

SCHEME OF INSTRUCTION

BE (INFORMATION TECHNOLOGY)

Proposed scheme with effect from the academic year 2017-2018

IV/IV-SEMESTER-I

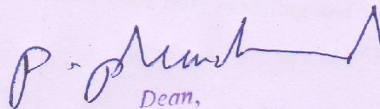
S.No.	Syllabus Ref.No.	Subject	Scheme of Instruction Periods Per Week		Scheme of Examination Duration in Hrs	Maximum Marks	
			L	D/P		Univ. Exam	Sessionals
			THEORY				
1	BIT 401	VLSI Design	4	-	3	75	25
2	BIT 402	Middleware Technologies	4	-	3	75	25
3	BIT 403	Information Security	4	-	3	75	25
4		Elective-II	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: n-wells, active area definition, design of n^+ , p^+ regions, masks for the nFET, pFET, active contact cross section and mask set, metal 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^2 MOS 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, cryptographic 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, QoS 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 versus 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 versus 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 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 Jacobson, Martin Griss, Patrick Johnsson, “Software Reuse: Architecture, Process and for 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
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1. Switch level modeling using Verilog
 - a) Logic gates b) AOI 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) AOI gate with and without delay c) OAI 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.

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 Duration in Hrs	Maximum Marks	
			L	D/P		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

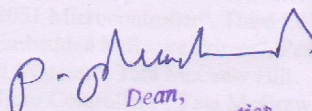
BIT 458 Human Computer Interaction

BIT 459 Software Project Management

BIT 460 Cloud Computing

ME 411 Entrepreneurship

BIT 461 Disaster Management


Dean,
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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 VDeshmlkhi, "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 IR Models, Retrieval: Adhoc and Filtering, A formal characterization of IR Models, Classic IR, Set Theoretic Models, Algebraic Models, Probabilistic Models, Structured Text Retrieval Models, Models for Browsing.

UNIT-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, Automatic Global 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, Comparing Text 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 IR.

Suggested Reading:

1. Ricardo Baeza-Yates, Berthier Ribeiro-Neto, "Modern Information Retrieval" Pearson Education, 2008
2. W.B. Frakes, Ricardo Baeza Yates, "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, Poisson 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.

Suggesting Reading:

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 form, 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 form, 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. Timothy 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 of IPv6 . Finding a Common Method to Communicate Using the 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.theartofservice.org
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. Entrepreneurship 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 GIS 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.

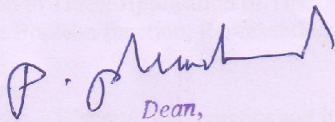
* Excellent / Very Good / Good / Satisfactory / Unsatisfactory.

Note: Three periods of contact load will be assigned to each project guide.

SCHEME OF INSTRUCTION
BE (INFORMATION TECHNOLOGY)
Proposed scheme with effect from the academic year 2017-2018

Semester - III

S.No	Course Code	Course	Scheme of Instruction			Scheme of Examination			Credit
			Hours Per Week			Contact Hrs/Wk	Maximum Marks		
			L	T	P		CIE	SEE	
THEORY									
1	PC 301 IT	Discrete Mathematics	3	1	0	4	30	70	3
2	PC 302 IT	Microelectronics	3	1	0	4	30	70	3
3	PC 303 IT	Digital Electronics & Logic Design	3	1	0	4	30	70	3
4	PC 304 IT	Data Structures	3	1	0	4	30	70	3
5	PC 305 IT	Probability and Random Processes	3	1	0	4	30	70	3
6	MC 322 HS	Environmental Studies	3	0	0	3	30	70	3
PRACTICALS									
7	PC 331 IT	Data Structures Lab	0	0	4	2	25	50	2
8	PC 332 IT	Basic Electronics Lab	0	0	2	2	25	50	1
9	PW333 IT	Mini Project - I	0	0	4	2	25	50	1
TOTAL			18	5	6	29	255	570	22


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Osmania University

PC 301 IT

DISCRETE MATHEMATICS

Instruction:	(3L+1T)Hours/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To Learn mathematical concepts as applied in computer science for solving logical problems.
2. To model relationships, analyze data, apply probability concepts and use functions to solve problems.
3. To develop the mathematical skills needed for advanced quantitative courses.

UNIT – I

Logic – Sets and Functions – Logic, Propositional equivalences – Predicates and quantifiers – Nested quantifiers-Sets-Set Operations, Functions.

Algorithms- Integers – Matrices : Algorithms, Complexity of Algorithms. The Integers and Division, Integers and Algorithms, Applications of Number Theory, Matrices.

UNIT – II

Mathematical Reasoning, Induction, and Recursion: Proof Strategy, Sequence and Summation, Mathematical Induction, Recursive Definitions and Structural Induction, Recursive Algorithms.

Counting – Basics, Pigeonhole principle, Permutations and combinations – Binomial Coefficients, Generalized Permutations and combinations, Generating permutations and combinations.

UNIT – III

Discrete Probability: An Introduction to Discrete Probability theory, Expected Value and Variance.

Advanced Counting Techniques: Recurrence relations – Solving Recurrence Relations, - Divide and conquer relations – and Recurrence Relations, Generating function – Inclusion – Exclusion – Applications of Inclusion – Exclusion.

UNIT – IV

Relations – Relations & their Properties, n-ray relations and applications, Representing relations – Closures, equivalence relations, partial orderings.

Graphs: Introduction, Graph terminology, representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamiltonian paths, Shortest path problems, Planar graphs, Graph coloring.

UNIT –V

Trees: Introduction to Trees, Application of Trees, Spanning Trees, Minimum Spanning Trees.

Boolean Algebra: Boolean function, Representing Boolean functions, Logic Gates

Suggested Reading:

1. Kenneth H. Rosen – Discrete Mathematics and its Application – 5th Edition, McGraw Hill, 2003.
2. J. K. Sharma, Discrete Mathematics, Second Edition, Macmillan, 2005.
3. J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Application to Computer Science, McGraw Hill – 1997.

4. Joel. Mott. Abraham Kandel, T.P. Baker, Discrete Mathematics for Computer Scientist & Mathematicians, Prentice Hall N.J., 2nd Edition, 1986.

PC 302 IT

MICRO ELECTRONICS

Instruction:	(3L + 1T) Hours/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To understand basic semiconductor devices and create foundation for forthcoming circuit design courses
2. To train students in logic design for real world problems.
3. To familiarize with the principles of the transducers and advances in Instrumentation

UNIT – I

Semi-conductors, Conductors, and Insulators, Conduction in semiconductors, N-type and P-type semi-conductors, PN junction diode. Forward and Reverse bias characteristics, Breakdown diodes. Rectifier Circuits, Limiting and clamping circuits, Schottky Barrier diode and Varactor diode. Cathode Ray Oscilloscope and its applications.

UNIT – II

Bipolar junction transistors – Physical structure and modes of operation, npn transistor, pnp transistor, CB,CE input and output characteristics, transistor as a switch ,transistor as an amplifier, biasing of a transistor. The Junction Field-Effect Transistors(JFET) – Structure and physical operation, Current – Voltage characteristics (Drain and Transfer).
MOSFET – Physical structure and modes (Enhancement & depletion) of operation.

UNIT – III

Feedback – Structure, Properties of negative feedback, Topologies, Advantages of negative feedback. Sinusoidal Oscillators – Loop gain, Barkhausen criteria, RC Oscillators, LC Oscillators and Crystal Oscillators.

UNIT – IV

Operational Amplifiers : Ideal characteristics, Op. Amp. as-Adder, Subtractor, Integrator, Differentiator and comparator. Generation of Square and Triangular waveforms using Op.Amp, Monostable multivibrator
Op. Amp. as - V to I and I to V converter, Instrumentation Amplifier, logarithmic and antilogarithmic amplifiers, analog multiplier.

UNIT – V

Digital CMOS logic circuits: Introduction, digital IC technologies and logic circuit families, Voltage Transfer Characteristic (VTC) of inverter, Noise Margins, Propagation delay, static operation of a CMOS inverter.

CMOS logic gate circuits: Basic structure (PUN and PDN), Implementation of 2-input NOR gate, NAND gate, complex gates and exclusive OR gate.

Suggested Reading :

1. Adel S. Sedra, Kenneth C. Smith, Micro Electronic Circuits, 5th Edition, Oxford International Student Edition, 2006.
2. S.Salivahan , Electronics Devices and Circuits, 4th Edition, McGraw Hill, 2009.
3. Jacob Millman, Arvin Grable – Micro Electronics – 2nd Edition, McGraw Hill 1987.

PC 303 IT DIGITAL ELECTRONICS AND LOGIC DESIGN

Instruction:	(3L+1T) Hrs/Wk
Duration of University Examination:	3 Hours
University Examination (SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To learn the principles of digital hardware and support given by it to the software.
2. To explain the operation and design of combinational and arithmetic logic circuits.
3. To design hardware for real world problems.

UNIT – I

Design Concepts – Digital Hardware, Design process, Design of digital hardware Introduction to logic circuits – Variables and functions, Logic gates and networks. Boolean algebra, Synthesis using AND, OR, and NOT Gates, Design examples.

Optimized implementation of logic functions – Karnaugh Map, Strategies for minimization, minimizing Product-of-Sum Forms, Incompletely Specified functions, multiple output circuits. NAND and NOR logic networks, Introduction to CAD tools and Very High Speed Integrated Circuit Hardware Description Language (VHDL).

UNIT – II

Programmable logic devices: general structure of a Programmable Logic Array (PLA), gate level diagram, schematic diagram, Programmable Array Logic (PAL) Structure of CPLDs and FPGAs, 2-input and 3-input lookup tables (LUT). Design of Arithmetic circuits, VHDL for Arithmetic-circuits Combinational circuit building blocks – Multiplexers, Decoders, Encoders, Code converters, Arithmetic comparison circuits. VHDL for Combinational circuits.

UNIT – III

Basic Latch Gated SR Latch, Gated D Latch, Master-Slave and Edge- Triggered D Flip- Flops, T Flip-flop, JK Flip-flop, Excitation tables. Registers-Shift Register, Counters- Asynchronous and synchronous counters, Ring counter, Johnson counter, VHDL code for D Flip-flop and Up-counter

UNIT – IV

Synchronous Sequential Circuits – Basic design steps. Moore and Mealy state model, State minimization, Design of a Counter using the Sequential Circuit Approach. Algorithmic State Machine (ASM) charts

UNIT – V

Asynchronous Sequential Circuits – Behaviour, Analysis, Synthesis, State reduction, State Assignment, examples. Hazards: static and dynamic hazards. Significance of Hazards. Clock skew, set up and hold time of a flip-flop.

Suggested Reading:

1. Stephen Brown, Zvonko Vranesic, “Fundamentals of Digital Logic with VHDL Design”, 2nd Edition, McGraw Hill, 2009.

2. Jain R.P., "Modern Digital Electronics," 3rd Edition, TMH, 2003.
3. John F. Wakerly, "Digital Design Principles & Practices", 3rd Edition, Prentice Hall, 2001
4. M. Morris Mano, Charles R. Kime, "Logic and Computer Design Fundamentals", 2nd Edition, Pearson Education Asia, 2001.
5. ZVI Kohavi, Switching and Finite Automata Theory, 2nd Edition, Tata McGraw Hill, 1995.
6. William I Fletcher, "An Engineering Approach to Digital Design", Eastern Economy Edition, PHI
7. H.T. Nagle, "Introduction to Computer Logic", Prentice Hall, 1975.

PC 304 IT

DATA STRUCTURES

Instruction:	(3L+1T) Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To develop proficiency in the specification, representation, and implementation of abstract data types and data structures.
2. To understand of applications of data structures.
3. To solve advanced computer science problems by making appropriate choice for intended applications.

UNIT-I

Algorithm Specification, Performance Analysis and Measurement.

Arrays: Abstract Data Types and the C++ Class, Array as an Abstract Data Type, Polynomial Abstract Data Type, Sparse Matrices, Representation of Arrays, String Abstract Data Type.

UNIT-II

Stacks and Queues: Templates in C++, Stack Abstract Data Type, Queue Abstract Data type, Sub typing and Inheritance in C++, A Mazing Problem, Evaluation of Expressions.

UNIT-III

Linked Lists: Singly Linked Lists and Chains, Representing Chains in C++, Template Class Chain, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Doubly Linked Lists.

Hashing: Static Hashing, Hash Tables, Hash Functions, Overflow Handling, Theoretical Evaluation of Overflow Techniques

UNIT-IV

Trees: Introduction, Binary Trees, Binary Tree Traversal and Tree Iterators, Copying Binary Trees, Threaded Binary Trees, Heaps, Efficient Binary Search Trees: AVL Trees, m-way Search Trees, Introduction to Red Black tree & splay tree, B-tree.

Graphs: Graph Abstract Data Type, Elementary Graph operations (DFS and BFS), Minimum Cost Spanning Trees (Prim's and Kruskal's Algorithms).

UNIT-V

Sorting: Insertion sort, Quick sort, Best computing time for Sorting, Merge sort, Heap sort, shell sort, Sorting on Several Keys, List and Table Sorts, Summary of Internal Sorting.

Suggested Reading:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press. 2007.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education 2006.
3. Michael T. Goodrich, Roberto Tamassia, David Mount, Data Structures and Algorithms in C++, Wiley India Pvt. Ltd, 2004.

PC 305 IT

PROBABILITY AND RANDOM PROCESSES

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To induce the ability to describe a random experiment in terms of procedure, observation, and a Probability model.
2. To inculcate ability to characterize functions of random variables
3. To familiarize the students with the methods to characterize stochastic processes with an emphasis on stationary random processes.

UNIT – I

Probability: Introduction, definitions. The Axioms of Probability: Set theory, Probability Space Conditional Probability, Baye's Theorem. Repeated Trials: Combined Experiments, Bernoulli Trials Bernoulli's theorem and games of chance.

The Concept of a Random Variable: Introduction, Continuous and Discrete Random variables.

UNIT – II

Distribution and Density functions: Properties. Specific Random Variables: Normal, Exponential, Uniform, Gamma, Bernouli, Binomial, Poisson, Geometric and Negative Binomial Distributions. Conditional Distributions, Normal Approximation, Poisson approximation, Functions of One Random Variable: The Random Variable $g(x)$, Distribution and density of $g(x)$, Mean and Variance. Moments. Characteristic Functions and their properties.

UNIT – III

Two Random Variables: Bivariate Distributions and their properties. One Function of Two Random variables and its density function. Two Functions of Two Random Variables and their Joint density. Joint Moments. Joint Characteristic Functions. Conditional Distribution and Density. Conditional Excepted Values.

UNIT – IV

Random Processes – Definitions. Classification, Stationarity- Wide Sense and Strict Sense stationary processes. Ergodicity – Mean and Correlation Ergodic process. Auto-correlation and Covariance functions with their properties.

UNIT –V

Spectral representation of Random Peocesses: Power Spectral density and its properties, Weiner – Kintchine theorem. Gaussian Process, Poisson Process. Noise: Types, Low pass and Band pass representation of white noise.

Suggested Reading:

1. Papoulis: Probability, Random Variables and Stochastic Processes, 4th Edition Tata McGraw Hill, 2002
2. T.Veerarajan, “Probability, Statistics and Random Process”, 3rd Edition Tata McGraw Hill
3. Peyton Peebles: Probability, Random Variables and Random Signal Principles, Fourth Edition, Tata McGraw Hill, 2009.
4. H.Stark and J Woods: Probability, Random Processes and Estimation Theory for Engineers, Prentice, 2010.
5. P.Ramesh Babu , “Probability Theory and Random Processes” – TMH Education Private Limited First Edition-2014

MC 322 HS

ENVIRONMENTAL STUDIES

Instruction:	3L Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To study the basic concepts, sources of water, floods and their impact on environment
2. To know the ecosystems and energy resources systems
3. To understand the Biodiversity concepts and their advantages
4. To study the different pollutions and their impact on environment
5. To know the social and environment related issues and their preventive measures

UNIT- I

Environmental Studies: Definition, scope and importance, need for public awareness.

Natural resources: Water resources; use and over-utilization of surface and ground water, floods, drought, conflicts over water

Dams: benefits and problems. Effects of modern agriculture, fertilizer- pesticide problems, water logging and salinity.

UNIT-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

Energy resources: Growing energy needs, renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

UNIT-III

Biodiversity: Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution; solid and liquid waste management.

Environment Protection Act: Air, water, forest and wild life Acts, enforcement of environmental legislation.

UNIT-V

Social Issues and the Environment: Water conservation, watershed management, and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle, and disaster management in India.

Suggested Reading:

1. A.K. De “Environmental Chemistry”, Wiley Eastern Ltd.
2. E.P. Odum “Fundamentals of Ecology”, W.B. Saunders Co., USA.
3. M.N. Rao and A.K. Datta “Waste Water Treatment”, Oxford and IBK Publications.
4. Benny Joseph “Environmental Studies”, Tata McGraw Hill, 2005.
5. V.K. Sharma “Disaster Management”, National Centre for Disaster Management, IPE, Delhi, 1999.
6. Teri Document, “Green Building Council of India”

PC 331 IT

DATA STRUCTURES LAB

Instruction:	4 P Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

1. To design, analyze, and implement basic data structures and algorithms.
2. To implement data structures such as Trees, Threaded Binary Trees, Heaps, graph operations and algorithms.
3. To familiarize with advanced tree structures like AVL, Splay, m-way, B-Trees.

List of Experiments:

1. Write a C++ program for the implementation of Array ADT
2. Write a C++ program for the implementation of String ADT
3. Write a C++ program to implement the following using array
 - a) Stack ADT
 - b) Queue ADT
4. Write a C++ program to implement the following using a single linked list
 - a) Stack ADT
 - b) Queue ADT
5. Write a C++ program for evaluation of Infix to postfix conversion, evaluation of postfix expression.
6. Write a C++ program to implement polynomial arithmetic using linked list.
7. Write a C++ program to perform following operations:
 - a) Insert an element into a binary search tree
 - b) Delete an element from a binary search tree
 - c) Search for a key element in a binary search tree
8. Write a C++ program to implement all the functions of a dictionary(ADT) using hashing
9. Write C++ program for the implementation of tree traversals on Binary Trees
10. Write C++ program to perform following operations
 - a) Insertion into B- tree
 - b) Deletion into B- tree
11. Write C++ program to perform following operations
 - a) Insertion into AVL tree
 - b) Deletion into AVL tree
12. Write C++ program for the implementation of bfs and dfs for a given Graph
13. Write C++ program for the implementation of Splay Trees
14. Write C++ program to implement Kruskal's algorithm to generate a minimum spanning tree.
15. Write C++ program to implement Prim's algorithm to generate a minimum spanning tree
16. Write C++ program for implementing the following sorting methods
 - a) Selection sort
 - b) Quick sort
 - c) shell sort
 - d) Merge sort
 - e) Heap sort

PC 332 IT

BASIC ELECTRONICS LAB

Instruction:	2 P Hrs/Wk
Duration of University Examination:	3 Hours
University Examination (SEE):	50 Marks
Sessionals (CIE):	25 Marks

Course Objectives:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices and design rectifiers, filters and amplifiers.
3. To study simple electronic circuits

List of Experiments

ANALOG:

1. CRO and its applications: Measurement of amplitude, frequency. Obtaining transfer characteristics and lissajous figures.
2. Characteristics of pn junction diode , zener diode, BJT and FET.
3. Diode applications-Half-wave and full-wave rectifiers, clipping and clamping circuits.
4. Hartley and RC phase shift oscillators.
5. Inverting and non-inverting Operational Amplifier.
6. Operational Amplifier as an adder, sub tractor, differentiator, integrator.

DIGITAL:

6. Truth table verification of logic gates using TTL 74 series ICs.
7. Half Adder, Full Adder, Decoder, MUX
8. Truth table verification of D flip flop, SR flip-flop ,T flip-flop and JK flip-flop
9. Counters.
10. Shift Registers

SOFTWARE: Any 3 experiments using PSPICE.

Note : All the experiments are compulsory.

PC 333 IT

MINI PROJECT – I

Instruction:	2 Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

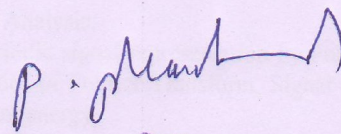
1. To develop capability to analyse and solve real world problems with an emphasis on applying/integrating knowledge acquired.
2. To take responsibility of the end product.

The Students are required to take one of larger projects listed in the suggested readings or assigned by the teacher, implement and submit the report. The workbooks and project reports should be evaluated.

SCHEME OF INSTRUCTION
BE (INFORMATION TECHNOLOGY)
Proposed scheme with effect from the academic year 2017-2018

Semester – IV

S.No	Course Code	Course	Scheme of Instruction		Scheme of Examination			Credits	
			Periods Per week		Contact	Maximum Marks			
			L	T	P	Hrs/Wk	CIE		SEE
THEORY									
1	PC 401 EC	Signals and Systems	3	1	0	4	30	70	3
2	PC 402 IT	Computer Organisation & Microprocessor	3	1	0	4	30	70	3
3	PC 403 IT	Scripting Languages	3	1	0	4	30	70	3
4	PC 404 IT	OOPS USING JAVA	3	1	0	4	30	70	3
5	PC 405 IT	Data Communications	3	1	0	4	30	70	3
6	MC411BM	Managerial Economics and Accountancy	3	0	0	3	30	70	3
PRACTICALS									
7	PC 431 IT	Microprocessor Lab	0	0	2	2	25	50	1
8	PC 432 IT	JAVA Lab	0	0	4	2	25	50	2
9	PW 433 IT	Mini Project - II	0	0	4	2	25	50	2
TOTAL			18	5	6	29	255	570	23



Dean,
Faculty of Informatics,
Osmania University

PC 401 IT

SIGNALS AND SYSTEMS

Instruction:	(3L+1T) Hrs/Wk
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
2. To understand Sampling theorem, with time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
3. To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advanced courses.

UNIT-I

Some useful operations on signals: Time shifting, Time scaling, Time inversion.

Signal models: Impulse function, Unit step function, Exponential function, Even and odd signals.

Systems: Linear and Non-linear systems, Constant parameter and time varying parameter systems, Static and dynamic systems, Causal and Non-causal systems, Lumped Parameter and distributed parameter systems, Continuous-time and discrete-time systems, Analog and digital systems.

UNIT-II

Fourier Series:

Signals and Vectors, Signal Comparison: correlation, Signal representation by orthogonal signal set, Trigonometric Fourier Series, Exponential Fourier Series, LTI system response to periodic inputs.

UNIT-III

Continuous-Time Signal Analysis:

Fourier Transform: Aperiodic signal representation by Fourier integral, Fourier Transform of some useful functions, Properties of Fourier Transform, Signal transmission through LTI Systems, ideal and practical filters, Signal energy.

Laplace transform: Definition, some properties of Laplace transform, solution of differential equations using laplace transform.

UNIT-IV

Discrete-time signals and systems: Introduction, some useful discrete-time signal models, Sampling continuous-time sinusoids and aliasing, Useful signal operations, examples of discrete-time systems.

Fourier Analysis of discrete-time signals, periodic signal representation of discrete-time Fourier Series, aperiodic signal representation by Fourier integral.

UNIT-V

Discrete-time signal analysis:

Z-Transform, some properties of Z-Transform, Solution to Linear difference equations using Z-transform, System realization. Relation between Laplace transform and Ztransform.

DTFT: Definition, Properties of DTFT, comparison of continuous-time signal analysis with discrete-time signal analysis.

