NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Final Year Engineering (Computer)

Faculty of Engineering and Technology

Teacher and Examiner's Manual

Semester – VII

W.E.F. 2015 – 2016

Advanced UNIX Programming

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit – I

Teacher should facilitate learning of Basic Concepts of UNIX System.

1.			Lect required	Ref No
	a	**Unix System Overview**- Introduction, UNIX Architecture, Logging In, Files and Directories, Input and Output	01	01
	b	Programs and Processes, Error Handling, User Identification, Signals	01	01
	c	Time Values, System Calls and Library Functions	02	01
	d	**File I/O**- Introduction, File Descriptors, open Function, creat Function, close Function, lseek Function, read Function, write Function	01	01
	e	File Sharing, Atomic Operations- Appending to a file, Creating a file	02	01
	f	dup and dup2 Functions, sync, fsync, and fdatasync functions, fcntl function	01	01

References:

1	W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

Unit - II

Teacher should facilitate learning of Files and Directories along with system file.

2.			Lect required	Ref No
	a	**Files and Directories**- Introduction, stat, fstat, and lstat Functions, File Types, File Access Permissions, access Function, umask Function	01	01
	b	chmod and fchmod Functions, Sticky Bit, File Size, File Truncation, File Systems, link, unlink, remove and rename Functions	02	01
	c	Symbolic Links, symlink and readlink Functions, File Times, mkdir and rmdir Functions, chdir, fchdir, and getcwd Functions	01	01
	d	**System Data Files and Information** – Introduction, Password File-getpwuid, getpwnam, getpwent, setpwent, endpwent, Shadow Passwords- getspnam, getspent, setspent, endspent	02	01
	e	Group File- getgrgid, getgrnam, getgrent, setgrent, endgrent, Login Accounting, System Identification- uname, gethostname	01	01
	f	Time and Date Routines- time, gettimeofday, gmtime, localtime, mktime, asctime,ctime, strftime	01	01

References:

1	W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

Unit – III

Teacher should facilitate learning of process environment and control.

3.			Lect required	Ref No
	a	**Process Environment-** Introduction, main Function, Process Termination- Exit Functions, atexit Function	02	01
	b	Command-Line Arguments, Environment List, Memory Layout of a C Program, Memory Allocation- malloc , calloc, realloc, free	01	01
	c	Environment Variables	01	01
	d	**Process Control** – Introduction, Process Identifiers- getpid, getppid, getuid, geteuid, getgid, getegid	01	01
	e	fork Function- file sharing, vfork Function, wait and waitpid Functions	02	01
	f	Race Conditions, exec Functions- execl, execv, execle, execve, execlp, execvp, Process Accounting	01	01

References:

1	W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

Unit – IV

Teacher should facilitate learning of signals, threads and daemon process.

4.			Lect required	Ref No
	a	**Signals** – Introduction, Signal Concepts, signal Function, Unreliable Signals	01	01
	b	Interrupted System call ,Reliable-Signal Terminology and Semantics, kill and raise Functions, alarm and pause Functions	02	01
	c	Signal Sets- sigemptyset, sigfillset, sigaddset, sigdelset, sigismember, sleep Function	01	01
	d	**Threads** – Introduction, Thread Concepts, Thread Identification- pthread_equal, pthread_self, Thread Creation- pthread_create, Thread Termination- pthread_exit, pthread_join, pthread_cancel, pthread_cleanup_push, pthread_cleanup_pop, pthread_detach	02	01
	e	Thread Synchronization-pthread_mutex_init, pthread_mutex_destroy,pthread_mutex_lock, pthread_mutex_trylock, pthread_mutex_unlock	01	01
	f	**Daemon Processes** – Introduction, Daemon Characteristics, Coding Rules, Error Logging	01	01

References:

1	W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

Unit - V

5.			Lect required	Ref No
	a	**Interprocess Communication** – Introduction, Pipes, FIFOs- mkfifo, XSI IPC, identifires and keys, ftok	02	01
	b	Message Queues- msgget, msgctl, msgsnd, msgrcv, Semaphores- semget, semctl, semop, Shared Memory-shmget, shmctl, shmat, shmdt	02	01
	c	**Network IPC-** Socket Descriptors- socket, shutdown	01	01
	d	Associating Addresses with sockets- bind	01	01
	e	Connection Establishment- connect, listen, accept	01	01
	f	Data Transfer- send, recv	01	01

References:

1	W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

Artificial Intelligence & Expert System

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

Teacher should facilitate basic of Artificial Intelligence:

1	**Introduction to Artificial Intelligence**		Lecture required	Ref No
	a.	Definitions of AI, History, AI representation	02	1
	b.	Turing test	01	1
	c	AI Problem and Techniques: Problem as State Space Search, Problem Characteristics	01	1
	d.	Production System: Production Rules ,Water Jug Problem	02	1
	e.	Heuristic Search Techniques: BFS, DFS, A*, AO*, Mean Ends Analysis	02	1

Text Book:

1	Elaine Rich, Kevin Knight and Shivshankar B. Nair ,"Artificial Intelligence", 3rd Edition TMH

Unit-II

Teacher should facilitate Process of Knowledge Engineering:

2.	**Knowledge Engineering**		Lecture required	Ref No
	a.	Knowledge Representation Issues	02	1
	b.	Knowledge Representation using Predicate Logic	02	1
	c	Knowledge Representation using Rules	02	1
	d.	Weak and Strong Filler Structures for Knowledge : Semantic net, Frames, Script, Conceptual dependency.	02	1

Text Book:

1	Elaine Rich, Kevin Knight and Shivshankar B. Nair ,"Artificial Intelligence", 3rd Edition TMH

Unit –III

Teacher should facilitate basic of Game Playing and Planning

3.	**Game Playing and Planning**		Lecture required	Ref No
	a.	Minimax Search with Additional Refinements	02	1
	b.	Overview of Planning	01	1
	c.	Goal Stack Planning : Block World, STRIPS	02	1
	d.	Nonlinear, Hierarchical and other Planning Techniques	02	1
	e.	Perception and Action	01	1

Text Book:

1	Elaine Rich, Kevin Knight and Shivashankar B. Nair ,"Artificial Intelligence", 3rd Edition TMH

Unit-IV

Teacher should facilitate basic of Understanding , NLP and Learning

4.	**Understanding , NLP and Learning**		Lecture required	Ref No
	a.	Understanding as a Constraint satisfaction : Waltz's algorithm, Constraint determination, Trihedral and Nontrihedral figures labelling.	02	1
	b.	Natural Language Processing steps .	02	1
	c.	Learning techniques .	02	1
	d.	Neural Network Learning :Biological neuron, Artificial neuron, Architecture of Neural Network and Learning	02	1

Text Book:

1	Elaine Rich, Kevin Knight and Shivashankar B. Nair ,"Artificial Intelligence", 3rd Edition TMH

Unit-V

Teacher should facilitate basic of Expert Systems

5.	**Expert Systems**		Lecture required	Ref No
	a.	Architecture of Expert System	01	1
	b.	Utilization and functionality	02	1
	c.	Knowledge Representation and Utilization in Expert System	01	1
	d.	Two Case Studies of Expert System	01	1
	e.	Expert System Shell	02	1
	f.	Applications of Expert System	01	1

Text Book:

1	Elaine Rich, Kevin Knight and Shivashankar B. Nair ,"Artificial Intelligence", 3rd Edition TMH

Reference Books:

1. B. Yegnanarayana, "Artificial Neural Network", PHI
2. S. Rajasekaran and G. A. Vijayalakshmi, "Neural Networks, Fuzzy Logic, and Genetic Algorithms" PHI
3. Timothy J Ross, "Fuzzy Logic with Engineering Application", TMH
4. Dan W. Patterson, "Introduction to artificial intelligence and expert system", PHI

Software Engineering & Project Management
(Inter Disciplinary Elective)

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

Teacher should facilitate basic of Software Engineering:

1	**Introduction to Software Engineering**		Lecture required	Ref No
	a.	Nature of Software	01	1
	b.	Software Process	01	1
	c	Software Engineering Practice	01	1
	d.	Software Myths	01	1
	e.	Generic Process model	01	1
	f.	Process Assessment and Improvement	01	1
	g.	Perspective Process Models, Specialized Process Models	01	1
	h.	Personal and Team Process Models	01	1

References:

1	Pressman Roger S., "Software Engineering: A Practitioners Approach", 7th Edition, Tata McGraw Hill.

Unit-II

Teacher should facilitate Project Management:

2.	**Introduction to Project Management**		Lecture required	Ref No
	a.	What is project, The triple constraint	01	1
	b.	What is project management , Stakeholders, Project Management Knowledge Area , Project Management tools and techniques	01	1
	c	Role of a Project Manager , Project Manager's job description, Suggested Skills for Project Manager , Importance of people and leadership skills	01	1
	d.	Project Management	01	1
	e.	Organizational Structure	01	1
	f.	Project Life Cycle and Phases	01	1
	g.	Nature of IT projects, Characteristics of IT project Team members	01	1
	h.	Trends affecting IT Project Management, Globalization , Outsourcing , Virtual Teams	01	1

References:

1	Joseph Phillips, PMP Project Management Professional Study Guide, Third Edition McGraw Hill.

Unit –III

Teacher should facilitate Project Integration & Scope Management:

3.	**Project Integration & Scope Management**		Lecture required	Ref No
	a.	Project Selection	01	1
	b.	Developing Project Charter	01	1
	c.	Developing Project Charter	01	1
	d.	Developing Project Management Plan	01	1
	e.	Collecting Requirements	01	1
	f.	Collecting Requirements	01	1
	g.	Creating Work Breakdown Structure	01	1
	h.	Controlling Scope	01	1

References:

1	Joseph Phillips, PMP Project Management Professional Study Guide, Third Edition McGraw Hill.

Unit-IV

Teacher should facilitate Project Time & Cost Management

4.	**Project Time & Cost Management**		Lecture required	Ref No
	a.	Defining and Sequencing Project Activities and Dependencies	01	1
	b.	Developing Schedule, Gantt Chart, Critical Path Method , Incorporating Project Uncertainty - PERT , Critical Chain Method	01	1
	c.	Resource loading and Resource Leveling	01	1
	d.	Schedule Controlling, Estimating Techniques	01	1
	e.	Earned Value Management, Project Quality Management	01	1
	f	Planning Quality	01	1
	g.	Performing Quality Assurance	01	1
	h.	Quality Control, Tools and Techniques	01	1

References:

1	Joseph Phillips, PMP Project Management Professional Study Guide, Third Edition McGraw Hill.

Unit-V

Teacher should facilitate Project Resource & Communication Management

5.	**Project Resource & Communication Management**		Lecture required	Ref No
	a.	Development of Human Resource Plan	01	1
	b.	Project Organizational Chart and Responsibility Assignment	01	1
	c.	Project Organizational Chart and Responsibility Assignment	01	1
	d.	Multi project Scheduling and Resource Allocation	01	1
	e.	Multi project Scheduling and Resource Allocation	01	1
	f.	Identifying Stakeholders	01	1
	g.	Identifying Stakeholders	01	1
	h	Planning Communication	01	1

References:

1	Joseph Phillips, PMP Project Management Professional Study Guide, Third Edition McGraw Hill.

Reference Books:

1. Samuel Mantel, Jack Meredith, Scott Shafer, Margaret M. Sutton, With M.R. Gopalan,"Project Management Core Text Book", Wiley India Edition.
2. K.K. Chitkara, Uddesh Kohli, "Project Management Handbook", Tata McGraw-Hill Education Pvt. Ltd., 2006

Enterprise Resource Planning and SAP
(Inter Disciplinary Elective)

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit - I

Teacher should facilitate learning of Enterprise Resource Planning, Enterprise and advantages of ERP.

