adhoc Networks: Introduction, Definition of QoS, Medium Access Layer, Q0S Routing, Inter- Layer Design Approaches. Security in Mobile Adhoc Networks: Vulnerabilities of Mobile Adhoc Networks, Potential Attacks, Attack Prevention Techniques. Intrusion Detection Techniques.

UNIT-V

Basic Wireless Sensor Technology: Introduction, Sensor Node Technology, Sensor Taxonomy.

Introduction and Overview of Wireless Sensor Networks: Introduction, Overview MAC Protocols for Wireless Sensor networks. Applications of Wireless Sensor Networks: Examples of Category 1 and Category 2 WSN applications.

Suggested Reading:

1. Prasant Mohapatra and Srihanamurthy, “Ad Hoc Networks Technologies and Protocols”, Springer, Springer International Edition, 2009.
2. Kazem Sohraby, Daniel Minoli, Taieb Znati, “Wireless Sensor Networks”, A John Wiley & Sons, Inc., Publication.
3. Shivaram Murthy and B. S. Manoj, “Adhoc Networks – Principles and Protocols”, Pearson Education, 2012.

BIT 406 **DISTRIBUTED SYSTEMS**
(ELECTIVE –II)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT -I

Introduction: Definition of Distributed Systems, Goals: Connecting Users and Resources, Transparency, Openness, Scalability, Hardware Concepts: Multiprocessors, Homogeneous Multicomputer systems, Heterogeneous Multicomputer systems, Software Concepts: Distributed Operating Systems, Network Operating Systems, Middleware, The client-server model: Clients and Servers, Application Layering, Client-Server Architectures.

UNIT-II

Communication: Layered Protocols, Lower-Level Protocols, Transport Protocols, Higher-Level Protocols, Remote Procedure Call: Basic RPC Operation, Parameter Passing. Extended RPC Models, Remote Object Invocation: Distributed Objects, Binding a Client to an Object; Static verses Dynamic Remote Method Invocations, Parameter Passing, Message Oriented Communication: Persistence and synchronicity in Communication, Message-Oriented Transient Communication, Message-Oriented' Persistent Communication, Stream Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.

UNIT-III

Process: Threads: Introduction to Threads, Threads in Distributed Systems, Clients: user Interfaces, Client-Side Software for Distribution Transparency, Servers: General Design Issues, Object Servers, Software Agents: Software Agents in Distributed Systems, Agent Technology, Naming: Naming Entities: Names, Identifiers, and Address, Name Resolution, The Implementation of a Name System, Locating Mobile Entities: Naming verses Locating Entities, Simple Solutions, Home-Based Approaches, Hierarchical Approaches

UNIT-IV

Distributed Object based Systems: CORBA: Overview of CORBA, Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance, Security, Distributed COM: Overview of DCOM, Communication, Processes, Naming, Synchronization, Replication, Fault Tolerance, Security, GLOBE: Overview of GLOBE, Communication, Process, Naming, Synchronization, Replication, Fault Tolerance, Security, Comparison of COREA, DCOM, and Globe: Philosophy. Communication. Processes. Naming. Synchronization. Caching and Replication, Fault Tolerance. Security.

UNIT-V

Distributed Multimedia Systems: Introduction. Characteristics of Multimedia Data. Quality of Service Management: Quality of Service negotiation. Admission Control. Resource Management: Resource Scheduling.

Suggested Reading:

1. Andrew S. Tanenbaum and Van Steen "Distributed Systems" . PHI, 2nd Edition.
2. Colouris G.. Dollimore Jean, Kindberg Tim, "Distributed Systems Concepts and Design". 3rd Edition Pearson education 2002.

LA 473 INTELLECTUAL PROPERTY RIGHTS
(ELECTIVE –II)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To introduce fundamental aspects of IP
2. Introducing all aspects of IPR acts.
3. Creating awareness of multi-disciplinary audience
4. Creating awareness for innovation and its importance
5. Exposing to the changes in IPR culture
6. Awareness about techno-business aspects of IPR

UNIT –I

Introduction: Meaning of Intellectual Property- Nature of I.P- Protection of I.P. Rights-kinds of Intellectual Property Rights –International Conventions of Intellectual Property Rights-patent Treaty 1970, GATT 1994, TRIPS & TRIMS – International Organization for Protection of IPR – WTO, WIPRO, UNESCO.

UNIT –II

Patents: Meaning of Patent- Commercial Significance – Obtaining of Patent – patentable Subject – matter – rights and obligations of Patentee – specification – Registration of patents – Compulsory licensing and licenses of rights – Revocation.

UNIT –III

Industrial Designs : Definitions of Designs – Registration of Designs – Rights and Duties of Proprietor of Design – Piracy of Registered Designs.

UNIT –IV

Trade Marks : Meaning of trademark – purpose of protecting trademarks Registered trade mark – procedure – passing off – Assignment and licensing of trademarks – Infringement of trademarks.

UNIT – V

Nature, scope of copyright – Subject matter of copy right – Right conferred by copyrightPublication – Broad – casting, telecasting – computer programme – Database right – Assignment – Transmission of copyright – Infringement of copy right.

Suggested Reading:

1. Cornish W.R, “Intellectual Property Patents”, Copyright, Trademarks and Allied Rights, Sweet & Maxwell 1993.
2. P . Narayanan, “Intellectual Property Law”, Eastern law House 2nd Edn. 1997.
3. Robin Jacob & Daniel Alexander, “A Guide Book to Intellectual Property Patents, Trademarks, Copy rights and designs”, Sweet and Maxwell, 4th Edn.,1993.