Suggested Reading:

1. B. P. Lathi, Linear Systems and Signals, Oxford University Press, 2nd Edition, 2009
2. Alan V O P Penheim, A. S. Wlisky , Signals and Systems, 2nd Edition, Prentice Hall
3. Rodger E. Ziemer, William H Trenter, D. Ronald Fannin, Signals and Systems, 4th Edition, Pearson 1998.
4. Douglas K. Linder, Introduction to Signals and Systems, McGraw Hill, 1999
5. P. Ramakrishna Rao, Signals and Systems, TMH.

PC 402 IT COMPUTER ORGANISATION AND MICROPROCESSOR

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To provide in depth knowledge to the students about the design and organization of a digital computer, operation of various functional units, instruction set design and factors that influence the performance of a computer.
2. To enable the students with the understanding of basic computer architecture with instruction set and programming of 8085 in particular.
3. To learn the functionality and interfacing of various peripheral devices.

UNIT-I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputers, Historical perspective. Input/Output Organization: Accessing I/O devices, Interrupts, Processor examples, Direct memory access, Buses, Interface circuits, Standard I/O interfaces.

UNIT-II

The Memory System: Basic concepts, Semi conductor RAM memories, Read-Only memories, Speed, Size and Cost, Cache memories, Performance considerations, Virtual Memories, Memory management requirements, Secondary Storage.

UNIT-III

8085 Architecture: Introduction to microprocessors and microcontrollers, 8085 Processor Architecture, Internal operations, Instructions and timings. Programming the 8085 - Introduction to 8085 instructions, Addressing modes and Programming techniques with Additional instructions.

UNIT-IV

Stacks and subroutines, interfacing peripherals - Basic interfacing concepts, Interfacing output displays, Interfacing input keyboards. Interrupts - 8085 Interrupts, Programmable Interrupt Controller (8259A). Direct Memory Access (DMA) - DMA Controller (Intel 8257), Interfacing 8085 with Digital to Analog and Analog to Digital converters.

UNIT-V

Programmable peripheral interface (Intel 8255A), Programmable communication interface (Intel 8251), Programmable Interval timer (Intel 8253 and 8254), Programmable Keyboard /Display controller (Intel 8279). Serial and parallel bus standards RS 232 C, IEEE 488.

Suggested Reading:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, McGraw Hill, 2002.
2. Ramesh S Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5/E Prentice Hall, 2002.
3. Pal Chouduri, Computer Organization and Design, Prentice Hall of India, 1994.
4. M. M. Mano, Computer System Architecture, 3rd Edition, Prentice Hall, 1994.

PC 403 IT

SCRIPTING LANGUAGES

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To understand why Python is a useful scripting language for developers.
2. To learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries in Python programs.
4. To learn how to write loops and decision statements in Python.
5. To learn how to write functions and pass arguments in Python.
6. To learn how to read and write files in Python.

Unit- I

INTRODUCTION: Origin of Scripting , Scripting Today, Definition of scripting language, Characteristics of Scripting Languages, Uses for Scripting Languages, How scripting languages differ from non-scripting languages; Types of scripting languages.

Unit- II

Introduction to Python: Python - History Language Features, Installing Python, Environment Setup, Running a Python Script, Python Versions: 2.x vs. 3.x,

Data Types, Operators, Expressions- Comments Indentation, Built-in Data Types, Variables, Operators, Expressions.

Unit-III

Control Statements: if Statements for Statement, while Statement, Use of range () in for loop, Use of break, continue, else in Loops, Use of pass Statement

Standard I/O Operations Input from Standard Input Device, Output to Standard Output Device Formatting String with %, Formatting string with format()

Unit-IV

Sequences, Strings: Lists, Tuples, Sets, Dictionaries, Strings and String Operations.

Functions: Function Definitions, Function Calling, DocStrings, Local Variables and Global Variables, Built-in Functions

Unit-V

File Handling: Opening modes, with statement, Closing a file, File read positions in Python, Renaming and deleting files in Python, The rename() method, The remove() method, Python file object methods.

Suggested Reading:

1. Martin C Brown, "Python: The Complete Reference", McGrawHill Education,2001.
2. Mark Chen, "Python: The Ultimate Beginner's Guide for Becoming Fluent in Python Programming", CreateSpace Independent Publishing Platform, October 2016.

PC 404 IT

OOPS USING JAVA

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination (SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, using class libraries.
2. To create Java application programs using sound OOP practices such as interfaces, APIs and error exception handling.
3. Using API to solve real world problems.

UNIT- I

Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Concepts, Benefits of Object Oriented Development.

Java Programming Fundamentals: History of Java, Java buzzwords, data types, variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT- II

Inheritance: Inheritance concept, benefits of inheritance, Super classes and Sub classes, Member access rules, Inheritance hierarchies, super uses, preventing inheritance: final classes and methods. Polymorphism - dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Interfaces: Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages

UNIT- III

Exception handling: Dealing with errors, benefits of exception handling, the classification of exceptions - exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes

Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads

UNIT- IV

Collections: Overview of Java Collection frame work, Commonly used Collection classes – ArrayList, LinkedList, HashSet, HashMap, TreeMap, Collection Interfaces – Collection, Set, List, Map, Legacy Collection classes – Vector, Hashtable, Stack, Dictionary(abstract), Enumeration interface, Iteration over Collections – Iterator interface, ListIterator interface.

Other Utility classes: String Tokenizer, java.util. Files – streams - byte streams, character streams, text Input/output, binary input/output, random access file operations, File management using File class, java.io. , serialization

UNIT- V

GUI Programming with java: The AWT class hierarchy, Introduction to Swing, Swing vs. AWT, MVC architecture, AWT Classes.

AWT Controls: Components, container, panel, window, frames, canvas, Font class, Color class and Graphics, Layout Managers, Menu bars and Menus, Dialog Boxes, FileDialog.

Event Handling: Handling mouse and keyboard events, Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces. Examples: handling a button click, handling mouse and keyboard events, Adapter classes.

Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, Developing applets and testing, passing parameters to applets, applet security issues.

Suggested Reading:

1. Herbert Scheldt, “The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem Solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th Edition, McGraw Hill Publishing, 2010.
4. H. M. Dietel and P. J. Dietel, Java How to Program, Sixth Edition, Pearson Education / PHI.

PC 405 IT

DATA COMMUNICATIONS

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objectives:

1. To understand the basics of data transmission, transmission media, data communications system and its components.
2. To describe various encoding and modulation schemes, various data link protocols for flow control, error detection and correction.
3. To understand different types of multiplexing, spread spectrum techniques, Ethernet, services of WLANs and Bluetooth.

UNIT-I

Introduction: Communication model and Modulation Techniques (AM, FM and PM), Data Communication networking, Protocols and Architecture, Standards.

Data Transmission: Concepts and Terminology, Analog and Digital Transmission, Transmission Impairments, Transmission media.

Data Encoding: Digital Data Digital Signals, Digital Data-Analog Signals, Analog Data- Digital Signals, Analog Data-Analog Signals.

UNIT-II

Data Communication Interface: Asynchronous and Synchronous Transmission, Line Configuration, Interfacing.

Data Link Control: Flow Control, Error Detection, Error Control, HDLC, Other Data link Control Protocols, Performance Issues.

UNIT - III

Multiplexing & Switching: Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. Asymmetric Digital Subscriber Line, xDSL. Circuit Switching, Packet Switching & Frame Relay. ATM : Architecture, Logical Connection, ATM Cells, Transmission of ATM cells.

UNIT -IV

Ethernets: Traditional Ethernet Topologies and Transmission Media, LAN protocol architecture, MAC sub layer, CSMA/CD, Physical Layer, Bridged, Switched and Full Duplex Ethernets. Fast Ethernet: MAC sub Layer, Physical layer, Gigabit Ethernet: MAC sub Layer, Physical Layer

UNIT –V

Cellular Wireless Networks: Principles of Cellular Networks, First Generation Analog, Second Generation CDMA and Third Generation Systems.

Wireless LANs: Overview, Wireless LAN Technology, IEEE 802.11 Architecture and Services, IEEE 802.11 Medium Access Control, IEEE 802.11 Physical Layer.

Bluetooth & Zigbee: Architecture, Layers and Protocols.

Suggested Reading:

1. William Stallings, “Data and Computer Communication”, 8th Edition, Pearson Education, Asia-2004.
2. Behrouz A. Forouzan, “Data Communications and Networking”, 4th Edition, Tata McGraw Hill, 2006.
3. Simon Haykins “Communication Systems”, 2nd Edition, John Wiley & Sons
4. Drew Gislason “Zigbee Wireless Networking” Elsevier Published: August 2008

MC 411 BM MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	70 Marks
Sessionals(CIE):	30 Marks

Course Objective:

1. To provide the analytical tools and managerial insights that are essential for the solution of those business problems that have significant consequences for the firm and society.

Unit I

Meaning and Nature of Managerial Economics: Managerial Economics its usefulness to Engineers, Fundamental Concepts of Managerial Economics, Scarcity, Marginalism, Equi-marginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

Unit II

Consumer Behaviour: Law of Demand, Determinants, Kinds; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply, Concept of Equilibrium. (Theory questions and small numerical problems can be asked).

Unit III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price – Output determination under Perfect Competition and Monopoly (theory and problems can be asked).

Unit IV

Capital Management: Its significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

Unit V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts Trial Balance, concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

Suggested Reading:

1. Mehta P.L., “*Managerial Economics – Analysis, Problems and Cases*”, Sulthan Chand & Son’s Educational publishers, 2011.
2. Maheswari S.N. “*Introduction to Accountancy*”, Vikas Publishing House, 2005.
3. Panday I.M. “*Financial Management*”, Vikas Publishing House, 2009.

PC 431 IT

MICROPROCESSOR LAB

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

1. To become familiar with the architecture and Instruction set of Intel 8085 microprocessor.
2. To provide practical hands on experience with Assembly Language Programming.
3. To familiarize the students with interfacing of various peripheral devices with 8085 microprocessor.

List of Experiments

1. Tutorials on 8085 Programming.
2. Interfacing and programming of 8255. (E.g. traffic light controller).
3. Interfacing and programming of 8254.
4. Interfacing and programming of 8279.
5. A/D and D/A converter interface.
6. Stepper motor interface.
7. Display interface.

Note: Adequate number of programs covering all the instructions of 8085 instruction set should be done on the 8085 microprocessor trainer kit

PC 432 IT

JAVA LAB

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination(SEE):	50 Marks
Sessionals(CIE):	25 Marks

Course Objectives:

1. To build software development skills using java programming for real world applications.
2. To implement frontend and backend of an application
3. To implement classical problems using java programming.

List of Experiments

- 1) Write a Java program to illustrate the concept of class with method overloading
- 2) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java. util)
- 3) Write a Java program to illustrate the concept of Single level and Multi level Inheritance.
- 4) Write a Java program to demonstrate the Interfaces & Abstract Classes.
- 5) Write a Java program to implement the concept of exception handling.
- 6) Write a Java program to illustrate the concept of threading using Thread Class and runnable Interface.
- 7) Write a Java program to illustrate the concept of Thread synchronization.
- 8) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
- 9) Write a Java program to illustrate collection classes like Array List, LinkedList, Tree map and Hash map.
- 10) Write a Java program to illustrate Legacy classes like Vector, Hashtable, Dictionary & Enumeration interface
- 11) Write a Java program to implement iteration over Collection using Iterator interface and ListIterator interface
- 12) Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
- 13) Write a Java program to illustrate the concept of I/O Streams
- 14) Write a Java program to implement serialization concept
- 15) Write a Java applet program to implement Color and Graphics class
- 16) Write a Java applet program to implement AWT classes like Label, TextField, Checkbox, CheckboxGroup, Button, TextAreaetc
- 17) Write a Java applet program for handling mouse & key events
- 18) Write a Java applet program to implement Adapter classes
- 19) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

PW 433 IT

MINI PROJECT - II

Instruction:	4 Periods per week
Duration of University Examination:	3 Hours
University Examination (SEE):	50 Marks
Sessionals (CIE):	25 Marks

Course Objectives:

1. To develop capability to analyse and solve real world problems with an emphasis on applying/integrating knowledge acquired.
2. To take responsibility of the end product.

The Students are required to take one of the projects listed in the suggested readings or assigned by the teacher, implement and submit the report. The project reports should be evaluated.

SCHEME OF INSTRUCTION
MCA (MASTER OF COMPUTER APPLICATIONS)
Proposed scheme with effect from the academic year 2017-2018
Semester -III

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1.	PC301IT	Software Engineering	3	1	0	4	30	70	3
2.	PC302IT	Database Management Systems	3	1	0	4	30	70	3
3.	P3303IT	Design and Analysis of Algorithms	3	1	0	4	30	70	3
4.	PC304IT	Operating Systems	3	1	0	4	30	70	3
5.	PC305CM	Operations Research	3	1	0	4	30	70	3
6.	OE#	Open Elective-I	3	0	0	3	30	70	3
Practicals									
7.	PC351IT	Programming Lab V (DBMS Lab)	0	0	3	3	25	50	2
8.	PC352IT	Programming Lab VI (OS Lab)	0	0	3	3	25	50	2
Total			18	5	06	29	230	520	22

Open Elective-I:

1. OE301BM Organizational Behavior
2. OE302BM Professional Ethics
3. OE303LA Intellectual Property Rights and Cyber Laws
4. OE304BT Environmental Science

SCHEME OF INSTRUCTION
MCA (MASTER OF COMPUTER APPLICATIONS)
Proposed scheme with effect from the academic year 2017-2018
Semester - IV

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1.	PC401CS	Data Mining	3	1	0	4	30	70	3
2.	PC402CS	Computer Networks	3	0	0	3	30	70	3
3.	PC403CS	Unix Programming	3	0	0	3	30	70	3
4.	PC404CS	Web Programming	3	0	0	3	30	70	3
5.	PC405CS	Distributed Systems	3	1	0	4	30	70	3
6.	# PE – I	Professional Elective-I	3	0	0	3	30	70	3
Practicals									
7.	PC451CS	Unix Programming Lab	0	0	3	3	25	50	2
8.	PC452CS	Web Programming Lab	0	0	3	3	25	50	2
9.	ITP1	Mini Project	0	0	3	3	25	50	2
Total			21	02	09	32	255	570	24

Professional Elective- I:

1. PE406CS Artificial Intelligence
2. PE407CS Distributed Databases
3. PE408CS Information Retrieval Systems
4. PE409CS Theory of Computation

PC301IT

SOFTWARE ENGINEERING

Credits: 3

Instruction: (3L +1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

The software Problem: Cost, Schedule and Quality, Scale and change,

Software Processes: - Process and project, Component Software Processes, Software Development Process Models, Project management Process.

UNIT-II

Software Requirements Analysis and Specification: Value of a good SRS, Requirements Process, Requirements Specification, Functional Specification with Use Cases, Other approaches for analysis.

Software Architecture: Role of Software Architecture Views, Component and connector view, Architectural styles for C & C view, Documenting Architecture Design, Evaluating Architectures.

UNIT-III

Planning a Software Project: Effort Estimation, Project Schedule and staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling. **Design:** Design concepts, Function oriented Design, Object Oriented Design, Detailed Design, Verification, Metrics.

UNIT-IV

Coding and Unit Testing: Programming Principles and Guidelines, Incrementally developing code, managing evolving code, unit testing, code inspection, Metrics. **Testing:** Testing Concepts, Testing Process, Black Box testing, White box testing, Metrics.

UNIT-V

Maintenance and Re-engineering: Software Maintenance, supportability, Reengineering, Business process Reengineering, Software reengineering, Reverse engineering; Restructuring, Forward engineering, Economics of Reengineering.

Software Process Improvement: Introduction, SPI process, CMMI, PCMM, Other SPI Frameworks, SPI return on investment, SPI Trends.

Suggested Reading:

1. Pankaj Jalote, "*Software Engineering- A Precise Approach*", Wiley India, 2010.
2. Roger. S.Pressman , "*Software Engineering - A Practitioner's Approach*", 7th Edition, McGraw Hill Higher Education, 2010.
3. Deepak Jain, "*Software Engineering*", Oxford University Press, 2008.
4. Rajib Mall, "*Fundamentals of Software Engineering*", 4th Edition, PHI Learning, 2014.
5. Ian Sommerville, "*Software Engineering*", 10th Edition, Addison Wesley, 2015.

PC302IT

DATABASE MANAGEMENT SYSTEMS

Credits: 3

*Instruction: (3L+ 1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT-I

Introduction to DBMS and ER Model: File Systems versus DBMS, Advantages of DBMS, Database Design and E-R Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

The Relational Model: Introduction to Relational Model, Integrity Constraints over Relations, Logical Database Design (ER to Relational), Introduction to Views, Destroying / Altering Tables & Views.

Schema Refinement and Normal Forms: Schema Refinement, Functional Dependencies, Normal Forms, Normalization, Schema Refinement in Database Design.

UNIT-II

Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational Calculus, Expressive Power of Algebra and Calculus.

SQL: Queries, Constraints, Triggers: The Form of Basic SQL Query, Set Operators, Nested Queries, Aggregate Operators, Null Values, Triggers and Active Databases, Designing Active Databases, Accessing Databases from Applications using Embedded SQL, Cursors, Dynamic SQL.

UNIT-III

Overview of Storage and Indexing: File Organizations and Indexing, Index Data Structures, Comparison of File Organizations.

Tree-Structured Indexing: Indexed Sequential Access Method (ISAM), B+ Trees, Search, Insert Delete, B+ Trees in Practice.

Hash-Based Indexing: Static Hashing, Extendible Hashing, Linear Hashing, Extendible versus Linear Hashing.

UNIT-IV

Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control.

Concurrency Control: 2PL, Serializability, and Recoverability, Introduction to Lock Management, Dealing with Deadlock, Specialized Locking Techniques, Concurrency Control without Locking.

UNIT-V

Crash Recovery: Introduction to ARIES, The Log, Other Recovery Related Structures, The WAL, Checkpointing, Recovering from a System Crash, Media Recovery.

Security and Authorization: Introduction to Database Security, Access Control, Discretionary Access Control, Mandatory Access Control, Additional Issues related to Security.

Suggested Reading:

1. Raghu Ramakrishnan, Johannes Gehrke, "*Database Management Systems*", 3rd Edition, McGraw Hill, 2003.
2. Abraham Silberschatz, Henry F Korth, S Sudharshan, "*Database System Concepts*", 6th Edition, McGraw-Hill International Edition, 2011
3. Peter Rob, Carlos Coronel, "*Database System Concepts*", Cengage Learning, 2008
4. Ramez Elmasri, Durvasul VLN Somayajulu, Shamkant B Navathe, Shyam K Gupta, "*Fundamentals of Database Systems*", 6th Edition, Addison Wesley, 2011.

PC303IT

DESIGN AND ANALYSIS OF ALGORITHMS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT I

Introduction to Algorithms: Algorithm Specification, Performance Analysis, Randomized Algorithms. **Elementary Data Structures:** Stacks and Queues, Trees, Dictionaries, Priority Queues, Sets and Disjoint Set Union, Graphs.

UNIT II

Divide and Conquer: Binary Search, Finding the Maximum and Minimum, Merge Sort; Quick Sort, Selection, Strassen's Matrix Multiplication, Convex Hull. **The Greedy Method:** Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees, Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT III

Dynamic Programming: General Method, Multistage Graphs, All-Pairs Shortest Paths, Single-Source Shortest Paths, Optimal Binary Search Trees, 0/1 Knapsack, Reliability Design, The Traveling Salesperson Problem. **Basic Traversal and Search Techniques:** Techniques for Binary Trees, Techniques for Graphs, Connected Components and Spanning Trees, Biconnected Components and DFS.

UNIT IV

Back Tracking: General Method, 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack Problem. **Branch-Bound:** The Method, 0/1 Knapsack Problem, Traveling Sales Person.

UNIT-V

NP-Hard and NP-Complete Problems: Basic Concepts, Cook's Theorem, NP-Hard. Graph Problems, NP-Hard Scheduling Problems, NP-Hard Code Generation, Some Simplified NP-Hard Problems.

Suggested Reading:

1. E Horowitz, S Sahni, S Rajasekaran, "*Fundamentals of Computer Algorithms*", Second Edition, Universities Press, 2007.
2. R. Pannerselvam, "*Design and Analysis of Algorithms*", PHI, 2007.
3. Hari Mohan Pandey, "*Design, Analysis and Algorithm*", University Science Press, 2009.
4. TH Cormen, CE Leiserson, RL Rivert, C Stein, "*Introduction to Algorithms*", Third Edition, PHI, 2010.

PC304IT

OPERATING SYSTEMS

Credits: 3

*Instruction: (3L+ 1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT I

Introduction to Operating Systems: OS structure and strategies, Process concept, Interprocess communication, Threads, Multithreaded Programming. **Process Scheduling:** Scheduling Criteria, Scheduling Algorithms, Multi Processor scheduling, Thread Scheduling.

UNIT II

Memory Management: Swapping, Contiguous allocation, Paging, Static and dynamic partition, Demand paging, Page replacement Algorithms, Thrashing, Segmentation, Segmentation with Paging.

File System Interface: File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, and Protection.

File System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, and Free Space management, Efficiency and Performance, Recovery.

UNIT III

Process Synchronization: Critical Section Problem, Semaphores, Monitors.

Deadlocks: Necessary conditions, Resource Allocation Graph, Methods for handling deadlocks, preventions, avoidance, detection and recovery.

Protection: Goal, domain of protection, access matrix.

UNIT IV

Device Management: Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID structure and Storage Implementation.

I/O System: I/O hardware, Application TO Interface, Kernel I/O Subsystem, Transforming I/O request to hardware operation, STREAM.

UNIT V

Case Studies: Linux System: Design Principles, Kernel Modules, Process Management, Scheduling Memory Management, File Systems, Input and Output, Inter-Process Communication, Network Structure, Security. **Windows XP:** General Architecture. The NT Kernel, The NT Executive.

Suggested Reading:

1. Abraham Silberschatz, Peter B Galvin, Greg Gagne, "*Operating System Concepts*", 9th Edition, Wiley India, 2016.
2. Andres S Tanenbaum, "*Modern Operating Systems*", 4th Edition, PHI, 2016.
3. Robert Love, "*Linux Kernel Development*", Pearson Education, 2004.
4. William Stallings, "*Operating Systems*", 7th Edition, PHI, 2012.

PC305CM

OPERATIONS RESEARCH

Credits: 3

*Instruction: (3L+ 1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT I

Linear Programming: Introduction, Concept of Linear Programming Model, Development of LP models, Graphical Method, Linear Programming Methods, Special cases of Linear Programming, Duality, Sensitivity Analysis.

UNIT II

Transportation Problem: Introduction, Mathematical Model for Transportation Problem, Types of Transportation Problem, Methods to solve Transportation Problem, Transshipment Model.

UNIT III

Assignment Problem: Introduction, Zero-One Programming Model, Types of Assignment Problem, Hungarian Method, Branch-and-Bound Technique for Assignment Problem.

Integer Programming: Introduction, Integer Programming Formulations, The Cutting-Plane Algorithm, Branch-and-Bound Technique, Zero-One Implicit Enumeration Algorithm.

UNIT IV

Dynamic Programming: Introduction, Applications of Dynamic Programming, Solution of Linear Programming Problem through Dynamic Programming.

UNIT V

Game Theory: Introduction, Game with Pure Strategies, Game with Mixed Strategies, Dominance Property, Graphical Method for $2 \times n$ or $m \times 2$ Games, Linear Programming Approach for Game Theory.