1.	ERP Introdution		Lect required	Ref No
	a	Enterprise – An Overview: Introduction, Business Function and Business Processes, Integrated management Information, Role of enterprising ERP system, Business Modeling, Integrated data model	04	01
	b	Introduction to ERP: Introduction, Common ERP Myths, A Brief History of ERP, The Advantages of ERP, Roadmap for the successful ERP Implementation	04	01

References:

1	Alexis Leon, " Enterprise Resource Planning", Second Edition, Tata Mcgraw Hill

Unit - II

Teacher should facilitate learning of ERP risk, benefits and Related Technologies like BPR, Data Warehousing, Data Mining, On-line analytical processing (OLAP), PLM, Supply chain management (SCM) and Customer relationship management (CRM).

2.	ERP Risk, Benefits and Related Technologies		Lect required	Ref No
	a	Risks and Benefits of ERP: The quantifiable benefits from ERP system, The Intangible Benefits of ERP, Risks of ERP, Risks factor of ERP implementation, Benefits of ERP	04	01
	b	ERP and Related Technologies: Introduction, BPR, Data warehousing, Data Mining, OLAP, PLM, SCM, CRM, GIS, Internet and Extranet	04	01

References:

1	Alexis Leon, " Enterprise Resource Planning", Second Edition, Tata Mcgraw Hill

Unit – III

Teacher should facilitate learning of ERP functional modules and Implementation life cycle.

3.	ERP Functional Modules and Implementation		Lect required	Ref No
	a	ERP Functional Modules: Introduction, Functional Modules of ERP software, Supply chain and customer relationship application	02	01 & 02
	b	ERP Implementation Life Cycle: Introduction, Objective of ERP Implementation, Different phases of ERP Implementations	01	01 & 02

References:

1	Alexis Leon, " Enterprise Resource Planning", Second Edition, Tata Mcgraw Hill

Unit – IV

Teacher should facilitate learning of ERP Consultants, vendor & employees, eBusiness and Future Direction

4.		ERP Consultants, Vendor & Employees, eBusiness and Future Direction	Lect required	Ref No
	a	Consultants, Vendors and Employees: Introduction, In-house implementation-Pros and Cons, Vendors, Consultants, Employee and Employee resistance, Reason for employee resistance, Dealing with employee resistance	03	01
	b	ERP and eBusiness: Introduction, ERP and eBusiness, eBusiness-supply chain integration, The eBusiness process model, Components of the eBusiness supply chain, ERP/eBusiness integration, ERP internet and WWW	03	01
	c	Future Direction and Trends in ERP: Introduction, New market new channel and faster implementation methodologies	02	01

References:

1	Alexis Leon, " Enterprise Resource Planning", Second Edition, Tata Mcgraw Hill

Unit - V

Teacher should facilitate learning of SAP Introduction and Architecture of Web Application Server

5.		SAP Introduction and Architecture of Web Application Server	Lect required	Ref No
	a	SAP Introduction: SAP Transformation into a Global Business, SAP for industries, SAP R/3 Releases and Fundamentals, SAP Enterprise Core Application Overview, SAP Services Overview	04	01
	b	The Architecture of the SAP Web Application Server: The SAP Web Application Server, Basic Architectural Concepts, Services Work Process Types, Building the Client/Server SAP web AS System	04	01

References:

1	Jose A. Hernandez, Jim Keogh, Franklin Foster Mertinez, " SAP R/3 Handbook", Third Edition, Tata McGraw Hill

Advanced Computer Architecture (Elective I)

Teacher, Paper setter and Examiners should follow the guidelines as given below.

Unit – I

1.	Introduction to Parallel Processing		Lectures Required	Ref. No.
	a	**Evolution of parallel processors with future trends & applications:** Generation of Computer System, Trends towards parallel processing	01	2
	b	**Parallelism in Uniprocessor system:** Basic Uniprocessor Architecture, Parallel Processing Mechanisms, Balancing subsystem bandwidth, Multiprogramming and Time sharing	02	2
	c	**Parallel computer structure:** Pipeline Computers, Array computers, Multiprocessor system, Performance of Parallel Computers, Dataflow and new concepts	01	2
	d	**Architectural classification schemes:** Multiplicity of Instruction-Data stream, Serial versus parallel processing, Parallelism versus Pipeline	01	2
	e	System Attributes to Performance	01	1,2
	f	**Program and Network Properties:** Condition of Parallelism, Program Partitioning and scheduling, Program flow mechanisms, System interconnect architecture	02	1

References:

1.	Kai Hwang, "Advance Computer Architecture, Parallelism, Scalability, Programmability", Mc-GrawHill Publication
2.	Kai Hwang and Faye A Briggs, "Computer Architecture and Parallel Processing"

Unit – II

2.	Memory Hierarchy and Processor		Lectures Required	Ref. No.
	a	**Hierarchical Memory Technology:** Register and caches, Main memory, Disk drives and Tape units, Peripheral Technology	01	1
	b	**Back Plan Bus Systems:** Backplane bus specification, Addressing and timing Protocol, Arbitration, transaction and Interrupt,	02	1
	c	**Shared Memory Organization:** Interleaved Memory Organization, Bandwidth and Fault tolerance, Memory allocation systems	02	1
	d	**Advanced Processor Technology:** Design space of processor, Instruction-Set Architecture	01	1
	e	**RISC and CISC Scalar Processor**	01	1

	f	**Superscalar and Vector Processors:** Superscalar Processors, The VLIW Architecture, Vector and Symbolic processor	01	1

References:

1.	Kai Hwang, "Advance Computer Architecture, Parallelism, Scalability, Programmability", Mc-GrawHill Publication

Unit – III

3.		Pipelining Processors and its Super Scalars Techniques	Lectures Required	Ref. No.
	a	**Principles of Linear Pipelining**	01	2
	b	**Linear pipelining processors :** Asynchronous and Synchronous models, Clocking and timing control, Speedup, Efficiency and Throughput **Nonlinear pipelining processors:** Reservation and Latency Analysis, Collision free scheduling, Pipeline schedule optimization	03	1
	c	**General Pipelining & Reservation Table**	01	1
	d	**SIMD Array Processors**: SIMD Computer organization, Masking and Data Routing Mechanism, Inter-PE Communication	01	2
	e	**Parallel Algorithm for array processor:** SIMD Matrix Multiplication, Parallel Sorting on Array processor	01	2
	f	**Associative array Processing:** Associative Search algorithm	01	2

References:

1.	Kai Hwang, "Advance Computer Architecture, Parallelism, Scalability, Programmability", Mc-GrawHill Publication
2.	Kai Hwang and Faye A Briggs, "Computer Architecture and Parallel Processing"

Unit – IV

4.		Multiprocessors Architecture	Lectures Required	Ref. No.
	a	Loosely and Tightly coupled multiprocessor	01	2
	b	Processor characteristics for multiprocessing	01	2
	c	**Parallel algorithm for multiprocessors:** Classification of Parallel Algorithms, Performance of Parallel algorithms	02	2
	d	Synchronized and Asynchronous parallel algorithm	02	2
	e	**Vector Processing Principles:** Vector Instruction Types, Vector Access Memory Schemes	02	1

References:

1.	Kai Hwang, "Advance Computer Architecture, Parallelism, Scalability, Programmability", Mc-GrawHill Publication
2.	Kai Hwang and Faye A Briggs, "Computer Architecture and Parallel Processing"

Unit – V

5.		Principles of Multithreading	Lectures Required	Ref. No.
	a	**Principles of Multithreading:** Multithreading Issues and Solutions, Multiple-Context Processors, Multidimensional Architectures	02	1
	b	**Parallel Programming modules:** Shared-variable Model, Message Passing Model, Data-parallel Model, Object-oriented Model, Functional and Logic Model	02	1
	c	**Parallel Languages:** Language features for parallelism	01	1
	d	**Data Flow Computer Architecture:** Static Data Flow Computer, Dynamic Data Flow computers, Data Flow Design Alternatives	01	2
	e	**Data driven computing and languages:** Control-Flow versus Data Flow Computers, Data Flow Graphs and Languages, Advantages and Potential Problems	02	2

References:

1.	Kai Hwang, "Advance Computer Architecture, Parallelism, Scalability, Programmability", Mc-GrawHill Publication
2.	Kai Hwang and Faye A Briggs, "Computer Architecture and Parallel Processing"

Android Programming (Elective I)

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

1.	Introduction to Mobile Operating Systems and Mobile Application Development		Lect required	Ref No
	a	**Introduction to Mobile OS:**Palm OS, Windows CE, Embedded Linux, J2ME (Introduction), Symbian (Introduction)	01	01,02,03
	b	**Overview of Android:**Devices running android, Why Develop for Android, Features of Android, Architecture ofAndroid, Libraries.	01	01,02,03
	c	**Setup Android Development Environment:** Android development Framework- - Android-SDK Eclipse, Emulators – What is an Emulator / Android AVD? , Creating & setting up custom Android emulator, Android Project Framework	02	01,02,03

References:

1	Reto Meier, "Professional Android™ Application Development", Wrox Publications
2	Lauren Dercy and Shande Conder, "Sams teach yourself Android application development" , Sams publishing
3	Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

Unit – II

2.	Android Activities, UI Design and Database		Lect required	Ref No
	a	Understanding Intent**,** Activity, Activity Lifecycle and Manifest, Form widgets, Text Fields	01	01,02,03
	b	**Layouts:** Relative Layout, Table Layout, Frame Layout, Linear Layout, Nested layouts	01	01,02,03
	c	**UI design:** Time and Date, Images and media, Composite, Alert Dialogs & Toast, Popup	02	01,02,03
	d	**Menu:** Option menu, Context menu, Sub menu	01	01,02,03
	e	**Database:** Introducing SQLite, SQLite Open Helper, SQLite Database, Cursor	01	01,02,03
	f	**Content providers:**defining and using content providers, example- Sharing database among twodifferent applications using content providers, Reading and updating Contacts, Reading bookmarks	02	01,02,03

References:

1	Reto Meier, "Professional Android™ Application Development", Wrox Publications
2	Lauren Dercy and Shande Conder, "Sams teach yourself Android application development" , Sams publishing
3	Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

Unit – III

3.	Preferences, Intents and Notifications		Lect required	Ref No
	a	**Preferences:**Shared Preferences, Preferences from xml	02	01,02,03
	b	**Intents:** Explicit Intents, Implicit intents	03	01,02,03
	c	**Notifications:** Broadcast Receivers, Services (Working in background) and notifications, Alarms	03	01,02,03

References:

1	Reto Meier, "Professional Android™ Application Development", Wrox Publications
2	Lauren Dercy and Shande Conder, "Sams teach yourself Android application development" , Sams publishing
3	Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

Unit – IV

4.	Telephony, SMS and Location Based Services		Lect required	Ref No
	a	**Telephony:** Accessing phone and Network Properties and Status, Monitoring Changes in Phone State, Phone Activity and data Connection	03	01,02,03
	b	**SMS:** Sending SMS and MMS from your Application, sending SMS Manually, Listening for incoming SMS	03	01,02,03
	c	**Location based Services:** Using Location Based Services, Working with Google Maps, Geocoder.	02	01,02,03

References:

1	Reto Meier, "Professional Android™ Application Development", Wrox Publications
2	Lauren Dercy and Shande Conder, "Sams teach yourself Android application development" , Sams publishing
3	Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

Unit – V

5.	Accessing Android Hardware		Lect required	Ref No
	a	**Networking:** An overview of networking, checking the network status, communicating with a server socket, Working with HTTP, Web Services	03	01,02,03
	b	**Bluetooth:** Controlling local Bluetooth device, Discovering and bonding with Bluetooth devices, Managing Bluetooth connections, communicating with Bluetooth	03	01,02,03
	c	**Audio and Video:** Playing Audio and Video, Recording Audio and Video, Using Camera and Taking Picture	02	01,02,03

References:

1	Reto Meier, "Professional Android™ Application Development", Wrox Publications
2	Lauren Dercy and Shande Conder, "Sams teach yourself Android application development" , Sams publishing
3	Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

Human Computer Interaction (Elective I)

Unit – I

Teacher should facilitate learning of basics of human computer interaction

1.	Introduction and Basic Concept		Lecture required	Ref No
	a	**Introduction** Importance of user interface, Defining the user interface, Importance of good design, GUI-Benefits of good UI.	02	01,02
	b	**Graphical User Interface** Concept of Direct Manipulation, Indirect manipulation Graphical systems :Advantage and disadvantage	02	02
	c	Characteristics of Graphical User Interface.	02	02
	d	**The web user Interface** GUI versus web page design, Characteristics of Web UI.	02	02

Unit - II

Teacher should facilitate learning of Design process

1.	Design Process		Lecture required	Ref No
	a	**The Human interaction with computer** Understand how people interact with computers, why people have trouble with computers, responses to poor design, people and their tasks.	02	02
	b	**Important Human Characteristics in design** Perception, memory, sensory storage, visual Acuity, foveal and peripheral vision, information processing, mental models, movement control learning, skill, individual Differences.	02	02
	c	**Human Consideration in Design** User's knowledge and experience task and needs, psychological characteristics, physical characteristics.	02	02
	d	**Human Interaction Speeds**	01	02
	e	**Understand the Principles of Good Screen Design** Human consideration in screen design ,Interface design goals, screen meaning and purpose of organizing screen elements clearly and meaning fully, Ordering screen data and control, screen navigating and flow, amount of information, focus and emphasis.	03	02

Unit – III

Teacher should facilitate learning of Models of HCI.

1.	Models of HCI		Lecture required	Ref No
	a	**Cognitive models** Introduction, goal and task hierarchies, GOMS.	02	01
	b	**Linguistics Models** BNF, Task action Grammar	02	01
	c	**Physical and Device Models** Keystroke level model, three state level model	02	01
	d	**Cognitive Architecture** The problem space, interactive cognitive subsystem	02	01

Unit – IV

Teacher should facilitate learning of interaction styles

1.	Interaction styles		Lecture required	Ref No
	a	**Menus** Structure of menu, functions of menus, contents of menus, formatting of menus, selecting menu choices, kinds of graphical menus.	02	02
	b	**Windows** Components of windows, window presentation styles, types of windows, window operations.	02	02
	c	**Device Based controls** Characteristics of device based controls, trackball, joystick, graphic tablet, touch screen	02	02
	d	**Screen Based controls** Operable control, text boxes, selection controls, combo boxes	02	02

Unit - V

Teacher should facilitate learning of communication

1.	Communication		Lecture required	Ref No
	a	**Text messages** Words, sentences, messages ,text word, text for web pages	02	02
	b	**Feedback and guidance** Providing proper feedback, guidance and assistance.	02	02
	c	**Graphics icons and images** Icons- Kinds of icon, Characteristics of icons, Influences on icon usability, choosing icons, creating and drawing images, icon animation and audition, the design process, screen presentation. Multimedia- graphics, images, pictures, video, animation, auditions, diagram, drawings, combining mediums.	02	02
	d	**Colors** RGB, HSV, Dithering, color uses ,possible problems with color, color and human vision, choosing color.	02	02

References:

1	Alan Dix, J. E. Finlay, G. D. Abowd, R. Beale “Human Computer Interaction”,Prentice Hall, Third edition.
2	Wilbert O. Galitz, “The Essential Guide to User Interface Design”, Wiley publication, Second edition.
3	Ben Shneidermann “Designing the user interface “, Pearson Education Asia.
4	Rogers Sharp Preece, “Interaction Design:Beyond Human Computer Interaction”, Wiley.

Advanced Computer Network (Elective I)

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit - I

Teacher should facilitate learning wireless Networking, Overview of 802.11 Networks, 802.11 MAC Fundamentals.

1	Wireless Networking, Overview of 802.11 Networks, 802.11 MAC Fundamentals.		Number Lecturers Required	Ref No
	a	Introduction to wireless Networking: Why Wireless? What makes Wireless Network different? A Network by Any other name.	2	1
	b	Overview of 802.11 Networks: IEEE 802 Network Technology Family tree, 802.11 Nomenclature and design, 802.11 Network Operation, Mobility Support.	2	1
	c	802.11 MAC Fundamentals: Challenges for the MAC,MAC Access Modes and Timing, Contention-Based Access Using the DCF, Fragmentation and Reassembly, Frame Format, Encapsulation of Higher-Layer Protocols Within 802.11,Contention-Based Data Service, Frame Processing and Bridging	4	1

References:

1	Matthew Gast, 802.11 Wireless Networks: The Definitive Guide, Second Edition, O'Reilly

Unit – II

Teacher should facilitate learning 802.11 Framing in Detail and Management Operations.

2	802.11 Framing in Detail and Management Operations.		Number Lecturers Required	Ref No
	a	802.11 Framing in Detail: Data Frames, Control Frames, Management Frames, Frame Transmission and Association and Authentication States	4	1
	b	Management Operations: Management Architecture, Scanning, Authentication, Pre-authentication, Association, Power Conservation, Timer Synchronization, Spectrum Management	4	1

References:

1	Matthew Gast, 802.11 Wireless Networks: The Definitive Guide, Second Edition, O'Reilly

Unit – III

Teacher should facilitate learning Contention-Free Service with the PCF,Wired Equivalent Privacy, User
Authentication with 802.1X

3	Contention-Free Service with the PCF,Wired Equivalent Privacy, User Authentication with 802.1X		Number Lecturers Required	Ref No
	a	Contention-Free Service with the PCF: Contention-Free Access Using the PCF, Detailed PCF Framing, Power	2	1

		Management and the PCF		
	b	Wired Equivalent Privacy (WEP): Cryptographic Background to WEP, WEP Cryptographic Operations, Problems with WEP, Dynamic WEP	3	1
	c	User Authentication with 802.1X: The Extensible Authentication Protocol, EAP Methods, 802.1X: Network Port, Authentication, 802.1X on Wireless LANs	3	1

References:

1	Matthew Gast, 802.11 Wireless Networks: The Definitive Guide, Second Edition, O'Reilly

Unit – IV

Teacher should facilitate learning 802.11i, Ad Hoc Wireless Networks, Routing Protocols for Ad Hoc Wireless Networks.

4		**802.11i, Ad Hoc Wireless Networks, Routing Protocols for Ad Hoc Wireless Networks**	**Number Lecturers Required**	**Ref No**
	a	802.11i: Robust Security Networks, TKIP, and CCMP: The Temporal Key Integrity Protocol (TKIP), Counter Mode with CBC-MAC (CCMP), Robust Security Network (RSN) Operations	3	1 & 2
	b	Ad Hoc Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.	2	1 & 2
	c	Routing Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols	3	1 & 2

References:

1	Matthew Gast, 802.11 Wireless Networks: The Definitive Guide, Second Edition, O'Reilly
2	C.Siva Ram Murthy, B.S. Manoj, Ad Hoc Wireless Networks: Architectures and Protocols, Pearson

Unit – V

Teacher should facilitate learning Routing Protocols for Ad Hoc Wireless Networks, Wireless Sensor Networks.

5		**Routing Protocols for Ad Hoc Wireless Networks, Wireless Sensor Networks**	**Number Lecturers Required**	**Ref No**
	a	Routing Protocols for Ad Hoc Wireless Networks: Table-Driven Routing Protocols, On Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Power-Aware Routing Protocols	4	2
	b	Wireless Sensor Networks: Introduction, Sensor Networks Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network.	4	2

Embedded System

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

Teacher should facilitate basic of Embedded System and its Applications:

1	**Introduction to Embedded System**		Lecture required	Ref No
	a.	What is Embedded System?	01	1
	b.	Application areas	01	1
	c	Categories of the Embedded System	01	1
	d.	Overview of Embedded System architecture	01	1
	e.	Specialties of Embedded System	01	1
	f.	Recent trends in Embedded System	01	1
	g.	Hardware architecture-CPU, Memory, Clock Circuitry, WDT, Chip Select, Communication Interfaces.	01	1
	h.	Communication Protocols-I^2C, SPI & CAN	01	1

References:

1	Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.

Unit-II

Teacher should facilitate Process of Embedded system Development Life cycle:

2.	**Process of Embedded System Development**		Lecture required	Ref No
	a.	The development process	01	1
	b.	Requirement engineering	01	1
	c	Design	01	1
	d.	Implementation	01	1
	e.	Integration and Testing	01	1
	f.	Packaging	01	1
	g.	Configuration Management	01	1
	h.	Managing Embedded System development projects	01	1

References:

1	Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.

Unit –III

Teacher should facilitate basic of ARM System Architecture

3.	**ARM System Architecture**		Lecture required	Ref No
	a.	RISC design philosophy, ARM design philosophy	01	2
	b.	Embedded system hardware, Embedded system software	01	2
	c.	Registers, Current program status register	01	2

	d.	Pipeline, Exception, Interrupts Vector table	01	2
	e.	Core Extensions	01	2
	f.	Architecture revision	01	2
	g.	ARM Processor families	01	2
	h.	RISC design philosophy, ARM design philosophy	01	2

References:

1	Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.
2	Andrew. N. Sloss, Domnic Symes, Chris Wright, "ARM System Developer's Guide", Elsevier, edition 2004

Unit-IV

Teacher should facilitate basic of Real time Operating System

4.	**Real Time Operating System**		Lecture required	Ref No
	a.	Architecture of kernel	01	1
	b.	Tasks & Task Scheduler	01	1
	c.	Interrupt Service Routines, Semaphores, Mutex, Mailbox, Message queues	01	1
	d.	Pipes, Event Register, Timers, Signals, Memory management	01	1
	e.	Priority Inversion Problem	01	1
	f	RTOS services in contrast with traditional OS.	01	1
	g.	Introduction to uCOSII RTOS, Salient Features of uCOSII, Study of kernel structure of uCOSII	01	1
	h.	Synchronization in uCOSII, Inter-task communication in uCOSII, Porting of RTOS	01	1

References:

1	Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.