BIT 408 **DIGITAL IMAGE PROCESSING**
(ELECTIVE –III)

Instructions per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Image processing: Introduction, Fundamental steps, Components. Elements of visual perception, image sampling and quantization, some basic relationships between pixels.

Intensity Transformations Some Basic Intensity Transformation Functions, Histogram Processing.

UNIT- II

Spatial Filtering: Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters

Filtering in the Frequency Domain: Preliminary Concepts, Image Smoothing using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.

UNIT- III

Image Restoration and Reconstruction : A Model of the Image degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only—Spatial Filtering, Minimum Mean Square Error (Wiener) Filtering

Morphological Image Processing: Preliminaries, Erosion and Dilation, Opening and Closing

UNIT- IV

Image Segmentation: Fundamentals, Point, Line, and Edge Detection, Segmentation by Thresholding, Region-Based Segmentation, Segmentation Using Watershed Algorithm.

Representation and Description: Representation, Some Simple Descriptors, Shape Numbers, Fourier Descriptors.

Object Recognition: Patterns and Pattern Classes, Matching: Minimum distance classifier, correlation.

UNIT-V

Color Image Processing: Color Fundamentals, Color Models, Pseudo color Image Processing.

Image Compression: Fundamentals, Compression Techniques, Lossless Compression, Lossy Compression, Measuring Information, Lossless Compression, Huffman Encoding, Arithmetic Coding, LZW, Run Length, Predictive Coding

Suggested Reading

1. Rafael C Gonzalez and Richard E Woods, “Digital Image Processing”, Pearson Education, 3rd Edition.
2. Vipula Singh, “Digital Image Processing with MatLab and lab View” Elsevier
3. Milan Sonka, Vaclav Halvac and Roger Boyle, “Image Processing, Analysis, and Machine Vision”, Second Edition, Thomson Learning Publishers.
4. Kenneth R.Castleman, “Digital Image Processing”, Pearson Education.
5. Rapel C Gonzalez , Richard E Woods and Steven L Eddins, “Digital Image Processing using MATLAB”, Pearson Education.

BIT 409 **GRID COMPUTING**
(ELECTIVE –III)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT - I

Introduction to Grid Computing: Grid Computing Concept, History of Distributed Computing Computational Grid Applications, Grid Computing Infrastructure Development, Grid Computing Software Interface Job Submission: Introduction, Globus Job Submission, Transferring Files.

UNIT - II

Schedulers: Scheduler Features, Scheduler Examples, Grid Computing Meta-Schedulers, Distributed Resource Management Application (DRMAA).

Security Concepts: Introduction, Symmetric Key Cryptography, Asymmetric Key Cryptography, (Public Key Cryptography), Public Key Infrastructure, Systems/Protocols Using Security Mechanisms.

Grid Security: Introduction, Grid Security Infrastructure (GSI), Delegation, Higher-Level Authorization Tools.

UNIT - III

System Infrastructure I: Web Services: Service-Oriented Architecture, Web Services and Web Service Implementation.

System Infrastructure II: Grid Computing Services: Grid Computing and Standardization Bodies, Interacting Grid Computing Components, Open Grid Services Architecture (OGSA), WSRF. **User-Friendly Interfaces:** Introduction Grid Computing Workflow Editors, Grid Portals.

UNIT - IV

Grid-Enabling Applications: Introduction, Parameter Sweep, Using an Existing Program on Multiple Grid Computers, Writing an Application Specifically for a Grid, Using Multiple Grid Computers to Solve a Single Problem.

UNIT - V

Case Studies:

Globus: Overview of Globus Toolkit 4, Installation of Globus, GT4 Configuration, Main Components and programming Model, Using Globus.

gLite: Introduction, Internal Workings of gLite, Logging and Bookkeeping (LB), Security Mechanism Using gLite.Resource management using Gridway and Gridbus.

Scheduling using Condor, SGE, PBS, LSF Grid scheduling with QoS.

Suggested Reading:

1. Barry Wilkinson, "Grid Computing Techniques and Applications", CRC Press, 2010
2. Frederic Magoules, Jie Pan, Kiat-An Tan, Abhinit Kumar, “Introduction to Grid Computing” CRC Press, 2009.
3. Vladimir Silva, "Grid Computing for Developers ", Dreamtech Press, 2006.
4. Ian Foster, Carl Kesselman. "The Grid 2- Blueprint for a new computing Infrastructure". Elsevier Series, 2004.
5. Fran Berman, Geoffrey Fox. Anthony J.G Hey, "Grid Computing: Making the Global Infrastructure a Reality", Wiley, 2003.

BIT 410 CPLD AND FPGA ARCHITECTURE
(ELECTIVE –III)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT – I

Review of Logic Design, Implementation with NAND – NOR gates, designing with multiplexers, implementation of logic functions with look-up tables, minimization of combinational functions based on a) Circuit size, gates and literals i.e. space & power b) number of levels of logic i.e. time or circuit depth.

