NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Third Year Engineering

(Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – V

W.E.F. 2014 – 2015

Annexure - I

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Software Engineering*	D	3	---	---	3	20	80	---	---	100	3
Formal Language & Automata Theory*	D	3	---	---	3	20	80	---	---	100	3
Computer Network*	D	3	---	---	3	20	80	---	---	100	3
System Programming*	D	3	---	---	3	20	80	---	---	100	3
Principles of Management*	C	3	---	---	3	20	80	---	---	100	3
Software Engineering Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Linux Lab*	D	---	---	2	2	---	---	25	---	25	1
Computer Network Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
System Programming Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Java Programming Lab*	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study*	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA : Internal Continuous Assessment**

*** Common Subjects with TE I.T.**

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Operating System*	D	3	--	---	3	20	80	---	---	100	3
Object Oriented Modeling & Design*	D	3	---	---	3	20	80	---	---	100	3
Database Management System*	D	3	---	---	3	20	80	---	---	100	3
Analysis & Design of Algorithms	D	3	---	---	3	20	80	---	---	100	3
Management Information System*	C	3	---	---	3	20	80	---	---	100	3
Operating System Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Object Oriented Modeling & Design Lab*	D	---	---	2	2	---	---	25	25 **(OR)**	50	1
Database Management System Lab*	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Web Programming Lab*	B	---	---	2	2	---	---	25	---	25	1
Minor Project*	D	---	---	2	2	---	---	50	---	50	2
Seminar – I*	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

*** Common Subjects with TE I.T.**

Software Engineering

COURSE OUTLINE

Course Title	Short Title	Course Code
Software Engineering	**SE**	

Course Description:
The objective of this course is to introduce students the knowledge of Software Development Life Cycle, application of analysis, design, testing principles and project planning & management concepts to develop quality software economically.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of programming languages and data structures.

COURSE CONTENT

Software Engineering **Semester-V**

Teaching Scheme

Lecture: 3 Hours/Week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Software Engineering (08Hrs, 16 Marks)

a. Nature of Software
b. Software Process
c. Software Engineering Practice
d. Software Myths
e. Generic Process model
f. Process Assessment and Improvement
g. Perspective Process Models
h. Specialized Process Models
i. Personal and Team Process Models
Agile Process models:
j. Agile process
k. Extreme programming

2. Requirements Engineering (08Hrs, 16 Marks)

Requirements Engineering:
a. Eliciting Requirements
b. Building the Requirements Model
c. Negotiating requirements
d. Validating requirements
e. Requirements Analysis

f. Scenario-Based Modeling
g. Requirements modeling strategies
h. Flow-Oriented Modeling
i. Data modeling Concepts
j. Class based modeling
k. SRS.

3. Design Engineering (08Hrs, 16 Marks)

a. Design Process
b. Design Concepts
c. The Design Model

Architectural Design:

d. Software Architecture
e. Architectural Styles
f. Architectural Design

User Interface Design:

a. Rules
b. User Interface Analysis and Design
c. Interface Analysis
d. Interface Design Steps
e. Pattern Based Design
f. Design Patterns
g. Pattern Based software Design
h. Component Level Design patterns
i. User Interface Design patterns
j. WebApp Design patterns

Introduction to UML Diagrams.

4. Software Testing (08Hrs, 16 Marks)

Testing Strategies:

a. A Strategic approach to Software Testing
b. Strategic Issues
c. Testing Strategy for Conventional Software
d. Testing Strategy for Object-Oriented Software
e. Testing strategies for Web App
f. Validation Testing
g. System Testing

Testing Tactics:

h. Testing Fundamentals
i. White Box Testing
j. Basis Path Testing
k. Control Structure Testing
l. Black Box Testing

5. Software Project Planning & Management Concepts (08Hrs, 16 Marks)

a. Management Spectrum
b. People
c. Product

d. Process
e. Project
f. Critical Practices

Estimation for software project:

g. Project Planning Process
h. Software scope and feasibility
i. Resources
j. Decomposition Techniques
k. Empirical Estimation Models
l. Make/Buy Decision

Project Scheduling:

a. Task set for Software project
b. Defining a task network
c. Scheduling
d. Earned Value Analysis

Product Metrics:

e. A framework for product metrics
f. Software Quality
g. Software Quality Factors

Text Books:

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

Reference Books:

1. Rajib Mall, "Software Engineering", 3rd Edition, PHI.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3rd Edition, Springer.
3. Sommerville, "Software Engineering", 8th Edition, Pearson.
4. Fairly R. , "Software Engineering", Tata McGraw Hill.
5. Davis A. , "Principles of Software Development", Tata McGraw Hill.
6. Shooman, M.L., "Software Engineering", Tata McGraw-Hill.

Formal Language and Automata Theory

COURSE OUTLINE

Course Title | Short Title Course Code
Formal Language and Automata Theory | **FLAT**

Course Description:
The objective of this course is to introduce the students the knowledge of automata Theory, principles of Grammars, Push down Automata, Turing Machines and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of Discrete Structure & Graph Theory and Data Structures.