Suggested Reading:

1. Pannarselvam, "*Operations Research*", 3rd Edition, PHI, 2009.
2. Prem Kumar Gupta, DS Hira, "*Problems in Operations Research*", S. Chand, 2010.
3. Rathindra P Sen, "*Operations Research - Algorithm and Application*", PHI, 2010.
4. JK Sharma, "*Operations Research*", Fourth Edition, MacMillan, 2009.

PC351IT

PROGRAMMING LAB – V

(DATABASE MANAGEMENT SYSTEMS LAB)

Credits: 2

Instruction: (3 P) hrs per week

Duration of SEE: 3 hours

CIE: 25 marks

SEE: 50 marks

I. SQLIPL- SQL:

1. Creation of database (exercising the commands for creation)
2. Simple to complex condition query creation using SQL plus
3. Demonstration of blocks, cursors & database triggers.

II. Forms / Reports :

4. Creation of forms for the case study assigned.
5. Creation of Reports based on different queries.
6. Creating password and security features for applications.
7. Usage of file locking and table locking facilities in applications.
8. Creation of Small full fledged database application spreading over to 3 sessions.

Note :

- (i) Use Case Studies as Library Information Studies, Pay roll System, Bank Information System, Reservation System, Inventory System, etc.
- (ii) The creation of Sample database, for the purpose of the experiments is expected to be decided by the instructor based on the case study assigned to the students.
- (iii) Oracle DBMS package should be used to carry the Lab experiments.

PC352IT

PROGRAMMING LAB – VI

(OPERATING SYSTEMS LAB)

Credits: 2

Instruction: (3 P) hrs per week

CIE: 25 marks

Duration of SEE: 3 hours

SEE: 50 marks

1. Printing file flags for specified descriptor.
2. Print type of file for each command line arguments.
3. Recursively descends a director hierarchy counting file types.
4. Program using process related system calls.
5. Programs to create threads.
6. Program using Signals.
7. Echo Server-using pipes.
8. Echo Server-using messages.
9. Producer& Consumer Problem using Semaphores and Shared Memory.
10. Producer & Consumer Problem using message passing.
11. Readers and Writers Problem using message passing.
12. Dining Philosopher's problem using semaphores.
13. Program using File Locking.
14. Understanding and submitting and assignment on RC scripts.
15. Programs using shell script

OE301BM

ORGANIZATIONAL BEHAVIOR

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT I

Management Process and Functions, Scientific and Modern Management, 3D Model of Managerial Behavior - MBO - MBWA - Line and Staff - The Peter's Principle - Parkinson's Law - Approaches to Organisation Structure-Management - Classical, Human Relations, Systems and Contingency Approaches, Hawthorne's Experiments - Human Engineering.

UNIT II

Decision Making and Negotiations: Approaches to Decision making - Rational, Behavioral, Practical, and Personal Approaches - Open and Closed Models of Decision Making, Types and steps in planning, Authority, Responsibility, Centralisation, Decentralisation and Recentralisation, Bureaucracy.

UNIT III

Psychological contract - Personality Traits, Big 5 personality traits, MBTI inventory, the Process of Perception - Perceptual distortions and errors, Kelly's personal construct Theory, Motivation-Content Theories: Maslow, Alderfer, Herzberg, McClelland. Process Theories: Vroom, Potter and Lawler, Equity Theory - Goal Theory - Attribution Theory.

UNIT IV

Models of Organization Behaviour - Autocratic, Custodial, Supportive, Collegial and System Models, Transactional Analysis, Johari Window. Group Dynamics: Typology of Groups - Conflicts in groups - The nature, of conflict - Reactions to conflict - A model of conflict. Trait and Behavioral Approaches to Leadership, Managerial Grid, Path-Goal Theory, Vroom's Decision Tree Approach to Leadership - Hersey and Blanchard Model.

UNIT V

Organization Design, Organization culture and Organisation climate, Stress Management and Counseling, Management of change and Organisation development. Communication - Emerging aspects of OB.

Suggested Reading:

1. Harold Koontz and Heinz Weihrich, *Essentials of Management*, 9th Edition, McGraw Hill Education, 2015.
2. Curtis W. Cook and Phillip L. Hunsaker, *Management and Organisational Behaviour*, 3rd Edition, McGraw-Hill, 2010.

3. Robbins & Judge, *Organisational Behaviour*, Prentice Hall of Indi, 2010.
4. Gregory Moorhead and Ricky W. Griffin, *Organisational Behaviour*, 2010
5. VSP Rao, V. Harikrishna, *Management - Text and Cases, Excel Books* ,2010.
6. K. Aswathappa, *Organisational Behaviour - Text, Cases and Games*, Himalaya Publishing House, 2010.
7. Udai Pareek, *Understanding Organisational Behaviour*, Oxford University Press,2010.
8. Lauriel J Mullins, *Management & Organisational Behaviour*, Pearson, 2010.
9. Robin Finchem and Peter Rhodes, *Principles of Organisational Behaviour*, Oxford University Press, 2010.
10. B.R. Virmani, *Managing People in Organisations*, Response Books, 2010.

OE302BM

PROFESSIONAL ETHICS

Credits: 3

*Instruction: (3L+ 1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT-I

Development of Legal Profession in India — Advocates Act, 1961 — Right to Practice — a right or privilege? -- Constitutional guarantee under Article 19(1) (g) and its scope — Enrolment and Practice — Regulation governing enrolment and practice — Practice of Law — Solicitors firm — Elements of Advocacy.

UNIT-II

Seven lamps of advocacy — Advocates duties towards public, clients, court, and other advocates and legal aid ; Bar Council Code of Ethics.

UNIT-III

Disciplinary proceedings --- Professional misconduct — Disqualifications — Functions of Bar Council of India/State Bar Councils in dealing with the disciplinary proceedings — Disciplinary Committees -- Powers and functions - Disqualification and removal from rolls.

UNIT-IV

Accountancy for Lawyers - Nature and functions of accounting — Important branches of accounting — Accounting and Law – Bar - Bench Relations.

UNIT- V

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Suggested Reading:

1. Myneni S.R, *Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation*, Asia Law House, Hyderabad.
2. Gupta S.P, *Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation*, Asia Law House, Hyderabad.
3. Kailash Rai, *Professional Ethics, Accountancy for Lawyers and Bench-Bar Relation*, Allahabad Law Agency.
4. Siroh, *Professional Ethics*, Central Law Publications, Allahabad.
5. Ramachandra Jha, *Selected Judgements on Professional Ethics*, Bar Council of India Trust.

2002.

6. Dr. G.B. Reddy, *Practical Advocacy of Law*, 2nd Ed, Gogia Law agency, Hyderabad, 2005.

OE303LA INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Meaning, Nature, Classification and protection of Intellectual Property — The main forms of Intellectual Property — Copyright, Trademarks, Patents, Designs (Industrial and Layout) -- Geographical Indications - Plant Varieties Protection and Biotechnology

UNIT-II

Introduction to the leading International instruments concerning Intellectual Property Rights — The Berne Convention — Universal Copyright Convention — The Paris Union — Patent Co-operation Treaty -- The World Intellectual Property Organization (WIPO) and the UNEESCO, International Trade Agreements concerning IPR — WTO — TRIPS.

UNIT-III

Select aspects of the Law of Copyright in India--- The Copy Right Act,1957 - Historical evolution — Meaning of copyright — Copyright in literary, dramatic and musical works, computer programmes and cinematograph films — Neighbouring rights — Rights of performers and broadcasters, etc. — Ownership and Assignment of copyright — Author's special rights — Notion of infringement — Criteria of infringement -- Infringement of copyright in films, literary and dramatic works — Authorities under the Act — Remedies for infringement of copyright.

UNIT-IV

Intellectual Property in Trademarks and the rationale of their protection - The Trade Marks Act. 1999 —Definition of Trademarks — Distinction between Trademark and Property Mark - Registration — Passing off — Infringement of Trademark — Criteria of Infringement — Remedies. The Designs Act, 2000 -- Definition and characteristics of Design — Law in India — Protection and rights of design holders -- Copyright in design — Registration — Remedies for infringement.

UNIT-V

Patents — Concept of Patent — Historical overview of the Patents Law in India — Patentable Inventions —Kinds of Patents — Procedure for obtaining patent — The Patents Act, 1970 — Rights and obligations of a patentee — Term of patent protection — Use and exercise of rights — Exclusive Marketing Rights — Right to Secrecy — The notion of 'abuse' of patent rights — Infringement of patent rights and remedies available.

Suggested Reading:

1. P. Narayanan, *Patent Law*, Eastern Law House, 1995.
2. Roy Chowdhary, S.K. & Other, *Law of Trademark, Copyrights, Patents and Designs*, Kamal Law House, 1999.
3. Dr. G.B. Reddy, *Intellectual Property Rights and the Law*, 5th Edition, Gogia Law Agency, 2005.
4. John Holyoak and Paul Torremans, *Intellectual Property Law*, Oxford University Press, 8th Edition, 2016.
5. B.L. Wadhera, *Intellectual Property Law*, 2nd Edition, Universal Publishers, 2000.
6. W.R. Cornish, *Intellectual Property Law*, 3rd Edition, Universal Publishers, 2001.

OE304BT

ENVIRONMENTAL SCIENCE

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Environmental Studies: Introduction - Definition, Scope and Importance - Basic principle of ecosystem functioning - Concept of ecosystem, structure and functioning of ecosystem, introduction and characteristic features, structures and functions, different ecosystems.

Biodiversity and its conservation: Introduction - Bio-geographical classification of India. Value of biodiversity - consumptive and predictive use, social, ethical and optional values. Biodiversity - Global, National and local levels. Hot spots of biodiversity - Threats to biodiversity - Endangered and endemic species of India - Conservation of biodiversity - In-situ and Ex-situ conservant.

UNIT-II

Environmental and Natural Resources: Forest resources - Use and over-exploitation, Deforestation, Timber extraction, Mining and dams - their effects on forests and tribal' people. Water resources - Use and over-utilization of surface and ground water, floods, droughts, conflicts over water, dams - effects of extracting and using mineral resources. Food resources - World food problems - change caused by agricultural and overgrazing, effects of modern agricultural fertilizer pesticide problems, water logging and salinity.

Environmental Valuation: Welfare measure and environmental values, definition and classification of environmental values, valuation methods.

Environmental Economics: Economic approach to environmental preservation and conservation, property rights and externalities, management of natural resources.

UNIT-III

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution.

Environmental Problems in India: Effects of human activities on the quality of life, Water and River, Ground water, Wasteland reclamation.

UNIT-IV

Regional and Sectoral Issues: Urbanization, Agro-forestry, Dry lands, Goods and services, Mountain development, River basin water resources management. sustainable tourism, and Costal zone management.

Environment and Development: The economy and environment interaction, State of the Environment - Economics of development; Preservation and conservation.

Sustainability: Theory and Practice, Equitable use of resources for sustainable life styles - Role of an individual in prevention of pollution.

Human Population and the Environment: Population growth and environment - Human Rights.

UNIT-V

Social Issues and the Environment: Sustainable Development - Resettlement and rehabilitation of people and its problems and concerns.

Environmental ethics: Issues and possible solutions-Consumerism and waste products - Public awareness.

Sustainable resources management.

Design of Environmental Policy -- Direct regulation by Government - Command and control instrumentation.

Suggested Reading:

1. B. Sudhakara Reddy, T. Sivaji Rao, U. Tataji & K. Purushottam Reddy, *An Introduction to Environmental Studies*, Maruti Publications.
2. C.Manohar Chary and P.Jayaram Reddy, *Principles of Environmental Studies*, B.S. Publications, Hyderabad.
- 3.Y.Anjaneyulu, *Introduction to Environmental Science*, B.S. Publications, Hyderabad.
4. P.D. Sharma, *Ecology and Environment*, Rastogi Publications.

SCHEME OF INSTRUCTION
MCA (MASTER OF COMPUTER APPLICATIONS)
Proposed scheme with effect from the academic year 2017-2018

Semester - IV

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
Theory									
1.	PC401IT	Data Mining	3	1	0	4	30	70	3
2.	PC402IT	Computer Networks	3	0	0	4	30	70	3
3.	PC403IT	Unix Programming	3	0	0	4	30	70	3
4.	PC404IT	Web Programming	3	0	0	4	30	70	3
5.	PC405IT	Distributed Systems	3	1	0	4	30	70	3
6.	# PE – I	Professional Elective-I	3	0	0	3	30	70	3
Practicals									
7.	PC451IT	Unix Programming Lab	0	0	3	3	25	50	2
8.	PC452IT	Web Programming Lab	0	0	3	3	25	50	2
9.	ITP1	Mini Project -I	0	0	3	3	25	50	2
Total			21	02	09	32	255	570	24

Professional Elective- I:

1. PE406CS Artificial Intelligence
2. PE407CS Distributed Databases
3. PE408CS Information Retrieval Systems
4. PE409CS Theory of Computation

PC401IT

DATA MINING

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Introduction: Challenges – Origins of Data Mining and Data Mining Tasks. Data: Types of Data – Data Quality – Data Preprocessing – Measures of Similarity and Dissimilarity – OLAP and Multidimensional Data Analysis

UNIT-II

Classification: Preliminaries – General approach to solving a classification problem – Decision tree induction – Model overfitting – Evaluating the performance of a classifier – Methods of comparing classifiers - Rule-based classifier

UNIT-III

Classification: Nearest-Neighbor classifiers – Bayesian classifiers – Artificial Neural Networks – Support vector machine – Ensemble methods – Class imbalance problem – Multiclass problem

UNIT-IV

Association Analysis: Problem definition – Frequent item set generation – Rule generation – Compact representation of frequent item sets – Alternative methods for generating frequent item sets – FP-Growth Algorithm – Evaluation of association patterns – Effect of Skewed support distribution – Handling categorical attributes – Handling continuous attributes – Handling a concept hierarchy

UNIT-V

Cluster Analysis: Overview – K-means – Agglomerative hierarchical clustering – DBSCAN – Cluster evaluation – Characteristics of Data, Clusters, and Clustering Algorithms

Suggested Reading:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining*, Pearson Education, 2008.
2. K.P.Soman, Shyam Diwakar, V.Ajay, *Insight into Data Mining Theory and Practice*, PHI, 2010.
3. Arun K Pujari, *Data Mining Techniques*, University Press, 2nd Edn, 2009.
4. Vikram Pudi P. Radha Krishna, *Data Mining*, Oxford University Press, 1st Edition 2009
Galit S, Nitin RP, Peter C Bruce. *Data Mining for Business Intelligence*. Wiley India Edition, 2007.

PC402IT**COMPUTER NETWORKS*****Credits: 3***

Instruction: (3L) hrs per week
CIE: 30 marks

Duration of SEE: 3 hours
SEE: 70 marks

UNIT-I

Data Communications : Components - Direction of Data flow - networks -Components and Categories - types of Connections - Topologies -Protocols and Standards - ISO/OSI model, TCP/IP. Transmission Media - Coaxial Cable - Fiber Optics - Line Coding - Modems - RS232 Interfacing.

UNIT II

Datalink Layer : Error detection and correction, CRC, Hamming code, Flow Control and Error control - stop and wait - go back-N ARQ - selective repeat ARQ-sliding window - HDLC.

Mac Layer : LAN - Pure and Slotted ALOHA, Ethernet IEEE 802.3 -IEEE 802.4 -IEEE 802.5, Bridges.

UNIT-III

Network Layer : Internetworks - virtual circuit and Datagram approach, Routers IP addressing, Subnetting, CIDR.

Routing - Distance Vector Routing, Link State Routing, OSPF and BGP.

UNIT-IV

Transport Layer : Services of transport layer, Multiplexing. Transmission Control Protocol (TCP) - Congestion Control, tinier management, Quality of services (QOS) and User Datagram Protocol (UDP)

UNIT-V

Application Layer : Domain Name Space (DNS) - SMTP - FTP - HTTP - WWW.

Suggested Reading:

1. Andrew S. Tanenbaum, "*Computer Networks*", Pearson Education; Fourth Edition, 2008.
2. Behrouz A. Forouzan, "*Data communication and Networking*", Tata McGraw-Hill, 2009.
3. James F. Kurose and Keith W. Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*", Pearson Education, 2006.

PC403IT

UNIX PROGRAMMING

Credits: 3

Instruction: (3L) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Unix: Introduction, commands, file system, security and file permission, regular expression and grep, shell programming, awk

UNIT-II

The Unix Model, signal, process control, daemon process. **Interprocess Communication:** Introduction, file and record locking, other unix locking techniques, pipes, FIFOs, streams and messages, namespaces, message queues, semaphores and shared memory.

UNIT-III

Socket programming, Socket address, elementary socket system calls, advanced socket system calls, reserved ports, socket options, asynchronous I/O, Input/ Output Multiplexing, out-of-band data, sockets and signals, Internet super server.

UNIT-IV

Introduction to PHP: Overview, syntactic characteristics, primitives, operations and expressions, output, control statements, arrays, functions. pattern matching, form handling files, cookies and session tracking.

UNIT-V

Python Basics, Python Objects, Numbers, Sequences: Strings, Lists, and Tuples, Mapping and Set Types, Conditionals and Loops, Files and Input/Output, Errors and Exceptions, Functions and Functional Programming, Modules, Object oriented programming.

Suggested Reading:

1. Behrouz A. Forouzan and Richard F. Gilberg, "*Unix and Shell Programming: a Text book*" Cengage learning, 2008.
2. W. Richard Stevens, "*Unix Network Programming*", Pearson Education, 2009.
3. Robert W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 2008.
4. Wesley J. Chun, "*Core Python Programming*", Prentice Hall.
5. Sumitabha Das, "*Unix concepts & Applications*", Fourth Edition, Tata McGraw hill, 2006.

PC404IT

WEB PROGRAMMING

Credits: 3

Instruction: (3L) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

HTML: Markup languages, common tags, header, text styling, linking images Formatting text, Unordered lists, nested and ordered list, Tabs-and formatting, Basic forms; Complex forms linking, Meta Tags. Dynamic HTML: Cascading style sheets in line styles, style element External Style sheet, text flow and Box model, user style sheets.

UNIT-II

Object model and collections: Object referencing, collections all, children frames, navigator object. Event model: ONCLICK, ONLOAD, Error Handling, ON ERRORS ONMUSEMOVE, ONMUSEOVER, ONMOUSEOUT, ONFOCUS, ONBLUR, ONSUBMIT. Dynamic HTML: Filters and transitions, Data binding with Tabular data control binding to IMO, TABLE, Structured graphics, Active controls.

UNIT-III

Introduction to scripting, Java Script, Data types, Arithmetic's Equality relational, assignment increment, decrement operators, Java Script Control Structures- if, if-else, while. Java Script Control Structures: For, Switch, Do/while, break. Programming modules, recursion, recursion vs iteration global functions arrays,. using arrays, Reference and reference parameters, passing arrays to functions, multiplesubscripted arrays, objects-math, string. Boolean and number.

UNIT-IV

Client side scripting with VB Script, operations, Data types and control structures, Functions, Arrays, String manipulations, classes and objects. Web Servers : Personal Web server, Internet information server, Apache Web Server, Installation of a Web Server.

UNIT-V

Active Sever Pages, Client side Scripting vs Server side Scripting, Server side Active X Component, ADO, file system objects, Session tracking, CGI and PERL5, String. Processing and Regular Expressions, Server side includes, Cookies and PERL XML Document Type Definition, XML Parsers, Using XML with HTML.

Suggested Reading:

1. Deiterl, Deitel & NIETO, "*Internet & World Wide Web - How to Program*", Pearson Education, Third Edition, 2004.
2. Steven Holzner, "*HTML Black Book - Comprehensive Problem Server*", Dream Tech Press, 2000.
3. B Sosinsky, V Hilley, "*Programming the Web - An Introduction*", MGH, 2004.

PC405IT

DISTRIBUTED SYSTEMS

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 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 versus 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 versus 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, 2010.
2. Colouris G, Dollimore Jean, Kindberg Tim, *Distributed Systems Concepts and Design*, 5th Edition Pearson Education, 2011.

PC451IT

PROGRAMMING LAB – VII

(Unix Programming Lab)

Credits: 2

*Instruction: (3 P) hrs per week
CIE: 25 marks*

*Duration of SEE: 3 hours
SEE: 50 marks*

1. Examples using Shell scripts.
2. Programming using IPC.
3. Socket programs.
4. PHP Programs using form handling using cookies.
5. Develop Python programs for the following: (Prerequisite)
 - a) Demonstrate user-defined functions
 - b) Demonstrate Control Structures
 - c) Demonstrate Caching a Template Fragment
 - d) Programs based on object oriented design.
6. Examples using IPC
7. Echo Server using TCP (Concurrent or Iterative) and UDP
8. Time of the day server
9. Talker and Listener
10. Ping routine
11. Trace route
12. Mini DNS

Note: The above experiments [7-12] have to be carried out using socket programming interface. Multi- threading has to be employed wherever it is required.

PC452IT

PROGRAMMING LAB – VIII

(Web Programming Lab)

Credits: 2

Instruction: (3 P) hrs per week

CIE: 25 marks

Duration of SEE: 3 hours

SEE: 50 marks

1. Creating HTML pages to test different Tags.
 - a) Headers
 - b) Linking Images.
 - c) Images as anchor.
 - d) Text Formatting.
 - e) HTML Table Formatting.
 - f) Ordered and Unordered lists.
2. Creation of Frames.
3. Examination result in Java Script.
4. Creation of Quiz program.
5. Usage Data and the methods of Date and Time objects.
6. Floating alerts, aligning text and setting box dimension using CSS.
7. Demonstrating object hierarchy using collection children.
8. Using HTML Events.
9. Using Transition & Filters like Flip filter, Chrome filter, Shadow filter etc.,
10. VB script classes and regular expression.
11. Installing Web Server (PWS or IIS).
12. Guest book Active Server pages.
13. Creation of Small full fledged database application using ADO spreading over to 3 sessions.

ITP1

MINI PROJECT-I

Credits: 2

Instruction: (3P) hrs per week

CIE: 25 marks

Duration of SEE: 3 hours

SEE: 50 marks

The students are required to carry out mini project that involves usage of data mining tools, various algorithms to pre process and analysis related to the data mining problems.

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

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

All the projects are to be evaluated by a monitoring committee comprising of project coordinator and the supervisor on the basis of an oral presentation, demonstration, mini project report and Viva-Voce.

PE406IT

ARTIFICIAL INTELLIGENCE

Credits: 3

*Instruction: (3L+ 1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT - 1

Introduction: History Intelligent Systems, Foundations of Artificial Intelligence, Sub areas of AI, Applications.

Problem Solving - State - Space Search and Control Strategies: Introduction, General Problem Solving Characteristics of problem, Exhaustive Searches, Heuristic Search Techniques, Iterative - Deepening A*, Constraint Satisfaction.

Game Playing, Bounded Look - ahead Strategy and use of Evaluation Functions, Alpha Beta Pruning.

UNIT – II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Table, A System in Propositional Logic, Resolution, Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT - III

Expert System and Applications: Introduction, Phases in Building Expert Systems Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and tools.

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster - Shafer Theory.

UNIT - IV

Machine - Learning Paradigms: Introduction, Machine learning System, Supervised and Unsupervised Learning, Inductive Learning, Learning Decision Trees, Deductive Learning, Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction Artificial Neural Networks, Single - Layer Feed Forward Networks, Multi - Layer Feed Forward Networks, Radial - Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks

UNIT - V

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web.