The Quine-McCluskey Algorithm, Multi level logic minimization, covering, factored forms, technology mapping, review of finite state machines, one hot encoding

UNIT – II

Programmable Logic: Introduction, programmable logic devices (PLDs), SPLDs, CPLDs, fundamentals of PLD circuits, PLD symbology, PLD architectures: Progrmmable Read Only Memories (PROMs), Programmable Array Logic (PAL), ALTERA CPLDs

UNIT – III

FPGAs: Introduction, Programming Technologies: SRAM, Antifuse, EPROM and EEPROM Xilinx FPGAs, Actel, Altera, Concurrent Logic FPGAs. Crosspoint Solutions FPGA, translation to XNF format, Partition, Place and route, Technology mapping for FPGAs: Logic Synthesis, logic Optimization, Lookup Table Technology Mapping, Mapping into Xilinx 3000 CLBs, Multiplexer Technology, Mapping.

UNIT – IV

Logic Block Architecture: Logic Block functionality Versus area-efficiency, Impact of Logic Block Functionality in FPGA performance, Routing for FPGAs: Segmented Channel Routing, Routing for Symmetrical FPGAs, CGE detailed router Algorithm. Flexibility of FPGA routing architectures: Logic Block, Connection Block, Trade offs in Flexibilities of the S and C blocks, A theoretical model for FPGA routing.

UNIT – V

Platform FPGA architectures, Multi-FPGA Systems: Xilinx Virtex II Pro Platform FPGA, Altera Stratix Platform FPGA, Serial I/O, Memories, CPUs and Embedded Multipliers, Multi FPGA systems: Interconnecting Multiple FPGAs, partitioning, Novel architectures.

Suggested Reading:

1.Park K. Chan / Samiha Mourad, “Digital Design using Field Programmable Gate Arrays”, Pearson, 1994 (Unit-I)
2.Ronald J Tocci, Neal S. Widmer, Gregory L. Moss, “Digital Systems: Principles & Applications”, 10th Edition, Pearson, 2009 (Unit-II)
3.Stephen Brown Zvonko Vranesic – Fundamentals of Digital Logic with VHDL design, McGraw Hill – 2000 (Unit I & II).
4.Stephen D. Brown, Robert J Francis, Jonathan Rose, Ivonko G. Vranesic, “Field Programmable Gate Arrays”, Springer International Edition, First Indian Print 2007
5.Wayne Wolf, “FPGA-based System Design”, Pearson Education, First Impression, 2009

BIT 411 SOFTWARE REUSE TECHNIQUES
(ELECTIVE –III)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Software reuse success factors, Reuse driven software engineering as business, Object oriented software engineering, Applications and Component subsystems, Use case components, Object components.

UNIT-II

Design Patterns — Introduction. Creational Patterns — Factory Pattern, Factory Method, Abstract Factory Pattern, Singleton Pattern, Builder Pattern, Prototype Pattern.

UNIT-III

Structural Patterns — Adapter Pattern, Bridge Pattern, Composite Pattern, Decorator Pattern, Façade Pattern, Flyweight Pattern, Proxy Pattern. Behavioral Patterns — Chain of responsibility Pattern, Command Pattern, Interpreter Pattern.

UNIT-IV

Behavioral Patterns—Iterator Pattern, Mediator Pattern, Memento Pattern, Observer Pattern, State Pattern, Strategy Pattern, Template Pattern, Visitor Pattern. Architectural Patterns—Layers, Pipes and Filters, Black board.

UNIT-V

Object Oriented Business Engineering –Business Process Reengineering, Software Engineering Process in reuse business. Component System Engineering – building flexible components systems, requirement analysis, robustness analysis, design, implementation and testing the component system.

Suggested Reading:

1. Ivar Jacabson, Martin Griss, Patrick Johnsson,"Software Reuse: Architecture, Process andfor Business Success". Pearson Education,2003.
2. James W Cooper, "Java Design Patterns, a tutorial", Pearson Education, 2003.
3. Frank Buschmann, et al.,"Pattern Oriented Software Architecture – Volume I" John Wiley & Sons,1996.

BIT 412 **SEMANTIC WEB**
(ELECTIVE –III)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT- I

The Future of the Internet: Introduction, Syntactic Web, Semantic Web, Working of Semantic Web, What is not a Semantic Web, Side Effects.

Ontology: Definitions, Taxonomies, Thesauri and Ontologies, Classifying Ontologies, Web Ontology Description language, Ontologies-Categories-Intelligence .

UNIT- II

Knowledge Description in Description Logic: Introduction, Example, Family of Attributive Languages, Inference problems.

RDF and RDF Schema: Introduction, XML Essentials, RDF, RDF Schema.

UNIT- III

OWL: Introduction, Requirements for Web Ontology Description Languages, Header Information, Versioning and Annotation Properties, Properties, Classes, Individuals, Data types

Rule Languages: Introduction, Usage Scenarios, Datalog, RuleML, SWRL, TRIPLE.

UNIT- V

Semantic Web Services: Introduction, Web Service Essentials, OWL-S Service Ontology, OWL-S Example.

Methods for Ontology Development: Introduction, Uschold and King Ontology Development Method, Toronto Virtual Enterprise Method, Methontology, KACTUS Project Ontology Development Method, Lexicon-Based Ontology Development Method, Simplified Methods.

UNIT- V

Ontology Sources: Introduction, Metadata, Upper Ontologies

Software Agents: Introduction, Agent Forms, Agent Architecture, Agents in the Semantic Web Context.

Applications: Introduction, Horizontal Information Products, Open academia, Bibster, Data Integration, Skill Finding, Think Tank Portal, e-learning, Web Services.

Suggested Reading

1. Karin K Brietman, Marco Antonio Casanova, Walter Truszkowski, “Semantic Web – Concepts”, Technologies and Applications. Springer 2007.
2. Grigoris Antoniou, Frank van Harmelen, “A Semantic Web Primer”, PHI 2008.
3. Liyang Yu, “Semantic Web and Semantic Web Services”, CRC 2007.

