

**NORTH MAHARASHTRA UNIVERSITY,  
JALGAON (M.S.)  
Third Year Engineering  
(Information Technology)  
Faculty of Engineering and Technology**



**Teacher and Examiner's Manual  
Semester - V  
W.E.F 2014 - 2015**



# Software Engineering

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

## Unit - I

Teacher should facilitate learning of introductory issues of software engineering.

| 1. | Introduction to Software Engineering                         | Lectures Required | Ref. No. |
|----|--|-------------------|----------|
| a  | Nature of Software, Software Process                         | 02                | 1        |
| b  | Software Engineering Practice, Software Myths                | 01                | 1        |
| c  | Generic Process model, Process Assessment and Improvement    | 01                | 1        |
| d  | Perspective Process Models                                   | 02                | 1        |
| e  | Specialized Process Models, Personal and Team Process Models | 01                | 1        |
| f  | Agile Process models: Agile process, Extreme programming     | 01                | 1        |

### References:

|    |  |
|----|--|
| 1. | Pressman R., "Software Engineering - A Practitioners Approach", 7 <sup>th</sup> Edition, Tata McGraw Hill. |
|----|--|

## Unit - II

Teacher should facilitate learning of software requirement engineering issues.

| 2. | Requirements Engineering                                 | Lectures Required | Ref. No. |
|----|--|-------------------|----------|
| a  | Requirements Engineering Eliciting Requirements          | 01                | 1        |
| b  | Building the Requirements Model                          | 01                | 1        |
| c  | Negotiating requirements, Validating requirements        | 01                | 1        |
| d  | Requirements Analysis                                    | 01                | 1        |
| e  | Scenario-Based Modeling                                  | 01                | 1        |
| f  | Requirements modeling strategies, Flow-Oriented Modeling | 01                | 1        |
| g  | Data modeling Concepts                                   | 01                | 1        |
| h  | Class based modeling                                     | 01                | 1        |
| i  | SRS  | 01                | 1        |

### References:

|    |  |
|----|--|
| 1. | Pressman R., "Software Engineering - A Practitioners Approach", 7 <sup>th</sup> Edition, Tata McGraw Hill. |
|----|--|

## Unit - III

Teacher should facilitate learning of issues related to software design engineering.

| <b>3. Design Engineering</b> |   | <b>Lectures Required</b> | <b>Ref. No.</b> |
|------------------------------|---|--------------------------|-----------------|
| a                            | Design Process, Design Concepts, The Design Model   | 02                       | 1               |
| b                            | Architectural Design: Software Architecture, Architectural Styles, Architectural Design   | 02                       | 1               |
| c                            | User Interface Design: Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps  | 02                       | 1               |
| d                            | Pattern Based Design, Design Patterns, Pattern Based software Design, Component Level Design patterns, User Interface Design patterns, WebApp Design patterns | 02                       | 1               |
| e                            | Introduction to UML Diagrams  | 01                       | 1 & 2           |

**References:**

|   |   |
|---|---|
| 1 | Pressman R., "Software Engineering - A Practitioners Approach", 7 <sup>th</sup> Edition, Tata McGraw Hill.  |
| 2 | Object Oriented Software Engineering – A Practical Software Development using UML and JAVA, Timonhy C. Lethbridge and Robert Laganieri, 2 <sup>nd</sup> Edition, McGraw-Hill. |

**Unit - IV**

Teacher should facilitate learning of issues related to software testing.

| <b>4. Software Testing</b> |  | <b>Lectures Required</b> | <b>Ref. No.</b> |
|----------------------------|--|--------------------------|-----------------|
| a                          | Testing Strategies: A Strategic approach to Software Testing, Strategic Issues | 01                       | 1               |
| b                          | Testing Strategy for Conventional Software                                     | 01                       | 1               |
| c                          | Testing Strategy for Object-Oriented Software, Testing strategies for Web App  | 01                       | 1               |
| d                          | Validation Testing, System Testing   | 01                       | 1               |
| e                          | Testing Tactics: Testing Fundamentals, White Box Testing                       | 01                       | 1               |
| f                          | Basis Path Testing   | 01                       | 1               |
| g                          | Control Structure Testing  | 01                       | 1               |
| h                          | Black Box Testing  | 01                       | 1               |

**References:**

|    |  |
|----|--|
| 1. | Pressman R., "Software Engineering - A Practitioners Approach", 7 <sup>th</sup> Edition, Tata McGraw Hill. |
|----|--|

## Unit – V

Teacher should facilitate learning of concepts of related to software project planning and management.

| 5. | Software Project Planning & Management Concepts  | Lectures Required | Ref. No. |
|----|--|-------------------|----------|
| a  | Management Spectrum, People, Product, Process, Project, Critical Practices   | 02                | 1        |
| b  | Estimation for software project: Project Planning Process, Software scope and feasibility, Resources, Decomposition Techniques, Empirical Estimation Models, Make/Buy Decision | 03                | 1        |
| c  | Project Scheduling: Task set for Software project, Defining a task network, Scheduling, Earned Value Analysis  | 02                | 1        |
| d  | Product Metrics: A framework for product metrics, Software Quality, Software Quality Factors   | 01                | 1        |

### References:

|    |  |
|----|--|
| 1. | Pressman R., "Software Engineering - A Practitioners Approach", 7 <sup>th</sup> Edition, Tata McGraw Hill. |
|----|--|

# Formal Language and Automata Theory

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

## Unit - I

Teacher should facilitate learning of set theory, graph theory concepts, and define strings with properties and operations. Introduce the concept of basic machine and finite automaton.

| 1. | Mathematical Preliminaries and Finite State Machines  | Lecture required | Ref. No.    |
|----|---|------------------|-------------|
| a  | <b>Basic concepts:</b><br>Sets, Relations and Functions, Alphabets, Words / Strings, their Properties and operations, Graphs and trees.   | 02               | 01 & 03     |
| b  | <b>Finite State Machines</b><br>Basic machine, FSM, State tables, Transition graph, Adjacency matrix, Description of a Finite automaton, Transition Systems, Properties of Transition functions, Acceptability of a string by a FA. | 02               | 01, & 03    |
| c  | <b>DFA and NFA</b><br>Deterministic and Non-deterministic FSM's, Equivalence of DFA and NFA, FSM with Epsilon moves.  | 02               | 01, 02 & 03 |
| d  | <b>FA with outputs and Minimization of FA:</b><br>Moore and Mealy Models, Minimization of Finite Automata.  | 02               | 01, & 03    |

### References:

|    |  |
|----|--|
| 1. | E V Krishnamurthy, S.K.Sen, "Introductory Theory of Computer Science", Second Edition, EWP.  |
| 2. | John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson. |
| 3. | K.L.P.Mishra, N. Chandrasekaran, "Theory of Computer Science Automaton, Languages and Computation", Third Edition, PHI.                    |

## Unit - II

Teacher should facilitate learning of regular expressions, language of finite automaton or transition systems, use of pumping lemma for regular sets to prove that certain sets are not regular.

| 2. | Regular Expressions  | Lecture required | Ref.No. |
|----|--|------------------|---------|
| a  | <b>Regular Expressions:</b><br>Definition, Identities for Regular Expressions, Finite Automata and Regular Expressions, Transition System Containing $\epsilon$ -moves, NDFAs with $\epsilon$ -moves and Regular Expressions, Conversion of Nondeterministic Systems to Deterministic System | 02               | 02 & 03 |
| b  | <b>FA and RE:</b><br>Building RE, Construction of Finite Automata Equivalent to a Regular Expression, Conversion of RE to FA.  | 02               | 02 & 03 |

|   |  |    |         |
|---|--|----|---------|
| c | Converting FA to RE, Equivalence of two FA.  | 02 | 02 & 03 |
| d | <b>Regular sets:</b><br>Pumping lemma for regular sets, Applications of Pumping lemma, Closure properties of Regular sets. | 02 | 02 & 03 |

**References:**

|    |  |
|----|--|
| 1. | E V Krishnamurthy, S.K.Sen, "Introductory Theory of Computer Science", Second Edition, EWP.  |
| 2. | John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson. |
| 3. | K.L.P.Mishra, N. Chandrasekaran "Theory of Computer Science Automaton, Languages and Computation", Third Edition, PHI.                     |

**Unit - III**

Teacher should facilitate learning of context-free grammar and context-free languages.

| 3. | Context - free Grammars   | Lecture required | Ref. No.    |
|----|---|------------------|-------------|
| a  | <b>Grammars:</b><br>Definition, Derivation trees, Leftmost and Rightmost Derivations, Ambiguous grammar, Removal of ambiguity, Chomsky hierarchy.             | 02               | 01, 02 & 03 |
| b  | <b>Simplification of CFG:</b><br>Construction of Reduced Grammar, Eliminating Useless symbols, Eliminating Epsilon productions, Eliminating Unit productions. | 02               | 02 & 03     |
| c  | <b>Normal Forms for CFG:</b><br>Chomsky Normal Form, Greibach Normal Form, Reduced Forms - CNF and GNF, Reduction to CNF and GNF.                             | 02               | 02 & 03     |
| d  | Pumping Lemma for Context - free Languages, Decision Algorithms for Context- free Languages.  | 02               | 03          |

**References:**

|    |  |
|----|--|
| 1. | E V Krishnamurthy, S.K.Sen, "Introductory Theory of Computer Science", Second Edition, EWP.  |
| 2. | John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson. |
| 3. | K.L.P.Mishra, N. Chandrasekaran "Theory of Computer Science Automaton, Languages and Computation", Third Edition, PHI.                     |

**Unit - IV**

Teacher should facilitate learning of Push down automaton and discuss two types of acceptance.

| 4. | Pushdown Stack Memory Machines & Production Systems  | Lecture required | Ref. No. |
|----|--|------------------|----------|
| a  | <b>Pushdown Stack Memory Machines:</b><br>Definition, PDM examples, Acceptance by PDA, Power of PDM. | 02               | 01 & 03  |
| b  | Deterministic and Non-deterministic PDM,   | 02               | 01, 02 & |

|  |   |   |    |         |
|--|---|---|----|---------|
|  |   | Construction of PDA from CFG.   |    | 03      |
|  | c | Construction of CFG from PDA.   | 01 | 02 & 03 |
|  | d | <b>Production Systems:</b><br>Definition, Post canonical system, PMT systems, Markov algorithm. | 03 | 01      |

**References:**

|    |  |
|----|--|
| 1. | E V Krishnamurthy, S.K.Sen, "Introductory Theory of Computer Science", Second Edition, EWP.  |
| 2. | John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson. |
| 3. | K.L.P.Mishra, N. Chandrasekaran "Theory of Computer Science Automaton, Languages and Computation", Third Edition, PHI.                     |

**Unit - V**

Teacher should facilitate learning of Turing's formulation as a model of algorithm or computation.

| 5. | <b>Turing Machine</b> |  | <b>Lecture required</b> | <b>Ref. No.</b> |
|----|-----------------------|--|-------------------------|-----------------|
|    | a                     | Turing Machine Model, Representation of Turing Machines, Language Acceptability By Turing Machines.        | 03                      | 03              |
|    | b                     | Design of Turing Machines, Techniques for TM Construction.   | 02                      | 02 & 03         |
|    | c                     | Variants of Turing Machines, Composite and Iterated TM, Universal TM, TM limitations, The Halting problem. | 03                      | 01, 02 & 03     |

**References:**

|    |  |
|----|--|
| 1. | E V Krishnamurthy, S.K.Sen, "Introductory Theory of Computer Science", Second Edition, EWP.  |
| 2. | John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson. |
| 3. | K.L.P.Mishra, N. Chandrasekaran "Theory of Computer Science Automaton, Languages and Computation", Third Edition, PHI.                     |