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

Suggested Reading:

1. Saroj Kaushik, *Artificial Intelligence*, Cengage Learning India, First Edition, 2011.
2. Russell, Norvig, *Artificial Intelligence: A Modern Approach*, Pearson Education, 2nd Edition, 2004.
3. Rich, Knight, Nair , *Artificial Intelligence*, Tata McGraw Hill, 3rd Edition 2009.

PE407IT

DISTRIBUTED DATABASES

Credits: 3

*Instruction: (3L+ 1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT- I

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object-Based and Semistructured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators, History of Database Systems.

UNIT-II

Relational Model: Structure of Relational Databases, Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra Operations, Null Values, Modification of the Database.

Query Processing : Overview, Measures of query cost, Selection operation, sorting, Join operation, Other operations, Evaluation of Expressions.

UNIT-III

Query Optimization : Overview, Transformation of Relational expressions, Estimating statistics of expression results, Choice of evaluation plans, Materialized views.

Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Interoperation Parallelism, Intraoperation Parallelism, Design of Parallel Systems.

UNIT-IV

Distributed Databases: Reference architecture for DDB, Types of Data Fragmentation, Distribution Transparency for Read-only applications, Distribution Transparency for Update applications, Distributed Database Access Primitives, Integrity Constraints in DDB.

Distributed Database Design: A frame work for Distributed Database Design, The design of Database fragmentation, The allocation of fragmentation.

UNIT-V

Translation of Global Queries to Fragment Queries: Equivalence transformations for queries, Transforming global queries into fragment queries, Distributed grouping and aggregate function evaluation, Parametric queries. **Optimization of Access Strategies:** Access Control Models, Database Security, A framework for query optimization, Join queries, General queries.

Suggested Reading:

1. Silberschatz A, Korth HF, Sudarshan S, *Database System Concepts*, McGraw-Hill International Edition, 5th Edition, 2006.
2. Ceri S, Pelagatti G, *Distributed Databases: Principles and Systems*, McGraw-Hill International Edition, 1984.

PE408IT

INFORMATION RETRIEVAL SYSTEMS

Credits: 3

*Instruction: (3L+ 1T) hrs per week
CIE: 30 marks*

*Duration of SEE: 3 hours
SEE: 70 marks*

UNIT-I

Introduction to Retrieval. Strategies: Vector Space model, Probabilistic Retrieval.

Strategies Language Models: Simple Term Weights, Non Binary Independence Model.

UNIT-II

Retrieval Utilities: Relevance Feedback, Clustering, N-grams, Regression Analysis, Thesauri.

UNIT-III

Retrieval Utilities: Semantic Networks, Parsing, Cross-Language Information Retrieval:
Introduction, Crossing the Language Barrier.

UNIT-IV

Efficiency: Inverted Index, Query Processing, Signature Files, Duplicate Document Detection.

UNIT - V

Integrating Structured Data and Text: A Historical Progression, Information Retrieval as a
Relational Application, Semi-Structured Search using a Relational Schema.

Distributed Information Retrieval: A Theoretical Model of Distributed Retrieval, Web Search.

Suggested Reading:

1. David A. Grossman, Ophir Frieder. *“Information Retrieval - Algorithms and Heuristics”*, Springer, 2nd Edition (Distributed by Universities Press), 2004.
2. Gerald J Kowalski, Mark T Maybury. *“Information Storage and Retrieval Systems”*, Springer, 2000
3. Soumen Chakrabarti, *“Mining the Web: Discovering Knowledge. from Hypertext Data”*, Morgan-Kaufmann Publishers, 2002.
4. Christopher D. Manning, Prabhakar Raghavan, Hinrich SchGtze, *“An Introduction to Information Retrieval”*, Cambridge University Press, Cambridge, England,-2009.

PE409IT

THEORY OF COMPUTATION

Credits: 3

Instruction: (3L+ 1T) hrs per week

Duration of SEE: 3 hours

CIE: 30 marks

SEE: 70 marks

UNIT-I

Basic concepts of Automata Theory: Alphabets, Strings and Languages, Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA) – Definition, Representation using Transition Tables and State Diagrams, Language of DFA and NFA. NFA with ϵ -transitions, Language of NFA with ϵ -transitions, Equivalence of NFA and DFA

UNIT-II

Regular Expressions and Languages: Introduction, Definition of regular expression, Kleen's Theorem, Equivalence of regular expression and Finite Automata, Pumping Lemma for regular Languages, Closure properties of Regular Languages, Decision properties of Regular Languages, Finite Automata with Output: Moore and Mealy Machine, Equivalence of Moore and Mealy Machines.

UNIT-III

Non-Regular Grammars: Definition of Grammar, Classification of Grammars, Chomosky's Hierarchy. Context Free Grammars (CFG) and Context Free Languages (CFL) - Definition, Examples, Derivation trees, Ambiguous Grammars, Simplification of Grammars, Normal forms of CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs, Pumping lemma for CFLs. Push Down Automata (PDA): Definition and Description, Language of PDA and its applications.

UNIT-IV

Turing Machines: Introduction, Basic Features of a Turing Machine, Language of a Turing Machine, Variants of Turing Machine: Multitapes, Nondeterministic Turing Machine, Universal Turing Machine. Turing Machine as Computer of Integer functions, Halting problem of Turing Machine, Church-Turing Thesis

UNIT-V

Undecidability: Introduction, Undecidable problems about Turing Machines, Rice's Theorem, Post's Correspondence problem (PCP) and Modified PCP. Tractable and Intractable Problems: P and NP, NPCComplete Problems, Introduction to recursive function theory

Suggested Reading:

1. John E. Hopcroft, Jeffrey D. Ullman, *Introduction to Automata Theory, Languages and Computation*, Narosa, 1979
2. J.E.Hopcraft, R.Motwani, and Ullman, *Introduction to Automata theory, Languages and Computation*, 2nd Edition, Pearson Education Asia, 2001.

SCHEME OF INSTRUCTION AND EXAMINATION
M.C.A IIIrd YEAR
FACULTY OF INFORMATION TECHNOLOGY

SEMESTER – I

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration In Hours	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessionals
THEORY							
1	CS 801	Information Security	4	-	3	80	20
2	CS 802	Middleware Technologies	4	-	3	80	20
3	CS 803	Object Oriented System Development	4	-	3	80	20
4		Elective – II (One of the following)	4	-	3	80	20
	CS 804	Cloud Computing					
	CS 805	Electronic Commerce					
	CS 806	Human Computer Interaction					
	CS 807	Software Reuse Techniques					
	CS 808	Soft Computing					
	CS 809	XML & Web Services					
5		Elective – II (One of the following)	4	-	3	80	20
	CS 810	Mobile Computing					
	CS 811	Software Testing					
	CS 812	System Administration					
	CS 813	Rich Internet Applications					
	CS 814	Software Project Management					
	CS 815	Research Methodology					
PRACTICALS							
1	CS 831	Programming Lab IX- OOSD Lab	-	3	3	50	25
2	CS 832	Programming Lab X- Middleware Technologies Lab	-	3	3	50	25
3	CS 833	Seminar	-	3	3	-	25
		TOTAL	20	9	-	500	175

CS 801

INFORMATION SECURITY

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 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, Quantitive 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 tolls: Intrusion detection and prevention systems, Scanning and analysis tools, Access control devices.

Cryptography: Foundations of cryptology, Cipher methods, Cryptographic 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

Suggested Reading:

1. Michel E Withman and Herbert J Mattord, Principles and Practices of Information Security, Cengage Learning, 2009.
2. Thomas R Peltier, Justin Peltier, John Blackley, Information Security Fundamentals, Auerbach Publications, 2010.
3. Detmar W Straub, Seymour Goodman, Richard L Baskerville, Information Security, Policy, Processes and Practices, PHI , 2008.
4. Mark Merkow and Jim Breithaupt, Information Security Principle and Practices, Pearson Education, 2007.

MIDDLEWARE TECHNOLOGIES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit – I

Client/Server Concepts:Client-Server,File Server, Database server, Group server, Object Server, Web server, Middleware – General middleware –Service specific middleware. Client/Server Building blocks – RPC – Messaging – Peer- to- Peer. Web Services – SOA, SOAP, WSDL, REST Services.

Unit – II

EJB Architecture: EJB – EJB Architecture – Overview of EJB software architecture – View of EJB – Conversion – Building and Deploying EJBs – Role in EJB.

Unit – III

EJB Applications: EJB Session Beans – EJB entity beans – EJB Clients – EJB Deployment Building an application with EJB.

Unit – IV

CORBA: EJB – Distributed Systems – Purpose – Exploring CORBA alternatives – Architecture overview – CORBA and networking model – CORBA object model – IDL – ORB – Building an application with CORBA.

Unit – V

COM: COM - Data types – Interfaces – Proxy and Stub – Marshalling – Implementing Server/Client – Interface Pointers – Object Creation, Invocation, Destruction – Comparison COM and CORBA – Introduction to .NET – Overview of .NET architecture – Marshalling – Remoting.

Suggested Reading:

1. Robert Orfali, Dan Harkey and Jeri Edwards, The Essential Client / Server Survival Guide, Galgotia Publications Pvt.Ltd, 2002 (Unit 1).
2. Tom Valesky, Enterprise Java Beans, Pearson Education, 2002 (Unit 2 & 3).
3. Jason Pritchard, COM and CORBA side by side, Addison Wesley, 2000 (Unit 4 & 5).
4. Jesse Liberty, Programming C#, 2nd Edition , O’ Reilly Press , 2002 (Unit5).
5. Arno Puder, Kay Romer and Frank Pilhofer, Distributed Systems Architecture , Morgan Kaufman, 2006.
6. Mowbray, Inside CORBA, Pearson Education, 2002.
7. Jeremy Rosenberger, Teach yourself CORBA in 14 days, Tec Media, 2000.

CS 803

OBJECT ORIENTED SYSTEM DEVELOPMENT

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit – I

UML Introduction : Why we model, Introducing the UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.

Advanced Structural Modeling : Advanced Classes, Advanced Relationships, Relationships, Interfaces, Types and Roles, Packages, Instances, Object Diagrams , Components.

Unit – II

Basic Behavioral Modeling: Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams.

Advanced Behavioral Modeling: Events and signals, State Machines, Processes and Threads, Times and space, State Chart Diagrams.

Unit – III

Architectural Modeling: Artifacts, Deployment Collaborations, Patterns and Frame works, Artifact diagrams, Deployment diagrams, Systems and models.

Unit – IV

Unified Software Development Process: The Unified Process, The Four Ps, A Use- Case- Driven Process, An Architecture, An Architecture – Centric Process, An Iterative and incremental Process.

Unit – V

Core Workflows: Requirements Capture , Capturing Requirements as Use Cases, Analysis, Design, Implementation, Test.

Suggested Reading:

1. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language – User Guide, (Covering UML 2.0) 2nd Edition , Pearson Education, India, 2007.
2. Ivor Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, India, 2008.

CS 708

CLLOUD COMPUTING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessionals	20 Marks

UNIT-I

Introduction to Cloud Computing: Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

UNIT-II

Virtual Machines and Virtualization of Clusters and Data Centers, Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

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

UNIT-III

Cloud computing architectures over Virtualized Data Centers: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management

UNIT-IV

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud CryptDb: Onion Encryption layers- DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE.

Trust, Reputation and Security Management.

Unit-V

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

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

Suggested Reading:

- 1) John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ". James F. Ransome, CRC Press 2009.
- 2) Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Elsevier, 2012.
- 3) Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley Publishing ©2011
- 4) Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "CryptDB: Protecting Confidentiality with encrypted Query Processing"23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
- 5) A Fully Homomorphic Encryption Scheme, Craig Gentry, September 2009.
- 6) David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.

Web resources:

<http://aws.amazon.com>

<http://code.google.com/appengine>

<http://www.buyya.com/>

CS 805

ELECTRONIC COMMERCE

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT – I

Electronic Commerce – Electronic Commerce Frame Work , Electronic Commerce and Media Convergence, Anatomy of E- Commerce appellations, Electronic Commerce Consumer applications, Electronic Commerce Organization Applications.

Consumer Oriented Electronic Commerce – Consumer- Oriented Applications, Mercantile Process Models, Mercantile Models from the Consumers’s Perspective., Mercantile Models from the Merchants’s Perspective.

UNIT – II

Electronic Payment systems – Types of Electronic Payment Systems, Digital Token – Based Electronic Payment Systems , Smart Cards Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk and Electronic Payment systems , Designing Electronic Payment Systems .

UNIT – III

Inter Organizational Commerce And EDI- Electronic Data Interchange , EDI applications in business, EDI:Legal, Security, and Privacy issues, EDI and Electronic Commerce

EDI Implementation,MIME , and Value added net works.-Standardization and EDI, EDI Software Implementation, EDI Envelope for Message Transport, Value-Added Networks, Internet-Based EDI.

Intraorganizational Electronic Commerce – Internal Information Systems, Work Flow Automation and Coordination, Customization and internal Commerce, Supply chain Management.

UNIT – IV

Corporate Digital Library – Dimensions of Internal electronic Commerce Systems, Types of Digital Documents, Issues behind Document Infrastructure, Corporate Data Warehouse

Advertising and Marketing on the Internet – Information based marketing, advertising on Internet, on-line marketing process, market research.

UNIT –V

Consumer Search and Resource Discovery – Search and Resource Discovery paradigms, Information search and Retrieval, Electronic Commerce catalogues or Directories, information filtering, Consumer-Data Interface3:Emerging Tools.

Multimedia and Digital Video – key multimedia concepts, Digital Video and Electronic Commerce, Desktop video processing, Desktop video conferencing.

Suggested Reading:

1. Ravi Kalakota & A . B. Whinstong – “ *Frontiers of Electronic Commerce*”, Pearson Education, India, 2006.
2. Daniel Minoli, Emma Minoli: ” *Web Commerce Technology Handbook*” Tata McGraw Hill 2007
3. J Christopher W, Theodore HKC, Global Electronic Commerce: Theory and Case Studies. Universities Press, 2001

CS 806

HUMAN COMPUTER INTERACTION

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT- I

Importance of the user interface. Characteristics of graphical and web user interfaces, User Interface Design Process: Knowing the client, Understanding business function, Principles of good screen design.

UNIT-II

System Menus and Navigation Schemes, Kinds of windows, Device based controls, Screen based controls, Test and Messages.

UNIT- III

Feedback, Guidance and assistance. Internationalization and accessibility, graphics, icons and images, colours, Layout windows and pages.

UNIT- IV

Interaction Design: Introduction, Goals, Usability, Conceptualization interaction: Problem space, Conceptual models, Interface metaphors, Interaction paradigms, Cognition: Conceptual frameworks for cognition. Collaboration and Communication: Social mechanism, Conceptual framework.

UNIT- V

Affective aspects, Expressive interface, User frustration, Agents, Process of interaction design, Activities characteristics, Practical issues, Life cycle models, Design: Prototyping and construction, Prototyping, conceptual design, Physical design Evaluation: Introduction, Framework, Testing and modelling users: Kinds of tests ,Doing user testing, Experiments, Predictive models.

Suggested Reading:

1. Wilbert O.Galitz, The Essential Guide to User Interface Design, Wiley Dreamtech 2002.
2. Sharp, Rogers, Preece, Interaction Design, John Wiley, 2007.
3. Andrew Sears, Julie A Jacko, Human, Computer Interaction Fundamentals, CRC Press, 2009.
4. Dan R Oslan, Human, Computer Interaction, Cengage Learning, 2010.

CS 807

SOFTWARE REUSE TECHNIQUES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Software reuse success factors, Reuse driven software engineering business, Object oriented software engineering, applications and component sub systems, use case components, object components.

UNIT-II

Design Patterns – Introduction, Creational patterns, factory, factory method, abstract factory, singleton, builder prototype.

UNIT-III

Structural Patterns- Adapters, bridge, composite, decorator, façade, flyweight, proxy.
Behavioral Patterns – Chain of responsibility, command, interpreter.

UNIT-IV

Behavioral Patterns – Iterator, mediator, memento, observer, state, strategy, template, visitor, other, design patterns- Whole part, master- slave, view handler, forwarder- receiver, client – dispatcher- server, publisher – subscriber.

UNIT-V

Architectural patterns – Layers, pipes and filters, black board, broker, model - view controller, presentation- abstraction – control, micro kernel, reflection.

Suggested Reading:

1. Ivar Jacobson, Martin Griss, Patrick Hohson – Software Reuse. Architecture, Process and Organization for Business Success, ACM Press, 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – Design Patterns- Addison, 1995, Pearson Education.
3. Frank Buschmann etc. – Pattern Oriented Software Architecture – Volume 1, Wiley 1996.
4. James W Cooper – Java Design Patterns, a tutorial, Addison 2000, Pearson Education.

CS 808

SOFT COMPUTING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Fundamentals of Neural Networks: Basic Concepts of Neural Networks, Human Brain, Model of an Artificial Neuron, Neural Network Architectures, Characteristics of Neural Networks, Learning Methods, Taxonomy of Neural Network Architectures, History of Neural Network Research, Early Neural Network Architectures, Some Application Domains.
Back Propagation Networks: Architecture of a Back Propagation Network, Back Propagation Learning, Illustration, Applications.

UNIT-II

Associative Memory: Autocorrelators, Heterocorrelators, Wang Et Al's Multiple Training Encoding Strategy, Exponential BAM, Associative Memory for Real-Coded Pattern Pairs, Applications, Recent Trends.
Adaptive Resonance Theory: Introduction, ART1, ART2, Applications, Sensitives of Ordering of Data.

UNIT-III

Fuzzy Set Theory: Fuzzy Versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations.
Fuzzy Systems: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based Systems, Defuzzification Methods, Applications.

UNIT-IV

Fundamentals of Genetic Algorithms: Genetic Algorithms: History, Basic Concepts, Creation of Offsprings, Working Principle, Encoding, Fitness Function, Reproduction.
Genetic Modeling: Inheritance Operators, Cross Over, Inversion, And Deletion, Mutation Operator, Bit-Wise Operators, Bit-Wise Operators used in GA, Generational Cycle, Convergence of Genetic Algorithms, Applications, Multi- Level Optimization, Real Life Problem, Differences and Similarities Between GA and Other Traditional Methods, Advances in GA.

UNIT-V

Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms: Hybrid Systems, Neural Networks, Fuzzy Logic, and Genetic Algorithms Hybrids, Preview of Hybrid Systems
Genetic Algorithms Based Backpropagation Networks: Ga Based Weight Determination, Applications.
Fuzzy Logic Controlled Controlled Genetic Algorithms: Soft Computing Tools, Problem Description of Optimum Design, Fuzzy Constraints, Illustrations, GA in Fuzzy Logic Controller Design, Fuzzy Logic Controller, FLC-GA Based Structural Optimization, Applications.

Suggested Reading:

1. S.Rajasekaran, G.A. Vijayalakshmi Pai, Neural Networks, fuzzy logic, and genetic algorithms - Genetic Algorithm, PHI Learning Private Limited-2010
2. S.N.Sivanandam, S.N.Deepa Wiley India , Principles of SOFT COMPUTING, Second Edition 2011.

XML AND WEB SERVICES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT- I :

Introduction : Role Of XML - XML and The Web - XML Language Basics - SOAP - Web Services - Revolutions Of XML - Service Oriented Architecture (SOA).

UNIT- II :

XML Technology : XML Technology, XML - Name Spaces - Structuring With Schemas and DTD - Presentation Techniques - Transformation - XML Infrastructure.

UNIT- III:

SOAP: Overview Of SOAP - HTTP - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns And Faults - SOAP With Attachments.

UNIT- IV:

WEB Services: Overview - Architecture - Key Technologies - UDDI - WSDL - ebXML - SOAP And Web Services In E-Com - Overview Of .NET And J2EE.

UNIT- V:

XML Security: Security Overview - Canonicalization - XML Security Framework - XML Encryption - XML Digital Signature - XKMS Structure - Guidelines For Signing XML Documents - XML In Practice.

Suggested Reading:

1. Frank. P. Coyle, XML, Web Services And The Data Revolution, Pearson Education, 2002.
2. Ramesh Nagappan , Robert Skoczylas and Rima Patel Sriganesh, Developing Java Web Services, Wiley Publishing Inc., 2004.
3. Sandeep Chatterjee, James Webber, Developing Enterprise Web Services, Pearson Education, 2004.
4. McGovern, et al., Java Web Services Architecture, Morgan Kaufmann Publishers,2005.
Gustavo A, Fabio C, Harumi K, Vijay M. Web Services: Concepts, Architectures and Applications. Springer (Universities Press), 2004

CS 810

MOBILE COMPUTING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT- I

Introduction and applications of mobile computing, Wireless transmission: Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems.

Medium Access Control, SDMA, FDMA, TDMA, CDMA, Comparisons.

UNIT- II

Telecommunication system, GSM, DECT, TDMA, TETRA, UMTS & IMT-2000.

Satellite systems: Applications, Basics, routing, localization, Handover.

Broadcast systems: Cyclic representation of data, Digital audio Broad casting, Digital video Broadcasting, Convergence of Broadcasting and mobile communication.

UNIT- III

Wireless LAN: Infrared Vs Radio Transmission, Infrastructure and Ad hoc Networks, IEEE 802.11, HIPERLAN, Bluetooth.

UNIT- IV

Mobile IP, Dynamic Host Configuration Protocol, Mobile Adhoc Networks, Mobile Transport Layer, Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks, Performance Enhancing Proxies.

UNIT- V

Operating Systems for Mobile Devices: Features of Windows CE, Palm OS, Symbian Os, Java Card support for Mobility: File systems, WWW, Wireless Application Protocol.

Suggested Reading:

1. Jochen M.Schiller, Mobile Communications, 2nd edition , Pearson Education, India 2003.
2. Hansmann, Merk, Nicklous, Stober, Principles of Mobile Computing, 2nd edition Springer International edition, 2003.
3. Dharma P. Agarwal, Qing An Zeng, Introduction to wireless and Mobile systems, 2nd edition Thomas India 2007.
4. Frank Adelstien, Sandeep K.S.Gupta, Fundamentals of Mobile and Pervasive Computing, Tata McGraw Hill, 2005.
5. Ivan Stojmenovic, Handbook of Wireless and Mobile Computing, Wiley India, 2006.

CS 811

SOFTWARE TESTING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit-I

A Mathematical Context: A Perspective on Testing, Examples

Functional Testing: Boundary Value Testing, Equivalence Class Testing, Decision Table-Based Testing, Retrospective on Functional Testing.

Unit-II

Structural Testing: Path Testing, Dataflow Testing, Retrospective on Structural Testing.

Unit-III

Integration and System Testing: Levels of Testing, Integration Testing, System Testing, Interaction Testing.

Unit-IV

Object-Oriented Testing: Issues in Object-Oriented Testing, Class Testing, Object-Oriented Integration Testing, GUI Testing, Object-Oriented System Testing.

Unit-V

Millennium Testing: Exploratory Testing, Model-Based Testing, Test-Driven Development, All Pairs Testing, Software Testing Excellence.

Suggested Reading:

1. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, 3rd Edition, CRC Press, 2007.
2. Boris Beizer, Software Testing Techniques, Dreamtech, 2009.

CS 812

SYSTEM ADMINISTRATION

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT- I

Functions of system administration, UNIX: Files, Processes Devices, file system, essential administrative tools: Grep, awk, files and directory commands, starting and shutdown process.

UNIT- II

User accounts, security, managing system resources : System performance, managing CPU usage, memory, disk I/O automating tasks with scripts.