Unit-V

Teacher should facilitate basic of Embedded Linux

5.	**Embedded Linux**		Lecture required	Ref No
	a.	Introduction to the Linux kernel,	01	3
	b.	Configuring and booting the kernel	01	3
	c.	The root file system	01	3
	d.	Root file directories, /bin, /lib etc.,	01	3
	e.	Linux file systems,	01	3
	f.	Types of file system: Disk, RAM, Flash and Network	01	3
	g.	Some debug techniques- Syslog and Strace, GDB	01	3
	h	TCP/IP Networking- Network configuration	01	3

References:

3	Karim Yaghmour , "Building Embedded Linux Systems**",** 2003 O'Reilly & Associates,

Reference Books:

1. Rajkamal, “Embedded Sytems “, TMH.
2. David Simon, “Embedded systems software primer”, Pearson
3. Steve Furber, “ARM System-on-Chip Architecture”, Pearson
4. Iyer,Gupta, “Embedded real systems Programming“, TMH

Advanced UNIX Programming Lab

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

			Lab hours required
		Group A	
	1	**Write a program for File Management (any 7 option)** File management consist of creating file, reading, writing into file , removing file etc.	02
	2	**Write a program for Simulation of various commands(any7 option)** Various unix command are implemented.	02
	3	**Write a program to display user and system information** User functions like getuid, getgid are used for user information and uname used for system information.	02
	4	**Write a program to display file status flags on specified descriptor** Using fstat function file status is display.	02
	5	**Write a program using atexit function** Program consists of atexit function to create exit handler.	02
	6	**Write a program for process creation using fork and vfork function** Process is created using fork and vfork function	02
		Group B	
	1	**Write a program for Inter Process Communication using pipe.** Using pipe and fork function two process communicate with each other using this program.	02
	2	**Write a program for catching of Signals** More than one signal catch with signal function.	02
	3	**Write a program for Daemon process** Daemon coding rules are implemented.	02
	4	**Write a program for multithreading** More than one thread created with thread create function and then they are use for multithreading to implement other task.	02
	5	**Write a program for client server communication using socket** Socket related function like bind, connect, listen, accept are used to create client and server program for communication.	02
	6	**Write a program for Inter Process Communication using Message Queue** Message queue is created and by exchanging message to process can communicate with each other.	02

Text Book:

1. W. Richard Stevens and Stephen A. Rago, Advanced Programming in the UNIX Environment, 2/E, Pearson Education

Reference Book:

1. W. Richard Stevens, Unix Network Programming - Interprocess Communications, Volume 2, 2/E, Pearson Education

Note:-

Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Embedded System Lab

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

			Lab hours required
		Group A	
	1	Writing basic C-programs for I/O operations.	02
	2	Program to interface LCD.	02
	3	Program to demonstrate I2C Protocol.	02
	4	Program to demonstrate CAN Protocol.	02
	5	Program to interface Keyboard and display key pressed on LCD.	02
	6	Program to interface stepper motor.	02
	7	Program to interface Graphics LCD.	
		Group B	
	1	Program to interface Touch Panel.	02
	2	Program to implement AT commands and interface of GSM modem.	02
	3	Interfacing 4 x 4 matrix keyboards and 16 x 2 character LCD display to microcontroller /Microprocessor and writing a program using RTOS for displaying a pressed key.	02
	4	Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard LCD, LED etc. and porting it on microcontroller/ microprocessor.	02
	5	Implement a semaphore for any given task switching using RTOS on microcontroller board.	02
	6	Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.	02
	7	Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux.	02

Text Books:

1. Dr. K.V.K.K. Prasad, "Embedded /Real-Time System: Concepts, Design & Programming", Dreamtech, Edition 2010.
2. Andrew. N. Sloss, DomnicSymes, Chris Wright, "ARM System Developer's Guide", Elsevier, edition 2004.

Reference Books:

1. KarimYaghmour , "Building Embedded Linux Systems**",** 2003 O'Reilly & Associates,
2. Rajkamal, "Embedded Sytems ", TMH.
3. David Simon, "Embedded systems software primer", Pearson
4. Steve Furber, "ARM System-on-Chip Architecture", Pearson
5. Iyer, Gupta, "Embedded real systems Programming", TMH

Note:-

Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Advanced Computer Architecture Lab (Elective I)

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

(Minimum **FOUR** Experiments each from below list)

		Group A	Lab hours required
	1	Study of CRAY-1 System Architecture	02
	2	Implement instruction pipeline	02
	3	Implementation of matrix multiplication using threading.	02
	4	Implementation of hyper quick sort algorithm.	02
	5	Study of PARAM Supercomputer.	02
	6	Study of data flow computer.	02

Reference Books:

1. Kai Hwang, "Advance Computer Architecture, Parallelism, Scalability, Programmability", Mc-Graw Hill Publication.

2. Kai Hwang and Faye A Briggs, "Computer Architecture and Parallel Processing"

Note:-

Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Android Programming Lab (Elective I)

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

			Lab hours required
	1	Program to show use of UI elements	02
	2	Program to show demo of layouts	02
	3	Program to create Menus and Dialog box.	02
	4	Program to show how to use intents (implicit and explicit)	02
	5	Program to work with database (create, insert ,delete ,update ,select operations)	02
	6	Program to show how to use notifications	02
	7	Program to make call, send and receive SMS.	02
	8	Program to work with Google maps.	02
	9	Program to play Audio and video files	02
	10	Program to send and receive file using Bluetooth	02
	11	Program to show how to use Networking and web-services in Android	02

Note:

- Concerned faculty should suitably frame at least any **06 practical** assignments out of the above list.
- Every assignment should include print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal

Text Books/Reference Books:

1. Reto Meier, "Professional Android™ Application Development", Wrox Publications
2. Lauren Dercy and Shande Conder, "Sams teach yourself Android application development", Sams publishing
3. Hello Android, Introducing Google's Mobile Development Platform, Ed Burnette, Pragmatic Programmers, ISBN: 978-1-93435-617-3

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Human Computer Interaction Lab (Elective I)

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments each from group A and B)

Group A

1. Know your client –
   Children (3-4 years of age): An application to teach Alphabets , shapes.
2. Learn HCI design principles –Identify 3 different websites catering to one specific goal (e.g. Goal – on-line shopping and 3 different websites – ebay, amazon, flipkart, zovi, myntra) and perform a competitive analysis on them to understand how each one caters to the goal, the interactions and flow of the payment system and prepare a report on the same.
3. Learn the importance of menus and navigation – website redesign: News websites like CNN are always cluttered with information
4. Menu designing: Choose a unique domain, design a menu and show how it can be accommodated on an interface.
5. Icon designing: Choose a unique domain, design a few icons and show how it can be accommodated on an interface.
6. Understand the need of colors and animation – web site for an artist: A celebrity in some form of art like music, dance, painting, martial arts, etc (not actors). This site will be used to display his works and should portray his character.
7. Any other new relevant topics covering the above syllabus

Group B

1. Online shopping website
2. E -learning web site
3. Video/ Audio on demand web site
4. Travel reservation system
5. ATM Interface
6. Online trading on stock market
7. University web site
8. Placement agency

(**Note**: A project with a team of minimum 2 and maximum 3 students. The purpose of the project is focused on User interaction and NOT on the implementation of the entire project. Explain technology in interface Design; explain the user interface design process; coloring guidelines; Speech Recognition and speech generation; Types of windows; Components of UI, such as Text Boxes, List Boxes, Messages, Icons, Multimedia; Mental models; Importance of the mental models in UI design.)

Text Books:

1. Alan Dix, J. E. Finlay, G. D. Abowd, R. Beale “Human Computer Interaction”, Prentice Hall.
2.Wilbert O. Galitz, “The Essential Guide to User Interface Design”, Wiley publication.

Reference Books:

1. Ben Shneidermann "Designing the user interface ", Pearson Education Asia.
2. Donald A. Norman, "The design of everyday things", Basic books.
3. Rogers Sharp Preece, "Interaction Design:Beyond Human Computer Interaction", Wiley.
4. Guy A. Boy "The Handbook of Human Machine Interaction", Ashgate publishing Ltd.
5. Alan Cooper, Robert Reimann, David Cronin, "About Face3: Essentials of Interaction design", Wiley publication.
6. Jeff Johnson, "Designing with the mind in mind", Morgan Kaufmann Publication.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Advanced Computer Network Lab (Elective I)

LAB COURSE CONTENT

			Lab hours required
	1	Setting up wireless network with and without infrastructure support.	02
	2	Configuring Access Point with bridging mode (Point to Point and Point to Multi Point).	02
	3	Configuring Routing between wired and wireless Networks.	02
	4	Configuring Security in wireless network with and without infrastructure support.	02
	5	At least 3 lab assignments based on above syllabus using any network simulator such as NS2, OPNET, OMNET, NetSim, NS3 etc.	06

Concerned staff members should suitably frame the term work at least FOUR based on above syllabus. Practical Examination should be conducted based on the above syllabus and the term work submitted in the form of journal.

Note:-
Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Final Year Engineering (Computer)

Faculty of Engineering and Technology

Teacher and Examiner's Manual

Semester – VIII

W.E.F. 2015 – 2016

Compiler Design

Teacher, Paper setter and Examiners should follow the guidelines as given below.

Unit – I

Teacher should facilitate learning of introductory of complier design.

Sr. No.		Introduction	Lecture Required	Ref. No.
1	**a.**	Language Processors	**1**	**1**
	b.	The Structure of a Compiler	**1**	**1**
	c.	Application of Compiler Technology	**1**	**1**
	d.	The Role of Lexical Analyzer	**1**	**1**
	e.	Specification of Tokens	**2**	**1**
	f.	Recognition of Tokens	**1**	**1**
	g.	Lexical Analyzer Generator LEX	**1**	**1**

References:

1.	Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers- Principles, Techniques and Tools, 2nd edition, Pearson, 2014.

Unit – II

Teacher should facilitate learning of issues syntax analysis.

Sr. No.		Syntax Analysis	Lecture Required	Ref. No.
2.	**a.**	Role of the Parser	**1**	**1**
	b.	Representative Grammar	**1**	**1**
	c.	Syntax Error Handling	**1**	**1**
	d.	Error-recovery Strategies	**1**	**1**
	e.	Context Free Grammars: Definition, Notational Conventions	**1**	**1**
	f.	Derivations , Parse Trees and Derivations	**1**	**1**
	g.	Ambiguity , Eliminating Ambiguity	**1**	**1**
	h.	Elimination of Left Recursion ,Elimination of Left Factoring	**1**	**1**

References:

1	Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers- Principles, Techniques and Tools, 2nd edition, Pearson, 2014.

Unit – III

Teacher should facilitate learning of parsing methods.