# Computer Network

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

## Unit - I

Teacher should facilitate learning of TCP/IP Protocol Suit, Data Link Layer and Ethernet concepts.

| 1. | <b>TCP/IP Protocol Suit, Data Link Layer and Ethernet</b>   | <b>Lect required</b> | <b>Ref No</b> |
|----|---|----------------------|---------------|
| a  | <b>TCP/IP Protocol Suit:</b> Physical and Data Link Layers, Network Layer, Transport Layer, Application Layer. Addressing: Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses.   | 02                   | 01 & 02       |
| b  | <b>Data Link Layer:</b> Framing: Fixed size and variable size framing.  | 02                   | 01 & 02       |
| c  | <b>Ethernet:</b> IEEE Standards: Data Link Layer, Physical Layer. Standard ETHERNET: MAC Sublayer, Physical Layer. Changes in the standard: Bridged Ethernet, Switched Ethernet, Full-Duplex Ethernet. Fast Ethernet: MAC Sublayer, Physical Layer. Gigabit Ethernet: MAC Sublayer, Physical Layer, Ten-Gigabit Ethernet. | 04                   | 01 & 02       |

### References:

|   |  |
|---|--|
| 1 | B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition. |
| 2 | A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.   |

## Unit - II

Teacher should facilitate learning Logical Addressing, IPv4 Addresses, Internet Protocol: IPv4, IPv6, Address Mapping: ARP, RARP, BOOTP and DHCP.

| 2. | <b>Network Layer: Logical Addressing, Internet Protocol and Address Mapping</b>  | <b>Lect required</b> | <b>Ref No</b> |
|----|--|----------------------|---------------|
| a  | <b>Logical Addressing:</b> IPv4 Addresses: Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation (NAT).   | 02                   | 01 & 02       |
| b  | <b>Internet Protocol: IPv4:</b> Datagram, Fragmentation, Checksum, Options. IPv6: Structure, Address Space, Advantages, Packet Format, Extension Headers, Transition from IPv4 to IPv6: Dual Stack, Tunneling, Header Translation. | 03                   | 01 & 02       |
| c  | <b>Address Mapping:</b> Mapping Logical to Physical Address: ARP, Mapping Physical to Logical Address: RARP, BOOTP and DHCP.   | 03                   | 01 & 02       |

### References:

|   |  |
|---|--|
| 1 | B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition. |
| 2 | A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.   |

### Unit - III

Teacher should facilitate learning of Error Reporting, Delivery, Forwarding, Unicast Routing Protocols and Multicast Routing Protocols.

| 3. | <b>Network Layer: Error Reporting, Delivery, Forwarding, Unicast and Multicast Routing Protocols</b>   | <b>Lect required</b> | <b>Ref No</b> |
|----|--|----------------------|---------------|
| a  | <b>Error Reporting:</b> ICMP: Types of Messages, Message Format, Error Reporting, Query, Debugging Tools.  | 02                   | 01<br>&<br>02 |
| b  | <b>Delivery:</b> Direct Versus Indirect Delivery.  | 01                   | 01<br>&<br>02 |
| c  | <b>Forwarding:</b> Forwarding Techniques, Routing Table.   | 01                   | 01<br>&<br>02 |
| d  | <b>Unicast Routing Protocols:</b> Optimization, Intra and Interdomain Routing, Distance Vector Routing, Link State Routing, Path Vector Routing. | 02                   | 01<br>&<br>02 |
| e  | <b>Multicast Routing Protocols:</b> Source-Based Tree and Group-Shared Tree, MOSPF, Core-Based Tree (CBT).                                       | 02                   | 01<br>&<br>02 |

**References:**

|   |  |
|---|--|
| 1 | B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition. |
| 2 | A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.   |

### Unit - IV

Teacher should facilitate learning of Transport Layer, User Datagram Protocol (UDP) and Transmission Control Protocol (TCP).

| 4. | <b>Transport Layer: UDP and TCP</b>   | <b>Lect required</b> | <b>Ref No</b> |
|----|---|----------------------|---------------|
| a  | <b>Transport Layer:</b> Transport-layer services: Process-to-Process Communication, Addressing: Port Numbers, Encapsulation and Decapsulation, Multiplexing and Demultiplexing, Flow Control and Error Control. | 02                   | 01<br>&<br>02 |
| b  | <b>User Datagram Protocol (UDP):</b> User Datagram, UDP Services: Process-to-Process Communication, Connectionless Services, Flow Control and Error Control.  | 02                   | 01<br>&<br>02 |
| c  | <b>Transmission Control Protocol (TCP):</b> Services, Features, Segment, Connection, Flow Control, Error Control and Congestion Control: open-loop congestion control and closed-loop congestion control.       | 04                   | 01<br>&<br>02 |

**References:**

|   |  |
|---|--|
| 1 | B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition. |
| 2 | A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.   |

**Unit - V**

Teacher should facilitate learning of the Wireless Network, Overview of 802.11 Networks and Network Security.

| 5. | Wireless Networks: 802.11 and Network Security   | Lect required | Ref No  |
|----|--|---------------|---------|
| a  | <b>Introduction to Wireless Network:</b> Why Wireless? A Network by Any Other Name.  | 01            | 01 & 03 |
| b  | <b>Overview of 802.11 Networks:</b> IEEE 802 Network Technology Family Tree, 802.11 Nomenclature and Design, 802.11 Network Operations, Mobility Support.  | 03            | 01 & 03 |
| c  | <b>Network Security:</b> Introduction to cryptography, symmetric-key and asymmetric-key cryptography. Symmetric-Key cryptography: Introduction, traditional ciphers, simple modern ciphers: XOR Cipher, Rotation Cipher, Substitution Cipher: S-box, Transposition Cipher: P-box. Asymmetric-Key cryptography: RSA, Diffie-Hellman algorithms. | 04            | 01 & 03 |

**References:**

|   |  |
|---|--|
| 1 | B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition.                   |
| 2 | A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.                     |
| 3 | Matthew S. Gast, "802.11 Wireless Networks: The Definitive Guide", O'Reilly, Second Edition. |

# System Programming

## Unit - I

Teacher should facilitate learning of system programs and the use of system program for designing the system software.

| 1. |           | <b>Introduction system programs and Assembler</b>   | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|---|--------------------------|------------------|
|    | <b>a.</b> | Introduction to system programming, Types of software and application software, System programming and system programs, Need of system software. Assemblers, Loaders, Compilers, Interpreters, Macros, Operating system and formal system, Translators and its types. | <b>02</b>                | <b>1,2</b>       |
|    | <b>b.</b> | Assemblers: Structure of assembler, Basic function, Machine dependent and machine independent features of assembler, Types of assemblers – single pass, multi-pass, cross assembler,  | <b>01</b>                | <b>1,2</b>       |
|    | <b>c.</b> | General design procedure of assembler, Design of Pass-I and Pass-II assembler (with reference to 8086 assembler),   | <b>04</b>                | <b>1,2</b>       |
|    | <b>d.</b> | Operating System:- Operating System:- concept, services, types (brief introduction only)  | <b>01</b>                | <b>1,2</b>       |

### References:

|    |   |
|----|---|
| 1. | John J. Donovan, "System Programming", 2nd Edition, TATA Mc GRAW HILL.                                  |
| 2. | D. M. Dhamdhare, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL. |

## Unit - II

Teacher should facilitate learning of system programs like Macro processor, loader and the detailed design of these system programs.

| 2. |           | <b>Macro processor &amp; Loader</b>  | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|--|--------------------------|------------------|
|    | <b>a.</b> | Macros and Macro Processors: Definition and function of Macro Processor, Macro expansion, Features of macro facility.  | <b>02</b>                | <b>1,2</b>       |
|    | <b>b.</b> | Design of macro processor – single pass and two pass macro processor, detailed design of two pass macro processor.   | <b>02</b>                | <b>1,2</b>       |
|    | <b>c.</b> | Loaders and Linkage Editors: Basic loader functions, Relocation and linking concepts, various loader schemes (Compile and go loader, Absolute loader, Relocating loader, general loading scheme) with their advantages and disadvantages | <b>04</b>                | <b>1,2</b>       |

### References:

|    |  |
|----|--|
| 1. | John J. Donovan "System Programming", 2nd Edition, TATA Mc GRAW HILL.                                  |
| 2. | D. M. Dhamdhare "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL. |

### Unit - III

Teacher should facilitate learning of Linker, grammar and to generate the parse tree using the grammar.

| 3. |           | <b>Linker &amp; Grammar</b>  | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|--|--------------------------|------------------|
|    | <b>a.</b> | Design of direct linking loaders, specification of problem, specification of data structures, format of databases.                           | <b>02</b>                | <b>1</b>         |
|    | <b>b.</b> | Design of a linker, A linker for MS DOS, Linking for overlays.   | <b>02</b>                | <b>1,3</b>       |
|    | <b>c.</b> | Other loader schemes - binders, Linking loaders, Overlays, Dynamic binders.  | <b>02</b>                | <b>1,2</b>       |
|    | <b>d.</b> | Grammar and scanner, Programming language grammar, Derivation, Reduction and Syntax tree, Ambiguity, Regular grammar and Regular expression. | <b>02</b>                | <b>2,3</b>       |

#### References:

|    |   |
|----|---|
| 1. | John J. Donovan, "System Programming", 2nd Edition, TATA Mc GRAW HILL.  |
| 2. | D. M. Dhamdhare, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL.           |
| 3. | Aho Alfred V, Sethi Rav and Ullman D, "Compiler Principles Techniques and Tools", 2nd Edition, Pearson Education. |

### Unit - IV

Teacher should facilitate learning of parser and different parsing techniques.

| 4. |           | <b>Parser and Parsing Technique</b>   | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|---|--------------------------|------------------|
|    | <b>a.</b> | Parsing Techniques: - Concept, Top Down and Bottom up Parsing.                                  | <b>01</b>                | <b>1</b>         |
|    | <b>b.</b> | Top Down Parsing: - limitations of Top Down Parsing - Recursive descent and Predictive Parsing. | <b>02</b>                | <b>2</b>         |
|    | <b>c.</b> | Bottom Up Parsing:- Concepts, Shift Reduce Parser, LR Parser, LALR, SLR Parser.                 | <b>03</b>                | <b>1</b>         |
|    | <b>d.</b> | Operator Precedence Parser, Syntax directed translation (Concept and introduction only).        | <b>01</b>                | <b>1</b>         |
|    | <b>e.</b> | Introduction to software development tools LEX & YACC   | <b>01</b>                | <b>1,2</b>       |

#### References:

|    |  |
|----|--|
| 1. | D. M. Dhamdhare, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL.          |
| 2. | Aho Alfred V, Sethi Rav and Ullman D, "Compiler Principles Techniques and Tools", 2nd Edition, Pearson Education |

### Unit - V

Teacher should facilitate learning of Compiler and the compilation process with machine dependant and independent features.

| <b>5.</b> |           | <b>Compiler &amp; Inter Process Communication</b>   | <b>Lectures required</b> | <b>Reference</b> |
|-----------|-----------|---|--------------------------|------------------|
|           | <b>a.</b> | Overview of compilation process, Basic functions of compiler, Machine dependent and machine independent features of compiler. | <b>01</b>                | <b>1,2</b>       |
|           | <b>b.</b> | Types of compilers – single pass, multi-pass, cross compiler and pseudo code compiler.  | <b>02</b>                | <b>1,2,3</b>     |
|           | <b>c.</b> | Phase structure of compiler.  | <b>03</b>                | <b>1,2</b>       |
|           | <b>d.</b> | Introduction to inter process communication in windows (DLL, DDE, OLE, Clipboard:- concepts and introduction only).           | <b>02</b>                | <b>2</b>         |