UNIT- III

File system and Disks: Mounting, adding disks, CD-Rom devices, and backup and restore terminals modems and printers.

UNIT- IV

TCP/IP Network Management: TCP/IP networking, adding a new host, NFS/NIS, monitoring the network, E-mail, configuring and building Kernel for Linux.

UNIT- V

Windows 2003 Server: Startup, shutdown, server configuration , user accounts, managing processes, disks and file system security.

Note: First four units are related to UNIX system, Fifth unit is related to Windows 2003 Server.

Suggested Reading:

1. Aeleon Frisch, Essential System Administration, O'Reilly, 1995, Second Edition.
2. Aeleon Frisch, Essential Windows Administration, O'Reilly, 1998, First Edition.
3. Nemeth, Unix System Administration, Pearson Education, 2000.

CS 813

RICH INTERNET APPLICATIONS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Web 2.0 Folksonomies and Web 2.0, Software as a service. Multiple delivery channels (Voice – VOXML, and ANT (HTML), Social Net working.

UNIT - II

Client side programming – Overview of Java Script, Objects in Java Script, Regular expressions, Overview of XML, DTD and XML Schema, DOM and SAX Parsers,CSS,XSLT.

UNIT- III

Web Services- SOA,SOAP,WSDL,REST Services.
JSON Format- Ajax introduction, XML HTTP object comparison with I frames.

UNIT-IV

Building Rich Internet Application- Flash Player, Flex framework, MXML introduction, Action Script Introduction, working with Action Script, Flex Data binding, Common UI Components using Datagrids. Tree controls, Pop up controls etc.

UNIT-V

Mashup using Flex and Ajax. Web services in Flex. Semantic web(Web 3.0). Resource Description Frame work, use and examples, Ontologies, Web ontology language(OWL).

Suggested Reading:

1. Ivan Bayross,Web Enabled Commercial Applicaton Development using HTML, DHTML, Javascript , Perl CGI ,BPB Publications, 2007.
2. Colin Moock, Essential Actionsript 3.0 , O'Reilly publications, 2007.
3. Steven Holzner, Ajax Bible Wiley India Edition, 2007.
4. Justin Gehtland et al, A Web 2.0 Primer Pragmatic Ajax, SPD Publications, 2006.

CS 814

SOFTWARE PROJECT MANAGEMENT

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit – I

Introduction to Software Project Management, Project Evaluation and Programme Management, An Overview of Project Planning.

Unit – II

Selection of an Appropriate Project Approach, Software Effort Estimation, Activity Planning.

Unit – III

Risk Management, Resource Allocation, Monitoring & Control.

Unit – IV

Managing Contracts, Managing People in Software Environments, Working in Teams.

Unit – V

Software Quality, An Overview of PRINCE 2

Suggested Reading:

1. Bob Hughes and Mike Cotterell, Software Project Management , Tata McGraw Hill, 5th Edition, 2010.
2. Walker Royce, Software Project Management: A Unified Framework Addison Wesley, 1998.

CS 814

RESEARCH METHODOLOGY

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Research Methodology: Objectives and Motivation of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Research Methodology, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India, Benefits to the society in general.

Defining the Research Problem: Definition of Research Problem, Problem Formulation, Necessity of Defining the Problem, Technique Involved in Defining a Problem.

UNIT-II

Literature Survey: Importance of Literature Survey, Sources of Information, Assessment of Quality of Journals and Articles, Information through Internet.

Literature Review: Need of Review, Guidelines for Review, Record of Research Review

UNIT-III

Research Design: Meaning of Research Design, Need of Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Developing a Research Plan, Design of Experimental Set-up, Use of Standards and Codes.

UNIT-IV

Exploration of the data. Description and Analysis of Data. Sample Design and Sampling. Role of Statistics for Data Analysis. Functions of Statistics, Estimates of Population Parameters. Parametric V/s Non Parametric methods. Descriptive Statistics, Points of Central tendency, Measures of Variability, Measures of relationship. Inferential Statistics- Estimation, Hypothesis Testing. Use of Statistical software.

Data Analysis: Deterministic and random data, uncertainty analysis, tests for significance: Chi-square, student's 't' test. Regression modeling, direct and interaction effects. ANOVA, F-test. Time Series analysis, Autocorrelation and autoregressive modeling.

UNIT-V

Research Report Writing: Format of the Research report. Style of writing report. References / Bibliography / Webliography, Technical paper writing / Journal report writing.

Research Proposal preparation: Writing a Research Proposal and Research Report, Writing a Research Grant Proposal.

Suggested Reading:

1. C.R. Kothari; Research Methodology, Methods & Technique; New age international publishers, 2004
2. R. Ganesan; Research Methodology for Engineers; MJP Publishers; Chennai, 2011.
3. Y.P. Agarwal; Statistical Methods: Concepts, Application and Computation; Sterling Publishers Pvt Ltd, New Delhi; 2004
4. Dr. Vijay Upagade and Dr. Aravind Shende; Research Methodology; S. Chand & Company Ltd., New Delhi; 2009.
5. P. Ramdass and A Wilson Aruni; Research and Writing across the disciplines; MJP Publishers;

CS 831

PROGRAMMING LAB IX – OOSD LAB

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

Students have to perform the following OOAD steps on a given

Case Study:

- * Use Case Modeling
- * Structural Modeling
- * Behavioral Modeling
- * Architectural Modeling

The output should consists of:

- * Use case Diagrams
- * Class Diagrams
- * Sequence Diagrams
- * Collaboration Diagrams
- * State Chart Diagrams
- * Activity Diagrams
- * Deployment Diagrams
- * Component Diagrams

Students should form into groups. They should carry out the Case Study as a group activity. The lab should be carried out using a CASE Tool. Finally they should submit a report.

Students should familiarize themselves with Rational Test Suite/ WinRunner/ LoadRunner

CS 832

PROGRAMMING LAB X – MIDDLEWARE TECHNOLOGIES LAB

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

1. Create a Distributed name Server (like DNS) RMI.
2. Create a Java Bean to draw various graphical shapes and display it using or without using BDK.
3. Develop an enterprise Java Bean for student Information System.
4. Develop an enterprise Java Bean for Library operations.
5. Create and invoke Web Services.
6. Develop a component for converting the currency values using COM/.NET.
7. Develop a component for browsing CD catalogue using COM/.NET.
8. Develop a component for retrieving information from message box using DCOM/.NET.
9. Develop a middleware component for retrieving Stock Market Exchange information using CORBA.
10. Develop a middleware component for retrieving Bank balance using CORBA.

CS 833

SEMINAR

Instruction
Sessional

3 Periods per week
25 Marks

1. Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for systematic independent study of the art topics in the broad area of his/her specialization.
2. Seminar topics can be chosen by the students with the advice from the faculty members.
3. Students are the exposed to the following aspects of seminar presentations.
 - Literature survey
 - Organization of the material
 - PPT Presentation
 - Technical writing

Each student is required to

4. Submit one page of Synopsis of the seminar talk two days before for display on notice board.
5. Give 20 minutes PPT presentation, followed by 10 minutes discussion.
6. Submit a report on the seminar topic with a list of references and slides used within a week.

Seminars are to be scheduled in the 5th week of the semester.

The Sessional marks will be awarded to the students by at least 2 faculty members on the basis of an oral and written presentation as well as their involvement in the discussion.

BCA 2nd Year Syllabus & Scheme of Instruction

Faculty of Information Technology

(Effectuated from Academic Year 2017-18)

Semester wise BCA Course CBCS Credits List

S.NO	Type of Course	I SEM	II SEM	III SEM	IV SEM	V SEM	VI SEM	Total
1	GE	4	8	4	0	0	0	16
2	CC	16	12	16	26	24	17	111
3	AECC / SEC	4	4	4	0	0	0	12
	TOTAL	24	24	24	26	24	17	139

1. GE : Generic Elective
2. CC : Compulsory Course
3. AECC : Ability Enhancement Compulsory Course
4. SEC : Skill Enhancement Course
5. PC- Practical Course
6. EC- Elective Course

SCHEME OF INSTRUCTION
BCA (BACHELOR OF COMPUTER APPLICATIONS)
Proposed scheme with effect from the academic year 2017-18

SEMESTER-III

S.No	Course Code	Course Title	Category	Contact Hour/week			No. of Credits	Scheme of Exam Duration(hrs)		Scheme of Examination (Max Marks)	
				L	T	P		Univ. Exam	Sessio nals	Univ. Exam	Sessi onal
Theory											
1	BCA201	Effective Communication	SEC	3	1	0	3	3	1	70	30
2	BCA202	Environmental Science	GE	3	0	0	3	3	1	70	30
3	BCA203	Computer Organization	CC	4	1	0	4	3	1	70	30
4	BCA204	Data Structures	CC	4	0	0	4	3	1	70	30
5	BCA205	Operating System	CC	4	0	0	4	3	1	70	30
PRACTICALS											
9	BCA230	Data Structures Using C++ LAB	PC	0	0	4	2	3	2	50	25
10	BCA231	Operating Systems Lab	PC	0	0	4	2	3	2	50	25
			TOTAL	18	2	8	22			450	200

IV – SEMESTER

S.No	Course Code	Course Title	Category	Contact Hour/week			Credits	Scheme of Exam Duration(hrs)		Scheme of Examination (Max Marks)	
				L	T	P		Univ. Exam	Sessio nals	Univ. Exam	Sessi onal
Theory											
1	BCA251	Computer Networks	CC	4	0	0	4	3	1	70	30
2	BCA252	Data Base Design	CC	3	0	0	3	3	1	70	30
3	BCA253	Java Programming	CC	3	1	0	3	3	1	70	30
4	BCA254	Software Engineering	CC	3	0	0	3	3	1	70	30
5	BCA255	Web Technology	CC	3	0	0	3	3	1	70	30
PRACTICALS											
6	BCA280	Data Base Design-Lab	PC	0	0	4	2	3	2	50	25
7	BCA281	Java Programming-Lab	PC	0	0	4	2	3	2	50	25
8	BCA282	Web Technology-Lab	PC	0	0	4	2	3	2	50	25
			TOTAL	16	1	12	22			500	225

SCHEME OF INSTRUCTION
BCA (BACHELOR OF COMPUTER APPLICATIONS)
Proposed scheme with effect from the academic year 2017-18

III – SEMESTER

BCA 201 - EFFECTIVE COMMUNICATIONS

Scope: The course enables the student to improve oral-aural and written communication skills.

UNIT-I:

Objective: To improve writing skills for effective Communication.

Writing a dialogue (Introduction, asking for: information, permission)

Dialogue Writing on the basis of a short-story, newspaper report, print and or visual media. Writing advertising copy, descriptive writing.

UNIT-II:

Objective: To improve Writing Skills (at an advanced level)

Preparing a CV. application for a job, Essay Writing, Documentation based on research and database.

UNIT-III:

Objective: To improve aural skills and to improve presentation skills.

Listening for specific information, formal/informal speech, use of language in a given situation.

UNIT-IV:

Objective: To develop oral skills and to improve presentation skills.

Formal/informal speech, using language in a given situation.

UNIT-V:

Presentation skills (TUTORIAL) Group Discussion, Simulated situations.

N.B: Units III, IV & V Source Material: Print / Audio - Visual/Multi - media

Suggested Reading :

1. Spoken English (Tata McGraw Hill) (Text & Audio Cassette)
2. Strengthen Your Writing (Orient Longman)
3. Krishnaswamy & Sriraman (Macmillan), Current English for Colleges
4. Sarah Freeman (Orient Longman), Written Communication in English by
5. Ian Gordon (Macmillan), Brendan J Carroll (Macmillan), English for Colleges, Common Errors in Written English

BCA 202-Environmental Studies

UNIT-I : Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Bio geochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II: Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III: Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV: Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

UNIT-V: Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).
Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

BCA 203- COMPUTER ORGANIZATION

UNIT-I

Data Representation: Data types, Complements, Fixed and Floating Point Representation, Other binary codes and error Detection codes.

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Flip Flops, Sequential Circuits.

UNIT-II

Central Processing Unit: Instruction formats, addressing modes, Data Transfer and Manipulation, Program Control - Status bit conditions, conditional branch instructions, Program Interrupts: Types of Interrupts.

UNIT-III

Input-Output Organizations- Input-Output Interface, Asynchronous data Transfer, Modes of transfer, Direct Memory Access (DMA).

Memory Organization- Memory hierarchy, Main Memory, Cache Memory -Associative, Direct, Set Associative mapping, virtual memory.

UNIT-IV

8086 CPU Pin Diagram- Special functions of general purpose registers. Segment register, concept of pipelining, 8086 Flag register, Addressing modes of 8086

UNIT-V.

8086-Instruction formats: assembly Language Programs involving branch & Call instructions, sorting, evaluation of arithmetic expressions.

TEXT BOOKS:

1. Computer System Architecture: M.Morris Mano 3rd Edition, 2009.
2. Advanced Micro Processor and Peripherals - Hall/ A K Ray, 2009.

BCA 204 - DATA STRUCTURES

UNIT -I

Linear Lists-Data objects and Structures, The Linear List Data Structure, Array Representation of Linear Lists, Linked Representation of Linear Lists-Singly Linked List and chains, Doubly Linked List

UNIT -II

Arrays, Matrices, **Stacks:** Definitions, Operations and Applications, Array and Linked Representation of Stacks and their Applications, **Queues:** Definitions and Operations. Array and Linked Representation of Queues and their Applications.

UNIT- III

Trees: Definitions and Properties, Representation of Binary Trees, Operations. Binary Tree Traversal, Binary Search Tree, AVL Trees and Operations on AVL Trees

UNIT -IV

B-Trees- Operations on B-Trees, Applications of B-trees, **Hashing-** Hash table Representation, **Priority Queues-** Heap and its Applications,

UNIT -V

Sorting: Merge Sort, Selection Sort, heap sort, Complexity Analysis, **Searching-** Sequential Search, binary search,

Graphs: Definitions and Representation of Graphs. Graphs Search Methods and Applications

Text Books:

- 1) S Sahani, "Data Structures, Algorithms and Applications in C++", Second Edition, University Press, 2005.
- 2) D S Malik "Data Structures using C++", Thomson Learning, 2003.
- 3) Cormen Leiserson & Rivest, "Introduction to Algorithms", Prentice Hall India, 1996.
- 4). Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

BCA 205-OPERATING SYSTEMS

UNIT-I

Introduction: Definition of Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, **Operating System Structures:** Operating-System Services, System Calls, Types of System Calls. **Process:** Process Concept, Process Scheduling, Operations on Processes, Inter process Communication, **Threads:** Overview, Multi core Programming, Multithreading Models, Threading Issues. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT-II

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT-III

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Background, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Mass-Storage Structure, Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Formatting, RAID Structure

UNIT-IV

File-System Interface: File Concept, Access Methods, Directory and Disk Structure, Protection.

File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance.

I/O Systems: Overview, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.

UNIT-V

Protection: Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems.

Security: The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication.

Text book:

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts", Ninth Edition, John Wiley and Sons publication, 2013.

Suggested Reading:

1. A.Tanenbaum,"Modern Operation Systems", Third Edition, Pearson Education, 2008.
2. William Stallings, "Operating Systems", Fifth Edition, Pearson Education, 2005.
3. Ida M.Flynn, "Understanding Operating Systems", Sixth Edition, Cengage, 2011.
4. D.M.Dhamdhare,"Operating systems a concept based approach", Second Edition, McGraw-Hill, 2007.

BCA 230 - Data Structures Lab

1. Implementation of ADT Stacks (Arrays and Linked representation)
2. Infix to Postfix conversion (un parenthesized)
3. Infix to Postfix conversion (Parenthesized).
4. Evaluation of postfix expression.
5. Implementation Parenthesis Matching Application using Stack.
6. Implementation of ADT Queues. (Linear, Circular and De Queue)
7. Application of Queues (Super-market, Ticket reservation etc)
8. Implementation of ADT Linked Lists (Singly, Doubly and Circular)
9. Implementation of Linear, Binary Search.
10. Implementation of Hashing.
11. Implementation of Collision Resolution Techniques.
12. Implementation of Insertion Sort.
13. Implementation of Selection Sort.
14. Implementation of Shell Sort.
15. Implementation of Quick Sort.
16. Implementation of Merge Sort.
17. Implementation of Basic Operations on Binary Trees.
18. Implementation of Traversals on Binary Trees.
19. Implementation of Binary Search Trees.
20. Implementation of Heap Sort.
21. Implementation of Operation of AVL Trees.
22. Implementation of Red-Black Trees.
23. Implementation of Graph Search Methods.
24. Program to find the minimal Spanning tree

BCA 231 - OPERATING SYSTEM LAB

1. Introduction to Unix architecture and File system
2. Installing Linux operating system
3. Creating Users ,groups and assigning file permissions
4. Demonstrate the Basic and advanced shell commands
5. Demonstration on shell scripting
6. Shell programs to demonstrate arithmetic operations
7. Shell programs to demonstrate Loops
8. Shell programs to demonstrate control statements
9. Shell programs to demonstrate switch case
10. Shell programs to demonstrate file permissions
11. Shell programs to test the type of a file
12. Shell programs to copy a file from source to destination

BCA251 - COMPUTER NETWORKS

UNIT-I

Data Communications : Components - Direction of Data flow - networks -Components and Categories - types of Connections - Topologies -Protocols and Standards - ISO/OSI model, TCP/IP.
Transmission Media - Coaxial Cable - Fiber Optics - Line Coding - Modems - RS232 Interfacing.

UNIT II

Datalink Layer : Error detection and correction, CRC, Hamming code, Flow Control and Error control - stop and wait - go back-N ARQ - selective repeat ARQ-sliding window - HDLC.
Mac Layer : LAN - Pure and Slotted ALOHA, Ethernet IEEE 802.3 -IEEE 802.4 -IEEE 802.5, Bridges.

UNIT-III

Network Layer : Internetworks - virtual circuit and Datagram approach, Routers IP addressing, Subnetting, CIDR.
Routing - Distance Vector Routing, Link State Routing, OSPF and BGP.

UNIT-IV

Transport Layer : Services of transport layer, Multiplexing.
Transmission Control Protocol (TCP) - Congestion Control, tinier management, Quality of services (QOS) and User Datagram Protocol (UDP)

UNIT-V

Application Layer : Domain Nanie Space (DNS) - SMTP - FTP - HTTP - WWW.

Text Books:

1. Andrew S. Tanenbaum, "*Computer Networks*", Pearson Education; Fourth Edition, 2008.
2. Behrouz A. Forouzan, "*Data communication and Networking*", Tata McGraw-Hill, 2009.
3. James F. Kurose and Keith W. Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*", Pearson Education, 2006.

BCA252 - DATABASE DESIGN

UNIT-I

Database Environment - concepts and definitions, traditional file processing systems, database approach, range of database applications, advantages, costs and risks, components. Database Development process - IS development, three schema Architecture, Database Analysis - E-R Model - Entities, attributes, Relationships, degree and cardinality - case studies

UNIT-II

Enhanced E-R model - super type, sub type, specialization and generalization, constraints, disjointness, subtype discriminator, super type /subtype hierarchies, business rules, scope classification, structural constraints operational constraints, case study.

Relational model - Definitions, integrity constraints, transforming EER diagrams into relations, normalization - normal forms, merging relations, case study.

UNIT-III

Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational Calculus, Expressive Power of Algebra and Calculus.

SQL: Queries, Constraints, Triggers: The Form of Basic SQL Query, Set Operators, Nested Queries, Aggregate Operators, Procedures and functions, Triggers

UNIT-IV

Overview of Storage and Indexing: File Organizations and Indexing, Index Data Structures, Comparison of File Organizations. Tree-Structured Indexing: Indexed Sequential Access Method (ISAM), B+ Trees, Search, Insert Delete, B+ Trees in Practice.

Hash-Based Indexing: Static Hashing, Extendible Hashing, Linear Hashing, Extendible versus Linear Hashing.

UNIT-V

Transaction Management : ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control.

Concurrency Control: 2PL, Serializability, and Recoverability, Introduction to Lock Management, Dealing with Deadlock

Text Books

1. Fred R Me Fadden. Jeffrey A Hoffer, Mary B Prescott - Modern Database Management, Fifth edition. Addison Wesley 1999 (Unit-1,2)
2. Raghuram Ramakrishnan, Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2003.(Unit-3,4,5)
3. Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", Sixth Edition, McGraw-Hill International Edition, 2011

BCA253 - JAVA PROGRAMMING

UNIT-I

Introduction To Java: Java History – Features of java, how java differ from C and C++, Introduction to JDK and JRE, Java Primitive Types, Basic Operators, Conditional and Logical statements, Some Typical Differences Between C and Java.

Defining Classes: Adding Instance Fields and Methods, Constructors, Access Modifiers (Visibility Modes), Object Creation Examples, Method Overloading and Constructor Overloading, Use of static and final keywords, Objects as parameters, Difference between local variable and instance field, Introduction to Object class, How to read user input (from keyboard).

UNIT-II

Arrays, Strings in Java: How to create and define arrays, Introduction to java.util.Array class, Difference between String & StringBuffer classes, StringTokenizer class and Wrapper classes and conversion between Objects and primitives

Inheritance, Interfaces and Packages in Java: Defining super / sub classes, Abstract classes, Method overriding, Interfaces, Using Library Interfaces [Comparable and Comparator], Creating and Defining Packages;

Inner classes in Java: Types of inner classes, Creating static / non-static inner classes, Local and anonymous inner classes.

UNIT-III

Exception Handling in Java: What are exceptions, writing your own exception classes, [try, catch, throw, throws clauses , Difference between checked Vs unchecked Exceptions, Error Vs. Exception.

Multithreading in Java: Thread and its Life cycle, how to create threads, Thread class in java, use of synchronized keyword, how to avoid deadlock.

UNIT-IV

GUI Design & Event Handling: Component, Container, Color , GUI Controls, Layout Managers, Introduction to Swings, Events, Listeners, Icon interface, Writing GUI Based applications, Applets , Running Applets.

UNIT-V

File Handling: Stream classes, Reader and Writer classes, File and Directory class

Generics and Frameworks: Generics, Collections Framework, Collection interfaces and classes ArrayList, LinkedList, Vector.

Text Book:

1. Herbert Schildt: “Java™: The Complete Reference Java”, Eighth Edition, Tata McGraw Hill Publications, 2011, ISBN: 9781259002465

Suggested Reading:

1. Cay S. Horstmann, Gary Cornell: “Core Java, Volume I--Fundamentals”, 8th edition, Prentice Hall, 2008, ISBN: 9780132354790
2. K. Arnold and J. Gosling, “The JAVA programming language”,.

BCA254 - SOFTWARE ENGINEERING

UNIT-I

The software Problem- Cost, Schedule and Quality, Scale and change Software Processes - Process and project, Component Software Processes, Software Development Process Models, Project management Process.

UNIT-II

Software Requirements Analysis and Specification - Value of a good SRS, Requirements Process', Requirements Specification, Functional Specification with Use Cases, Other approaches for analysis. Software Architecture - Role of Software Architecture Views, Component and connector view, Architectural styles for C & C view, Documenting Architecture Design, evaluating Architectures.

UNIT-III

Planning a Software Project - Effort Estimation, Project Schedule and staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling
Design - Design concepts, Function oriented Design, Object Oriented Design, Detailed Design, Verification, Metrics

UNIT-IV

Coding and Unit Testing - Programming Principles and Guidelines, Incrementally developing code, managing evolving code, unit testing, code inspection, Metrics
Testing - Testing Concepts, Testing Process, Black Box testing, White box testing, Metrics.