BIT 431 **VLSI DESIGN LAB**

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To introduce the students to understand basics in Hardware design using CAD tools
2. Understand and Experience Verilog Design Flow
3. Learn Transistor Level CMOS Logic Design using both Verilog and VHDL
4. Understand VLSI Fabrication and experience CMOS Physical Design using backend tools

1. Switch level modeling using Verilog
   a) Logic gates b) AOl and OAI gates
   c) Transmission gate d) Complex logic gates using CMOS

2. Gate-level Modeling—Digital circuits using gate primitives—using Verilog.
   a) Half adder and full adders b) AOl gate with and without delay c) OAl gate with and without delay
   c) MUX using tri-state buffers d) S-R latch

3. . RTL Modeling of general VLSI system components.
   a) 4:1 MUX b) Decoders c) Priority encodes d) Flip-flops e) Registers.
   a) 2 to 4 decoder b) 8:3 Priority encoder

4. Mixed gate-level and Switch-level modeling using Verilog-usage of primitives, modules and instancing
   and understanding the hierarchical design.
   a) Constructing a 4-input AND gate using CMOS 2-input NAND and NOR gates.
   b) Constructing a decoder using CMOS 2-input AND gates and NOT gates etc.

5. Synthesis of Digital Circuits
   a) Ripple carry adder and carry look-ahead adder

6. Verilog code for finite state machine
7. Simple layouts of Inverter, NAND2 and NOR2 gates
8. Stick diagram representations of Inverter, NAND2 and NOR2 gates

BIT 432 MIDDLEWARE TECHNOLOGIES LAB

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

1. Create a distributed name server (like DNS) RMI.
2. Develop an Enterprise Java Bean for student Information System.
3. Develop an Enterprise Java Bean for Library operations.
4. Develop a component for browsing CD catalogue using COM / .NET.
5. Develop a component for retrieving information from message box using DCOM/.NET.
6. Develop a middleware component for retrieving Bank Balance using CORBA.
7. Develop a PERL-CGI program to handle user input.
8. Develop a PERL-CGI program to pass data from web components (textarea, dropdownlist etc).
9. Develop Python programs for the following: (Prerequisite)
    a) Demonstrate user-defined functions
    b) Demonstrate Control Structures
    c) Demonstrate Caching a Template Fragment
10. A case study on Python-Django framework to develop any application.

BIT433 PROJECT SEMINAR

Instruction	4 Periods per week
Duration of University Examination	-
University Examination	-
Sessional	25 Marks

The objective of the project seminar is to actively involve the student in the initial work required to undertake the final year project. It may comprise of:

- Problem definition and specifications.
- A broad understanding of the available technologies/ tools to solve a problem of interest.
- Presentation (Oral and Written) of the project.

Seminar topics may be chosen by the students with advice from the faculty members.

First 4 weeks of IV year 1st semester will be spent on special lectures by faculty members, research scholar speakers from industries and R&D institutions. The objective of these talks is to be expose students to real life / practical problems and methodologies to solve them.

A seminar schedule will be prepared by the coordinator for all the students. It should be from the 5th week to the last week of the semester and should be strictly adhered to.

Each student will be required to

1. Submit a one page synopsis of the seminar to be delivered for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write up on the talk delivered.

At least two teachers will be associated with the evaluation of the project seminar for the award of the sessional marks which should be on the basis of performance on all the three items stated above.

In the first Semester the student is expected to complete problem definition, requirements specification and analysis, design.

With Effect from the Academic Year 2017 - 2018

SCHEME OF INSTRUCTION

BE (INFORMATION TECHNOLOGY)

Proposed scheme with effect from the academic year 2017-2018

IV/IV-**SEMESTER-II**

Sl.No.	Syllabus Ref.No.	Subject	Scheme of Instruction Periods Per Week		Scheme of Examination		
			L	D/P	Duration in Hrs	Maximum Marks Univ. Exam	Sessionals
		THEORY					
1	BIT 451	Embedded Systems	4	-	3	75	25
2		Elective-IV	4	-	3	75	25
3		Elective-V	4	-	3	75	25
		PRACTICALS					
4	BIT 481	Embedded Systems Lab	-	3	3	50	25
5	BIT 482	Seminar	-	3	-	-	25
6	BIT 483	Main Project	-	6	Viva Voce	Grade*	50
		Total	12	12	-	275	175

ELECTIVE IV

BIT 452 Information Retrieval Systems
BIT 453 Information Storage and Management
BIT 454 Simulation and Modeling
BIT 455 Advanced Computer Architecture
BIT 456 Natural Language Processing

ELECTIVES: V

BIT 457 Soft Computing
BIT 458 Human Computer Interaction
BIT 459 Software Project Management
BIT 460 Cloud Computing
ME 411 Entrepreneurship
BIT 461 Disaster Management

Dean,
Faculty of Informatics,
Osmania University

BIT 451 **EMBEDDED SYSTEM DESIGN**

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Embedded Computing: Introduction, Complex Systems and Microprocessor, 1 be Embedded System Design Process, Formalisms for System Design, Design Examples. The 8051 Architecture: Introduction, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts.

UNIT-II

Basic Assembly Language Programming Concepts: Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts.