Sr. No.		Parsing Methods	Lecture Required	Ref. No.
3	**a.**	Top Down Parsing: Recursive-Descent Parsing, FIRST and FOLLOW, LL(1) grammar	**1**	1
	b.	Nonrecursive Predictive Parsing, Construction of Nonrecursive Predictive Parsing Table	**1**	1
	c.	Error Recovery in Predictive Parsing	**1**	1
	d.	Bottom-up Parsing: Shift-Reduce Parsing, Conflicts during Shift-Reduce Parsing	**1**	1
	e.	Introduction to LR Parsing, L-R Parsing Algorithm, Viable Prefixes	**1**	1
	f.	Simple LR Parser (SLR), Construction of Simple LR Parsing Table	**1**	1
	g.	Canonical LR(1), Construction of LR(1) Parsing Table	**1**	1
	h.	Look Ahead LR (LALR), Construction of LALR Parsing Table , Parser Generator – Yacc	**1**	1

References:

1	Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers- Principles, Techniques and Tools, 2nd edition, Pearson, 2014.

Unit – IV

Teacher should facilitate learning of syntax directed translation and Intermediate Code Generation

Sr. No.		Syntax directed translation and Intermediate Code Generation	Lecture Required	Ref. No.
4	**a.**	Syntax-Directed Definitions	**1**	1
	b.	Dependency Graphs	**1**	1
	c.	S-attributed Definitions	**1**	1
	d.	L-attributed Definitions	**1**	1
	e.	Application of Syntax Directed Translation	**1**	1
	f.	Syntax Directed Translation Schemes, Variants of Syntax Trees	**1**	1
	g.	Three Address Code	**1**	1
	h.	Control Flow, back patching	**1**	1

References:

1	Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers- Principles, Techniques and Tools, 2nd edition, Pearson, 2014.

Unit – V

Teacher should facilitate learning of Run time Environment & Code Generation.

Sr. No.		Syntax directed translation and Intermediate Code Generation	Lecture Required	Ref. No.
5	**a.**	Storage Organization	**1**	1
	b.	Activation Trees	**1**	1
	c.	Activation Records	**1**	1
	d.	Calling Sequence	**1**	1
	e.	Heap Management	**1**	1
	f.	Introduction to Garbage Collection, Issues in Code Generator	**1**	1
	g.	The Target Language, Basic Blocks and Flow Graphs	**1**	1
	h.	Optimization of Basic Blocks, A simple Code Generator	**1**	1

References:

1	Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers- Principles, Techniques and Tools, 2nd edition, Pearson, 2014.

Data Warehousing & Mining

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

Teacher should facilitate Introduction to Data Warehousing:

1	**Introduction to Data Warehousing**		Lecture required	Ref No
	a.	What is a Data Warehouse?	01	1
	b.	A Multidimensional data model	01	1
	c	Data Warehouse Architecture	01	1
	d.	From Data Warehousing to Data Mining	01	1
	e.	Why preprocess data	01	1
	f.	Data Cleaning	01	1
	g.	Data Integration and Transformation	01	1
	h.	Data Reduction, Data discretization and concept hierarchy generation	01	1

References:

1	Jiawei han, Micheline Kamber, "Data Mining: Concepts and systems", Morgan Kaufmann Publishers Second Edition

Unit-II

Teacher should facilitate Introduction to Data Mining:

2.	**Introduction to Data Mining**		Lecture required	Ref No
	a.	What is Data Mining?	01	1
	b.	Data Mining Functionalities: What kinds of Patterns can be Mined?	01	1
	c	Classification of Data Mining Systems	01	1
	d.	Data Mining Task Primitives	01	1
	e.	Integration of Data Mining system with a Data Warehouse System	01	1
	f.	Major issues in Data Mining	01	1
	g.	Data Mining statics: Guidelines for successful Data Mining	01	1
	h.	Applications and Trends in Data Mining	01	1

References:

1	Jiawei han, Micheline Kamber, "Data Mining: Concepts and systems", Morgan Kaufmann Publishers Second Edition

Unit –III

Teacher should facilitate Mining Frequent Patterns:

3.	**Mining Frequent Patterns**		Lecture required	Ref No
	a.	Mining frequent pattern	01	1
	b.	Associations: Basic concepts	01	1

	c.	Market basket analysis	01	1
	d.	Apriori Algorithm	01	1
	e.	Association rules from frequent item sets	01	1
	f.	Mining multilevel association rules	01	1
	g.	Constraint based association mining	01	1
	h.	Association mining to correlation analysis	01	1

References:

1	Jiawei han, Micheline Kamber, "Data Mining: Concepts and systems", Morgan Kaufmann Publishers Second Edition
2	Andrew. N. Sloss, Domnic Symes, Chris Wright, "ARM System Developer's Guide", Elsevier, edition 2004

Unit-IV

Teacher should facilitate Classification and Prediction:

4.	**Classification and Prediction**		Lecture required	Ref No
	a.	Introduction to Classification and Prediction	01	1
	b.	Classification by Decision tree Induction	01	1
	c.	Bayesian classification	01	1
	d.	Rule based classification	01	1
	e.	Classification by Backpropagation	01	1
	f	Other classification methods	01	1
	g.	Prediction: Linear Regression	01	1
	h.	Non-linear regression	01	1

References:

1	Jiawei han, Micheline Kamber, "Data Mining: Concepts and systems", Morgan Kaufmann Publishers Second Edition

Unit-V

Teacher should facilitate Cluster Analysis:

5.	**Cluster Analysis**		Lecture required	Ref No
	a.	What is Cluster Analysis and Outliers	01	1
	b.	Types of data in cluster analysis	01	1
	c.	Categorization of clustering methods	01	1
	d.	Classical Partitioning methods: k-Means and k-Medoids	01	1
	e.	Hierarchical Methods: Agglomerative and divisive	01	1
	f.	Density Based Methods: DBSCAN	01	1
	g.	Grid Based Methods: STING	01	1
	h	Outlier analysis	01	1

References:

1	Jiawei han, Micheline Kamber, "Data Mining: Concepts and systems", Morgan Kaufmann Publishers Second Edition

Software Metrics and Quality Assurance (Elective II)

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit – I

Teacher should facilitate learning of Basic Concepts of Software Metrics and Quality Assurance.

1.	Introduction to Software Measurement:		Lect required	Ref No
	a	Measurement in everyday life	01	01
	b	Measurement in Software Engineering	01	01
	c	The scope of software metrics	01	01
	d	The representational theory of measurement	01	01
	e	Measurement and Models	01	01
	f	Measurement scales and scales types	01	01
	g	Meaningfulness in measurement	01	01
	h	Classifying software measures & Determining what to measure	01	01

References:

1	Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach", Thompson Learning.
2	Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson Learning.
3	Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

Unit - II

Teacher should facilitate learning of internal product attributes.

2.	Measuring internal product attributes:		Lect required	Ref No
	a	Measuring internal product attributes: Size	01	01
	b	Aspects of software size, Length & Reuse	01	01
	c	Functionality & Complexity	01	01
	d	Measuring internal product attributes: Structure	01	01
	e	Types of Structural measures - Control Flow Structures	01	01
	f	Modularity and Information Flow attributes & Data structures	02	01
	g	Difficulties with general "complexity" measures	01	01

References:

1	Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach", Thompson Learning.
2	Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson Learning.
3	Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

Unit – III

Teacher should facilitate learning of external product attributes.

3.	Measuring external product attributes:		Lect required	Ref No
	a	Software Quality - Modelling Software Quality & Measuring aspects of Quality.	02	01
	b	Software Reliability: Basics of Reliability Theory The Software Reliability Problem, Parametric Reliability Growth Models.	04	01
	c	Predictive Accuracy, The importance of the operational environment.	02	01

References:

1	Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach", Thompson Learning.
2	Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson Learning.
3	Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

Unit – IV

Teacher should facilitate learning of cost estimation & documentation.

4.	Cost estimation & Documentation:		Lect required	Ref No
	a	Making Process Predictions - Good Estimates.	02	01,02
	b	Cost estimation-Problems and approaches.	02	01,02
	c	Models of Effort and cost.	02	01,02
	d	Software Documentation.	02	01,02

References:

1	Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach", Thompson Learning.
2	Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson Learning.
3	Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

Unit - V

5.	Quality Assurance Techniques:		Lect required	Ref No
	a	Quality Assurance Techniques- Testing Principles, Goals, Testing Life Cycle, Phases of Testing Manual Testing- Test case design criteria.	03	02, 03
	b	Automated Testing Introduction of Testing Tools- J-Meter, Win Runner, QTP, Selenium etc.	02	02, 03
	c	ISO-9000 Model.	01	02, 03
	d	SEI's CMM Model.	01	02, 03
	e	Comparison of the ISO-9000 model with SEI's CMM model.	01	02, 03

References:

1	Flanton, Pfleeger, “Software Metrics- A Rigorous and Practical Approach”, Thompson Learning.
2	Mordechai Ben-menachem/Garry S.Marliss, “Software Quality”, Thompson Learning.
3	Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0-672-32798-8.

Distributed Systems (Elective II)

Teacher, Paper setter and Examiner should follow the following guidelines.

Unit - I

Teacher should facilitate learning of Introduction to Distributed Systems, Types of Distributed Systems, Architectural Styles and System Architectures.

1.	Introduction to Distributed Systems and Architectures		Lect required	Ref No
	a	Introduction: Definition of a Distributed system. Goals: Making Resources Accessible, Distribution Transparency, Openness, Scalability, Pitfalls.	01	01 & 02
	b	Types of Distributed System: Distributed Computing Systems, Distributed Information Systems ,Distributed Pervasive Systems.	02	01 & 02
	c	Architectural Styles: Layered architectures, Object-based architectures, Data-centered architectures, Event-based architectures.	02	01 & 02
	d	System Architectures: Centralized Architectures, Decentralized Architectures, Hybrid Architectures.	03	01 & 02

References:

1	A.S.Tanenbaum, M. Van Steen , " Distributed Systems" , Pearson Education 2004.
2	George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems Concepts and Design" , Third Edition – 2002- Pearson Education Asia.

Unit - II

Teacher should facilitate learning of Processes, Threads, Virtualization, Clients, Servers and Code Migration.

2.	Processes		Lect required	Ref No
	a	Threads: Introduction to Threads , Threads in Distributed Systems.	02	01 & 02
	b	Virtualization: The Role of Virtualization in Distributed Systems, Architectures of Virtual Machines.	02	01 & 02
	c	Clients: Networked User Interfaces, Client-Side Software for Distribution Transparency.	01	01 & 02
	d	Servers: General Design Issues, Server Clusters, Managing Server Clusters.	01	01 & 02
	e	Code Migration: Approaches to Code Migration , Migration and Local Resources , Migration in Heterogeneous Systems.	02	01 & 02

References:

1	A.S.Tanenbaum, M. Van Steen , " Distributed Systems" , Pearson Education 2004.
2	George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems Concepts and Design" , Third Edition – 2002- Pearson Education Asia.

Unit – III

Teacher should facilitate learning of Communication Fundamentals, Remote Procedure Call, Message-Oriented Communication and Stream-Oriented Communication.