**References:**

|    |  |
|----|--|
| 1. | John J. Donovan, "System Programming", 2nd Edition, TATA Mc GRAW HILL.   |
| 2. | D. M. Dhamdhare, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL.            |
| 3  | Aho Alfred V, Sethi Rav and Ullman D, "Compiler Principles Techniques and Tools", 2nd Edition, Pearson Education . |

# Principles of Management

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

## Unit - I

Teacher should facilitate learning of need, classification of management and contribution of management thinkers.

| 1. |           | <b>BASIC CONCEPTS OF MANAGEMENT</b>   | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|---|--------------------------|------------------|
|    | <b>a.</b> | <b>Management:</b> Definition, classification, characteristics and importance of management, Principles of Management. Management Objectives, Types of objectives, Functions of Managers, Managerial skills, Managerial economics, Managerial accounting. | <b>03</b>                | <b>1,2</b>       |
|    | <b>b.</b> | <b>Development of management thoughts :</b> Functional approach to Management by Henry Fayol, Scientific Management Approach by Taylor, Gilbreth, Gantt, Human Relation Approach by Elton Mayo, Follet.   | <b>03</b>                | <b>1,2</b>       |
|    | <b>c.</b> | Schools of management Thoughts, Tools of Management science, Need usefulness of management theory.  | <b>02</b>                | <b>1,2</b>       |

### References:

|    |   |
|----|---|
| 1. | T. R. Banga & S. C. Sharma, "Industrial Organization and Management Economics", Twenty-Third Edition, Hanna Publishers. |
| 2. | O. P. Khanna, "Industrial Organization and Management Economics" 2006, Dhanpat Rai Publications.                        |
| 3. | Koontz and Weihrich, "Management – A Global Perspective" Tenth Edition, Mc Graw-Hill International Editions.            |

## Unit - II

Teacher should facilitate learning of functions of management, management by objective, different organizational structures.

| 2. |           | <b>FUNCTIONS OF MANAGEMENT AND ORGANISATIONS</b>   | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|--|--------------------------|------------------|
|    | <b>a.</b> | <b>Functions of Management:</b> Planning, Organising, Staffing - Concept, Nature, Importance, Steps, Concept of knowledge worker. Directing - Concept, Nature, Importance. Controlling - Concept, Nature, Importance, Process of controlling, leadership Theories, characteristic and styles of leaderships. | <b>03</b>                | <b>1,2</b>       |
|    | <b>b.</b> | <b>Management by objectives:</b> steps in setting up M.B.O, Problem in the approach of M.B.O., Management of participation, management by exception, quantitative and qualitative objectives.  | <b>02</b>                | <b>1,3</b>       |
|    | <b>c.</b> | <b>Organisation and its Concept:</b> Nature, Importance, Principles, Centralization, Decentralization, Organization Structures- Line and Staff, Functional, Organizations.   | <b>03</b>                | <b>1,2</b>       |

**References:**

|    |  |
|----|--|
| 1. | T. R. Banga & S. C. Sharma ,”Industrial Organization and Management Economics “Twenty-Third Edition,Khanna Publishers. |
| 2. | O. P. Khanna,” Industrial Organization and Management Economics”2006, Dhanpat Rai Publications.                        |
| 3. | Koontz and Weihrich, “Management –A Global Perspective “Tenth Edition,Mc Graw-Hill International Editions.             |

**Unit - III**

Teacher should facilitate learning of functions staffing on different levels in organization, Motivation theory and personal management.

| 3. |           | <b>HUMAN RESOURCE MANAGEMENT</b>   | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|--|--------------------------|------------------|
|    | <b>a.</b> | Function and objective Personnel Management, Manpower Planning, Selection and Recruitment of Employees, Needs & Types of Training, Objective and Benefits of training, Training for Craftsman, supervisor and Executive. | <b>03</b>                | <b>1,3</b>       |
|    | <b>b.</b> | <b>Motivation and motivators:</b> motivations, perspective: self motivation, motivation: the carrot and the Sticks, kinds of Motivation, Herzberg’s motivation, Hygien Theory.   | <b>02</b>                | <b>1,2</b>       |
|    | <b>c.</b> | <b>Personal management:</b> concept, principles of good personal policy, communication in industry, suggestion system, discipline in industry, promotion, transfer, layout and discharge.                                | <b>03</b>                | <b>2,3</b>       |

**References:**

|    |  |
|----|--|
| 1. | T. R. Banga & S. C. Sharma ,”Industrial Organization and Management Economics “Twenty-Third Edition,Khanna Publishers. |
| 2. | O. P. Khanna,” Industrial Organization and Management Economics”2006, Dhanpat Rai Publications.                        |
| 3. | Koontz and Weihrich, “Management –A Global Perspective “Tenth Edition,Mc Graw-Hill International Editions.             |

**Unit - IV**

Teacher should facilitate learning of Project management, life-cycle of project, its scheduling and total quality management.

| 4. |           | <b>PROJECT AND QUALITY MANAGEMENT</b>  | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|--|--------------------------|------------------|
|    | <b>a.</b> | Introduction, Project Management Terminology, Concept of project Management, Role and Responsibilities of Project Manager,   | <b>02</b>                | <b>1,2</b>       |
|    | <b>b.</b> | Types of project, Project Life Cycle Phase, Project Planning, Project Scheduling, Project Monitoring and Control, basic tools and Techniques for Project Scheduling.   | <b>03</b>                | <b>1,3</b>       |
|    | <b>c.</b> | <b>Total quality management:</b> Introduction, factors affecting quality, product quality analysis, product quality analysis, causes of quality failure, elements of T.Q.M , requirements of T.Q.M, Aims of T.Q.M., quality circles, ISO 9000. | <b>03</b>                | <b>1,2</b>       |



**References:**

|    |  |
|----|--|
| 1. | T. R. Banga & S. C. Sharma ,”Industrial Organization and Management Economics “Twenty-Third Edition,Khanna Publishers. |
| 2. | O. P. Khanna,” Industrial Organization and Management Economics”2006, Dhanpat Rai Publications.                        |
| 3. | Koontz and Weihrich, “Management –A Global Perspective “Tenth Edition,Mc Graw-Hill International Editions.             |

**Unit - V**

Teacher should facilitate learning of Industrial psychology, ethics and Management information system.

| 5. |           | <b>INDUSTRIAL PSYCHOLOGY, ETHICS AND MIS</b>   | <b>Lectures required</b> | <b>Reference</b> |
|----|-----------|--|--------------------------|------------------|
|    | <b>a.</b> | <b>Industrial Psychology:</b> Definition and Concepts, Industrial psychology Vs Personal Management, Aims and Objectives of Industrial Psychology, Scope, Individual difference in behavior, Group Dynamics, Theory X and Y, Working Environmental Conditions, Industrial Fatigue. | <b>03</b>                | <b>1,2</b>       |
|    | <b>b.</b> | <b>Professional and Business Ethics:</b> Concepts, Ethics and Morals, Business Ethics, Professional Ethics, Need and Importance of ethics, Ethical problems and business, Ethical Issues, How to make business ethical.  | <b>03</b>                | <b>1,2</b>       |
|    | <b>c.</b> | Definition & Evolution of MIS, Need/Objective/Functions of an MIS, Need for Information, Qualities of Good information, Information as an Organizational Resource, Management Information Categories, Application of MIS.  | <b>02</b>                | <b>1,2</b>       |

**References:**

|    |  |
|----|--|
| 1. | T. R. Banga & S. C. Sharma ,”Industrial Organization and Management Economics “Twenty-Third Edition, Hanna Publishers. |
| 2. | Koontz and Weihrich, “Management –A Global Perspective “Tenth Edition, Mc Graw-Hill International Editions.            |

# Software Engineering Lab

## LAB COURSE CONTENT

Teacher should facilitate learning the development of **any five** of following Mini-Projects:

| Sr. No. | Title of Mini-Project               | Lab Hours Required |
|---------|-------------------------------------|--------------------|
| 1       | ATM System                          | 05 to 06           |
| 2       | Library Management System           | 05 to 06           |
| 3       | Inventory Control System            | 05 to 06           |
| 4       | Railway Reservation System          | 05 to 06           |
| 5       | College Admission System            | 05 to 06           |
| 6       | University Result Management System | 05 to 06           |
| 7       | Vehicle Navigation System           | 05 to 06           |
| 8       | Hospital Management System          | 05 to 06           |
| 9       | Banking System                      | 05 to 06           |
| 10      | Web based/Online Auction System     | 05 to 06           |

### Note :

- The Software Engineering Lab must include any five of above software Mini-Projects covering Problem Definition, Analysis & Design using a CASE Tool and Documentation for each.
- Faculty In charge must use CASE Tool for Analysis & Design of Mini-Project. Faculty member may promote use of Open Source/Freeware/Shareware CASE Tool for Analysis & Design.
- Every student is required to submit Mini-Projects in the form of journal.

### Guidelines for ICA:

Students must submit ICA in the form of journal. Each assignment should be well documented. Faculty in charge will assess the assignments continuously and grade or mark each assignment on completion date declared for each assignments.

### Guidelines for ESE:

The oral examination will be based on the assignments performed by the candidates as part of ICA. Questions will be asked during the oral examination to judge the understanding of the student. It is expected that student knows theoretical (Software Engineering) aspect of the problem.

### Reference Books

1. Timonthy C. Lethbridge and Robert Laganriere, "Object Oriented Software Engineering – A Practical Software Development using UML and JAVA", 2<sup>nd</sup> Edition, McGraw-Hill.
2. Mike O'Docherty, "Object-Oriented Analysis & Design – Understanding System Development with UML 2.0", Wiley.

# Linux Lab

## LAB COURSE OUTLINE

Course Title

**Linux Lab**

Short Title Course Code

**Linux**

### Outline of Content:

**(Note: Minimum SIX Experiments from group A and FOUR from group B.)**

Teacher should facilitate learning following lab experiments:

|          | <b>Group A</b>  | <b>Lab hours required</b> |
|----------|---|---------------------------|
| <b>1</b> | <b>Installation of Linux OS.</b><br>Installing latest version of Linux. Observing each step of installation and notice the differences.   | <b>02</b>                 |
| <b>2</b> | <b>Study and execution of various Linux Commands.</b><br>Studying various basic commands of Linux. Use of commands.   | <b>02</b>                 |
| <b>3</b> | <b>Study of vi editor.</b><br>Studying basic working and use of vi editor.  | <b>02</b>                 |
| <b>4</b> | <b>Configuration of Linux Server (any two)</b><br>It shows step by step Configuration of various types of servers<br>1) Web Server<br>2) Mail Server<br>3) Proxy Server<br>4) Telnet Server<br>5) FTP Server                                    | <b>02</b>                 |
| <b>5</b> | <b>Shell script for finding out factorial of a number.</b><br>To calculate the Factorial of number.   | <b>02</b>                 |
| <b>6</b> | <b>Shell script for finding out file type and displaying list of a directory.</b><br>To find out file type and displaying list of directory.  | <b>02</b>                 |
| <b>7</b> | <b>Shell Script for File Handling.</b><br>Demonstrates the various file operations such as :<br>1) Create a File.<br>2) Read a File.<br>3) Add a record into a File.<br>4) Delete a record from File.<br>5) Delete a file.<br>6) Update a File. | <b>02</b>                 |

|          | <b>Group B</b>   | <b>Lab hours required</b> |
|----------|--|---------------------------|
| <b>1</b> | <b>Write shell script for displaying user process and system related information using environment variables.</b><br>Displays a user process and system related information using environment variables. | <b>02</b>                 |
| <b>2</b> | <b>Write a shell script to find the largest among the 3 given numbers.</b><br>To find out largest number among 3 given numbers.  | <b>02</b>                 |
| <b>3</b> | <b>Write a shell script to reverse the contents of a String.</b><br>To print contents of string in reverse order.  | <b>02</b>                 |

|          |  |           |
|----------|--|-----------|
| <b>4</b> | <b>Write a shell script to print date and time.</b><br>To print date and time along with greetings depend on time.                                   | <b>02</b> |
| <b>5</b> | <b>Shell script to perform arithmetic operations.</b><br>To perform arithmetic operations such as – Addition, Subtraction, Multiplication, Division. | <b>02</b> |

**Note:**

- Concerned faculty should suitably frame at least **10 practical** assignments (**SIX from PART – A and FOUR from PART – B**) out of the above list.
- Every assignment should include syntax, use of commands/functions used for coding & print out of code with proper comments and output.
- Every student is required to submit the assignments in the form of journal.