UNIT-III

Applications: Interfacing with Keyboards, Displays, D/A and NO Conversions, Multiple Interrupts, Serial Data Communication. Introduction to Real- Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT-IV

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS likeuC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT-V

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Net advanced embedded systems: Bus protocols, 12C bus and CAN bus; Internet- Enabled Systems, Design Example-Elevator Controller.2

Suggested Reading:

1. Wayne Wolt, "Computers and Components", Elsevier.
2. KennethJ.Ayala, "The8051 Microcontroller", Third Edition, , Thomson.
3. David E. Simon, "An Embedded Software Primer", Pearson Education
4. Raj Kamal, "Embedded Systems", Tata McGraw Hill.
5. Ajay VDeshmllkhi, "Micro Controllers", Tata McGraw Hill.

BIT 452 INFORMATION RETRIEVAL SYSTEMS
(Elective-IV)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Introduction: Basic concepts, Past present and Future of IRS, Retrieval Process. Modeling: Introduction, A Taxonomy of JR Models, Retrieval:Adhocand Filtering, A formal characterization of IR Models, Classic IR, Set Theoretic Models, Algebraic Models, Probabilistic Models, Structured Text Retrieval Models, Models for Browsing.

U NIT-II

Retrieval Evaluation: Introduction, Reference Collections. Query languages: Introduction, Keyword-based querying, pattern Matching, Structural Queries, Query Protocols.

UNIT-III

Query operations: Introduction, User Relevance Feedback, Automatic Local Analysis,AutomaticGlobal Analysis. Text and Multimedia Languages and Properties: Introduction, Meta Data, Text, Markup Languages, Multimedia.

UNIT-IV

Text operations: Introduction, Document Preprocessing, Document Clustering, Text Compression,ComparingText Compression Techniques. Indexing: Introduction, Inverted Files, Other Indices for Text Searching, Boolean Queries,

UNIT-V

Searching: Sequential Searching, Pattern Matching, Structural Queries, Compression. Parallel and Distributed IR: Introduction, Parallel IR, Distributed JR.

Suggested Reading:

1. Ricardo.Baeza-Yates.BerthierRibeiro-Neto, “Modern Information Retrieval”PearsonEducation, 2008
2. W.B.Frakes, RicardoBaezaYates, “Information Retrieval: Data Structures & Algorithms”, Pearson Education. 2008.

BIT 453 INFORMATION STORAGE AND MANAGEMENT
(Elective- IV)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To introduce storage architectures , including storage subsystems, DAS, SAN, NAS,CAS
2. To provide understanding of logical and physical components of a storage infrastructure and different storage virtualization technologies
3. To facilitate the knowledge about components for managing and monitoring the data center and for establishing clusters

UNIT-I

Introduction to Storage Technology: Data creation and The value of data to a business, Information Lifecycle, Challenges in data storage and data management, Solutions available for data storage, Core elements of a Data Center infrastructure, role of each element in supporting business activities.

UNIT-II

Storage Systems Architecture: Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Integrated and Modular storage systems ,high-level architecture and working of an intelligent storage system

UNIT-III

Introduction to Networked Storage: Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfil the need, Understand the appropriateness of the different networked storage options for different application environments.

UNIT-IV

Information Availability, Monitoring & Managing Data Center: Reasons for planned/unplanned outages and the impact of downtime, Impact of downtime. Differentiate between business continuity (BC) and disaster recovery (DR), RTO and RPO, Identification of single points of failure in a storage infrastructure and solutions to mitigate these failures, Architecture of backup/recovery and the different backup/ recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business

continuity capabilities. Key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor storage infrastructure.

UNIT-V

Securing Storage and Storage Virtualization: Information Security, Critical security attributes for information systems, Storage security domains, Analyze the common threats in each domain. Storage Virtualization: Forms, Configurations and Challenges. Types of Storage Virtualization: Block-level and File-Level.

Suggested Reading:

1) G.Somasundaram, Alok Shrivastava, EMC Education Series, " Information Storage and Management", Wiley, Publishing Inc., 2011.
2) Robert Spalding, "Storage Networks: The Complete Reference",TataMcGraw Hill,Osborne, 2003.
3) Marc Farley, "Building Storage Networks",TataMcGraw Hill, Osborne. 2001.
4) MeetaGupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002

BIT 454 SIMULATION AND MODELING

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

System and System Environment, Components of a System, Discrete and Continuous Systems, Model of a System, Types of Models Introduction to Simulation. Advantages and Disadvantages of Simulation, Areas of Applications, Discrete-Event System Simulation, Simulation Examples.

UNIT-II

Overview of Statistical Models and Queuing Systems, Programming Languages for Simulation, Continuous and Discrete Simulation Languages - GPSS, SIMAN, SIMSCRIPT, SLAM II and MODSIM III .

UNIT-III

Generation of Pseudo-Random Numbers, Properties of Random Numbers, Tests for Randomness, Generation of Random Variable for Continuous and Discrete Probability Distributions. Uniform, Exponential, Weibul, Possion and Normal Distributions.

UNIT-IV

Input Data Analysis: Data Collection, Identification of the Distribution, Parameter and Estimation. Goodness of Fit Tests. Multivariate and Time Series input models. Output Data Analysis: Stochastic Nature of Output Data. Types of Simulation with respect to Output Analysis. Measures of Performance and their estimation, Comparison and evaluation of alternative system designs.

UNIT-V

Verification, Validation and Calibration of Models, Validation of Model Assumptions, Validation of input/output Transformations, Input/output validation using historical Input Data, Input/output Validation using Turing Test.