3.	Communication		Lect required	Ref No
	a	Fundamentals: Layered Protocols , Types of Communication.	01	01 & 02
	b	Remote Procedure Call: Basic RPC Operation, Parameter Passing , Asynchronous RPC.	03	01 & 02
	c	Message-Oriented Communication: Message-Oriented Transient Communication, Message-Oriented Persistent Communication.	02	01 & 02
	d	Stream-Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.	02	01 & 02

References:

1	A.S.Tanenbaum, M. Van Steen , " Distributed Systems" , Pearson Education 2004.
2	George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems Concepts and Design" , Third Edition – 2002- Pearson Education Asia.

Unit – IV

Teacher should facilitate learning of Clock Synchronization, Logical Clocks, Mutual Exclusion, Global State and Election Algorithms.

4.	Synchronization and Election		Lect required	Ref No
	a	Clock Synchronization: Physical Clocks, Global Positioning System, Clock Synchronization Algorithms.	02	01 & 02
	b	Logical Clocks: Lamport's Logical Clocks, Vector Clocks.	02	01 & 02
	c	Mutual Exclusion: A Centralized Algorithm, A Decentralized Algorithm, A Distributed Algorithm, A Token Ring Algorithm.	02	01 & 02
	d	Global State: Needs, Properties and Various Global States.	01	01 & 02
	e	Election Algorithm: Bully and Ring Algorithm.	01	01 & 02

References:

1	A.S.Tanenbaum, M. Van Steen , " Distributed Systems" , Pearson Education 2004.
2	George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems Concepts and Design" , Third Edition – 2002- Pearson Education Asia.

Unit - V

Teacher should facilitate learning of Introduction to Security, Secure Channels, Access Control and Security Management.

5.	Security, Access Control and Security Management		Lect required	Ref No
	a	Introduction to Security: Security Threats, Policies and Mechanisms, Design Issues, Cryptography.	02	01 & 02
	b	Secure Channels: Authentication , message integrity and confidentiality.	02	01 & 02
	c	Access Control: General Issues in Access Control, Firewalls, Denial of Service.	02	01 & 02
	d	Security Management: Key Management, Authorization Management.	02	01 & 02

References:

1	A.S.Tanenbaum, M. Van Steen , " Distributed Systems" , Pearson Education 2004.
2	George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems Concepts and Design" , Third Edition – 2002- Pearson Education Asia.

Cryptography & Network Security (Elective II)

Teacher, Paper setter and Examiners should follow the guidelines as given below.

Unit – I

Teacher should facilitate learning of introductory issues of Cryptography & Network Security.

Sr. No.		Introduction	Lecture Required	Ref. No.
1	**a.**	The Need for Security, Security Approaches	**1**	**1**
	b.	Security Attacks	**1**	**1**
	c.	Security Services	**1**	**1**
	d.	Security Mechanisms	**1**	**1**
	e.	Network Security Model	**1**	**1**
	f.	Basics of Cryptography: Symmetric Cipher Model,	**1**	**1**
	g.	Substitution Techniques	**1**	**1**
	h.	Transposition Techniques	**1**	**1**

References:

1.	William Stalling, "Cryptography and Network and Network security-Principals and practices", Pearson Education

Unit – II

Teacher should facilitate learning of Cipher Properties & Secret Key Cryptography issues .

Sr. No.		Cipher Properties & Secret Key Cryptography	Lecture Required	Ref. No.
2.	**a.**	Other Cipher Properties- Confusion, Diffusion	**1**	**1**
	b.	Block and Stream Ciphers	**1**	**1**
	c.	Data Encryption Standard(DES)	**1**	**1**
	d.	Strength of DES	**1**	**1**
	e.	Block Cipher Design Principles	**1**	**1**
	f.	Modes of Operations	**1**	**1**
	g.	Triple DES	**1**	**2**
	h.	International Data Encryption algorithm(IDEA)	**1**	**2**

References:

1	William Stalling, "Cryptography and Network and Network security-Principals and practices", Pearson Education
2	Bernard Menezes, "Network Security and Cryptography", Cengage Learning

Unit – III

Teacher should facilitate learning of Public Key Cryptography & IP Security issues.

Sr. No.		Public Key Cryptography & IP Security	Lecture Required	Ref. No.
3	**a.**	Principles of Public Key Cryptosystems	**1**	1
	b.	RSA Algorithm	**1**	1
	c.	Diffie-Hellman Key Exchange	**1**	1
	d.	IP Security Overview	**1**	1
	e.	Architecture	**1**	1
	f.	Authentication Header	**1**	1

	g.	Encapsulating Security Payloads	**1**	1
	h.	Service provided by IP Security	**1**	1

References:

1	Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill

Unit – IV

Teacher should facilitate learning of Cryptographic Hash Functions.

Sr. No.		**Cryptographic Hash Functions**	**Lecture Required**	**Ref. No.**
4	**a.**	Applications of Cryptographic Hash Functions	**1**	1
	b.	Secure Hash Algorithm	**1**	1
	c.	Message Authentication Codes – Message Authentication Requirements and Functions	**1**	1
	d.	HMAC	**1**	1
	e.	Digital signatures	**1**	1
	f.	Digital Signature Schemes	**1**	1
	g.	Authentication Protocols	**1**	1
	h.	Digital Signature Standards	**1**	1

References:

1	––Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill

Unit – V

Teacher should facilitate learning of Authentication Applications.

Sr. No.		**Authentication Applications**	**Lecture Required**	**Ref. No.**
5	**a.**	Kerberos	**1**	1
	b.	Key Management and Distribution	**1**	1
	c.	X.509 Directory	**1**	1
	d.	Authentication service	**1**	1
	e.	Public Key Infrastructure	**1**	1
	f.	Electronic Mail Security	**1**	1
	g.	Pretty Good Privacy	**1**	1
	h.	S/MIME	**1**	1

References:

1	Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill

Neural Networks and Fuzzy Logic (Elective II)

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

Teacher should facilitate basic of Neural Network and Learning:

1	**Introduction to Neural Network**		Lecture required	Ref No
	a.	Human Brain, Biological Neural Networks	01	1&2
	b.	Model of Artificial Neuron, McCulloch and pitts models of neuron, Perceptron model, Adaline model	02	1&2
	c	Neural Network Architectures	01	1&2
	d.	Neural Learning Laws, Hebb's Law, Perceptron learning Law, Widrow and Hoff Learning, Corelation learning, InStar and Out Star learning.	02	2
	e.	Neural Network Learning Methods, Hebbian learning, Competitive Learning, Error Correction Learning, Reinforcement Learning, Stochastic Learning	02	2

References:

1	S. Rajasekaran & G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI.
2	J.M.Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House

Unit-II

Teacher should facilitate Process of Back propagation Learning:

2.	**Multilayer Perceptron Model**		Lecture required	Ref No
	a.	Multilayer Perceptron	01	1
	b.	Non-Linear Activation function	01	1
	c	Architecture of Backpropagation Network	01	1
	d.	Backpropagation Learning	02	1
	e.	Illustration of Backpropagation Learning	02	1
	f.	Applications of Backpropagation	01	1

References:

1	S. Rajasekaran & G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI.
2	J.M.Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House

Unit –III

Teacher should facilitate basic of Associative Memory and Adaptive Resonance Theory

3.	**Associative Memory and Adaptive Resonance Theory**		Lecture required	Ref No
	a.	Autocorrelators	01	1
	b.	Hetrocorrelators	01	1
	c.	Exponential BAM	01	1
	d.	ART1	02	1
	e.	ART2	01	1
	f.	Applications of Associative Memory	01	1
	g.	Applications of Adaptive Resonance Theory	01	1

References:

1	S. Rajasekaran & G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI.
2	J.M.Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House

Unit-IV

Teacher should facilitate basic of Unsupervised Learning.

4.	**Unsupervised Learning**		Lecture required	Ref No
	a.	Hamming Net and Maxnet	01	1
	b.	Unsupervised Learning of clusters- clustering and similarity measures, Winner take all Learning.	02	1
	c.	Counter Propogation Network.	02	1
	d.	Feature Mapping	01	1
	e.	Self Organizing Features Map	02	1

References:

1	S. Rajasekaran & G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI.
2	J.M.Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House

Unit-V

Teacher should facilitate basic of Fuzzy Logic.

5.	**Fuzzy Logic**		Lecture required	Ref No
	a.	Fuzzy Versus Crisp	01	1
	b.	Crisp Relations and Fuzzy Relations	01	1
	c.	Crisp Logic	01	1
	d.	Fuzzy Logic	01	1
	e.	Fuzzy Rule Based System	02	1
	f.	Defuzzification	01	1
	g.	Applications of Fuzzy Logic	01	1

References:

1	S. Rajasekaran& G. A. V. Pai, "Neural Networks, Fuzzy logic, and Genetic Algorithms", PHI.
2	J.M.Zurda, "Introduction to Artificial Neural Networks", Jaico Publishing House

Mobile Computing (Elective III)

Teacher, Paper setter and Examiners should follow the guidelines as given below.

Unit – I

Teacher should facilitate learning of introduction of Mobile Computing and its architecture

1.	Introduction		Lectures Required	Ref. No.
	a	Mobility of Bits and Bytes: Convergence leading to ICT Wireless -The Beginning: Evolution of Wireless Networks, Evolution of wireless data, Evolution of wireless LAN, Evolution of wireless PAN.	01	01
	b	Mobile Computing: Mobile Computing Functions, Mobile Computing Devices. Dialogue Control, Networks: Wireline Networks, Wireless Networks, Ad-hoc Networks, Bearers	01	01
	c	Middleware and Gateways: Communication Middleware, Transaction Processing Middleware, Behavior Management Middleware, Communication Gateways	01	01
	d	Application and Services (Contents), Developing Mobile Computing Applications: New mobile applications, Making legacy application mobile	02	01
	e	Security in Mobile Computing, Standards - why is it Necessary? : Who makes the standards, Standard Bodies	01	01
	Mobile Computing Architecture			
	f	Internet – The Ubiquitous Network, Architecture for mobile computing, Three Tier Architecture: presentation(Tier1),Application Tier(Tier2),Data Tier(Tier 3)	02	01

Reference:

1	Asoke K Talukder and Roopa R Yavagal, "Mobile Computing (Technology, Applications and Service Creation)", Tata Mcgraw-Hill

Unit – II

Teacher should facilitate learning of Emerging Technologies such as Bluetooth, RFID, WiMAX, IPv6 etc.