**Reference Books:**

1. Stevens Richard W, Rago Stephen A “Advanced programming in the unix environment”, Pearson 2008.
2. Gopalan N P,Sivaselvan B “Beginners guide to unix”, PHI Learning: New Delhi, 2009.
3. Richard Blum, Christine Bresnahan, “Linux Command Line and Shell Scripting Bible, 2nd Ed ”, Wiley India, 2011.
4. Dayanand Ambawade, Deven N. Shah, “Linux Lab: Hands on Linux”, Dreamtech Press
5. “Linux Administration”, Kogent Learning Solutions Inc.
6. Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, “Unix and Linux System Administration Handbook” 4th Edition, Pearson.
7. Neil Matthew, Richard Stones ,“Beginning Linux Programming”, 4th Edition, Wiley.
8. K. L. JAMES, “Linux -Learning the Essentials”, PHI,2011.

# Computer Network Lab

## LAB COURSE CONTENT

### Outline of Content:

(Note: Minimum SIX Experiments from group A and TWO from group B.)

#### Group A

- 1. Implementation of Character count/Bit-Stuffing/Byte stuffing framing methods.**  
Implementation of any one framing method i.e. Character count/Bit-Stuffing/Byte stuffing in C/C++/Java.
- 2. Implementation of Dijkstra's Shortest Path Network routing algorithm.**  
Implementation of Dijkstra's Shortest Path Network routing algorithm in C/C++/Java.
- 3. Implementation of TCP checksum.**  
Implementation of TCP checksum in C/C++/Java.
- 4. Socket programming for TCP.**  
Implementation of TCP server and TCP client using socket programming in C/C++/Java.
- 5. Socket programming for UDP.**  
Implementation of UDP server and UDP client using socket programming in C/C++/Java.
- 6. Encryption/Decryption using XOR symmetric-key cryptography algorithm.**  
Implementation of Encryption/Decryption using XOR symmetric-key cryptography algorithm in C/C++/Java.
- 7. Encryption/Decryption using RSA asymmetric-key cryptography algorithm.**  
Implementation of Encryption/Decryption using RSA asymmetric-key cryptography algorithm in C/C++/Java.
- 8. Implementation of RLE data compression algorithm.**  
Implementation of RLE data compression algorithm in C/C++/Java.

#### Group B

- 1. Simulate the Ethernet LAN for wired networks.**  
Ethernet LAN for wired networks simulation using NS-2/NS-3/OPNET/NetSim/OMNeT++ etc. network simulator software in Windows/ Linux.
- 2. Simulate the point-to-point wired network.**  
Point-to-Point wired networks simulation using NS-2/NS-3/OPNET/ NetSim/OMNeT++ etc. network simulator software in Windows/Linux.
- 3. Simulate any Wireless network.**  
Any Wireless network simulation using NS-2/NS-3/OPNET/NetSim/OMNeT++ etc. network simulator software in Windows/Linux.

#### Guidelines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.

- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of program code, execution of the program code, type of input and output for the program code.

**Text Books:**

1. B. A. Forouzan, "Data Communications and Networking", TMH, Fourth Edition.
2. A. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition.
3. Matthew S. Gast, "802.11 Wireless Networks: The Definitive Guide", O'Reilly, Second Edition.

**Reference Books:**

1. B. A. Forouzan, "TCP/IP Protocol Suite", TMH, Fourth Edition.
2. W.R. Stevens, "Unix Network Programming", Vol.1, Pearson Education.
3. S. Keshav, "An Engineering Approach to Computer Networking", Addison Wesley.
4. Comer, "Internetworking with TCP/IP", Vol. 1, Pearson Education, Fourth Edition.
5. W. Stallings, "Data and Computer Communications", Pearson Education, Fifth Edition.

# System Programming Lab

## LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

|          |   | <b>Lab hours required</b> |
|----------|---|---------------------------|
| <b>1</b> | <b>Develop an application to simulate pass-I of Two Pass Assembler.</b><br>To analyze the source program for finding Pseudo-opcode, Machine opcode, Literals and symbols.                 | 02                        |
| <b>2</b> | <b>Develop an application simulate pass- II of Two pass Assembler.</b><br>To analyze the output of pass-I to generate the machine operation code.   | 02                        |
| <b>3</b> | <b>Develop an application to create simple text editor.</b><br>Develop a text editor for creation, opening, editing and saving the content into a file.                                   | 02                        |
| <b>4</b> | <b>Develop an application for simulating Lexical Phase of compiler.</b><br>Develop a Lexical Analyzer for generating keywords, symbols, operators and identifiers within the source code. | 02                        |
| <b>5</b> | <b>Develop an application for simulating Syntax Analysis Phase of compiler.</b><br>Develop a Syntax Analyzer for generating a Parse tree from source code.                                | 02                        |
| <b>6</b> | <b>Develop an application for simulating Pass-I of Macro Processor.</b><br>Develop Pass-I of Macro processor for recognizing macro definition specified within a program.                 | 02                        |
| <b>7</b> | <b>Develop an application for simulating Pass-II of Macro Processor.</b><br>Develop Pass-II of an Macro processor for expanding a macro definition specified within a program             | 02                        |
| <b>8</b> | <b>Develop an application for simulation of any one of parsing techniques.</b><br>Develop a parser from the grammar specified within a source code.                                       | 02                        |

### Note:

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

### Guidelines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of concept understanding of topic and algorithm, understanding of the logic and the syntax, quality of program code, execution of the program code, type of input and output for the program code.

**Reference Books:**

1. John J. Donovan, "System Programming", 2<sup>nd</sup> Edition ,TATA Mc GRAW HILL.
2. D. M. Dhamdhere, "System Programming and Operating Systems", Second Revised Edition, TATA Mc GRAW HILL.
3. Aho Alfred V,Sethi Rav and Ullman D, "Compiler Principles Techniques and Tools",2nd Edition, Pearson Education.



# Java Programming Lab

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

## Unit - I

Teacher should facilitate learning of basics of JAVA, Programming Concepts in Java, Introduction to Classes, Arrays and Strings.

| 1. | Introduction to Java Programming Language  | Lectures required | Ref No |
|----|--|-------------------|--------|
| a  | <b>Introduction:</b><br>OOP, Features of Java, Difference between C++ and Java, Defining a class, Creating object of a class, Accessing instance variables and methods of a class. | 01                | 1,2    |
| b  | <b>Programming Concepts:</b><br>Data Types, Operators, Variables, A Simple Java Program.   | 01                | 1,2    |
| c  | <b>Arrays and String:</b><br>Command line arguments, Arrays, String handling.  | 01                | 1,2    |

### References:

|    |  |
|----|--|
| 1. | Herbert Schildt, "Java2:The Complete Reference" , Tata Mc GrawHill, 5 <sup>th</sup> edition. |
| 2. | E. Balagurusamy , "Programming with Java A primer", 3 <sup>rd</sup> Edition.                 |
| 3  | Horstman Cay, Cornell Gary, "Core JavaTM2", Vol.1, Pearson education.                        |
| 4  | Kathey Sierra & Bert Bates, "Head First Java", SPD Publication.                              |
| 5  | Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.                                |

## Unit - II

Teacher should facilitate learning of classes, objects, constructors, Visibility Control and Packages.

| 2. | Methods, Constructor, Visibility Control and Packages  | Lectures required | Ref No |
|----|--|-------------------|--------|
| a  | <b>Methods and Constructor:</b><br>Creating methods, Naming conventions of a class, Constructors, Constructor overloading .                        | 01                | 1,2,3  |
| b  | <b>Methods ,Keyword and Garbage Collection:</b><br>Methods overloading, 'this' keyword, Garbage collection, finalize () method, Static member.     | 01                | 1,2,3  |
| c  | <b>Packages:</b><br>Introduction of packages, Type of packages, Accessing system packages, Steps for creating and accessing User defined Packages. | 01                | 1,2,3  |

**References:**

|    |  |
|----|--|
| 1. | Herbert Schildt, "Java2:The Complete Reference" , Tata Mc GrawHill, 5 <sup>th</sup> edition. |
| 2. | E. Balagurusamy , "Programming with Java A primer", 3 <sup>rd</sup> Edition.                 |
| 3  | Horstman Cay, Cornell Gary, "Core Java™2", Vol.1, Pearson education.                         |
| 4  | Kathey Sierra & Bert Bates, "Head First Java", SPD Publication.                              |
| 5  | Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.                                |

**Unit - III**

Teacher should facilitate learning of inheritance, Types of inheritance, interfaces and threads.

| 3. | <b>Introduction to Inheritance, Interface, Thread</b>  | <b>Lectures required</b> | <b>Ref No</b> |
|----|--|--------------------------|---------------|
| a  | <b>Introduction to inheritance:</b><br>Introduction to inheritance and its Types, Super classes and Sub classes, Method overriding, Dynamic Method Dispatch, Abstract Method and Abstract class, use of final keyword. | 01                       | 1,2,3         |
| b  | <b>Introduction to interface:</b><br>Interfaces, Implementation of interfaces, Extending interface, Difference between Abstract Class and interface.   | 01                       | 1,2,3         |
| c  | <b>Introduction to threads:</b><br>Introduction to Threads, Thread life cycle, Creating thread by extending thread class, creating thread by implementing interface, Synchronization.                                  | 01                       | 1,2,3         |

**References:**

|    |  |
|----|--|
| 1. | Herbert Schildt, "Java2:The Complete Reference" , Tata Mc GrawHill, 5 <sup>th</sup> edition. |
| 2. | E. Balagurusamy , "Programming with Java A primer", 3 <sup>rd</sup> Edition.                 |
| 3  | Horstman Cay, Cornell Gary, "Core Java™2", Vol.1, Pearson education.                         |
| 4  | Kathey Sierra & Bert Bates, "Head First Java", SPD Publication.                              |
| 5  | Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.                                |

**Unit - IV**

Teacher should facilitate learning of Exception Handling and Event Handling.

| 4. | <b>Exception Handling and Event Handling</b> | <b>Lectures required</b> | <b>Ref No</b> |
|----|--|--------------------------|---------------|
|----|--|--------------------------|---------------|

|   |  |    |       |
|---|--|----|-------|
| a | <b>Exception</b><br>Exception Hierarchy, Types of Errors, Handling Exception using try and catch block, multiple catch block, finally clause, Throwing our Own Exception.                                  | 01 | 1,2,3 |
| b | <b>Event Handling</b><br>The Delegation Event Model, Events, Event Sources, Event Listeners, Event Classes, Sources of Events, Event Listener Interfaces, Handling Mouse Events, Handling Keyboard Events. | 02 | 1,2,3 |

### References:

|    |  |
|----|--|
| 1. | Herbert Schildt, "Java2:The Complete Reference" , Tata Mc GrawHill, 5 <sup>th</sup> edition. |
| 2. | E. Balagurusamy , "Programming with Java A primer", 3 <sup>rd</sup> Edition.                 |
| 3  | Horstman Cay, Cornell Gary, "Core Java™2", Vol.1, Pearson education.                         |
| 4  | Kathey Sierra & Bert Bates, "Head First Java", SPD Publication.                              |
| 5  | Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.                                |