SuggestingReading:

1. Anerill M Law and W. David Kelton, "Simulation, Modeling and Analysis", 3rd Edition, McGraw Hill.
2. Jerry Banks, John S. Carson II, Barry L. Nelson, and David M. Nicol, "Discrete-Event System Simulation", Pearson Education Asia, 2001.
3. Narsingh Deo, "System Simulation with Digital Computers", Prentice Hall of India, 1979.

BIT 455 ADVANCED COMPUTER ARCHITECTURE
(ELECTIVE –IV)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT – I
Measuring Performance and Cost: Performance Measurement, Enhancement to Uniprocessor Models, Benchmarks, Basic Model of Advanced Computer Architectures.

UNIT – II
Pipelining and Superscalar Techniques: Basic Pipelining, Data and Control Hazards, Dynamic Instruction Scheduling, Branch Prediction Techniques, Performance Evaluation, Case Study- Sun Microsystems – Microprocessor.

UNIT – III
Vector Processors: Vector Processor Models, Vector Architecture and Design, Performance Evaluation, Programming Vector Processors.

UNIT – IV
Array Processors: Parallel Array Processor Model, Memory Organization, Interconnection, Networks: Performance Measures, Static and Dynamic Topologies.

UNIT - V
Multiprocessors and Multi Computers: Multiprocessor Models, Shared – Memory and Distributed Memory Architectures, Memory Organization, Cache Coherence and Synchronization Mechanisms, Parallel Computer, Performance Models.

Suggested Reading:

1. John. L. Hennessey and David A Patterson, " Computer Architecture - A Quantitative Approach", 4th Edition, Elsevier, 2007.
2. Sajjan G. Shiva, Taylor Series, " Advanced Computer Architecture", CRC Press, 2006.
3. Kai Hwang, "Advanced Computer Architecture ", McGraw Hill,

BIT 456 NATURAL LANGUAGE PROCESSING
ELECTIVE-IV

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT- I

Natural Language Processing – Introduction to Natural Language Processing, The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax Spoken Language input and output Technologies. Written language Input – Mathematical Methods – statistical Modeling and classification Finite State Methods. Grammar for Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution, Semantic Representation.

UNIT- II

Introduction to semantics and knowledge representation , Some applications like Machine translation, database interface Semantic Interpretation, word senses and ambiguity, Basic logical form language, Encoding ambiguity in logical from, Thematic roles, Linking syntax and semantics, Recent trends in NLP.

UNIT- III

Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top- Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

UNIT- IV

Semantic Interpretation, word senses and ambiguity, Basic logical form language, Encoding ambiguity in logical from, Thematic roles, Linking syntax and semantics, Recent trends in NLP.

UNIT-V

Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

Suggested Reading:

1. James Allen, “Natural Language Understanding”, Pearson Education
2. Christopher D Manning and Hinrich Schutze, “ Foundations of Statistical Natural Language Processing” MIT Press, 1999.
3. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, “NLP: A Paninian Perspective”, Prentice Hall, New Delhi
4. D. Jurafsky, J. H. Martin, “Speech and Language Processing”, Pearson

BIT 457 SOFT COMPUTING
(Elective-V)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Fuzzy Sets and Fuzzy Logic: Introduction to Classical Sets and Fuzzy Sets. Classical set and Fuzzy sets – Operations and Properties. Fuzzy Relations – Equivalence & Tolerance. Membership Functions, Fuzzification, Membership Value Assignment. Fuzzy to Crisp Conversion. Lambda Cuts for Fuzzy Sets and Fuzzy Relations, Defuzzification Methods. Fuzzy Arithmetic. Fuzzy Logic and Approximate Reasoning. Rule Based Systems and Graphical Techniques of Inference. Fuzzy Associative Memories.

UNIT-II

Rough Sets and Granular Computation: Rough Sets – Definition, Upper and Lower Approximations, Boundary Region, Decision Tables and Decision Algorithms. Properties of Rough Sets. Rough Set Model based on Tolerance Relation. Introduction to Multi-Granulation Rough Set Models.

UNIT-III

Genetic Algorithms: Introduction to Genetic Algorithms, Basic Operators, Terminology and Mathematical Foundations. Computer Implementation of a Genetic Algorithm. Some Applications of Genetic Algorithms. Advanced Operators and Techniques in Genetic Search. Genetic Algorithms based Systems.

UNIT-IV

Artificial Neural Networks: Introduction, Learning Processes, Single Layer Perceptrons, Multilayer Perceptrons, Radial-Basis Function Networks, Support Vector Machines, Self-Organizing Maps. Artificial Neural Networks based Systems.

UNIT-V

Systems and Applications: Fuzzy Systems and Applications. Rough Set based Granular Systems and Applications. Genetic Algorithms based Systems and Applications. Artificial Neural Networks and Applications. Hybrid Systems and Applications.

Suggested Reading:

1. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill, 1997.
2. Zdzislaw Pawlak, "Rough Sets", Institute of Theoretical and Applied Informatics, Polish Academy of Sciences, University of Information Technology and Management, Poland. *bcpw.bg.pw.edu.pl/Content/2026/RoughSetsRep29.pdf*
3. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education, 1989.