2.	Emerging Technologies		Lectures Required	Ref. No.
	a	Design considerations for Mobile Computing: Client Context Manager, Context aware systems, Mobile Computing through Internet, Making Existing Applications Mobile -Enabled	02	01
	b	Bluetooth: Bluetooth Protocol, Bluetooth Protocol Stack, Bluetooth Security, Bluetooth Application Models.	01	01
	c	Radio Frequency Identification(RFID): Areas of applications for RFID	01	01
	d	Wireless Broadband(WiMAX): Physical Layer,802.16 Medium Access Control, Broadband Applications, Broadband Mobile Cellular Systems	01	01
	e	Mobile IP: How does Mobile IP work?, Discovery, Registration, Tunneling, Cellular IP	01	01
	f	Internet Protocol Version 6(IPv6): Address Space, IPv6 Security, Packet Payload, Migrating from IPv4 to IPv6, Migration of applications, Interconnecting IPv6 networks, Mobile IP with IPv6, Java Card	02	01

Reference:

1	Asoke K Talukder and Roopa R Yavagal, "Mobile Computing (Technology, Applications and Service Creation)", Tata Mcgraw-Hill

Unit – III

Teacher should facilitate learning of GSM and GPRS

3.	Global System for Mobile Communications (GSM)		Lectures Required	Ref. No.
	a	Global System for Mobile Communications, GSM Architecture, GSM Entities: Mobile Station, The Base Station Subsystem, The Network and Switching Subsystem, The Operation and Support Subsystem (OSS), Message Center.	02	01
	b	Call Routing in GSM: An example, PLMN Interfaces, GSM Addresses and Identifiers	01	01
	c	Network Aspects in GSM: Handover, Mobility Management, Roaming Example, GSM Frequency Allocation, Authentication and Security: The MS Authentication Algorithm A3,The Voice Privacy Key Generation Algorithm A8,The Strong Over-the-Air Voice-Privacy Algorithm A5/1	01	01
	General Packet Radio Service (GPRS)			
	d	Introduction, GPRS and Packet Data Network: Capacity and other end user aspects, Quality of service (QOS), Integral Part of Future 3G systems, GPRS Network Architecture: GPRS Network Enhancements, Channel Coding, Transmission Plane Protocol Architecture, security.	02	01
	e	GPRS Network Operations: Attachment and Detachment Procedure, Mobility Management, Routing, Communicating with IP Networks.	01	01
	f	Data Services in GPRS: GPRS Handsets, Device Types, Bearers in GPRS, Application for GPRS: Generic Application, GPRS Specific Applications. Limitations of GPRS, Billing and Charging in GPRS: Tariffing , Billing	01	01

Reference:

1	Asoke K Talukder and Roopa R Yavagal, “Mobile Computing (Technology, Applications and Service Creation)”, Tata Mcgraw-Hill

Unit – IV

Teacher should facilitate learning of WAP, CDMA and 3G

4.	WAP		Lectures Required	Ref. No.
	a	Introduction: Evolution of Wireless Data and WAP, Networks for WAP. WAP: WAP Application Environment(WAE), User Agent, User Agent Profile (UAProf),Wireless Markup Language(WML),WML Script, Wireless Telephony Applications(WTA,WTAI),WAP Push Architecture, The Push Framework, Wireless Session Protocol(WSP), Wireless Transaction Protocol(WTP),Wireless Transport Layer Security (WTLS),Wireless Data Protocol (WDP),WAP Gateway	02	01
	b	MMS: MMS Architecture, MMS Transaction Flows, SMIL (Synchronized Multimedia Integration Language), MMS Interconnection, Interoperability and Roaming, MMS Device Management and Configuration. GPRS Applications: Digital Rights Management, OMA Digital Rights Management	02	01
	CDMA and 3G			
	c	Introduction: How it started, Spread Spectrum Technology: Direct Sequence Spread Spectrum (DSSS).	01	01
	d	IS-95: Speech and Channel Coding,IS-95 Architecture,IS-95 Channel Structure,IS-95 Call Processing, Authentication and Security, Handoff and Roaming,IS-95 Channel Capacity	01	01
	e	CDMA versus GSM, Wireless Data: Short Message Service, Third Generation Networks: IMT- 2000,CDMA-2000,UMTS/WCDMA, Fixed Wireless	01	01
	f	Applications on 3G: 3G Specific Applications.	01	01

Reference:

1	Asoke K Talukder and Roopa R Yavagal, “Mobile Computing (Technology, Applications and Service Creation)”, Tata Mcgraw-Hill

Unit – V

Teacher should facilitate learning of Security Issues in Mobile Computing

5.	Security Issues in Mobile Computing		Lectures Required	Ref. No.
	a	Introduction, Information Security: Attacks, Components of Information Security	01	01
	b	Security Techniques and Algorithms: Stream Ciphering and Block Ciphering, Symmetric key Cryptography ,Public Key Cryptography, Hashing Algorithms	01	01
	c	Security Protocols: Secured Socket Layer(SSL),TLS,WTLS, Multifactor Security, Digital Watermark, Key Recovery	01	01
	d	Public key Infrastructure: Public Key Cryptography Standards, Storing Private Keys, Trust: Certificate, Simple PKI	01	01
	e	Security Models: Infrastructure level Security, System level Security, Policy Based Security, Application level Security, Java Security	02	01
	f	Security Frameworks for Mobile Environment: 3GPP Security, Mobile Virtual Private Network, Multifactor Security, Smart Card Security, Mutual and Spatial Authentication, RFID Security, Mobile Agent Security, Mobile Virus, Mobile Worm	02	01

Reference:

1	Asoke K Talukder and Roopa R Yavagal, “Mobile Computing (Technology, Applications and Service Creation)”, Tata Mcgraw-Hill

Bioinformatics (Elective III)

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

1.	Introduction to Bioinformatics		Lecture required	Reference No.
	a	Introduction and Historical overview of Bioinformatics, Bioinformatics Applications,	02	01
	b	Molecular biology Basic concepts-Protein and amino acid, DNA and RNA	02	01
	c	Tools for web search	01	01
	d	Bioinformatics Major databases,	01	01
	e	Data mining of biological databases	02	01

References:

1	S. C. Rastogi, N. Mendiratta, P. Rastogi "Bioinformatics-Methods & Application",[RMR]PHI
2	Bryan Bergeron, "Bioinformatics Computing", Pearson Education [BB].

Unit – II

2.	Data Structure & Data Analysis		Lecture required	Reference No.
	a	Sequence Visualization, Structure visualization,	01	01
	b	statistical concepts, micro arrays,	01	01
	c	imperfects data, quantitative randomness, data analysis,	02	01
	d	tool selective, Statistics of alignment,	02	01
	e	Clustering and classification	02	01

References:

1	S. C. Rastogi, N. Mendiratta, P. Rastogi "Bioinformatics-Methods & Application",[RMR]PHI
2	Bryan Bergeron, "Bioinformatics Computing", Pearson Education [BB].

Unit – III

3.	Bioinformatics Databases and Data mining		Lecture required	Reference No.
	a	Introduction, Primary & Secondary database,	01	01
	b	Biological databases, Protein pattern databases and structure classification databases	02	01
	c	Methods & Technology overview, infrastructure	01	01
	d	pattern recognition & discovery, machine learning, text mining & tools	02	01
	e	dot matrix analysis, substitution matrices, dynamic programming, word methods	01	01
	f	Multiple sequence, alignment, tools for pattern matching	01	01

References:

1	S. C. Rastogi, N. Mendiratta, P. Rastogi "Bioinformatics-Methods & Application",[RMR]PHI
2	Bryan Bergeron, "Bioinformatics Computing", Pearson Education [BB].

Unit – IV

4.	Data Representation, Simulation & Collaboration		Lecture required	Reference No.
	a	Drug discovery, fundamentals, Bioinformatics Issues	02	01
	b	protein structure	02	02
	c	System biology	02	02
	d	collaboration & communications, standards	02	02

References:

1	S. C. Rastogi, N. Mendiratta, P. Rastogi "Bioinformatics-Methods & Application",[RMR]PHI
2	Bryan Bergeron, "Bioinformatics Computing", Pearson Education [BB].

Unit - V

5.	Human Genome Project and Bioinformatics Tools		Lecture required	Reference No.
	a	History, Nucleic Acids, Genes, Genomes Introduction of National Institutes of Health (NIH), Introduction of National Library of Medicine (NLM) Introduction of National center for Biotechnology Information(NCBI)	02	02
	b	Human Genome Project, it's need, goal, uses and applications	02	02
	c	Introduction, working with FASTS, working with BLAST,	02	02
	d	FASTA & BLAST algorithms & comparison	02	02

References:

1	S. C. Rastogi, N. Mendiratta, P. Rastogi "Bioinformatics-Methods & Application",[RMR]PHI
2	Bryan Bergeron, "Bioinformatics Computing", Pearson Education [BB].

Real Time Systems (Elective III)

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

Teacher should facilitate basic of Real Time Systems and its Computing:

1	**Introduction To Real Time Systems**		Lecture required	Ref No
	a.	Issues in Real Time Computing	01	1
	b.	Issues in Real Time Computing	01	1
	c	Structure of Real Time System	01	1
	d.	Structure of Real Time System	01	1
	e.	Performance Measures for Real Time Systems	01	1
	f.	Performance Measures for Real Time Systems	01	1
	g.	Estimating Program Run Times	01	1
	h.	Estimating Program Run Times	01	1

References:

1	C.M Krishna and Kang G. Shin, Real Time Systems, TMH
2	Jane W.S Liu, Real time systems, Pearson education, 2003

Unit-II

Teacher should facilitate Algorithms of Real Time Systems:

2.	**Task Assignments and Scheduling**		Lecture required	Ref No
	a.	Classical Uniprocessor Scheduling	01	1
	b.	Task Assignment-Utilization balancing algorithm	01	1
	c	Next Fit and Bin Packing Assignment Algorithms	01	1
	d.	Myopic offline Scheduling	01	1
	e.	Focused addressing and bidding(FAB) Algorithm	01	1
	f.	Buddy Strategy	01	1
	g.	Buddy Strategy	01	1
	h.	Assignments with Precedence Conditions	01	1

References:

1	C.M Krishna and Kang G. Shin, Real Time Systems, TMH
2	Jane W.S Liu, Real time systems, Pearson education, 2003

Unit –III

Teacher should facilitate Characteristics of Real Time Systems:

3.	**Real Time Programming Languages & Tools**		Lecture required	Ref No
	a.	Desired language characteristics	01	2

	b.	Data typing, Control structures	01	2
	c.	hierarchical decomposition	01	2
	d.	Packages	01	2
	e.	Run Time Error Handling	01	2
	f.	Multitasking	01	2
	g.	Task Scheduling & Timing Specification	01	2
	h.	Programming Environment and Run Time Support	01	2

References:

1	C.M Krishna and Kang G. Shin, Real Time Systems, TMH
2	Jane W.S Liu, Real time systems, Pearson education, 2003

Unit-IV

Teacher should facilitate basic of Real time Operating System

4.	**Real Time Databases and Communications**		Lecture required	Ref No
	a.	Real Time Vs. Generic Purpose Databases	01	1
	b.	Real Time Vs. Generic Purpose Databases	01	1
	c.	Main Memory Databases	01	1
	d.	Main Memory Databases	01	1
	e.	Concurrency Control Issues	01	1
	f	Communication Media	01	1
	g.	Real Time Communication Protocols	01	1
	h.	Real Time Communication Protocols	01	1

References:

1	C.M Krishna and Kang G. Shin, Real Time Systems, TMH
2	Jane W.S Liu, Real time systems, Pearson education, 2003

Unit-V

Teacher should facilitate basic of Embedded Linux

5.	**Fault Tolerance Techniques**		Lecture required	Ref No
	a.	Fault Types	01	3
	b.	Fault Detection	01	3
	c.	Fault and Error Containment	01	3
	d.	Fault and Error Containment	01	3
	e.	Redundancy	01	3
	f.	Redundancy	01	3
	g.	Data Diversity	01	3
	h	Integrated Failure Handling	01	3

References:

1	C.M Krishna and Kang G. Shin, Real Time Systems, TMH
2	Jane W.S Liu, Real time systems, Pearson education, 2003

iPhone Programming (Elective III)

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

1.	Introduction: Basic concepts of Objective C		Lect required	Ref No
	a	What is objective C and Xcode , Installing Xcode and compiling objective C	02	01,02
	b	Object oriented programming in objective –C, similarities and differences from C and C++	03	01,02
	c	**Objective-C:** Classes, Objects, Methods, Data Types & Expressions, Program Looping, Decision Making	03	01,02

References:

1	Stephen G.Kochan ,"Programming in Objective-C" Sixth Edition, ,Addison-WesleyPublications. Aaron Hillegass. The Big Nerd Ranch Inc.
2	Wei-Meng Lee ,"Beginning iPhone SDK Programming with Objective-C", WileyPublication.