## Unit - V

Teacher should facilitate learning of the concept of Applet Handling with HTML, Graphics Design in Java and Database connectivity in Java.

| 5. | Web Page Design and Database connectivity  | Lectures required | Ref No |
|----|--|-------------------|--------|
| a  | <b>Applet Programming</b><br>Applet Programming Applet basics, Local and remote applets, How applet differ from application, Applet life cycle, Building applet code | 01                | 1,2,3  |
| b  | <b>Web Page Design Using Applets</b><br>Designing a Web page, Applet tag, Adding Applet to HTML file, Running the Applet   | 01                | 1,2,3  |
| c  | <b>Connectivity in Java</b><br>Introduction to JDBC, Types of JDBC Drivers, JDBC API Component   | 01                | 1,2,3  |

### References:

|    |  |
|----|--|
| 1. | Herbert Schildt, "Java2:TheCompleteReference" , Tata Mc GrawHill, 5 <sup>th</sup> edition. |
| 2. | E. Balagurusamy , "Programming with Java A primer", 3 <sup>rd</sup> Edition.               |
| 3  | Horstman Cay, Cornell Gary, "Core Java™2", Vol.1, Pearson education.                       |
| 4  | Kathey Sierra & Bert Bates, "Head First Java", SPD Publication.                            |
| 5  | Steven Holzner, "JAVA 2 Programming Black Book", Wiley India.                              |

**NORTH MAHARASHTRA UNIVERSITY,  
JALGAON (M.S.)**

**Third Year Engineering  
(Information Technology)  
Faculty of Engineering and Technology**



**Teacher and Examiner's Manual  
Semester – VI  
W.E.F 2014 – 2015**



# Operating System

## Unit - I

Teacher should facilitate learning of basic functions of Operating System.

| 1. | Operating System Overview   | Lectures required | Ref No |
|----|---|-------------------|--------|
| a  | <b>Introduction</b><br>Computer system organization, Architecture, Evolution of OS, Need of OS, User view and System view of OS.                                    | 02                | 1 & 2  |
| b  | <b>Types of Operating System</b><br>Batch, Timesharing, Multiprogramming, Multitasking, RTOS, Distributed.  | 02                | 1 & 2  |
| c  | <b>Operating System Services and Components</b><br>Different OS services and OS components, System calls and its types.   | 02                | 1 & 2  |
| d  | <b>Operating System Structures</b><br>Monolithic, Layered, Kernel, Microkernel, Virtual Machine.<br><b>Threads</b><br>Overview, Benefits, Models(Introduction Only) | 02                | 1 & 2  |

### References:

|   |  |
|---|--|
| 1 | A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7 <sup>th</sup> / 8 <sup>th</sup> edition, John Wiley Publications, 2008. |
| 2 | Dhananjay M. Dhamdhare, "Operating Systems-A Concept-Based Approach", 3 <sup>rd</sup> edition, TMH, 2012.  |

## Unit - II

Teacher should facilitate learning of Process and Process Management.

| 1. | Process and Process Management   | Lectures required | Ref No |
|----|--|-------------------|--------|
| a  | <b>Process Concept</b><br>The process, Process states, Process Control Block, Context Switching, SPOOLING, CPU & I/O burst.  | 01                | 1      |
| b  | <b>Scheduling</b><br>Concept, Objectives, Queuing diagram.<br><b>Types of Schedulers</b><br>Long term Scheduler, Middle term Scheduler, Short term Scheduler.                        | 02                | 1      |
| c  | <b>Scheduling Algorithm(For Uniprocessor System)</b><br>FCFS, SJF (preemptive & non preemptive), Priority (preemptive & non preemptive), Round Robin, MLQ with and without feedback. | 03                | 1      |
| d  | <b>IPC</b><br>Concept and types<br><b>Critical Section</b><br>Critical section problem, Solution to critical section problem, Mutual exclusion with busy waiting, TSL,               | 03                | 1      |

|  |  |  |  |
|--|--|--|--|
|  | Peterson's solution for two process, Dijkstra's semaphore.<br><b>Problem in Concurrent Programming</b><br>Producer-Consumer problem, Reader –Writer problem,<br>Dinning Philosopher problem, Monitors. |  |  |
|--|--|--|--|

**References:**

|   |  |
|---|--|
| 1 | A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7 <sup>th</sup> / 8 <sup>th</sup> edition, John Wiley Publications, 2008. |
|---|--|

**Unit - III**

Teacher should facilitate learning of Deadlock and Memory Management.

| 1. | Deadlocks  | Lectures required | Ref No |
|----|--|-------------------|--------|
| a  | <b>Deadlocks</b><br>System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.  | 03                | 1      |
| b  | <b>Memory Management</b><br>Memory Management Requirements.<br><b>Memory Partitioning</b><br>Fixed and Dynamic Partitioning.<br><b>Memory Allocation</b><br>Allocation strategies (First Fit, Best Fit and Worst Fit), Fragmentation, Swapping, Paging and Segmentation. | 03                | 1 & 2  |
| c  | <b>Virtual Memory Management</b><br>Background, Demand Paging, Page Replacement (FIFO, LRU, Optimal LRU), Thrashing.   | 02                | 1 & 2  |

**References:**

|   |  |
|---|--|
| 1 | A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7 <sup>th</sup> / 8 <sup>th</sup> edition, John Wiley Publications, 2008. |
| 2 | William Stalling, "Operating System Internals and Design Principles", 6 <sup>th</sup> edition, Pearson Publication, 2013.                        |

**Unit - IV**

Teacher should facilitate learning of Secondary Storage Management

| 1. | Storage Management   | Lectures required | Ref No |
|----|--|-------------------|--------|
| a  | <b>File concept</b><br>File Organization, Access Methods, Directory Structure.                               | 02                | 1      |
| b  | <b>Allocation of Disk Space</b><br>Contiguous allocation, Non-contiguous allocation (chaining and indexing). | 03                | 1      |
| c  | <b>Disk Scheduling Algorithms</b><br>FCFS, SSTF, SCAN, C-SCAN, LOOK.   | 03                | 1      |

**References:**

|   |  |
|---|--|
| 1 | A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7 <sup>th</sup> / 8 <sup>th</sup> edition, John Wiley Publications, 2008. |
|---|--|

## Unit - V

Teacher should facilitate learning of Protection and Security

| 1. | Secondary Storage Structure, Protection and Security, Introduction to UNIX.   | Lectures required | Ref No |
|----|---|-------------------|--------|
| a  | <b>System Protection</b><br>Goals of protection, Domain of protection, Threats, Security attacks, Types of Access, Access Control.  | 02                | 1 & 2  |
| b  | <b>Disk Management</b><br>Disk formatting, Boot block, Bad blocks.<br><b>Swap Space Management</b><br>Swap Space Use, Swap Space Location.  | 02                | 1 & 2  |
| c  | <b>Introduction to UNIX</b><br>History, System architecture.<br><b>Internal Representation of File</b><br>Inode, Structure of regular file, Super block, Pipes (No Algorithms).<br><b>Process Control</b><br>Process creation, Process States and Transitions, Process system calls (exec, fork). | 04                | 3      |

### References:

|   |  |
|---|--|
| 1 | A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7 <sup>th</sup> / 8 <sup>th</sup> edition, John Wiley Publications, 2008. |
| 2 | Dhananjay M. Dhamdhare, "Operating Systems-A Concept-Based Approach", 3 <sup>rd</sup> edition, TMH, 2012.  |
| 3 | Maurice J. Bach, "The Design of the Unix Operating System", 1 <sup>st</sup> edition, PHI.  |



# Object Oriented Modeling & Design

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

## Unit - I

Teacher should facilitate learning of importance and principles of modeling, object oriented methodology and themes, Architecture and its approaches, Rational Unified process.

| 1. | <b>Introduction of Object Oriented Modeling</b>  | <b>Lecture required</b> | <b>Ref No</b> |
|----|--|-------------------------|---------------|
| a  | <b>Introduction:</b><br>What is object-oriented? , Characteristics of Objects, What is Object oriented development? , Modeling Concept Not Implementation, Object-Oriented Methodology , Three Models, Object oriented themes, | 03                      | 01            |
| b  | <b>Why We Model:</b><br>The Importance of Modeling, Principles of Modeling, Object-Oriented Modeling,  | 01                      | 02            |
| c  | <b>4+1 View architecture, Architectural approaches:</b> Use case driven, Architecture-centric, Iterative and Incremental   | 01                      | 02            |
| d  | <b>Rational Unified Process:</b><br>Characteristics of the process, Inception Phase, Elaboration Phase, Construction Phase, Transition Phase, Iterations, Process Workflows, Artifacts, Other Artifacts                        | 03                      | 02            |

### References:

|    |   |
|----|---|
| 1. | James Rumbaugh , Michael Blaha , William Premerlani, Frederick Eddy, William Lorenzen ,“Object- Oriented Modeling and Design”, Pearson Education. |
| 2. | Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education.  |

## Unit - II

Teacher should facilitate learning of Overview of the UML, Building Blocks of the UML, Common Mechanism of the UML and Object Constraint Language.

| 2. | <b>Introduction to UML</b>   | <b>Lecture required</b> | <b>Ref No</b> |
|----|--|-------------------------|---------------|
| a  | <b>An Overview of the UML:</b><br>Visualizing, Specifying, Constructing, Documenting, Background , UML Basics, Introducing UML 2.0 | 02                      | 01&02         |
| b  | <b>A Conceptual Model of the UML:</b><br>Building Blocks of the UML: Things, Relationships, Diagrams , Rules of the UML            | 02                      | 01            |
| c  | <b>Common Mechanisms in the UML:</b><br>Specifications, Adornments, Common divisions, Extensibility Mechanisms,                    | 02                      | 01            |

|  |   |   |    |    |
|--|---|---|----|----|
|  |   | Extensibility Mechanisms: stereotypes, tagged values, constraints   |    |    |
|  | d | <b>Object Constraint Language:</b><br>OCL Basics: Basic Types, OCL Syntax: Constraints on Classifiers, Constraints on Operations, Constraints on Attributes, Advanced OCL Modeling: Conditionals, Variable Declaration , Operator Precedence, Built-in Object Properties, Collections | 02 | 02 |

**References:**

|    |  |
|----|--|
| 1. | Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education. |
| 2. | Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.   |

**Unit - III**

Teacher should facilitate learning of Object diagram, Class diagram with its common modeling techniques and forward and reverse engineering and composite structure diagram.

| 3. | <b>Class Diagram and Composite Structure Diagram</b> |  | <b>Lecture required</b> | <b>Ref No</b> |
|----|--|--|-------------------------|---------------|
|    | a  | <b>Object Diagram:</b><br>Common Properties, Contents, Common Uses, Common Modeling Techniques: Modeling Object Structures   | 01                      | 01            |
|    | b  | <b>Class Diagram:</b><br>Classes, Attributes: Inline Attributes, Attributes by Relationship, Derived Attributes, Attribute Multiplicity, Attribute Properties, Constraints Operations, Operation Constraints, Abstract Classes, Relationships: Dependency, Association: Navigability Naming an Association, Multiplicity, Aggregation, Composition, Generalization, Association Classes, Association Qualifiers. | 02                      | 02            |
|    | c  | <b>Advanced Relationships:</b><br>Stereotypes on Dependency, Stereotypes and Constraints on Generalization and Constraints on Association, Realization, Interfaces, Templates  | 02                      | 01 & 02       |
|    | d  | Class Diagram: Common Properties, Contents, Common Uses, Common Modeling Techniques : Modeling Simple Collaborations, Modeling a Logical Database Schema, Forward and Reverse Engineering  | 01                      | 01            |
|    | e  | <b>Composite Structures Diagram:</b><br>Connectors, Ports: Required and Provided Interfaces, Realizing port implementations, Multiple connectors, Port multiplicity, Port typing, Structured classes and Properties  | 02                      | 02            |