BIT 458 HUMAN COMPUTER INTERACTION
(Elective-V)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT- I

Interaction Paradigms: Computing Environments, Analyzing Interaction Paradigms, Interaction Paradigms

Interaction Frameworks and Styles : Frameworks for Understanding Interaction , Coping with Complexity, Interaction Styles

UNIT- II

Interaction Design Process: Iterative Design, User-Centered Design, Interaction Design Models, Overview of Interaction Design Models

Discovery : Discovery Phase Framework, Collection, Interpretation , Documentation

Design : Conceptual Design, Physical Design, Evaluation, Interface Design Standards, Designing the Facets of the Interface

UNIT- III

Design Principles: Principles of Interaction Design, Comprehensibility, Learnability, Effectiveness/Usefulness, Efficiency/Usability, Grouping, Stimulus Intensity, Proportion , Screen Complexity, Resolution/Closure, Usability Goals

Interaction Design Models: Model Human Processor , Keyboard Level Model, GOMS, Modeling Structure, Modeling Dynamics, Physical Models **Usability Testing:** Usability, Usability Test, Design the Test, Prepare for the Test, Perform the Test, Process the Data

UNIT- IV

Interface Components: The WIMP Interface, Other Components

Icons : Human Issues Concerning Icons, Using Icons in Interaction Design, Technical Issues Concerning Icons **Color:** The Human Perceptual System, Using Color in Interaction Design, Color Concerns for Interaction Design, Technical Issues Concerning Color

UNIT- V

Text : Human Issues Concerning Text, Using Text in Interaction Design, Technical Issues Concerning Text **Speech and Hearing :** The Human Perceptual System, Using Sound in Interaction Design, Technical Issues Concerning Sound

Touch and Movement: The Human Perceptual System, Using Haptics in Interaction Design, Technical Issues Concerning Haptics

Suggested reading:

1) Steven Heim, *The Resonant Interface: HCI Foundations for Interaction Design*, Addison-Wesley, 2007
2) J. Preece, Y. Rogers, and H. Sharp, *Interaction Design: Beyond Human-Computer Interaction*, Wiley & Sons, 2nd Ed., 2007
3) Ben Shneiderman , Catherine Plaisant, Designing the User Interface: Strategies for Effective Human-Computer Interaction, 5th edition, , Addison- Wesley, 2009

BIT 459 SOFTWARE PROJECT MANAGEMENT
(Elective-V)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I
Conventional Software Management: The waterfall model, conventional software Management performance, Evolution of Software Economics, Improving Software Economics: Reducing Software product size. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT-II
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, pragmatic artifacts, Work Flows of the process, Checkpoints of the process.

UNIT-III
Iterative Process Planning: work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning, Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT-IV
Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, Tailoring the Process: Process discriminants.Managing people and organizing teams.

UNIT-V
Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions. Process improvement and mapping to the CMM.

Suggested Reading:

1. Walker Royce, Software Project Management: A Unified Framework, Pearson Education 1998
2. Bob Hughes and Mike Cotterell – Software Project Management, 4th Edition – Tata McGraw Hill – 2006
3. Pankaj Jalote, Software Project Management, Pearson Education – 2002

BIT 460 **CLOUD COMPUTING**
(ELECTIVE –V)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

The Evolution of Cloud Computing: Hardware Evolution. Internet Software Evolution. Establishing a Common Protocol for the Internet. Evolution ofIpv6 . Finding a Common Method to Communicate Usingthe Internet Protocol. Building a Common Interface to the Internet .

Cloud Formations: From One Computer to a Grid of Many. Server Virtualization .Parallel Processing. Vector Processing. Symmetric Multiprocessing Systems. Massively Parallel Processing Systems

UNIT-II

Web Services and the Cloud: Communication-as-a-Service (CaaS). Infrastructure-as-a-Service (IaaS) . Monitoring-as-a-Service (MaaS) . Platform-as-a-Service (PaaS) . Software-NIS- a-Service (SaaS)

Building Cloud Networks: The Evolution from the MSP Model to Cloud. Computing and Software- as-a-Service . The Cloud Data Center .Collaboration i . Service-Oriented Architectures as a Step Toward Cloud Computing. Basic Approach to a Data Center-Based SOA

The Role of Open Source Software in Data Centers. Where Open Source Software Is Used

Case studies: Amazon web services. Google App Engine.

UNIT-III

Virtualization: Introduction. Types and Technologies. Accomplishing virtualization. importance of virtualization in Cloud computing.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products - Vmware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server

UNIT-IV

Federation in the Cloud, Presence in the Cloud I Privacy and Its Relation to Cloud-Based Information System. Cloud Security Challenges I Software-as-a-Service Security I Security-as-a-Service -the New MSSP.

UNIT-V

Common Standards in Cloud Computing: The Open Cloud Consortium, The Distributed Management Task Force, Standards for Application Developers I Standards for Messaging .Internet Messaging Access Protocol (IMAP) I Standards for Security . Examples of End-User Access to Cloud Computing

Mobile Internet Devices and the Cloud: Mobile Operating Systems for Smart phones Mobile Platform Virtualization I Collaboration Applications for Mobile Platforms

Suggested Reading:

1. John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ",. James F. Ransome, CRC Press 2009.
2. Virtualization Specialist level complete certification kit - Study guide from www. theartof service.erg
3. William von Hagen, "Professional Xen Virtualization", Wrox Publications, January, 2008.:
4. Chris Wolf, Erick M. Halter, "virtualization: From the Desktop to the Enterprise", APress 2005.
5. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.