Unit – II

2.	The Foundation Framework of Objective-C		Lect required	Ref No
	a	Introduction to the Foundation Framework, inheritance, Polymorphism	02	01,02
	b	Dynamic Typing &Binding, Categories and Protocols	02	01,02
	c	The Preprocessor, Numbers, Strings and Collections	02	01,02
	d	Working with Files, Memory Management, Copying Objects	02	01,02

References:

1	Stephen G.Kochan ,"Programming in Objective-C" Sixth Edition, ,Addison-WesleyPublications. Aaron Hillegass. The Big Nerd Ranch Inc.
2	Wei-Meng Lee ,"Beginning iPhone SDK Programming with Objective-C", WileyPublication.

Unit – III

3.	Cocoa, Cocoa Touch and the iOS SDK		Lect required	Ref No
	a	**Introduction to Cocoa and Cocoa Touch:**Framework Layers of Cocoa and Cocoa Touch	02	01,02
	b	**Introduction to iOS:** overview of the iOS 5 Architecture, Features of iOS, Registering as a AppleDeveloper	02	01,02
	c	**iOS -Environment Setup:** XCode Installation, Interface Builder, iOS simulator	02	01,02

		Writing iOS Applications: Creating first iOS application, Outlets, Actions and View Controllers	02	01,02

References:

1	Stephen G.Kochan ,"Programming in Objective-C" Sixth Edition, ,Addison-WesleyPublications. Aaron Hillegass. The Big Nerd Ranch Inc.
2	Wei-Meng Lee ,"Beginning iPhone SDK Programming with Objective-C", WileyPublication.

Unit – IV

4.	**Introduction to iPhone application programming**		**Lect required**	**Ref No**
	a	A simple iPhone Application	04	01,02
	b	Basic UI Elements: UITextField, UIButton, Labels, UIToolbar, UIStatusBar, UITabBar, UIAlert, UISwitch, UISlider, Action Sheet, Accelerometer, Image View, Web View, KeyBoard Inputs	04	01,02

References:

1	Stephen G.Kochan ,"Programming in Objective-C" Sixth Edition, ,Addison-WesleyPublications. Aaron Hillegass. The Big Nerd Ranch Inc.
2	Wei-Meng Lee ,"Beginning iPhone SDK Programming with Objective-C", WileyPublication.

Unit – V

5.	**iPhone Multimedia and Webservices**		**Lect required**	**Ref No**
	a	Accessing Built-in Application, Multimedia (audio and video)	03	01,02
	b	Animation with views	03	01,02
	c	Webservices, SQLite	02	01,02

References:

1	Stephen G.Kochan ,"Programming in Objective-C" Sixth Edition, ,Addison-WesleyPublications. Aaron Hillegass. The Big Nerd Ranch Inc.
2	Wei-Meng Lee ,"Beginning iPhone SDK Programming with Objective-C", WileyPublication.

Compiler Design Lab

LAB COURSE CONTENT

(Note: Minimum Three Experiments from group A and THREE from group B.)

			Lab hours required
		Group A	
	1	Implement a lexical analyzer for a subset of C using LEX Implementation should support Error handling	02
	2	Implement a lexical analyzer of identification of numbers (Numbers can be binary, octal, decimal, hexadecimal, float or exponential)	02
	3	Write an ambiguous CFG to recognize an infix expression and implement a parser that recognizes the infix expression using YACC. Provide the details of all conflicting entries in the parser table generated by LEX and YACC and how they have been resolved	02
	4	Implement a Calculator using LEX and YACC.	02
	5	Implementation of Syntax Tree	02
		Group B	
	1	Implementation of Context Free Grammar	02
	2	Design of a Predictive parser	02
	3	Implementation of code generator	02
	4	Implementation of code optimization for Common sub-expression elimination, Loop invariant code movement.	02
	5	Implement Deterministic Finite Automata	02

Text books:

1. A V Aho, R. Sethi, .J D Ullman, "Compilers: Principles, Techniques, and Tools", Pearson Education, ISBN 81 - 7758 - 590 - 8

References Books:

1. K. Cooper, L, Torczon, "Engineering a Compiler", Morgan Kaufinann Publishers, ISBN 81-8147-369-8.
2. K. Louden, "Compiler Construction: Principles and Practice", Cengage Learning, ISBN 978-81-315-0132-0
3. J. R. Levine, T. Mason, D. Brown, "Lex & Yacc", O'Reilly, 2000, ISBN 81-7366 -061-X.
4. S. Chattopadhyay, "Compiler Design", Prentice-Hall of India, 2005, ISBN 81-203-2725-X.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Data Warehousing Lab

LAB COURSE OUTLINE

			Lab hours required
		Group A	
	1	Develop a program to construct a multidimensional data model (Star, Snowflake or Fact constellations)	02
	2	2. Develop a program to implement data pre-processing techniques.	02
	3	3. Develop a program to implement data integration techniques.	02
	4	4. Implement Apriori algorithm for frequent item set.	02
		Group B	
	1	Develop a program to implement data generalization and summarization techniques.	02
	2	Develop a program to extract association mining rules.	02
	3	Develop a program for classification of data.	02
	4	Develop a program for implementing one of the clustering techniques.	02

Note: Concerned Faculty should suitably frame at least **6** practical assignments (**Three** from Group A and **Three** from Group B) out of the above list.

Use open source Tool/ Technology (like Weka) for Laboratory Assignments is recommended.

Text Books:

1. Jiawei han, Micheline Kamber, "Data Mining: Concepts and systems", Morgan Kaufmann Publishers Second edition

Reference Books:

1. Rob Coronel, Database systems: "Design implementation and management", 4th Edition, Thomson Learning Press
2. Raghu Ramkrishnan , Johannes Gehrke , "Database Management Systems", Second Edition, McGraw Hill International Edition

Software Metrics and Quality Assurance Lab

LAB COURSE OUTLINE

Teacher should facilitate learning following lab experiments:

	Group		Lab hours required
	Any 6 appropriate assignments based on given syllabus. (Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.)		
	OR		
	1	To perform the effort estimation based on project specification.	02
	2	Program for finding Length of program Implementation of program for finding Length of program using Lines Of Code.	02
	3	Program for measuring Size of program using Albretch's Method. Implementation of program for measuring size of program using Function Point Calculation Albrecht's method.	02
	4	Software testing using J-Meter testing tool.	02
	5	Software testing using Selenium testing tool.	02

Text Books:

1. Flanton, Pfleeger, "Software Metrics- A Rigorous and Practical Approach",Thompson Learning.
2. Mordechai Ben-menachem/Garry S.Marliss, "Software Quality", Thompson Learning.
3. Software Testing, Second Edition By: Ron Patton,Pearson Education ISBN -13: 978-0- 672-32798-8.

Reference Books:

1. Roger S. Pressman, "Software Engineering- A Practitioner's Approach", TMH.
2. Swapna Kishore and Rajesh Naik, "ISO 9001:2000 for Software Organizations", TMH.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Distributed Systems Lab

LAB COURSE OUTLINE

Teacher should facilitate learning of the following lab experiments:

	Name of the Experiment		Lab hours required
	1	Write a Program for Remote Procedure Call (RPC).	02
	2	Write a Program to implement Echo Client-Server application.	02
	3	Write a Program to find length of given string using thread.	02
	4	Simulate the Distributed Mutual Exclusion.	02
	5	Implementation of Distributed Chat Server.	02
	6	Simulate the function of Lamport's Logical Clock.	02
	7	Implementation of Date and Time server using Java RMI.	02
	8	Implementation of server that adds given two values by the clients using Java RMI.	02
	9	Write a program for word count using Hadoop.	02
	10	Implement merge sort algorithm and run it using Hadoop for large data set.	02
	11	Write simulation program for synchronization using Bully and Ring election algorithm.	02

Note:

- Concerned faculty should suitably frame at least **SIX practical** assignments out of the above list.
- Every assignment should include algorithm, print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Text Books:

1. A.S.Tanenbaum, M. Van Steen , " Distributed Systems" , Pearson Education 2004.
2. George Coulouris, Jean Dollimore, Tim Kindberg, " Distributed Systems Concepts and Design" , Third Edition – 2002- Pearson Education Asia.

Reference Books:

1. Pradeep K. Sinha, "Distributed Operating Systems", Prentice Hall of India Private Limited.
2. Sunita Mahajan, Seema Shah, " Distributed Computing", Oxford, Second Edition.
3. Randay Chow, Theodore Johnson, "Distributed Operating System and Algorithm Analysis", Publisher: Pearson (LPE). ISBN – 978-81-317-2859-8.

4. G. Sudha Sadasivam, Radha Shankarmani, "Middleware and Enterprise Integration Technologies " , Wiley Precise Textbook.
5. Tom white, “Hadoop: The Definitive Guide” , 2nd E, O’Reilly Media, 2011.

Cryptography & Network Security Lab

LAB COURSE OUTLINE

		Name of the Experiment	Lab hours required
	1	Write a Program to Implement Columanar Cipher Text	02
	2	Write a Program to Implement Encryption/Decryption using Ceaser Cipher.	02
	3	Write a Program to Simulate Diffie-Hellman Key Exchange	02
	4	Write a Program to Implement Play Fair Cipher.	02
	5	Write a Program for Encryption/Decryption using Rail Fence Technique	02
	6	Write a Program to Implement RSA Algorithm	02

Any FIVE lab assignments should be framed by concern staff member based on above syllabus.
Any Programming Language C/C++/Java.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Neural Networks and Fuzzy Logic Lab

LAB COURSE CONTENT

(Note: Minimum THREE Experiments each from group A and B)

Group A

[1] Implementation of Perceptron Learning.
[2] Implementation of McCulloh-Pitts model.
[3] Implementation of Hopfield model.
[4] Implement Delta rule.
[5] Implement model for Multilayer Perceptron.

Group B

[1] Program to implement Crisp set.
[2] Program to implement Fuzzy Sets.
[3] Program to implement Relations.
[4] Simulation of Neural supervised Learning in any soft Computing tool.
[5] Simulation of Neural unsupervised Learning in any soft Computing tool.

Note:-

- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.