**References:**

|    |  |
|----|--|
| 1. | Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education. |
| 2. | Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.   |

**Unit – IV**

Teacher should facilitate learning of UML Behavioral Diagrams such as Use case Diagram, Sequence Diagram, Communication Diagram, Timing Diagram, State chart Diagram and Activity Diagram.

| 4. | Behavioral Diagrams   | Lecture required | Ref No  |
|----|---|------------------|---------|
| a  | <b>Use case Diagram:</b><br>Names, Use Cases and Actors, Use Cases and Flow of Events, Use Cases and Scenarios, Use Cases and Collaborations, Organizing Use Cases, Common Properties, Contents, Common Uses ,  | 02               | 01      |
| b  | Sequence Diagram, Communication Diagram, Timing Diagram,  | 02               | 01 & 02 |
| c  | <b>State chart Diagram:</b><br>Behavioral State Machines, States, Composite States: Regions, Submachine States, Transitions: Transition types, Signal symbols , Transitions and Composite states, Activities, Protocol State Machines , Pseudo States , Event Processing: Dispatch , Deferred Events, | 02               | 02      |
| d  | <b>Activity Diagram:</b><br>Common Properties, Contents, Action States and Activity States, Transitions, Branching, Forking and Joining, Swimlanes, Object Flow, Common Uses  | 02               | 01      |

**References:**

|    |  |
|----|--|
| 1. | Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education. |
| 2. | Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.   |

**Unit – V**

Teacher should facilitate learning of Package Diagram, Component Diagram, Deployment Diagram and its Common Modeling Techniques.

| 5. | Package Diagram, Component Diagram, Deployment Diagram  | Lecture required | Ref No |
|----|---|------------------|--------|
| a  | <b>Package Diagram:</b><br>Names, Owned Elements, Visibility, Importing and Exporting,<br><b>Common Modeling Techniques:</b> Modeling Groups of Elements, Modeling Architectural Views, | 02               | 01     |
| b  | <b>Component:</b><br>Names, Components and Classes, Components and Interfaces, Kinds of Components,<br><b>Component Diagram:</b>  | 03               | 01     |

|  |   |   |    |    |
|--|---|---|----|----|
|  |   | Common Properties, Contents, Common Uses,<br><b>Common Modeling Techniques:</b> Modeling Source Code, Modeling an Executable Release, Modeling a Physical Database, Modeling Adaptable Systems, Forward and Reverse Engineering,  |    |    |
|  | c | <b>Deployment:</b><br>Names, Nodes and Components, Connections,<br><b>Deployment Diagram:</b><br>Common Properties, Contents, Common Uses,<br><b>Common Modeling Techniques:</b> Modeling an Embedded System, Modeling a Client/Server System, Modeling a Fully Distributed System, Forward and Reverse Engineering | 03 | 01 |

**Reference:**

|    |  |
|----|--|
| 1. | Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education. |
|----|--|

# Database Management System

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

## Unit - I

Teacher should facilitate learning of need of Database System, Types of Data Models, Database Architecture and E-R Model

| 1. | Introduction to DBMS  | Lecture required | Ref No |
|----|---|------------------|--------|
| a  | Database-System Applications, Purpose of Database Systems, View of Data: Data Abstraction ,Instances and Schemas, data independence,  | 02               | 01     |
| b  | Data Models: Relational Model , Entity-Relationship Model ,Object-Based data model, Semi structured Data Model, Database Languages, Data Storage and Querying ,Transaction Management, Database Architecture, Database Users and Administrators | 02               | 01     |
| c  | Overview of the Design Process: Design Phases, Design Alternatives, The Entity Relationship Model: Entity Sets , Relationship Sets, Attributes, Constraints: Mapping Cardinalities, Participation Constraints, Keys                             | 02               | 01     |
| d  | Entity-Relationship Diagram: Basic Structure, Mapping Cardinality, Roles, Weak Entity sets, Extended E-R Features: Specialization, Generalization, Attribute Inheritance, Constraints on Generalizations, Aggregation.                          | 02               | 01     |

### Reference:

|    |   |
|----|---|
| 1. | Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6 <sup>th</sup> Edition, McGraw-Hill. |
|----|---|

## Unit - II

Teacher should facilitate learning of structure of SQL and its queries, Set Operations and Joined Expressions, Views, Integrity Constraints.

| 2. | Structured Query Language   | Lecture required | Ref No |
|----|---|------------------|--------|
| a  | Structure of relational Databases, Database Schema, Keys, Schema Diagrams, Overview of the SQL Query Language, SQL Data Definition: Basic Types, Basic Schema Definition,                               | 01               | 01     |
| b  | Basic Structure of SQL Queries: Queries on Single Relation , Queries on Multiple Relations, The Natural Join Additional Basic Operations: The Rename Operation ,  | 01               | 01     |
| c  | String Operations, Attribute Specification in Select Clause, Ordering the Display of Tuples, Where Clause Predicates,   | 01               | 01     |
| d  | Set Operations: The Union Operation, The Intersect Operation, The Except Operation, Null Values, Aggregate Functions, Nested Sub queries: Set Membership, Set Comparison, Modification of the Database, | 02               | 01     |

|   |  |    |    |
|---|--|----|----|
| e | Joined Expressions: Join Conditions , Outer Joins, Views: View Definition, Using Views in SQL Queries, Materialized Views, Update of a View, | 02 | 01 |
| f | Integrity Constraints: Constraints on Single Relation, Not Null Constraints, Unique Constraints, The Check Clause, Referential Integrity     | 01 | 01 |

**Reference:**

|    |   |
|----|---|
| 1. | Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6 <sup>th</sup> Edition, McGraw-Hill. |
|----|---|

**Unit - III**

Teacher should facilitate learning of Relational Algebra and its Operations and Tuple and Domain Relational Calculus, Functions and Procedures, Triggers.

| 3. | Formal Relational Query Languages  | Lecture required | Ref No |
|----|--|------------------|--------|
| a  | <b>The Relational Algebra:</b><br>Fundamental Operations:<br>The select Operation, The Project Operation, The Union Operation, The Set-Difference Operation, The Cartesian-Product Operation, The Rename Operation, Formal definition of Relational Algebra, | 02               | 01     |
| b  | <b>Additional Algebra Operations:</b><br>The Set-Intersection Operation, The Natural-Join Operation, The Assignment Operation, Outer Join Operations, Extended Relational-Algebra Operations: Generalized Projection, Aggregation,                           | 02               | 01     |
| c  | <b>The Tuple Relational Calculus:</b><br>Formal Definition, Example Queries,<br><b>The Domain Relational Calculus:</b><br>Formal Definition, Example Queries,  | 02               | 01     |
| d  | <b>Functions and Procedures:</b><br>Declaring and Invoking SQL Functions and Procedures, Language Constructs for Procedures and Functions,<br><b>Triggers:</b><br>Need of Triggers , Triggers in SQL   | 02               | 01     |

**Reference:**

|    |   |
|----|---|
| 1. | Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6 <sup>th</sup> Edition, McGraw-Hill. |
|----|---|

**Unit - IV**

Teacher should facilitate learning of Good Relational Designs, Need of Normalization and its types, Transaction Management, Concurrency Control and Recovery System

| 4. | Relational Database Design and Transaction Management   | Lecture required | Ref No |
|----|---|------------------|--------|
| a  | <b>Relational Database Design:</b><br>Features of Good Relational Designs: Design Alternative: Larger Schemas, Design Alternative: Smaller Schemas, Atomic Domains and First Normal Form, | 01               | 01     |

|   |  |    |    |
|---|--|----|----|
| b | Decomposition Using Functional Dependencies: Keys and Functional Dependencies, Boyce-Codd Normal Form, BCNF and Dependency Preservation, Third Normal Form,  | 02 | 01 |
| c | Decomposition Using Multivalued Dependencies: Multivalued Dependencies, Fourth Normal Form   | 01 | 01 |
| d | <b>Transaction Management:</b><br>Transaction Concept, A simple Transaction Model, Transaction Atomicity and Durability,   | 01 | 01 |
| e | <b>Concurrency Control:</b><br>Lock-Based Protocols: Locks, Granting of Locks, The Two Phase Locking protocol, Timestamp-Based Protocols: Timestamps, The Timestamps-Ordering Protocol,  | 02 | 01 |
| f | <b>Recovery System:</b><br>Failure Classification, Storage: Stable-Storage Implementation, Data Access, Recovery and Atomicity: Log records, Database Modification, Concurrency Control and Recovery ,Transaction Commit , Using the Log to Redo and Undo Transactions | 01 | 01 |

**Reference:**

|    |   |
|----|---|
| 1. | Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6 <sup>th</sup> Edition, McGraw-Hill. |
|----|---|

**Unit - V**

Teacher should facilitate learning of Complex Data Types, Structured Types, Inheritance in SQL, Array and Multiset Types, Centralized and Client-Server Architectures, Parallel and Distributed Systems.

| 5. | Object-Based Databases and Database- System Architectures  | Lecture required | Ref No |
|----|--|------------------|--------|
| a  | <b>Object-Based Databases:</b><br>Overview, Complex Data Types, Structure Types and Inheritance in SQL: Structure Types, Type Inheritance                  | 01               | 01     |
| b  | Table Inheritance, Array and Multiset Types in SQL: Creating and Accessing Collection Values, Querying Collection-Valued Attributes,                       | 01               | 01     |
| c  | Object-Identity and Reference Types in SQL, Persistent Programming Languages: Persistence of Objects, Object Identity and Pointers                         | 01               | 01     |
| d  | <b>Database- System Architectures:</b><br>Centralized and Client-Server Architectures: Centralized Systems, Client- Server Systems,                        | 01               | 01     |
| e  | Server System Architectures: Transaction Servers, Data Servers, Cloud-Based Servers  | 01               | 01     |
| f  | Parallel Systems: Speedup and Scaleup, Interconnection Networks, Parallel Database Architectures: Shared Memory, Shared Disk, Shared Nothing, Hierarchical | 02               | 01     |
| g  | Distributed Systems  | 01               | 01     |

**Reference:**

|    |   |
|----|---|
| 1. | Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 6 <sup>th</sup> Edition, McGraw-Hill. |
|----|---|

## E-Commerce

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

### Unit – I

Teacher should facilitate introduction and learning of business models in e-commerce.

| 1. | <b>Introduction of E-Commerce and Business Models</b>  | <b>Lect required</b> | <b>Ref No</b> |
|----|--|----------------------|---------------|
| a  | <b>Introduction:</b><br>What is E-Commerce?, The difference between E-commerce and E-business, Why study E-Commerce?   | 01                   | 01            |
| b  | Eight unique features of E-Commerce technology: Ubiquity, Global Reach, Universal Standard, Richness, Interactivity, Information Density, Personalization /Customization, Social Technology: User Content Generation and Social Networking                     | 02                   | 01            |
| c  | Types of E-commerce:<br>Business-to-Consumer (B2C) E-commerce, Business-to-Business (B2B) E-commerce, Consumer-to-Consumer (C2C) E-commerce, Peer-to-Peer (P2P) E-commerce, Mobile Commerce (M-commerce)   | 01                   | 01            |
| e  | <b>E-commerce Business Models:</b><br>Introduction, Eight Key Elements of a Business Model, Value Proposition, Revenue Model, Market Opportunity, Competitive Environment, Competitive Advantage, Market Strategy, Organizational Development, Management Team | 02                   | 01            |
| f  | Business Models in Emerging E-commerce Areas:<br>Consumer-to-Consumer (C2C) Business Models, Peer-to-Peer (P2P) Business Models, M-commerce Business Models, E-commerce Enablers: The Gold Rush Model  | 02                   | 01            |