UNIT-V

Maintenance and Reengineering - Software Maintenance, supportability, Reengineering, Business process Reengineering, Software reengineering, Reverse engineering; Restructuring, Forward engineering, Economics of Reengineering.
Software Process Improvement - Introduction, SPI process, CMMI, PCMM, Other SPI Frameworks, SPI return on investment, SPI Trends.

Suggested Reading :

1. Pankaj Jalote, "*Software Engineering- A Precise. Approach*", Wiley India, 2010.
2. Roger. S.Pressman , "*Software Engineering - A Practitioner's Approach*", Seventh Edition, McGraw Hill Higher Education, 2010.
3. Deepak Jain, "*Software Engineering*", Oxford University Press, 2009.
4. Rajib Mall, "*Fundamentals of Software Engineering*", Third Edition, PHI, 2009.
5. Sommerville, "*Software Engineering*", Seventh Edition, Pearson Education, 2007.

BCA255 - WEB PROGRAMMING

Unit-I

HTML- Introduction, Structure of HTML page, Formatting, HTML Styles, Fonts, Headings, Presenting and Arranging text, images, Links and Lists, Tables, Frames, Multimedia, Style Sheets.

Unit-II

HTML - Forms and Controls Java Script - Objects, Properties and Methods, Events, Java Script Programming, Document object. Window object, location object, history object

Unit-III

Dynamic HTML - Setting styles, changing web pages, mouse over-effects, dynamic content, animation, VML. visual effects, drag and drop, data binding, MSHTML Data Source control, Tabular data control, XML Data Source control, RDS control, Behaviors

Unit-IV

XML - Valid and Well-formed XML Documents, XML Document type definitions. XML Schemes, creation and specification of XML, Accessing XML data, Parsing XML, handling e\cms. Data binding, Record sets, XML applet, XML data islands

Unit-V

Perl - Creating Perl programs, Handling data, modules, objects, Statements and Declarations, Variables, Operators. Numbers, truth values, Strings, A List, Arrays, Hashes, Control Structures, CGI Scripting, creating HTML controls in Perl, Reading data from HTML Controls, image maps, debugging

Text Books :

1. Steven Holzner - HTML Black book, Comprehensive problem solver, Dream Tech Press, 2000
2. Harvey MDietel, Paul J. Dietel, T.R.Nieto, Internet and World wide web: how to program, Pearson 2000

BCA280 - DATABASE DESIGN LAB

List of Programs

1. Creation of database (exercising the commands for creation).
2. Exercising Simple queries.(DDL,DML,DCL)
3. Exercising queries on Aggregate Functions
4. Exercising Complex queries like Sub Queries, Joins
5. Demonstration of PL/SQL Blocks,
6. Procedures and Functions.
7. Usage of Triggers and Cursors, Views.
8. Demonstrate Exception Handling by PL/SQL procedures for data validation.

Note:-The creation of sample database for the purpose of the experiments is to be pre-decided by the instructor.

Suggested Reading:

1. Rick F Vander Lans, "Introduction to SQL", Fourth edition, Pearson Education, 2007.
- Benjamin Rosenzweig, Elena Silvestrova, "Oracle PL/SQL by Example", Third Edition, Pearson Education, 2004.

BCA281 - JAVA PROGRAMMING LAB

List of Programs

1. A program to illustrate the concept of Class with Constructors, Methods and Overloading.
2. A program to illustrate the concept of Inheritance and Dynamic Polymorphism.
3. A program to illustrate the concept of Interface and Packages.
4. A program to illustrate the usage of Abstract Class.
5. A program to illustrate Multithreading.
6. A program to illustrate Thread Synchronization.
7. A program using StringTokenizer.
8. A program using LinkedList Class
9. A program using TreeSet Class
10. A program using Hash Set and Iterator Classes.
11. A program using Map Classes.
12. A program using Enumeration and Comparator Interfaces.
13. A program to illustrate the usage of Filter and Buffered I/O streams
14. A program to illustrate the usage of Serialization

BCA282 - Web Programming Lab

List of Programs

1. Creating HTML pages to test different Tags.
 - a) Headers
 - b) Linking Images.
 - c) Images , anchor.
 - d) Text Formatting.
2. a) HTML Table Formatting.
 - b) Ordered and Unordered lists.
3. Creating Frames.
4. Creating Forms
5. Examination result in Java Script
6. Usage Data and the methods of Date and Time objects.
7. Floating alerts, aligning text and setting box dimension using CSS.
8. Demonstrating object hierarchy using collection children.
9. Using HTML Events.
10. Using Transition & Filters like Flip filter, Chroma filter, Shadow filter etc.,

SCHEME OF INSTRUCTION AND EXAMINATION
M. Sc. (IS) III & IV SEMESTERS (CBCS)
(Effect from Academic Year 2017-18)



FACULTY OF INFORMATION TECHNOLOGY
OSMANIA UNIVERSITY

Semester wise M. Sc. (IS) Course CBCS Credits List

S. No	Type of Course	I-SEM	II-SEM	III-SEM	IV-SEM	TOTAL
1	GE	4	4	4	--	12
2	CC	20	20	18	5	63
3	AECC/SEC	4	4	2	--	10
	TOTAL	28	28	24	5	85

1. GE : Generic Elective
2. CC : Compulsory Course
3. AECC : Ability Enhancement Compulsory Course
4. SEC : Skill Enhancement Course
5. PC- Practical Course
6. EC- Elective Course

L - Lecture Periods
T- Tutorials Periods
P- Practical Periods

UE- University Exam
SE – Sessional Exams
CAT- Subject Category

**SCHEME OF INSTRUCTION AND EXAMINATION
M.Sc.(IS) IInd YEAR**

Faculty of Information Technology

SEMESTER – III

S. No.	Syllabus Ref. No.	Subjects	CAT	No. of Credits	Scheme of Instruction			Scheme of Examination			
					Periods per Week			Duration in Hours		Maximum Marks	
					L	T	P	UE	SE	UE	SE
1	IS 201	Digital Logic and Embedded Systems	CC	4	4	-	-	3	1	70	30
2	IS 202	Big Data	CC	4	4	-	-	3	1	70	30
3	IS 203	Formal Languages and Compiling Techniques	CC	4	4	-	-	3	1	70	30
4	IS 204	Cloud Computing	CC	4	4	-	-	3	1	70	30
5		Elective – II (One of Following)	GE	4	4	-	-	3	1	70	30
	IS 210	Human Computer Interaction									
	IS 211	Enterprise Application Integration									
	IS 212	Production and Operations Management									
PRACTICALS											
1	IS 221	Big Data Lab	CC	2	-	-	4	3	2	50	25
2	IS 222	Embedded System Lab	GE	2	-	-	4	3	2	50	25
3	IS 223	Soft Skills – III	SEC	2	-	-	4	3	2	50	25
	Total			26	20		12			500	225

SEMESTER – IV

S. No.	Syllabus Ref. No.	Subjects	CAT	No. of Credits	Scheme of Instruction			Scheme of Examination			
					Periods per Week			Duration in Hours		Maximum Marks	
					L	T	P	UE	SE	UE	SE
1	IS 251	Main Project	CC	3	-	-	6 *	3	1	100	50
2	IS 252	Seminar	CC	2	-	-	4 #	..	1	..	30
	Total			5	0	0	10			100	80

* 6 hours per week batch of 10 projects

4 hours per week batch of 30 students

1 period = 1 Hour as per UGC/AICTE

**CBCS SYLLABUS OF
M. SC. (IS) 2nd YEAR, III & IV SEMESTERS
(EFFECT FROM ACADEMIC YEAR 2017-18)**

III – SEMESTER

IS 201 - DIGITAL LOGIC AND EMBEDDED SYSTEMS

UNIT -I

Design Concepts-Digital Hardware, design process, design of digital hardware Introduction to logic circuits - Boolean Algebra, Gates, CAD tools

VHDL Implementation Technologies - NMOS, CMOS, PLDs, practical aspects, transmission gates, Implementation of PLDs and FPGAs

UNIT-II

Optimized implementation of logic functions- Karnaugh map, strategy, minimization of product of sums, NAND and NOR gates, Multilevel Synthesis, Cubical representations and minimization using cubical representation, CAD tools. Design of arithmetic circuits using CAD tools.

Combinational Building blocks - Multiplexers, decoders, encoders, code converters, VHDL for combinational circuits.

Latches-Basic. Gated SR, Gated D; Flip flops- D,T, and JK, Registers, Counters, using CAD tools.

UNIT -III

Synchronous sequential circuits - Basic design, state assignment, Mealy state model, design of finite state machines using CAD tools, State minimization, counter using sequential circuit, FSM as arbiter circuit, analysis, ASM charts.

Asynchronous sequential circuits - behavior, analysis, synthesis, state assignment, hazards.

Digital System design - Building block circuits, design examples, clock synchronization, Testing.

UNIT-IV

General Purpose processors software - Basic architecture, operation, programmers view, development environments, ASIPs.

Standard single purpose processor - introduction, timers, UARTs, PWM, LCD controller, keypad controller, stepper motor controller. A/D converter.

Memory - Introduction, Common Memory types.

Interfacing - Communication basics. I/O Addressing, Interrupts, DMA, Arbitration, Advanced communication principles, Serial protocols, Parallel protocols, wireless protocols.

UNIT - V

State Machine and concurrent process models - Models, Languages, FSM. Using state machines, HCFSM, PSM, Concurrent Process model- Processes, communication synchronization, implementation.

Control Systems - Open loop, closed loop, PID controllers, practical issues, benefits

IC Technology - VLSI, ASIC.

Design Technology - Automation: Synthesis, Verification, reuse.

Suggested Reading:

1. Stephen Brown, Zvonko Vranesic - "Fundamentals of Digital logic with VHDL design", McGraw- 2000.
2. Frank Vahid, Tony Givargis - "Embedded System Design - A Unified Hardware / Software Introduction", John Wiley, 2002.

IS 202 - BIG DATA

UNIT-I

Overview: Big Data, History of Data Management – Evolution of Big Data, Structuring Big Data, Types of Data, Elements of Big Data, Big Data Analytics, Advantages of Big Data Analytics, Future of Big Data

Exploring the Use of Big Data in Business Context: Social Networking, Preventing Fraudulent Activities, Detecting Fraudulent Activities in Insurance Sector, Retail Industry

Introducing Technologies for Handling Big Data: Distributed and Parallel Computing, Hadoop, Cloud Computing and Big Data, In-Memory Computing Technology for Big Data

UNIT-II

Hadoop: Hadoop Ecosystem, Hadoop Distributed File System, Map Reduce, Hadoop YARN, H Base, Hive, Pig and Pig Latin, Scoop, Zookeeper, Flume, Oozier

Map Reduce Fundamentals: The Map Reduce Framework, Techniques to Optimize Map Reduce Jobs, Uses of Map Reduce

Big Data Technology Foundations: Exploring the Big Data Stack, Virtualization and Big Data, Virtualization Approaches

Storing Data in Hadoop: Introducing HDFS, Introducing H Base, Combining H Base and HDFS

Selecting the Suitable Hadoop Data Organization for Applications

UNIT-III

Processing Your Data with Map Reduce: Concept of Map Reduce Framework, Developing Simple Map Reduce Application, Points to Consider while Designing Map Reduce

Customizing Map Reduce Execution: Controlling Map Reduce Execution with Input Format, Reading Data with Custom Record Reader, Organizing Output Data with Output Formats, Customizing Data with Record Writer, Optimizing Map Reduce Execution with Combiner, Controlling Reducer Execution with Partitioners

Exploring Hive: Introducing Hive, Getting Started with Hive, Data Types in Hive, Built-In Functions in Hive, Hive DDL, Data Manipulation in Hive, Data Retrieval Queries, Using JOINS in Hive

Analyzing Data with Pig: Introducing Pig, Running Pig, Getting Started with Pig Latin, Working with Operators in Pig, Working with Functions in Pig

UNIT-IV

Storing Data in Databases and Data Warehouses: RDBMS and Big Data, Non-Relational Database, Polyglot Persistence, Integrating Big Data with Traditional Data Warehouses, Big Data Analysis and Data Warehouse, Changing Deployment Models in Big Data Era

No SQL Data Management: Introduction to No SQL, Aggregate Data Models, Key Value Data Model, Document Databases, Relationships, Graph Databases, Schema-Less Databases, Materialized Views, Distribution Models, Sharding, Map Reduce Partitioning and Combining, Composing Map Reduce Calculations

Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics, Points to Consider during Analysis, Developing an Analytic Team, Understanding Text Analytics

Analytical Approaches and Tools to Analyze Data: Analytical Approaches, History of Analytical Tools, Introducing Popular Analytical Tools, Comparing Various Analytical Tools

UNIT-V

Data Visualization: Introducing Data Visualization, Techniques Used for Visual Data Representation, Types of Data Visualization, Applications of Data Visualization, Visualizing Big Data, Tools Used in Data Visualization

Social Media Analytics and Text Mining: Introducing Social Media, Introducing Key Elements of Social Media, Introducing Text Mining, Understanding Text Mining Process, Sentiment Analysis

Performing Social Media Analytics and Opinion Mining on Tweets

Mobile Analytics: Introducing Mobile Analytics, Introducing Mobile Analytics Tools, Performing Mobile Analytics, Challenges of Mobile Analytics

Suggested Reading:

1. DT Editorial Services, Big Data Black Book, Dream Tech Press, 2015
2. Tom White, Hadoop: The Definitive Guide, O Reily, 4th Edition, 2015
3. Alex Homes, Hadoop in Practice, Manning Publications Co, 2012
4. Jimmy Lin, Chris Dyer, Data-Intensive Text Processing with Map Reduce, Morgan Claypool Publishers. 2010

IS 203 - FORMAL LANGUAGES AND COMPILING TECHNIQUES

UNIT - I

Theory of computation – Introduction basic concepts.

Finite Automata - DFA, NFA, Regular languages and regular grammars - Regular expressions, connection between regular expressions and regular languages, regular grammars, Closure properties of regular languages.

UNIT-II

Context - Free Languages- CFG, Parsing and ambiguity, context free grammars and programming languages.

Simplification of context free grammars - Methods, normal forms. Push-down automata - Non-deterministic push down automata, PDA and CFG Pumping Lemmas, Introduction to Turing machine.

UNIT-III

Compiler - Introduction, Phases of compiler.

Lexical Analysis - role, specification of tokens, recognition of tokens, LEX.

UNIT-IV

Syntax Analysis - role of parser, Top-down parsing, Bottom-up parsing, YACC, Symbol Table organization.

UNIT - V

Semantic Analysis, Code generation, Code Optimization.

Suggested Reading:

1. Peter Linz, "An Introduction to Formal Languages and Automata", Narosa, 2001.
2. J.P. Bennett, " Introduction to Compiling Techniques", McGraw Hill, 1996.
3. Aho & Ulman, Compiler Design

IS 204 -CLOUD COMPUTING

UNIT-I

Overview of Cloud Computing: Introduction to Cloud Computing, Need and Motivation of Cloud computing, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

UNIT-II

Virtualization: Introduction to virtualization, Virtual Machines and Virtualization of Clusters and Data Centers, Levels of Virtualization, Virtualization Structures / tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case Studies: Xen Virtual machine monitors – Xen API. VMware – VMware products – VMware features. Microsoft Virtual Server – Features of Microsoft Virtual Server.

UNIT-III

Cloud computing architectures over Virtualized Data Centers: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

UNIT-IV

Cloud Security and Trust Management, data Security in the Cloud: An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, **CryptDb:** Onion Encryption layers – DET, RND, OPE, JOIN, SEARCH, HOM and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

UNIT-V

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Overview of Hadoop, Map Reduce and MPI, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

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

Suggested Reading:

1. John W. Ritting House, James F. Ran Some, "Cloud Computing: Implementation, Management, and Security ", CRC Press 2009.
2. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, "[Cloud Computing: Principles and Paradigms \(Wiley Series on Parallel and Distributed Computing\)](#)", Wiley Publishing ©2011

4. Raluca Ada Popa, Catherine M. S. Redfield, Nikolai Zeldovich and Hari Balakrishnana, "Crypt DB: Protecting Confidentiality with Encrypted Query Processing" 23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
5. Craig Gentry, A Fully Homomorphic Encryption Scheme, September 2009.
6. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.

ELECTIVE - I

IS 210 - HUMAN COMPUTER INTERACTION

UNIT- I

Importance of the user interface. Characteristics of graphical and web user interfaces, User Interface

Design Process: Knowing the client, Understanding business function, Principles of good screen design.

UNIT-II

System Menus and Navigation Schemes, Kinds of windows, Device based controls, Screen based controls, Test and Messages.

UNIT- III

Feedback, Guidance and assistance. Internationalization and accessibility, graphics, icons and images, colours, Layout windows and pages.

UNIT- IV

Interaction Design: Introduction, Goals, Usability, Conceptualization interaction: Problem space, Conceptual models, Interface metaphors, Interaction paradigms, **Cognition:** Conceptual frameworks for cognition. **Collaboration and Communication:** Social mechanism, Conceptual framework.

UNIT- V

Affective aspects, Expressive interface, User frustration, Agents, Process of interaction design, Activities characteristics, Practical issues, Life cycle models, **Design:** Prototyping and construction, Prototyping, conceptual design, **Physical design Evaluation:** Introduction, Framework, **Testing and modelling users:** Kinds of tests ,Doing user testing, Experiments, Predictive models.

Suggested Reading:

1. Wilbert O. Galitz, The Essential Guide to User Interface Design, Wiley Dream tech 2002.
2. Sharp, Rogers, Preece, Interaction Design, John Wiley, 2007.
3. Andrew Sears, Julie A Jacko, Human, Computer Interaction Fundamentals, CRC Press, 2009.
4. Dan R Oslen, Human, Computer Interaction, Cengage Learning, 2010.

IS 211 - ENTERPRISE APPLICATION INTEGRATION (WITH SPRING FRAMEWORK)

UNIT – I

Application Integration - Need, issues. Data level integration. Application Interface level integration. Method level integration.

UNIT-II

User interface level integration, EAI process.

Middleware – Models, Transaction, RPC, MOM, Distributed objects, Database oriented Middleware.

UNIT-III

Enterprise Integration Design objectives.

Enterprise architecture -General characteristics, Business Systems hierarchy,

Integration infrastructure- Network, workflow. Business Systems Domain Enterprise Data:s Tonge, knowledge access. **F_tal1Jjsl:** ting Enterprise infrastructure Business

System Domain - characteristics, components, Application lie sign issues. !" .

UNIT -IV

Message Infrastructure - Design Objectives, JMS, Design consideration Work Flow - Introduction, process design considerations, Integration elements, scalability, product requirements, standards.

Web based user Access - environment. client facilities, server facilities, session management.

XML Integration - benefits, XML extended technology, impact.

UNIT - V

Component Technology - strategy, specifications. **Enterprise System security** - requirements, techniques, strategy.

Enterprise Intelligence - Business requirements, architectural support.

Implementing architecture - Strategic pImming, changing user mind set, implementing infrastructure, managing infrastructure, setting application integration goals, managing application development, setting standards. managing changer- ,...""

Suggested Reading:

1. David S Linthicum, "Enterprise Application Integration", Addison, 2000.
2. Fred A Cummins, "Enterprise Integration", John Wiley, 2002.

IS 212 - PRODUCTION AND OPERATIONS MANAGEMENT

UNIT-1

Introduction to production and operations management : Definition of production and operation management, evolution of production management as operation management. Role of operation management in total management system. Interface between the operation system and systems of other functional areas.

UNIT – II

Production planning and control : Basic functions of production planning and control, production cycle- characteristics of process technologies. Project, job shop. Assembly and continuous inter relationship between product life cycle and process life cycle. Scheduling and control of production operation control procedures and devices. Product sequencing – Sequencing of products in multi product multi – stage situations – plant capacity and line balancing- plant layout- different types of layouts. Location and the factors influencing location.

UNIT- III

Maintenance Management : objectives – failure concept. Reliability, preventive and breakdown maintenance, replacement policies and quality control – Standards and specifications. Quality assurance and quality circles – statistical quality control – control charts for average. Range fraction defective and number of defects – total quality management. **ISO certification improvement of productivity :** work study, various techniques in the methods study for identifying the most appropriate method. Work measurement – its uses and different methods. Computation of allowance and allowed time.

UNIT-IV

Materials management: Need use and importance of material management – materials requirement planning- materials budgeting – Techniques for prioritization of materials – Source of supply of materials – Selection. Evaluation and performance of suppliers- make or buy decisions and its implications under various circumstances – vendor rating – determinants of vendor rating.

UNIT- V

Stores management- Objectives of stores management – requirements for efficient management of stores – safety stock – inventory control – types of inventory. Costs – systems of inventory control – ABC, VED and FNSD analysis. Different systems of inventory control – value analysis – importance in cost reduction – concepts and procedures.

Suggested Reading:

1. Everett. Adam. Jr. and Ronald J. Elbert, “Production and Operations Management Concepts and Behavior”. Prentice Hall International Ltd. 1995.
2. Joseph G. Monks – “ Operations Management – Theory and Problems”. McGraw Hill. New York, 1987.
3. Hamid Noori and Russel Radford: “Production and Operation Managements – Total Quality and Responsiveness” McGraw Hills – 1995.

IS 221- BIG DATA LAB

1. Install and Set up Hadoop
2. Work with basic HDFS Commands
3. Write Map Reduce program to count the occurrences of words in an input file
4. Write Map Reduce program to perform secondary sorting
5. Write Map Reduce Program that uses custom data types
6. Write Map Reduce Program to create custom partitioner class
7. Write Map Reduce Program to identify transactions performed on Sports Accessories data
8. Install and configure Hive
9. Write DDL, data manipulation, data retrieval queries in Hive
10. Install and configure Pig
11. Use operators and functions in Pig
12. Install and configure H base
13. Work with H base table commands

IS 222 - EMBEDDED SYSTEMS LAB

Embedded Systems Practical involves development of an Application controller using either VHDL or a Micro Controller (such as 8051, z80).

Tools Required:

- a) Xilinx ISE Tool / Max Plus synthesizer Tool
- b) 8050 or z80 Emulator

Suggested Reading :

1. David E. Siman, “ An Embedded Software Prime”, Pearson Education 1999.
2. Myke Predko, “ Programming and Customizing the 8051 Micro Controller “ Tata McGraw Hill, 1999.
3. Mohammed Ali Mazidi, Janice Gillespie Mazidi, “ 8051 Micro Controller and Embedded Systems”, Pearson 2000.

IS 223 – SOFT SKILLS-III

- 1. Career Skills**
- 2. Job Interviews**
- 3. Group Discussions**
- 4. Public Speaking**
- 5. Telephone Skills**

References:

1. Rizvi,MAshraf. *Effective Technical Communication*. McGraw – Hill, New Delhi, 2005.
2. Suresh Kumar, A.V. *Soft Skills*. Rishi Publication, New Delhi, 2009.

SEMESTER – IV

S. No.	Syllabus Ref. No.	Subjects	CAT	No. of Credits	Scheme of Instruction			Scheme of Examination			
					Periods per Week			Duration in Hours		Maximum Marks	
					L	T	P	UE	SE	UE	SE
1	IS 251	Main Project	CC	3	-	-	6 *	3	1	100	50
2	IS 252	Seminar	CC	2	-	-	4 #	..	1	..	30
		Total		5	0	0	10			100	80

* 6 hours per week batch of 10 projects

4 hours per week batch of 30 students

1 period = 1 Hour as per UGC/AICTE

IS 251 - MAIN PROJECT

Solving a real life problem should be the focus of U.G. projects. Faculty members should propose the projects (brief scope and references) well in advance which should be made available to the students at the department library. The project could be classified as hardware, software, modelling, simulation etc. The project should involve one or many elements of techniques such as analysis, design, and synthesis.