Web Resources:

1. http://aws.amazon.com
2. http://code.google.com/appsengine

ME411 ENTREPRENEURSHIP
(Elective - V)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT –I
Indian Industrial Environmental – Competence, Opportunities and Challenge. Enterpreneurship and Economic growth. Small Scale Industry in India, Objectives, Linkage among small, medium and heavy industries, Types and forms of enterprises.

UNIT –II
Identification and characteristics of entrepreneurs. Emergence of First generation entrepreneurs, environmental influence and women entrepreneurs. Conception and evaluation of ideas and their sources. Coice of Technology – Collaborative itneraction for Technology development.

UNIT –III
Project formulation, Analysis of market demand, Financial and profitability analysis and technical analysis. Project financing in India.

UNIT –IV
Project Management during construction phase, project organization, project planning and control using CPM, PERT techniques. Human aspects of project management. Assessment of tax burden.

UNIT –V
Behavioural aspects of entrepreneurs: Personality – determinants, attributes and models. Leadership concept and models. Values and attitudes. Motivation aspects. Change behavior. Time Management: Various approaches of time management, their strengths and weakness. The urgency addition and time management matrix.

Suggested Reading:

1. Vasant Desai, "Dynamics of Entrepreneurial Development and Management", Himalayas Publishing House,1997.
2. Jprasanna Chandra, "Project –Planning, Analysis Selection, Implementation and Review", Tata McGraw Hill Publishing Co. Ltd, 1995.
3. Stephen R. Covery and Roger Merrill A., " First Things First", Simon and Scheuster publication, 1994.
4. Sudha G.S, " Organizational Behaviour", National Publishing House,

CE461 **DISASTER MANAGEMENT**
(ELECTIVE –V)

Instruction per Week	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I
Introduction : Natural, human induced and human made disasters – international decade of disaster reduction

UNIT-II
Natural Disasters – Hydro metrological based disasters – Tropical cyclones, floods, drought and desertification – Zones Geographical based disasters- Earthquake, Tsunammis, Landslides and avalanches

UNIT-III
Human induced hazards – Chemical industrial hazards, major power break downs, traffic accidents etc.

UNIT-IV
Use of remote sensing and GISI disaster mitigation and management

UNIT – V
Rich and vulnerability to disaster – mitigation and management options – warning and forecasting.

Suggested Reading:

1. Notes / Reading material published by National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.

BIT 481 EMBEDDED SYSTEMS LAB

Instruction per Week	3 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

A Use of 8-bit and 32-bit Microcontrollers, (such as 8051 Microcontroller, ARM2 148 /ARM2378, LPC 2141/42/44/46/48) Microcontroller and C compiler (Keil, Ride etc.) to:

1. Interface Input-Output and other units such as: Relays,LEDs,LCDs, Switches, Keypads, Stepper Motors, Sensors, ADCs, Timers
2. Demonstrate Communications: RS232, IIC and CAN protocols
3. Develop Control Applications such as: Temperature Controller, Elevator Controller, TrafficController

B. Development of Embedded Application usingFPGAs,CPLDs, VHDL andXilinxProgrammable Logic Design Tools:

1. Four bit ALU
2. Pseudo Random Number Generator

C. Development and Porting of Real Time Applications on to Target machines such as Intel or other Computers using any RTOS

I. Understanding Real Time Concepts using any RTOS through Demonstration of:

1. Timing
2. Multi-Tasking
3. Semaphores
4. Message Queues
5. Round-Robin Task Scheduling
6. Preemptive Priority based Task Scheduling
7. Priority Inversion
8. Signals
9. Interrupt Service Routines

II. Application Development using any RIOS:

1. Any RTOS Booting
2. Application Development under any RTOS

BIT 482 **SEMINAR**

Instruction per Week	Periods
Duration of University Examination	-
University Examination	-
Sessional	25 Marks

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of state of the art topics in a broad area of his / her specialization.
Seminar *topics* may be chosen by the students with advice from the faculty members. Students are to be exposed to following aspects of seminar presentations; Literature survey, Organization of material, power point presentation, Technical writing

Each student will be required to

1. Submit a one page synopsis of the seminar talk for display on the notice board.
2. Give a 20 minutes presentation through power point presentation followed by 10 minutes of discussion.
3. Submit a report on the seminar topic with list of references.

Seminars are to be scheduled from the 2nd week to the last week of the semester and any change in schedule should be discouraged.
The sessional marks will be awarded to the students by at least 2 faculty members on the basis of an oral and a written presentation as well as their involvement in the discussions.

BIT483 **MAIN PROJECT**

Instruction per Week	6 Periods
Duration of University Examination	Viva Voce
University Examination	Grade *
Sessional	50 Marks

Focus of U.G. Project should be on *Solving a Real Life Problem*.

Faculty members should prepare project briefs well in advance. They should be made available to the students at the departmental library.

A project may be classified as hardware/software/modeling/simulation. It should involve elements of such as analysis, design, coding, testing, etc.,

The department will appoint a project coordinator who will be incharge of the following:

- Grouping of students (a maximum of three in a group)
- Allotment of projects and project guides
- Project monitoring at regular intervals

Project allotments is to be completed by the 4th week of 1st Semester of IV years to that students get sufficient time for completion of their projects.

All projects are to be based on the grade/marks, awarded by a monitoring committee comprising of faculty members as well as by the supervisor.

Efforts are to be made so that some of the projects are carried out in industries.

Projects may also be invited from industries.

Norms for final documentation of the project report are to be provided by the department.

* Excellent / Very Good / Good / Satisfactory / Unsatisfactory.
Note: Three periods of contact load will be assigned to each project guide.