#### References:

|   |  |
|---|--|
| 1 | Kenneth C. Laudon, Carol Guercio Traver, "E-Commerce-Business, Technology: society 2008", Pearson Education, Fourth Edition. |
|---|--|

### Unit – II

Teacher should facilitate learning of various threats in e-commerce environment and related technology solutions.

| 2. | <b>Security Issues and Technology Solutions</b>   | <b>Lect required</b> | <b>Ref No</b> |
|----|---|----------------------|---------------|
| a  | <b>Major Security Threats in the E-Commerce Environment:</b><br>Malicious Code, Unwanted Programs, Phishing and Identity Theft, Hacking and Cyber vandalism, Credit Card Fraud/Theft.           | 02                   | 01            |
| b  | Spoofing (Pharming) and Spam (Junk) Web Sites, Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks, Sniffing, Insider Attacks, Poorly Designed Server and Client Software. | 02                   | 01            |
| c  | <b>Technology Solutions</b><br>Protecting Internet Communications, Digital Envelopes,   | 02                   | 01            |



|  |   |   |    |    |
|--|---|---|----|----|
|  |   | Digital Certificates and Public Key Infrastructure (PKI), Limitations to Encryption Solutions.  |    |    |
|  | d | Securing Channels of Communication, Secure Sockets Layer (SSL), Secure Hypertext Transfer Protocol (S-HTTP), Virtual Private Networks (VPN) | 01 | 01 |
|  | e | Protecting Servers and Clients, Operating System Security Enhancements, Anti-Virus Software   | 01 | 01 |

**References:**

|   |  |
|---|--|
| 1 | Kenneth C. Laudon, Carol Guercio Traver, "E-Commerce-Business, Technology: society 2008", Pearson Education, Fourth Edition. |
|---|--|

**Unit - III**

Teacher should facilitate learning of management policies and payment systems in e-commerce.

| 3. | Management Policies and Payment Systems   | Lect required | Ref No |
|----|---|---------------|--------|
| a  | <b>Management Policies:</b><br>Security Plan: Management Policies   | 01            | 01     |
| b  | The Role of Laws and Public Policy:<br>Private and Private-Public Cooperation Efforts, Government Policies and Controls on Encryption Software, OECD Guidelines | 02            | 01     |
| c  | <b>E-Commerce Payment Systems :</b><br>Online Credit Card Transactions, Credit Card E-commerce Enablers, Limitations of Online Credit Card Payment Systems      | 02            | 01     |
| d  | Digital Wallets, Digital Cash, Online Stored Value Systems, Digital Accumulating Balance Payment Systems  | 02            | 01     |
| e  | Digital Checking Payment Systems, Wireless Payment Systems.   | 01            | 01     |

**References:**

|   |  |
|---|--|
| 1 | Kenneth C. Laudon, Carol Guercio Traver, "E-Commerce-Business, Technology: society 2008", Pearson Education, Fourth Edition. |
|---|--|

**Unit - IV**

Teacher should facilitate learning marketing communication with costs and benefits of online marketing communications.

| 4. | Communication and Online Marketing   | Lect required | Ref No |
|----|--|---------------|--------|
| a  | <b>Marketing Communications:</b><br>Online Advertising - Display Ads: Banners and Pop-Ups, Rich Media/Video Ads, Search Engine Advertising: Paid Search Engine Inclusion and Placement, Sponsorships, Referrals (Affiliate Relationship Marketing) | 02            | 01     |
| b  | E-mail Marketing and the Spam Explosion, Online Catalogs, Social Marketing: Blogs, Social Networks and Games, Blog Advertising, Social Network Advertising Game Advertising  | 02            | 01     |
| c  | Targeted Marketing: Getting Personal, Mixing Offline and   | 02            | 01     |

|  |   |  |    |    |
|--|---|--|----|----|
|  |   | Online Marketing Communications  |    |    |
|  | d | <b>Understanding the Costs and Benefits of Online Marketing Communications:</b><br>Online Marketing Metrics: Lexicon, How Well Does Online Advertising Work?, The Costs of Online Advertising, Software for Measuring Online Marketing Results | 02 | 01 |

**References:**

|   |  |
|---|--|
| 1 | Kenneth C. Laudon, Carol Guercio Traver, "E-Commerce-Business, Technology: society 2008", Pearson Education, Fourth Edition. |
|---|--|

**Unit - V**

Teacher should facilitate learning of ethical issues in e-commerce and online content.

| 5. |   | <b>Ethical Issues and Online Content</b>  | <b>Lect required</b> | <b>Ref No</b> |
|----|---|---|----------------------|---------------|
|    | a | <b>Understanding Ethical Issues in E-commerce:</b><br>A Model for Organizing the Issues, Basic Ethical Concepts: Responsibility, Accountability, and Liability, Analyzing Ethical Dilemmas, Candidate Ethical Principles.   | 02                   | 01            |
|    | b | Content Audience and Market: Where Are the Eyeballs and the Money? - Media Utilization, Internet and Traditional Media: Cannibalization versus, Complementarity, Media Revenues, TWO Models of the Digital Content Delivery: Paid and User-Generated Content, Free or Fee: Attitudes about Paying for Content and the Tolerance for Advertising | 02                   | 01            |
|    | c | Media Industry Structure, Media Convergence: Technology, Content, and Industry Structure, Technological Convergence, Content Convergence Industry Convergence   | 02                   | 01            |
|    | d | Online Content Revenue Models and Business Processes, Making a Profit with Online Content: From Free to Fee, Key Challenges Facing Content Producers and Owners- Technology, Cost, Distribution Channels and Cannibalization, Digital Rights Management (DRM)   | 02                   | 01            |

**References:**

|   |  |
|---|--|
| 1 | Kenneth C. Laudon, Carol Guercio Traver, "E-Commerce-Business, Technology: society 2008", Pearson Education, Fourth Edition. |
|---|--|

# Management of Information System

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

## Unit - I

Teacher should facilitate revision of Principles of Management and learning of basic concepts related to Information Systems.

| 1  | Information System  | Lectures required | Ref. No. |
|----|---|-------------------|----------|
| i  | <b>Introduction</b><br>a) Data Vs Information<br>b) Functions of Management<br>c) Managerial Roles<br>d) Levels of Management<br>e) Classification of Information System<br>f) Framework for Information System | 04                | 1        |
| ii | <b>Systems</b><br>a) System concepts<br>b) System and their Environments<br>c) How system works<br>d) System approach for problem solving   | 04                | 1        |

### References:

|   |   |
|---|---|
| 1 | Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4 <sup>th</sup> Edition Tata McGraw Hill |
| 2 | Waman S. Jawadekar, "Management Information Systems", 4 <sup>th</sup> Edition Tata McGraw Hill                                  |

## Unit - II

Teacher should facilitate learning of various E Business Technologies and how to organize business in Digital form.

| 2  | E- Business Enterprise  | Lectures required | Ref. No. |
|----|---|-------------------|----------|
| i  | <b>E Business Technology</b><br>a) Introduction to E Business<br>b) Models of E Business<br>c) Internet and WWW<br>d) Security in E Business<br>e) Electronic Payment System<br>f) Web Enabled Business Management<br>g) Enterprise Portal<br>h) MIS in Web Environment | 04                | 2        |
| ii | <b>Organization of Business in Digital Firm</b><br>a) E Business<br>b) E Commerce<br>c) E Communication<br>d) E Collaboration<br>e) Real Time Enterprise  | 04                | 2        |

**References:**

|   |   |
|---|---|
| 1 | Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4 <sup>th</sup> Edition Tata McGraw Hill |
| 2 | Waman S. Jawadekar, "Management Information Systems", 4 <sup>th</sup> Edition Tata McGraw Hill                                  |

**Unit – III**

Teacher should facilitate learning of applications to various functional business areas.

| 3 | Application & Functional Business Areas  | Lectures required | Ref. No. |
|---|--|-------------------|----------|
|   | <b>i Operational Information System</b><br>a) Accounting / Finance<br>b) Marketing<br>c) Production<br>d) Human Resource | 03                | 1        |
|   | <b>ii Tactical Information System</b><br>a) Accounting / Finance<br>b) Marketing<br>c) Production<br>d) Human Resource   | 03                | 1        |
|   | <b>iii Strategic Information System</b><br>a) Accounting / finance<br>b) Marketing<br>c) Production<br>d) Human Resource | 02                | 1        |

**References:**

|   |   |
|---|---|
| 1 | Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4 <sup>th</sup> Edition Tata McGraw Hill |
| 2 | Waman S. Jawadekar, "Management Information Systems", 4 <sup>th</sup> Edition Tata McGraw Hill                                  |

**Unit – IV**

Teacher should facilitate learning of Decision Support System, Enterprise Management System and Expert Systems.

| 4 | DSS, EMS AND ES  | Lectures required | Ref. No. |
|---|--|-------------------|----------|
|   | <b>i Decision Support System</b><br>a) Characteristics of Decision Making Process<br>b) Features of DSS<br>c) Development of DSS<br>d) Benefits and Risks of DSS<br>e) GDSS    | 02                | 1&2      |
|   | <b>ii Enterprise Management System</b><br>a) ERP System<br>b) ERP Model and Modules<br>c) Benefits of ERP<br>d) Supply Chain Management<br>e) Customer Relationship Management | 03                | 1&2      |
|   | <b>iii Expert Systems</b><br>a) Characteristics<br>b) How an Expert System Works   | 03                | 1&2      |

|  |  |  |  |  |
|--|--|--|--|--|
|  |  | c) Advantages<br>d) Expert System and DSS<br>e) Expert Systems and AI. |  |  |
|--|--|--|--|--|

**References:**

|   |   |
|---|---|
| 1 | Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4 <sup>th</sup> Edition Tata McGraw Hill |
| 2 | Waman S. Jawadekar, "Management Information Systems", 4 <sup>th</sup> Edition Tata McGraw Hill                                  |

**Unit - V**

Teacher should facilitate learning of Information Security Challenges in E Enterprise and Information Technologies' impact on Society.

| 5 | Information Security & IT  | Lectures required | Ref. No. |
|---|--|-------------------|----------|
|   | <b>i Information Security Challenges in E Enterprise</b><br>a) Risks<br>b) Common Threats<br>c) Common Controls<br>d) Protection of information system   | 03                | 1&2      |
|   | <b>ii IT: Impact on Society</b><br>a) Impact of IT on Privacy<br>b) Ethics<br>c) Technical Solution for Privacy Protection<br>d) Intellectual Property<br>e) Copyright and Patents<br>f) Impact of IT on the Workplace<br>g) Impact of quality on Life | 05                | 1&2      |

**References:**

|   |   |
|---|---|
| 1 | Robert Schultheis and Mary Sumner, "Management Information Systems The Managers View", 4 <sup>th</sup> Edition Tata McGraw Hill |
| 2 | Waman S. Jawadekar, "Management Information Systems", 4 <sup>th</sup> Edition Tata McGraw Hill                                  |