The department will appoint a project coordinator who will coordinate the following:

Grouping of students (maximum of 3 in a group)

Allotment of projects and project guides

Project monitoring at regular intervals.

All projects allotment is to be completed by the 4th week of 2nd year IV- Semester so that the students get sufficient time for completion of the project.

All projects will be monitored at least twice in a semester through student presentations. Sessional marks are to be based on the Grades/Marks, awarded by a monitoring committee comprising of faculty members as well as by the supervisor.

Efforts should be made that some of the projects are carried out in industries with the help of industry coordinators, Problems can also be invited from the industries to be worked out through U.G. projects.

Common norms will be established for the final documentation of the project report by the respective departments.

IS 252 - SEMINAR

Each student will be required to:

1. Submit one page of synopsis on the project work for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the project.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of Sessional marks which will be on the basis of performance in all the 3 items stated above.

The project seminar presentation should include the following components of the project:

- Problem definition and specification.
- Literature survey, familiarity with research journals.
- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of bar(activity) charts
- Presentation-oral and written.

SCHEME OF INSTRUCTION
MCA (MASTER OF COMPUTER APPLICATIONS)
Proposed from the Academic year 2017-2018
SEMESTER – I

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination	
			L	T	P		Sessio onals	Univ. Exam
1.	CS101	Discrete Mathematics	3	1	0	4	20	80
2.	CS102	Probability & Statistics	3	1	0	4	20	80
3.	CS103	Computer Programming and Problem Solving	4	0	0	4	20	80
4.	CS104	Elements of Information Technology	3	1	0	4	20	80
5.	CS105	Economic Analysis	3	1	0	4	20	80
6.	CS106	English	3	0	0	4	20	80
7.	CS107	Programming Lab I (C Programming Lab)	0	0	4	4	25	50
8.	CS108	Programming Lab II (Information Technology Lab)	0	0	4	4	25	50
Total			19	4	08	32	170	580

DISCRETE MATHEMATICS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT- I

Mathematical Logic - Statements and notation connectives, Equivalence of statement formula, Theorem proving – Introduction to predicate calculus.

Relations – Binary relations and digraphs, special properties of Binary relations, Equivalence relations, Ordered relations, Lattices and Enumerations, Operations of relations.

UNIT -II

Functions – Definitions and properties of functions, Inductively defined functions, partial functions, Hashing functions, Recursion.

Boolean Algebra – Definition and properties, Lattices, Boolean functions, Normal forms. Disjunctive Normal Forms (DNF). Conjunctive Normal Forms (CNF). Principal DNF, Principal CNF, Applications to switching networks, applications to logic.

UNIT –III

Recurrence Relations – First-order linear recurrence relation, Second-order linear homogeneous recurrence relations with constant coefficients, Non-homogeneous recurrence relations

Algebraic structures – Definition, Examples and Properties

Groups: Definition, Examples and elementary properties, Homomorphism, Isomorphism and Cyclic groups.

UNIT - IV

Elementary combinatory – sets, operations on sets, Venn diagram, basics of counting combinations and permutations without repetitions, unlimited repetitions, constrained repetitions. Binomial coefficients, Binomial and Multinomial theorems, principle of inclusion and exclusion.

UNIT -V

Graph Theory: Basic concepts, Isomorphism and sub graphs, trees and their properties, spanning trees, directed trees, binary trees.

Planar graphs, Euler's formula, multigraphs and Euler Circuits.

Hamiltonian graphs, chromatic numbers, four color problem, network flows.

Suggested Reading:

1. Jr. P. Tremblay and R Manohar “*Discrete Mathematical Structures with Applications to Computer Science*”, McGraw Hill, 1987.
2. Jol L. Moth, Abraham Kondel, Theoddar P. Paker “*Discrete Mathematics for Computer Scientists and Mathematicians*” PHI 1976.
3. Ralph P. Grimaldi “*Discrete and Combinatorial Mathematics*” 5th Edition, Pearson, 2004.

PROBABILITY AND STATISTICS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Data Validation and Information Abstraction: Methods of collecting data efficiently, Gathering information from data charting.

UNIT-II

Probability: Laws of Probability, Probability distributions, Discrete, Equiprobable, binomial, Poisson.

UNIT-III

Continuous Distributions: Rectangular, normal, gamma and beta.

UNIT-IV

Statistical Methods : Frequency distributions, Mathematical Expectation, Moments, Skewness and Kurtosis.

UNIT-V

Correlation and Regression, Introduction to tests of Significance, u, t, x tests.

Suggested Reading:

1. S.C. Gupta and V.K. Kapoor, “ Fundamentals of Mathematical Statistics”, 10th Edition, 2000.
2. William Mendenhall, Robert J. Beaver, Barbara M.. Beaver, “ Introduction to Probability and Statistics”, Thomson Brooks / Cole, Eleventh Edition, 2003.
3. Richard A. Johnson, “Probability and Statistics for Engineers”, Prentice Hall of India, Seventh Edition, 2005.

COMPUTER PROGRAMMING AND PROBLEM SOLVING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT – I

Introduction to Computer Programming: Computing Environments, Computer Languages, Creating and Running Programs, Number Systems (Binary, Octal, Decimal, Hex), Representation of numbers (fixed and floating point)

Algorithms and Flow charts : Definition of Algorithms, examples, Symbols used in Flow chart, examples.

Introduction to C Language - Background, C Identifiers, Data Types, Operators, Variables, Constants, Input / Output, Expressions, C Programs, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Bitwise Operators.

UNIT-II

Selection: Logical Data and Operators, if-else, switch Statements, Standard Functions.

Repetition: loops, while, for, do-while statements, Loop examples, break, continue, go to.

Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection, Bubble, Insertion Sorts.

UNIT – III

Functions: Designing Structured Programs, Functions Basics, User Defined Functions, Inter Function Communication, Standard Functions, Scope, Storage Classes-auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.

Recursion- Recursive Functions, Terminating Condition, Quick & Merge Sort Techniques, Preprocessor Commands.

UNIT - IV

Pointers - Introduction, Pointers to Pointers, Compatibility, L value and R value, Arrays and Pointers, Pointer Arithmetic and Arrays

Call-by-reference: Pointers for Inter-Function Communication, Passing Arrays to a Function,

Dynamic Memory Allocation: Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command-line Arguments.

Strings - Concepts, C Strings, String Input / Output Functions, Arrays of Strings, String Manipulation Functions.

UNIT - V

The Type Definition (type def), Enumerated Types

Structure: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures. Unions.

Input and Output: Files, Streams, Standard library Input Output Functions, Character Input Output Functions.

Suggested Reading:

1. Rajaraman V, "*The Fundamentals of Computer*", 4th Edition, Prentice Hall of India, 2006
2. Kernighan BW and Ritchie DM, "*The C Programming Language*", 2nd Edition, Prentice Hall of India, 2006.
3. J.R. Hanly and E.B. Koffman, "*Problem Solving and Program Design in C*", Pearson Education, 6th Edition, 2007.
4. B. A. Forouzan and R.F. Gilberg, "*C Programming & Data Structures*", Cengage Learning, 2nd Edition, 2007.

ELEMENTS OF INFORMATION TECHNOLOGY

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Introduction to Information Technology: Information concepts & Processing: Basic concepts of IT, data Processing, data and information

Elements of computer system: Classification, history and types of computers.

Hardware: CPU, Memory unit, I/O devices, auxiliary storage devices, data representation

Software: System and Application s/w and utility packages.

Programming Languages: classification, Machine code, Assembly Language, higher level languages, fourth generation languages. Translators: Assembler, Compiler and Interpreter.

UNIT –II

Operating systems: Concept as resource manager and coordinator of processor, devices and memory. Concept of priorities, protection and parallelism. Command interpreter, Typical commands of Linux/MS Windows

Communications: Client server systems, Computer networks, network protocols, LAN, WAN, Internet facilities through WWW, Mosaic, Gopher, html, scripting languages, communication channels, factors affecting communication among devices.

UNIT-III

Files & Databases: Data Storage hierarchy, File management systems, database management systems, types of data base organizations, features of database management systems.

Information integrity & computer security: Perverse software, concepts and components of security, Preventive measures and treatment.

UNIT-IV

Information System analysis & design: system study review, problem definition, system analysis, system design.

Management Information systems: information need of managers, developing a management information system, planning & decision making practices supported by an MIS.

UNIT-V

Computers impact on society & Range of applications: scientific, educational, industrial, business, multilingual applications.

Suggested Reading:

1. Sanders, D.H. "*Computers Today*" McGraw Hill. 3rd Edition, 1988.
2. Prof. Vikram Singh, "*Impact of Information & Communication Technology on public life*" (1st Edition) Lakshmi Publications, 2009.

ECONOMIC ANALYSIS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessionals	20 Marks

UNIT-I

The nature and scope of Managerial Economics, Fundamental concepts of managerial economics.

UNIT-II

Demand Analysis, concepts of demand, demand elasticity's.

UNIT -III

Production and cost analysis and principles: Production function, single output isoquantum, average cost curve – Laws of returns – Laws of supply, Price determination under different competitive situations.

UNIT-IV

National income : Concepts, measurement and determinants.

Planning : The machinery for planning in India, Salient features of India's Five, Year plans.

UNIT-V

Indian Financial Systems, Functions and role of Reserve Bank of India. Conventional Banks and Industrial Finance. Term "lending Financial Institutions-role and functions.

Suggested Reading:

1. Dhiraj Bhattacharya & Pranab Chakraborti, "*Fundamentals of Business Economics*", A.H. Wheeler & Co. (P) Ltd., 1986.
2. Barry Keating & J. Holton Wilson, "*Managerial Economics*". Biztantra, Second Edition, 2003.
3. Dominick Salvatore, "*Managerial Economics*", Thomson, Fourth Edition, 2001.

ENGLISH

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessionals	20 Marks

The following are the objectives of the course:

To enable the students to

- communicate clearly, accurately and appropriately
- know and use verbal and non-verbal communication appropriately
- infer information from texts
- learn basic grammar of the English language
- use appropriate idiomatic expressions, one word substitutes etc.

UNIT – I

Effective communication: Role and importance of communication; Features of human communication; Process of communication; Importance of listening, speaking, reading, and writing, Types of listening, Tips for effective listening, Types of communication: Non-verbal communication, Verbal – Formal versus informal communication, One-way versus two-way communication; Barriers to communication

UNIT – II

Remedial English : Common errors, Tense and aspects, Connectives and correlative conjuncts, Simple, complex and compound sentences, Voice, concord, Direct and indirect speech, Degrees of comparison, Question tags, Punctuation

UNIT - III

Written Communication : Paragraph writing, Précis writing, Expansion, Essay writing, Personal Letters, General reports

UNIT – IV

Vocabulary: Technical vocabulary, Homonyms, Homophones, Synonyms, Antonyms, Words often confused, One-word substitutes, Idiomatic usage, Affixes

UNIT – V

Reading comprehension and reading strategies.

The following five lessons are prescribed:

1. Dr. A.P.J. Abdul Kalam
2. Sathya Nadella
3. Azim Premji
4. Sachin Tendulkar
5. Sam Pitroda

Suggested Reading:

- 1.E. Suresh Kumar, *Engineering English*, Orient Blackswan, 2014.
- 2.E. Suresh Kumar et al., *Communication Skills and Soft Skills*, Pearson, 2011.
3. Sanjay Kumar and Pushp Lata, *Communication Skills*, OUP, 2011.
- 4.Kavita Tyagi and Padma Misra, *Professional Communication*, PHI, 2011.
- 5.Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, OUP, 2011.

**PROGRAMMING LAB - I
(C PROGRAMMING LAB)**

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessionals	20 Marks

1. Finding the maximum and minimum of given set of numbers
2. Finding Roots of a Quadratic Equation
3. Sin x and Cos x values using series expansion
4. Conversion of Binary to Decimal, Octal, Hex-Decimal and vice versa
5. Generating a Pascal triangle
6. Program using Recursion - Factorial, Fibonacci, GCD, Quick Sort and Merge Sort
7. Matrix addition and multiplication using arrays
8. Programs for Bubble Sort, Selection Sort, Insertion Sort
9. Programs on Linear Search and Binary Search
10. Functions for string manipulations
11. Finding the No. of characters, words and lines from a given text file
12. Program to open a file and copy the contents of it into another file.

**PROGRAMMING LAB - II
(IT Workshop)**

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessionals	20 Marks

Syllabus:

System Assembling , Disassembling and identification of Parts / Peripherals

Operating System Installation – Install Operating Systems like Windows, Linux along with necessary Device Drivers.

MS-Office / Open Office

- a. Word – Formatting Page Borders, Reviewing Equations, symbols
- b. Spread Sheet – organize data, usage of formula graphs charts
- c. Power point – features of power point, guidelines for preparing an effective presentation
- d. Access – creation of database, validate data
4. Network Configuration & Software Installation : Configuring TCP/IP, proxy and firewall settings. Installing application software system software & tools.
5. Internet and World Wide Web-Search Engines. Types of search engines, netiquette, Cyber hygiene.
6. Trouble Shooting – Hardware trouble shooting, Software trouble shooting.
7. MATLAB – basic commands, subroutines, graph plotting
8. LATEX – basic formatting, handling equations and images.

Suggested Reading:

1. K. L. James, Computer Hardware, Installation, Interfacing Troubleshooting and Maintenance, Eastern Economy Edition.
2. Gary B.Shelly, Misty E Vermaat and Thomas J. Cashman, Microsoft Office 2007 Introduction Concepts and Techniques, Windows XP Edition, 2007, Paperback.
3. Leslie Lam port, LATEX-User’s Guide and Reference manual, Pearson, LPE, 2nd Edition.
4. Rudraprathap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press, 2002.
5. Scott Mueller’s, Upgrading and Repairing PCs, 18th Edition, Scott. Mueller, QUE, Pearson, 2008.

**SCHEME OF INSTRUCTION
MCA (MASTER OF COMPUTER APPLICATIONS)
Proposed from the Academic year 2017-2018**

MCA I Year

SEMESTER – II

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination	
			L	T	P		Sess ional s	Univ Exa m
1.	CS201	Accounting & Financial Management	4	1	0	4	20	80
2.	CS202	Principles of Object Oriented Programming using Java	4	-	0	4	20	80
3.	CS203	Management Information Systems	4	1	0	4	20	80
4.	CS204	C++ and Data Structures	4	1	0	4	20	80
5.	CS205	Computer Organization	4	1	0	4	20	80
6.	CS206	Communication Skills	4	1	0	4	20	80
7.	CS207	Programming Lab – III (OOP Lab)	0	0	4	4	25	50
8.	CS208	Programming Lab – IV (C++ Programming Lab)	0	0	4	4	25	50
Total			19	5	08	32	230	520

ACCOUNTING AND FINANCIAL MANAGEMENT

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

An overview of Accounting cycle – Basic concepts and conventions – Books of Account – Terminal statement.

UNIT-II

Financial statement analysis and interpretation – Ration analysis.

UNIT-III

Working capital – Sources and uses – Funds flow and cash flow analysis – Management of Inventory.

UNIT-IV

Capital Budgeting – Techniques for evaluation – Cost of capital – Computation of specific costs, and weighted average cost of capital.

UNIT-V

Analysis of costs and their behavior – Cost volume – Profit analysis Variable costing and absorption costing.

Budgets-Flexible Budgeting – Long and Short term forecasting.

Suggested Reading:

1. James. C. Van Horne, “*Fundamentals of Financial Management*”, Pearson Edition, Eleventh Edition, 2001.
2. Khan MY, Lain PK, “*Financial Management*”, Tata McGraw Hill, Second Edition, 1993.
3. Maheswari SN, “*Management Accounting and Financial Control*”, Sultan Chand, & Sons, 2014.

PRINCIPLES OF OBJECT ORIENTED PROGRAMMING USING JAVA

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks
S	

UNIT-I

Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Oriented Concepts, Benefits of Object Oriented Development.

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements, Classes, Methods, Inheritance, Packages and Interfaces.

UNIT-II

Exception Handling, Multithreaded Programming, I/O basics, Reading console input and output , Reading and Writing Files, Print Writer Class, String Handling.

UNIT-III

Exploring Java Language, Collection Overview, Collections Interfaces, Collection Classes, Iterators, Random Access Interface, Maps, Comparators, Arrays, Legacy classes and Interfaces, String Tokenizer, Bit Set, Date, Calendar observable, Timer.

UNIT-IV

Java I/O classes and Interfaces, Files, Stream and Byte Classes, Character Streams, Serialization.

UNIT-V

GUI [and Event Driven Programming] : Applet Class, Event Handling, Delegation event model, event classes, event listener Interfaces. Customizing Frame Windows, GUI Programming Basics, Text Related GUI Components, Layout Managers, Effective use of Nested panels, Other GUI components, Menus and Handling Mouse Events.

Suggested Reading:

1. Patrick Naughton “*JAVA 2, The Complete Reference*” Tata McGraw Hill, 3rd Edition, 2005.
2. Richard A. Johnson, “*Java Programming and Object-Oriented Applications Development*” Cengage Learning, India Edition, 2009.
3. John Dean and Raymond Dean “*Introduction to Programming with JAVA A Problem Solving Approach*”, McGraw Hill, 7th Edition, 2008.
4. Joe Wigglesworth and Paula McMillan, “*Java Programming : Advanced Topics*” Cengage Learning, 3rd Edition, 2009.

MANAGEMENT INFORMATION SYSTEMS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

An Introduction to concepts of System and Organizations. Strategic uses of Information Technology, Business Process in Engineering and Information Technology.

UNIT-II

Applications of Operational Information Systems to Business, Tactical and Strategic Information System to Business.

UNIT-III

Information Systems Planning, approach to System Building Alternative Application Development.

UNIT-IV

Managing Knowledge, Knowledge Management in the Organization, Enhancing Management Decision-Making, DSS, GDSS, and ESS.

UNIT-V

Management of Information Systems, Information System security and control, Ethical issue, managing firm infrastructure and Enterprise system.

Suggested Reading:

- Robert Schultheis, Mary Summer, “ *Management Information Systems – The Manager’s view*”, Tata McGraw Hill, Fourth Edition, 2006.
1. Kenneth C. Loudon, Jane P Loudon, “*Management Information System*”, Prentice Hall, 4th Edition, 2008.
 2. Ralph Stair, George Reynolds “*Principles of Information Systems*”, Cengage Learning 12th Edition, 2008.
 3. James A, O’Brien, “*Management Information Systems*”, Tata McGraw Hill, Sixth Edition, 2004.

C++ AND DATA STRUCTURES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT - I

Introduction to C++: Programming paradigms, Object Oriented Programming Concepts, Advantages and Applications of OOPs.

Functions: Call by value, call by reference, Inline Functions, Function Overloading, Recursion,

Arrays: Introduction to Arrays, Arrays in functions, Programming with Arrays and multidimensional Arrays

UNIT - II

Defining classes: Classes, Abstract data types. Friend Functions and Member Functions. Constructors, Destructors, Strings, Pointers and Dynamic Arrays.

UNIT – III

Operator overloading.

Inheritance: The notation of inheritance, derived classes, overriding, Virtual Base Class. Virtual functions, Polymorphism, Exception Handling, Function Templates, Class Templates.

UNIT-IV

Introduction to Linear Data Structures: Linear Lists, Stacks, Queues using Array Representation and Linked Representation, Applications of Stacks and Queues, Hashing, Collision Resolution.

UNIT – V

Non-Linear Data Structures: Binary Trees, properties, Representation, and Traversals, AVL Trees, Operations on AVL Trees, B-Trees.

Graphs: Definition, Representation, Traversals.

Suggested Reading:

1. Walter Savitch, Problem Solving with C++, 6th Edition, Pears Education Publishing, 2009.
2. Bjarne Stroustrup, The C++ Programming Language, 3rd Edition, Pearson Education, 2013.
3. Sartaj A Sahani, Data Structures and Algorithms, Tata McGraw Hill, 3rd Edition, 2013,

COMPUTER ORGANIZATION

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip Flops, Sequential Circuits.

Digital Components: Integrated Circuits, Decoder, Multiplexers, Registers, Shift Registers, Binary counter, Memory unit.

Data Representation: Data types, Complements, Fixed and Floating Point Representation, Other binary codes and error Detection codes.

UNIT-II

Register Transfer and Micro operations: Register Transfer language, Register transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations and Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycles, Memory Reference Instructions, Input, Output and Interrupts, Design of Accumulator logic.

UNIT-III

Programming the Basic Computer: Introduction, Machine Language, Assembly Language, The Assembler, Programming Arithmetic and Logic Operations, Subroutines, and input-output, Programming.

Micro programmed Control: Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT-IV

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC.

Parallel Processing: Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.

Computer Arithmetic: Addition and Subtraction, Multiplication algorithms, Division Algorithms, Floating point arithmetic operations, decimal arithmetic unit, and decimal arithmetic operations.

UNIT-V

Input – Output Organization : Peripheral Devices, I/O output interface, Asynchronous data transfer, Modes of transfer, Priority Interrupt, DMA, Input output Processor, Serial Communication.

Memory Organization: Memory Hierarchy, Main Memory, Cache Memory.

Suggested Reading:

1. M. Morris Mano, "Computer System Architecture", Pearson Education Asia, Third Edition, 2007.
2. Mile Murdocca, Vincent Heuring, "Computer Architecture and Organization", John Wiley & Sons, 2007.
3. Sivarama P Dandamudi "Fundamentals of Computer Organization and Design", Wiley Dream Tech Publishers, 2003.
4. William Stallings, "Computer Organization & Architecture", Pearson Education, Sixth : Edition, 2003.
5. G.V.Anjaneyulu, "Computer Organization", Himalaya Publishing House, 2nd Edition, 2010.

Communication Skills

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

The following are the objectives of the courses, to enable the students to

- Communicate clearly, accurately and appropriately
- Learn different models of interpersonal communication
- Work in teams effectively and learn how to be effective in using time
- Comprehend the difference between technical and general writing
- Write reports, scientific papers, letters, Statement of Purpose, Resume
- Learn how to plan and prepare to face interviews effectively

UNIT – I

Business Communication: Importance of business communication; ABC of technical communication – Accuracy, Brevity, Clarity; Channels of communication: Downward communication, Upward communication, Diagonal communication, Horizontal communication; Organisational GDs

UNIT – II

Interpersonal Communication and Personality Development: Models of interpersonal development, Johari window, Knapp's model, styles of communication; Team work; Persuasion techniques; Mobile Etiquette, e-mail Etiquette; Time Management

UNIT – III

Technical Written Communication: Differences between Technical Writing and General Writing; Report Writing: Types of Reports, Structure/Format, Language Style, Writing Technical Reports; Writing Scientific Papers

UNIT – IV

Career Oriented Written Communication: Writing SOPs; Job Application: Language style and Format; Résumé writing: design and style; Cover Letter; Business Letters: Letters of enquiry and responses, Letters of complaint, Letters of adjustment, Sales letters; Agenda and minutes of the meeting

UNIT – V

Interview Skills and Group Discussions: Interviews: Purpose, Planning, Preparation, Language and style, Sample interview questions and answers; Group discussions: Types of GDs, Features of good GDs, Preparing for a group discussion

Textbook prescribed:

1. E. Suresh Kumar, *Engineering English*, Orient Blackswan, 2014.

Books Recommended:

1. E. Suresh Kumar et al., *Communication Skills and Soft Skills*. Pearson, 2011.
2. E. Suresh Kumar et al., *English for Success*. Cambridge University Press India Private Ltd, 2010.
3. Sanjay Kumar and Pushp Lata. *Communication Skills*. OUP, 2011.
4. Kavita Tyagi and Padma Misra. *Professional Communication*. PHI, 2011.
5. Meenakshi Raman and Sangeeta Sharma. *Technical Communication: Principles and Practice*. OUP, 2011.