# Operating System Lab

## LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

| Group-A |  | Lab hours required |
|---------|--|--------------------|
| 1       | <b>Study of Commercial and Open source Operating Systems (01 each) and Design structure of these Operating Systems.</b> <ul style="list-style-type: none"> <li>• Study the basic structures.</li> <li>• Study the File systems.</li> <li>• Study the Security aspects of Operating Systems.</li> <li>• e.g. Windows OS, Linux OS.</li> </ul> | 02                 |
| 2       | <b>Write a program to implement Command Interpreter using system calls.</b><br>Implementation of Command Interpreter using various system calls showing working of Command Line Interpreter.   | 02                 |
| 3       | <b>Write a program to implement concept of Threading</b><br>Demonstrate the concept of Threading in process. (Without using System Call/ Kernel Functions).  | 02                 |
| 4       | <b>Write a program to implement CPU Scheduling algorithms.</b><br>Demonstrate the working of CPU Scheduling algorithms (any two). <ul style="list-style-type: none"> <li>• FCFS</li> <li>• SJF(Preemptive &amp; non-preemptive)</li> <li>• Round Robin</li> <li>• Priority(Preemptive &amp; non-preemptive)</li> </ul>                       | 02                 |
| 5       | <b>Write a program to implement algorithmic solution for Critical Section Problem</b><br>Demonstrate solution to overcome the critical section problem.  | 02                 |

| Group- B |   | Lab hours required |
|----------|---|--------------------|
| 1        | <b>Write a program to implement Memory Management algorithms.</b><br>Demonstrate the working of Memory Management algorithms (any two). <ul style="list-style-type: none"> <li>• First Fit</li> <li>• Best Fit</li> <li>• Worst Fit</li> </ul>                            | 02                 |
| 2        | <b>Write a program to implement Page Replacement algorithms.</b><br>Demonstrate the working of Page Replacement algorithms (any two). <ul style="list-style-type: none"> <li>• FIFO(First In First Out)</li> <li>• LRU(Least Recently Used)</li> <li>• Optimal</li> </ul> | 02                 |

|   |  |    |
|---|--|----|
| 3 | <p><b>Write a program to implement Inter process communication</b><br/>         Demonstrate the working of Inter Process Communication (any one).</p> <ul style="list-style-type: none"> <li>• Full Duplex pipes</li> <li>• Half Duplex pipes</li> </ul>             | 02 |
| 4 | <p><b>Write a program for Banker's algorithm</b><br/>         Demonstrate the working of Banker's algorithm</p>  | 02 |
| 5 | <p><b>Write a program to demonstrate disk scheduling algorithms</b><br/>         Demonstrate the working of the Disk Scheduling algorithms (any two).</p> <ul style="list-style-type: none"> <li>• FCFS</li> <li>• SSTF</li> <li>• SCAN</li> <li>• C-SCAN</li> </ul> | 02 |

**Note:**

- Concerned faculty should suitably frame at least **08 practical assignments (FOUR from PART - A and FOUR from PART - B)** 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.

**Guidelines for ESE:**

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

**Reference Books:**

1. A. Silberschatz, P. B. Galvin, G. Gagne, "Operating Systems Concepts", 7<sup>th</sup>/ 8<sup>th</sup> edition, John Wiley Publications, 2008.
2. William Stalling, "Operating System Internals and Design Principles", 6<sup>th</sup> edition, Pearson Publication, 2013.
3. Maurice J. Bach, "The Design of the Unix Operating System", 1<sup>st</sup> edition, PHI.
4. Dhananjay M. Dhamdhare, "Operating Systems-A Concept-Based Approach", 3<sup>rd</sup> edition, TMH, 2012.
5. A. S. Tanenbaum, "Modern Operating System", 2<sup>nd</sup> edition Pearson publication, 2001.
6. H. M. Deitel, P. J. Deitel, D. R. Choffnes, "Operating System" 3<sup>rd</sup> edition, Pearson publication, 2013.
7. Rajiv Chopra, "Operating Systems-A Practical Approach", 1<sup>st</sup> edition, S. Chand Publication, 2009.
8. Sibsankar Haldar, Alex A. Arvind, "Operating Systems", 1<sup>st</sup> edition, Pearson Publication, 2009.

# Object Oriented Modeling & Design Lab

## LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

|   |  | Lab hours required |
|---|--|--------------------|
| 1 | Design ATM system using Structural and Behavioral UML diagram.                 | 02                 |
| 2 | Design Coffee vending machine using Structural and Behavioral UML diagram.     | 02                 |
| 3 | Design College Admission Process using Structural and Behavioral UML diagram.  | 02                 |
| 4 | Design Library Management System using Structural and Behavioral UML diagram.  | 02                 |
| 5 | Design Hospital Management System using Structural and Behavioral UML diagram. | 02                 |
| 6 | Design Railway Reservation System using Structural and Behavioral UML diagram. | 02                 |
| 7 | Design Online Shopping System using Structural and Behavioral UML diagram.     | 02                 |
| 8 | Design Hotel Management System using Structural and Behavioral UML diagram.    | 02                 |

### Note:

- Concerned faculty should suitably frame at least **06 practical** assignments out of the above list.
- Faculty member may promote use of Open Source/Freeware/Shareware CASE Tool for Analysis & Design.
- Every assignment should include all UML Diagrams of a system with its requirements, Analysis and good design.
- Every student is required to submit the assignments in the form of journal.

### Guidelines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.

### Reference Books:

1. Pascal Roques, "Modeling Software Systems Using UML 2", Wiley.
2. Russ Miles and Kim Hamilton, "Learning UML 2.0, SPD", O'Reilly.
3. Craig Larman, "Applying UML and patterns: An introduction to Object-Oriented Analysis and Design and Iterative Development", Pearson Education.
4. Mike O'Docherty "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.
5. Jim Arlow, Ila Neustadt, "UML 2 and the Unified Process: Practical Object-Oriented Analysis and Design", 2nd Edition, Addison-Wesley Professional.
6. Mark Priestley, "Practical Object-Oriented Design with UML", TATA McGraw-Hill.



# Database Management System Lab

## LAB COURSE OUTLINE

Teacher should facilitate learning following lab experiments:

| Group-A |  | Lab hours required |
|---------|--|--------------------|
| 1       | Creating a sample database using any client server RDBMS (Oracle/ Open Source Database) package using SQL DDL queries. This will include constraints (Primary key, Foreign key, Unique, Not Null, and Check) to be used while creating tables. | 02                 |
| 2       | SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 1.   | 02                 |
| 3       | SQL Queries: The queries should involve SQL feature such as aggregate functions, group by, having, order by the database created in experiment No. 1.  | 02                 |
| 4       | SQL Queries: The queries should involve Set Operations and Set Comparisons the database created in experiment No. 1.   | 02                 |
| 5       | Screen design and Report generation: Sample forms and reports should be generated using any front end tools.   | 02                 |

| Group- B |   | Lab hours required |
|----------|---|--------------------|
| 1        | Write a program to demonstrate different types of JOIN. | 02                 |
| 2        | Write a program to demonstrate use of Trigger.          | 02                 |
| 3        | Write a program to demonstrate view.                    | 02                 |
| 4        | Write a program to demonstrate PL/SQL block.            | 02                 |
| 5        | Write a program to demonstrate stored function.         | 02                 |
| 6        | Write a program to demonstrate stored procedure.        | 02                 |

### Note:

- Concerned faculty should suitably frame at least **08 practical** assignments (**PART - A is MANDATORY and THREE from PART - B**) 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.

### Guidelines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

## **Reference Books:**

1. Rick F. Van der Lans, "Introduction to SQL", Pearson education.
2. B. Rosenzweig and E. Silvestrova, "Oracle PL/SQL by Example", Pearson education.
3. Steven Feuerstein, "Oracle PL/SQL Programming", SPD, O'Reilly.
4. Dr. P. S. Deshpande, "SQL& PL/SQL for Oracle 10g", Black Book, Dreamtech Press.
5. M. McLaughlin, "Oracle Database 11g PL/SQL Programming", TMH.
6. J. J. Patrick, "SQL Fundamentals", Pearson Education.

# Web Programming Lab

## LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

|   | (Part A)   | No. of Hours required |
|---|--|-----------------------|
| 1 | <b>Develop a complete web page using HTML basic tags, CSS, Table and Layout</b><br>- A simple web page that includes basic tags such as head, body, text formatting tags, lists, paragraph, image tags, css, table and layout etc.   | 02                    |
| 2 | <b>Design a page web using JavaScript to demonstrate, if statement, if...else statement and Switch statement</b><br>- A simple web page that include JavaScript statements such as if, if...else and switch.   | 02                    |
| 3 | <b>Design a page web using JavaScript to demonstrate, Alert box Alert box with line breaks, Confirm box and Prompt box</b><br>- A simple web page that include JavaScript alert box, alert box with line breaks, confirm box and prompt box.   | 02                    |
| 4 | <b>Design a page web using JavaScript to demonstrate, Call a function ,Function with an argument, Function that returns a value</b><br>- A simple web page that include JavaScript call a function, function with arguments, function that return a value.   | 02                    |
| 5 | <b>Design a page web using JavaScript to demonstrate, For loop, While loop, Do While loop, Break a loop, Break and continue a loop</b><br>- A simple web page that include JavaScript for loop, while loop , do while loop, break a loop, break and continue a loop.   | 02                    |
| 6 | <b>Design a page web using JavaScript to demonstrate, Acting to the onclick event, Acting to the onmouseover event, onblur , onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload</b><br>- A simple web page that include JavaScript events like onclick, onmouseover, onblur, onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload etc. | 02                    |
| 7 | <b>Design a page web using JavaScript to demonstrate, Sort an array (alphabetically and ascending), Sort numbers (numerically and ascending), Sort numbers (numerically and descending)</b><br>- A simple web page that include JavaScript to sort an array alphabetically and ascending, sort numbers numerically and ascending and sort numbers numerically and descending.    | 02                    |
| 8 | <b>Design a page web using PHP to demonstrate, variables, echo/print, data types, string functions and operators</b><br>- A simple web page that include PHP variables, echo/print, data types, string functions and operators.  | 02                    |
| 9 | <b>Design a page web using PHP to demonstrate, if-else-elseif,</b>   | 02                    |

|                 |  |                              |
|-----------------|--|------------------------------|
|                 | <b>switch, for loop, while loop, functions and arrays</b><br>- A simple web page that include PHP if-else-elseif, switch, for loop, while loop, functions and arrays.  |                              |
| <b>10</b>       | <b>Design a page web using PHP to demonstrate, form handling, form validation and form URL/E-mail</b><br>- A simple web page that include PHP form handling, form validation and form URL/E-mail.  | 02                           |
| <b>(Part B)</b> |  | <b>No. of Hours required</b> |
| <b>1</b>        | <b>Web server installation and configuration</b><br>- Installation and configuration of any web server like IIS, Apache, WAMP, XAMP etc.   | 02                           |
| <b>2</b>        | <b>Design a page web using PHP to demonstrate, date, file, file upload, cookies and sessions</b><br>- A simple web page that include PHP date, file, file upload, cookies and sessions.  | 02                           |
| <b>3</b>        | <b>Design a page web using PHP to demonstrate, MySQL connect, create DB/Table, insert into, select, where, order by, update and delete</b><br>- A simple web page that include PHP MySQL connect, create DB/Table, insert into, select, where, order by, update and delete.                  | 02                           |
| <b>4</b>        | <b>Design a Website with the help of HTML and JavaScript with not less than 15 full size pages for a selected topic (Commercial, Institute, Portal or decided jointly by the student and teacher)</b><br>- Design a website on the above listed topics with the help of HTML and JavaScript. | 02                           |
| <b>5</b>        | <b>Design a Website with the help of HTML and PHP for a selected topic (Banking, Commercial, Institute, Portal or decided jointly by the student and teacher)</b><br>- Design a website on the above listed topics with the help of HTML and PHP.  | 02                           |

**Note:**

- Concerned faculty should conduct at least 07 practical assignments from part A and 03 from part B out of the above list.
- Every assignment should include print out of program with proper comments and output.
- Every student is required to submit the assignments in the form of journal.

**Reference Books:**

1. "Web Technologies HTML, JavaScript, PHP, Java, JSP, XML and AJAX", Black Book, Kogent Learning Solutions Inc., dreamtech press, 2014.
2. Chris Bates, "Web Programming: Building Internet Applications", Third Edition, Wiley India, 2012.
3. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.