**Programming Lab-III
(OOP LAB)**

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

1. A program to illustrate the concept of class with constructors, methods and overloading.
2. A program to illustrate the concept of inheritance and dynamic polymorphism.
3. A program to illustrate the usage of abstract class.
4. A program to illustrate multithreading.
5. A program to illustrate thread synchronization.
6. A program to illustrate Exception handling.
7. A program to illustrate user-defined Exceptions
8. A program to demonstrate use of User-defined Packages.
9. A program using String Tokenize.
10. A program using Linked list class
11. A program using Tree Set class
12. A program using Hash Set and Iterator classes
13. A program using Map classes.
14. A program using Enumeration and Comparator interfaces.
15. A program using File and Filename Filter
16. A program to illustrate the usage of Byte and Character I/O streams.
17. A program to illustrate the usage of Serialization.
18. Program using Data class.
19. An application involving GUI with different controls, menus and event handling.
20. A program to implement an applet.

Programming Lab-IV
(C++ PROGRAMMING LAB)

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

1. Call-by-Value and Call-by-Reference example programs
2. Program on Function Overloading
3. Program on Inline Functions and Default Arguments
4. Program to check Identity Matrix, Upper Triangular and Lower Triangular Matrices
5. Program to find $A \cup B$ using Dynamic Memory Allocation
6. Implementation of Rational Numbers using classes
7. Program on Complex Numbers Class.
8. Implementation of Matrix Class.
9. Programs on Constructors, Destructors, and Friend Functions
10. Programs on Inheritance, Virtual Functions, Dynamic Polymorphism
11. Programs on Operator Overloading and Templates
12. Implementation of Stacks using Arrays
13. Program on Linear Lists using Arrays
14. Implementation of Queues using Linked Representation
15. Program on Single Linked List Operations
16. Program on Binary Tree Traversal Techniques

SCHEME OF INSTRUCTION
PGDCA (POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS)
Proposed from the Academic year 2017-2018

SEMESTER – I

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination	
			L	T	P		Sessions	Univ Exam
1.	CS101	Programming in C and Data Structures	4	0	0	4	20	80
2.	CS102	Elements of Information Technology	4	0	0	4	20	80
3.	CS103	Operating Systems	4	0	0	4	20	80
4.	CS104	Database Management Systems	4	0	0	4	20	80
5.	CS105	C and Data Structures Lab	0	0	4	4	25	50
6.	CS106	Information Technology Lab	0	0	4	4	25	50
7.	CS107	Database Management Systems Lab	0	0	4	4	25	50
Total			16	0	12	28	155	470

SCHEME OF INSTRUCTION
PGDCA (POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS)
Proposed from the Academic year 2017-2018

SEMESTER –I I

S.No	Course Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Examination	
			L	T	P		sessional	Univ Exam
1.	CS201	Computer Networks	4	0	0	4	20	80
2.	CS202	Object Programming using JAVA	4	0	0	4	20	80
3.	CS203	Software Engineering and Object Oriented Analysis and Design	4	0	0	4	20	80
4.	CS204	Web Programming	4	0	0	4	20	80
5.	CS205	JAVA Programming Lab	0	0	4	4	25	50
6.	CS206	Web Programming Lab	0	0	4	4	25	50
7.	CS207	Mini Project	0	0	4	4	25	50
Total			16	0	12	28	155	470

ELEMENTS OF INFORMATION TECHNOLOGY

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Information Concepts and Processing: Definition, Need, Qualities, value of information. Categories of information in business organization, levels of information, data concepts, logical and physical concepts, data processing, Introduction to office automation.

Number Systems: Binary numbers, octal numbers, hexadecimal numbers, Radix- decimal, octal, hexadecimal, conversion from one form to another-Examples, Representation of decimal, octal, hexadecimal numbers: fractional numbers and signed numbers, 1's and 2's complement forms, Binary arithmetic-addition, subtraction ,multiplication and division-Examples. Codes-Variou types- ASCII and 8 bit EBCDIC

UNIT –II

An overview of Computer System: Components of a computer system, various I/O and auxiliary storage devices, system software, Introduction to system software, Distinction between systems software and Application software. Introductory ideas of loaders and linkers, High level languages. Different languages, Introduction to Assemblers, Compilers and Interpreters, relative merits of compilers v/s interpreters.

UNIT-III

Operating Systems: Evolution, introduction to Operating System, functions and facilities, single tasking and multitasking OS, single user and multi-user OS, characteristics of MS-DOS and Unix operating systems , DOS and UNIX commands for file and process management.

UNIT-IV

Text editors: overview of editing process Graphical User Interfaces- Introduction to Windows, Word processing software packages and features, spread sheet packages and features.

Database : Introduction to database and database packages. Desktop Publishing: Introduction to desktop publishing and desk top publishing packages.

UNIT-V

Computer Communications: Computer to computer communication through networking, Introduction to computer networks and networking software, Types of Networks, Internet and Intranet , Electronic mail.

Multimedia and Virtual reality: Introduction to Multimedia and Virtual reality Specifications of a typical desktop computer system, Recent Developments in ICT Recommended

Suggested Reading:

1. Satish Jain , *Information Technology* , BPB Publications, 2015.
2. Alexis Leon and Mathews Leon, *Fundamentals Of Information Technology*, 2nd Edition, Vikas publishers, 2009.
3. V.Rajaraman, *Fundamentals of Computers*, 5th Edition, Prentice Hall India, 2011

PROGRAMMING IN C AND DATA STRUCTURES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT – I

Introduction to C Language - Background, C Identifiers, Data Types, Operators, Variables, Constants, Input / Output, Expressions, C Programs, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Bitwise Operators.

Selection: Logical Data and Operators, if-else, switch Statements, Standard Functions.

Repetition: loops, while, for, do-while statements, Loop examples, break, continue, go to.

UNIT-II

Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection, Bubble, Insertion Sorts.

Functions: Functions Basics, User Defined Functions, Inter Function Communication, Standard Functions, Scope, Storage Classes-Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.

Recursion- Recursive Functions, Terminating Condition, Preprocessor Commands.

UNIT – III

Pointers - Introduction, Pointers to Pointers, Compatibility, L value and R value, Arrays and Pointers, Pointer Arithmetic and Arrays.

Call-by-reference: Passing Arrays to a Function, **Dynamic Memory Allocation:** Memory Allocation Functions, Array of Pointers.

Strings - Concepts, String Input/Output Functions, Arrays of Strings, String Manipulation Functions, The Type Definition (type def), Enumerated Types.

UNIT - IV

Structure: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures and Unions.

Input and Output: Files, Streams, Standard library Input Output Functions, Character Input Output Functions.

UNIT - V

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack application-infix to postfix conversion, postfix expression evaluation, recursion implementation, Queues-operations, array and linked representations.

Suggested Reading:

1. B.A.Forouzan and R.F. Gilberg , *C Programming and Data Structures*, 3rd Edition, Cengage Learning, 2007.
2. Kernighan BW and Ritchie DM, “The C Programming Language”, 2nd Edition, Prentice Hall of India, 2006.

DATABASE MANAGEMENT SYSTEMS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Introduction to DBMS and ER Model: File Systems versus DBMS, Advantages of DBMS, Database Design and E-R Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

The Relational Model: Introduction to Relational Model, Integrity Constraints over Relations, Logical Database Design (ER to Relational), Introduction to Views, Destroying / Altering Tables & Views.

Schema Refinement and Normal Forms: Schema Refinement, Functional Dependencies, Normal Forms, Normalization, Schema Refinement in Database Design.

UNIT-II

Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational Calculus, Expressive Power of Algebra and Calculus.

SQL: Queries, Constraints, Triggers: The Form of Basic SQL Query, Set Operators, Nested Queries, Aggregate Operators, Null Values, Triggers and Active Databases, Designing Active Databases, Accessing Databases from Applications using Embedded SQL, Cursors, Dynamic SQL.

UNIT-III

Overview of Storage and Indexing: File Organizations and Indexing, Index Data Structures, Comparison of File Organizations.

Tree-Structured Indexing: Indexed Sequential Access Method (ISAM), B+ Trees, Search, Insert Delete, B+ Trees in Practice.

Hash-Based Indexing: Static Hashing, Extendible Hashing, Linear Hashing, Extendible versus Linear Hashing.

UNIT-IV

Transaction Management: ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control.

Concurrency Control: 2PL, Serializability, and Recoverability, Introduction to Lock Management, Dealing with Deadlock, Specialized Locking Techniques, Concurrency Control without Locking.

UNIT-V

Crash Recovery: Introduction to ARIES, The Log, Other Recovery Related Structures, The WAL, Check pointing, Recovering from a System Crash, Media Recovery.

Security and Authorization: Introduction to Database Security, Access Control, Discretionary Access Control, Mandatory Access Control, Additional Issues related to Security.

Suggested Reading:

1. Raghuram Ramakrishnan, Johannes Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill, 2003.
2. Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", 6th Edition, McGraw-Hill International Edition, 2011
3. Peter Rob, Carlos Coronel, "Database System Concepts", Cengage Learning, 2008
4. Ramez Elmasri, Durvasul VLN Somayajulu, Shamkant B Navathe, Shyam K Gupta, "Fundamentals of Database Systems", 6th Edition, Addison Wesley, 2011.

OPERATING SYSTEMS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT I

Introduction to Operating Systems: OS structure and strategies, Process concept, Interprocess communication, Threads, Multithreaded Programming. **Process Scheduling:** Scheduling Criteria, Scheduling Algorithms, Multi Processor scheduling, Thread Scheduling.

UNIT II

Memory Management: Swapping, Contiguous allocation, Paging, Static and dynamic partition, Demand paging, Page replacement Algorithms, Thrashing, Segmentation, Segmentation with Paging.

File System Interface: File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, and Protection.

File System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, and Free Space management, Efficiency and Performance, Recovery.

UNIT III

Process synchronization: Critical Section Problem, Semaphores, Monitors.

Deadlocks: Necessary conditions, Resource Allocation Graph, Methods for handling deadlocks, preventions, avoidance, detection and recovery. **Protection:** Goal, domain of protection, access matrix.

UNIT IV

Device Management: Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID structure and Storage Implementation.

I/O System: I/O hardware, Application TO Interface, Kernel I/O Subsystem, Transforming; I/O request to hardware. operation, STREAM

UNIT V

Case Studies: Linux System: Design Principles, Kernel Modules, Process Management, Scheduling Memory Management, File Systems, Input and Output, Inter-Process Communication, Network Structure, Security. **Windows XP:** General Architecture. The NT Kernel, The NT Executive.

Suggested Reading:

1. Abraham Silberschatz, Peter B Galvin, Greg Gagne, "*Operating System Concepts*", 9th Edition, Wiley India, 2016.
2. Andres S Tanenbaum, "*Modern Operating Systems*", 4th Edition, PHI, 2016.
3. Robert Love, "*Linux Kernel Development*", Pearson Education, 2004.
4. William Stallings, "*Operating Systems*", 7th Edition, PHI, 2012.

C AND DATA STRUCTURES LAB

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

1. Finding the maximum and minimum of given set of numbers
2. Finding Roots of a Quadratic Equation
3. Sin x and Cos x values using series expansion
4. Conversion of Binary to Decimal, Octal, Hexa and Vice versa
5. Generating a Pascal triangle and Pyramid of numbers
6. Recursion: Factorial, Fibonacci, GCD
7. Matrix addition and multiplication using arrays
8. Bubble Sort, Selection Sort
9. Programs on Linear Search and Binary Search using recursive and non-recursive procedures.
10. Programs using functions for string manipulation operations.
11. Find the No. of characters, words and lines in a given text file
12. File Handling programs.
13. Implementation of Stacks using Arrays and Linked lists representation
14. Implementation of Queues using Linked Representation
15. Program on Single Linked List Operations.
16. Program on Binary Tree Traversal Techniques

ELEMENTS OF INFORMATION TECHNOLOGY LAB

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Syllabus:

1. System Assembling , Disassembling and identification of Parts / Peripherals
2. Operating System Installation – Install Operating Systems like Windows, Linux along with necessary Device Drivers.
3. MS-Office / Open Office
 - a. Word – Formatting Page Borders, Reviewing Equations, symbols
 - b. Spread Sheet – organize data, usage of formula graphs charts
 - c. Power point – features of power point, guidelines for preparing an effective presentation
 - d. Access – creation of database, validate data
4. Network Configuration & Software Installation : Configuring TCP/IP, proxy and firewall settings. Installing application software system software & tools.
5. Internet and World Wide Web-Search Engines. Types of search engines, netiquette, Cyber hygiene.
6. Trouble Shooting – Hardware trouble shooting, Software trouble shooting.

Suggested Reading:

1. K. L. James, Computer Hardware, Installation, Interfacing Troubleshooting and Maintenance, Eastern Economy Edition.

DATABASE MANAGEMENT SYSTEMS LAB

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

I. SQLIPL- SQL:

1. Creation of database (exercising the commands for creation)
2. Simple to complex condition query creation using SQL plus
3. Demonstration of blocks, cursors & database triggers.

II. Forms / Reports :

4. Creation of forms for the case study assigned.
5. Creation of Reports based on different queries.
6. Creating password and security features for applications.
7. Usage of file locking and table locking facilities in applications.
8. Creation of Small full fledged database application spreading over to 3 sessions.

Note :

- (i) Use Case Studies as Library Information Studies, Pay roll System, Bank Information System, Reservation System, Inventory System, etc.
- (ii) The creation of Sample database, for the purpose of the experiments is expected to be decided by the instructor based on the case study assigned to the students.
- (iii) Oracle DBMS package should be used to carry the Lab experiments.

COMPUTER NETWORKS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Data Communications : Components - Direction of Data flow - networks -Components and Categories - types of Connections - Topologies -Protocols and Standards - ISO/OSI model, TCP/IP. Transmission Media - Coaxial Cable - Fiber Optics - Line Coding - Modems - RS232 Interfacing.

UNIT II

Datalink Layer : Error detection and correction, CRC, Hamming code, Flow Control and Error control - stop and wait - go back-N ARQ - selective repeat ARQ-sliding window - HDLC.

MAC Layer : LAN - Pure and Slotted ALOHA, Ethernet IEEE 802.3 -IEEE 802.4 -IEEE 802.5, Bridges.

UNIT-III

Network Layer : Internetworks - virtual circuit and Datagram approach, Routers IP addressing, Subnetting, CIDR. Routing - Distance Vector Routing, Link State Routing, OSPF and BGP.

UNIT-IV

Transport Layer : Services of transport layer, Multiplexing. Transmission Control Protocol (TCP) - Congestion Control, Time management, Quality of services (QOS) and User Datagram Protocol (UDP)

UNIT-V

Application Layer : Domain Name Space (DNS) - SMTP - FTP - HTTP - WWW.

Suggested Reading:

1. Andrew S. Tanenbaum, "*Computer Networks*", Pearson Education; Fourth Edition, 2008.
2. Behrouz A. Forouzan, "*Data Communication and Networking*", Tata McGraw-Hill, 2009.
3. James F. Kurose and Keith W. Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet*", Pearson Education, 2006.

PRINCIPLES OF OBJECT ORIENTED PROGRAMMING USING JAVA

Instruction	4 periods per week
Duration of university Examination	3 hours
University Examination	70 Marks
Sessional	30 Marks

UNIT-I

Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Oriented Concepts, Benefits of Object Oriented Development.

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements, Classes, Methods, Inheritance, Packages and Interfaces.

UNIT-II

Exception Handling, Multithreaded Programming, I/O basics, Reading console input and output , Reading and Writing Files, Print Writer Class, String Handling.

UNIT-III

Exploring Java Language, Collection Overview, Collections Interfaces, Collection Classes, Iterators, Random Access Interface, Maps, Comparators, Arrays, Legacy classes and Interfaces, String Tokenizer, Bit Set, Date, Calendar observable, Timer.

UNIT-IV

Java I/O classes and Interfaces, Files, Stream and Byte Classes, Character Streams, Serialization.

UNIT-V

GUI [and Event Driven Programming : Applet Class, Event Handling, Delegation event model, event classes, event listener Interfaces. Customizing Frame Windows, GUI Programming Basics, Text Related GUI Components, Layout Managers, Effective use of Nested panels, Other GUI components, Menus and Handling Mouse Events.

Suggested Reading:

1. Patrick Naughton , *JAVA 2, The Complete Reference*, Tata McGraw Hill, 2005.
2. Richard A. Johnson, *Java Programming and Object-Oriented Applications Development*, Cengage Learning, India Edition, 2009.
3. John Dean and Raymond Dean, *Introduction to Programming with JAVA A Problem Solving Approach*, McGraw Hill, 2008.
4. Joe Wigglesworth and Paula McMillan, *Java Programming Advanced Topics*” Cengage Learning, 3rd Edition, 2009.

SOFTWARE ENGINEERING AND OBJECT ORIENTED ANALYSIS AND DESIGN

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Software Processes: - Process and project, Component Software Processes, Software Development Process Models, Project Management Process.

Software Requirements Analysis and Specification: Value of a good SRS, Requirements Process, Requirements Specification, Functional Specification with Use Cases, Other approaches for analysis

UNIT-II

Software Architecture: Role of Software Architecture Views, Component and connector view, Architectural styles for C & C view, Documenting Architecture Design, Evaluating Architectures.

Planning a Software Project: Effort Estimation, Project Schedule and staffing, Quality Planning, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling. **Design:** Design concepts, Function Oriented Design, Object Oriented Design, Detailed Design, Verification, Metrics.

UNIT-III

Coding and Unit Testing: Programming Principles and Guidelines, Incrementally developing code, managing evolving code, unit testing, code inspection, Metrics

Testing: Testing Concepts, Testing Process, Black Box testing, White box testing, Metrics.

UNIT-IV

Maintenance and Re-engineering: Software Maintenance, supportability, Reengineering, Business process Reengineering, Software reengineering, Reverse engineering; Restructuring, Forward engineering, Economics of Reengineering.

UML Introduction : Why we model, Introducing the UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams.

UNIT-V

Unified Software Development Process: The Unified Process, The Four Ps, A Use- Case- Driven Process, An Architecture, An Architecture – Centric Process, An Iterative and incremental Process. **Core Workflows:** Requirements Capture, Capturing Requirements as Use Cases, Analysis, Design, Implementation, Test.

Suggested Reading:

1. Pankaj Jalote, "*Software Engineering- A Precise Approach*", Wiley India, 2010.
2. Roger. S.Pressman , "*Software Engineering - A Practitioner's Approach*", 7th Edition, McGraw Hill Higher Education, 2010.
3. Deepak Jain, "*Software Engineering*", Oxford University Press, 2008
4. Ivor Jacobson, Grady Booch, James Rumbaugh, *The Unified Software Development Process*, Pearson Education, India, 2008.

WEB PROGRAMMING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

HTML: Markup languages, common tags, header, text styling, linking images Formatting text, Unordered lists, nested and ordered list, Tabs-and formatting, Basic forms; Complex forms linking, Meta Tags. Dynamic HTML: Cascading style sheets in line styles, style element External Style sheet, text flow and Box model, user style sheets.

UNIT-II

Object model and collections: Object referencing, collections all, children frames, navigator object. Event model: ONCLICK, ONLOAD, Error Handling, ON ERRORS ONMUOUSEMOVE, ONMUSEOVER, ONMOUSEOUT, ONFOCUS, ONBLUR, ONSUBMIT. Dynamic HTML: Filters and transitions, Data binding with Tabular data control binding to IMO, TABLE, Structured graphics, Active controls.

UNIT-III

Introduction to scripting, Java Script, Data types, Arithmetic's Equality relational, assignment increment, decrement operators, Java Script Control Structures- if, if-else, while.

Java Script Control Structures: For, Switch, Do/while, break.

Programming modules, recursion, recursion vs iteration global functions arrays,. using arrays, Reference and reference parameters, passing arrays to functions, multiple subscripted arrays, objects-math, string. Boolean and number.

UNIT-IV

Client side scripting with VB Script, operations, Data types and control structures, Functions, Arrays, String manipulations, classes and objects. Web Servers : Personal Web server, Internet information server, Apache Web Server, Installation of a Web Server.

UNIT-V

Active Sever Pages, Client side Scripting vs Server side Scripting, Server side Active X Component, ADO, file system objects, Session tracking, CGI and PERL5, String. Processing and Regular Expressions, Server side includes, Cookies and PERL XML Document Type Definition, XML Parsers, Using XML with HTML.

Suggested Reading:

1. Deiterl, Deitel & NIETO, "*Internet & World Wide Web - How to Program*", Pearson Education, Third Edition, 2004.
2. Steven Holzner, "*HTML Black Book - Comprehensive Problem Server*", Dream Tech Press, 2000.
3. B Sosinsky, V Hilley, "*Programming the Web - An Introduction*", MGH, 2004.

JAVA PROGRAMMING LAB

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

1. A program to illustrate the concept of class with constructors, methods and overloading.
2. A program to illustrate the concept of inheritance and dynamic polymorphism.
3. A program to illustrate the usage of abstract class.
4. A program to illustrate multithreading.
5. A program to illustrate thread synchronization.
6. A program to illustrate Exception handling.
7. A program to illustrate user-defined Exceptions
8. A program to demonstrate use of User-defined Packages.
9. A program using String Tokenize.
10. A program using Linked list class
11. A program using Tree Set class
12. A program using Hash Set and Iterator classes
13. A program using Map classes.
14. A program using Enumeration and Comparator interfaces.
15. A program using File and Filename Filter
16. A program to illustrate the usage of Byte and Character I/O streams.
17. A program to illustrate the usage of Serialization.
18. Program using Data class.
19. An application involving GUI with different controls, menus and event handling.
20. A program to implement an applet.

INTERNET AND WEB PROGRAMMING LAB

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

1. Creating HTML pages to test different Tags.
 - a) Headers
 - b) Linking Images.
 - c) Images as anchor.
 - d) Text Formatting.
 - e) HTML Table Formatting.
 - f) Ordered and Unordered lists.
2. Creation of Frames.
3. Examination result in Java Script.
4. Creation of Quiz program.
5. Usage Data and the methods of Date and Time objects.
6. Floating alerts, aligning text and setting box dimension using CSS.
7. Demonstrating object hierarchy using collection children.
8. Using HTML Events.
9. Using Transition & Filters like Flip filter, Chrome filter, Shadow filter etc.,
10. VB script classes and regular expression.
11. Installing Web Server (PWS or IIS).
12. Guest book Active Server pages.
13. Creation of Small full fledged database application using ADO spreading over to 3 sessions.

MINI PROJECT-I

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

The students are required to carry out mini project that involves usage of data mining tools, various algorithms to pre process and analysis related to the data mining problems.

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

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

All the projects are to be evaluated by a monitoring committee comprising of project coordinator and the supervisor on the basis of an oral presentation, demonstration, mini project report and Viva-Voce.