COURSE CONTENT

Formal Language and Automata Theory **Semester-V**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Finite State Machines: **(08 Hrs, 16 Marks)**

Mathematical Preliminaries:

a. Sets , Relations and Functions
b. Alphabets, Words / Strings, their Properties and operations
c. Graphs and trees
d. Basic machine

Finite State Machines:

e. State tables, Transition graph
f. Adjacency matrix
g. Description of a Finite automaton
h. Transition Systems
i. Properties of Transition functions
j. Acceptability of a string by a FA
k. Deterministic and Non-deterministic FSM's
l. Equivalence of DFA and NFA
m. Moore and Mealy Models
n. Minimization of Finite Automata
o. FSM with Epsilon moves

2. Regular Expressions: **(08 Hrs, 16 Marks)**

a. Definition, Identities for Regular Expressions

b. Finite Automata and Regular Expressions

   Transition System Containing ^-moves, NDFAs with ^-moves and Regular Expressions, Conversion of Nondeterministic Systems to Deterministic Systems

c. Building RE
d. Construction of Finite Automata Equivalent to a Regular Expression
e. Conversion of RE to FA
f. Converting FA to RE
g. Equivalence of two FA
h. Pumping lemma for regular sets
i. Applications of Pumping lemma
j. Closure properties of Regular sets

(08 Hrs, 16 Marks)

3. Grammars:

a. Definition
b. Derivation trees
c. Leftmost and Rightmost Derivations
d. Ambiguous grammar
e. Removal of ambiguity
f. Chomsky hierarchy
g. Construction of Reduced Grammar
h. Eliminating Useless symbols
i. Eliminating Epsilon productions
j. Eliminating Unit productions

Normal Forms for Context – free Grammars

k. Chomsky Normal Form
l. Greibach Normal Form
m. Reduced Forms – CNF and GNF
n. Reduction to CNF and GNF
o. Pumping Lemma for Context – free Languages
p. Decision Algorithms for Context- free Languages

4. Pushdown Stack Memory Machines & Production Systems (08 Hrs, 16 Marks)

Pushdown Stack Memory Machines:

a. Definition, PDM examples
b. Acceptance by PDA
c. Power of PDM
d. Deterministic and Non-deterministic PDM
e. Construction of PDA from CFG
f. Construction of CFG from PDA

Production Systems:

a. Definition, Post canonical system
b. PMT systems
c. Markov algorithm

5. Turing Machine: (08 Hrs, 16 Marks)

a. Turing Machine Model
b. Representation of Turing Machines

c. Language Acceptability By Turing Machines
d. Design of Turing Machines
e. Techniques for TM Construction
f. Variants of Turing Machines
g. Composite and Iterated TM
h. Universal TM
i. TM limitations
j. The Halting problem

Text Books -

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.

Reference Books -

1. Daniel Cohen, "Introduction to computer Theory", Wiley India.
2. John Martin, "Introduction to Languages and the Theory of Computation", TMH.
3. Lewis H., Papadimitriou C., "Elements of Theory of Computation", Second Edition, Pearson.
4. Moret B., "The Theory of Computation", Pearson Education.

Computer Network

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This course is aimed at introducing the fundamentals of Computer Networking to undergraduate students. The objective of the course is to understand the basics and knowledge about the Computer Network concepts and different protocols.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**3**	**14**	**42**	**03**

Prerequisite Course(s): Data Communications.

COURSE CONTENT

Computer Network **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. TCP/IP Protocol Suit, Data Link Layer and Ethernet

(08 Hours, 16 marks)

TCP/IP Protocol Suit: Physical and Data Link Layers, Network Layer, Transport Layer, Application Layer. Addressing: Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses.

Data Link Layer: Framing: Fixed size and variable size framing.

Ethernet: 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.

2. Network Layer: Logical Addressing, Internet Protocol and Address Mapping

(08 Hours, 16 marks)

Logical Addressing: IPv4 Addresses: Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation (NAT).

Internet Protocol: IPv4: Datagram, Fragmentation, Checksum, Options. IPv6: Structure, Address Space, Advantages, Packet Format, Extension Headers, Transition from IPv4 to IPv6: Dual Stack, Tunneling, Header Translation.

Address Mapping: Mapping Logical to Physical Address: ARP, Mapping Physical to Logical Address: RARP, BOOTP and DHCP.

3. Network Layer: Error Reporting, Delivery, Forwarding and Unicast 7 Mulicast Routing Protocols (08 Hours, 16 marks)

Error Reporting: ICMP: Types of Messages, Message Format, Error Reporting, Query, Debugging Tools.
Delivery: Direct Versus Indirect Delivery.
Forwarding: Forwarding Techniques, Routing Table.
Unicast Routing Protocols: Optimization, Intra and Interdomain Routing, Distance Vector Routing, Link State Routing, Path Vector Routing.
Multicast Routing Protocols: Source-Based Tree and Group-Shared Tree, MOSPF, Core-Based Tree (CBT).

4. Transport Layer: UDP and TCP

(08 Hours, 16 marks)

Transport Layer: Transport-layer services: Process-to-Process Communication, Addressing: Port Numbers, Encapsulation and Decapsulation, Multiplexing and Demultiplexing, Flow Control and Error Control.
User Datagram Protocol (UDP): User Datagram, UDP Services: Process-to-Process Communication, Connectionless Services, Flow Control and Error Control.
Transmission Control Protocol (TCP): Services, Features, Segment, Connection, Flow Control, Error Control and Congestion Control: open-loop congestion control and closed-loop congestion control.

5. Wireless Networks: 802.11 and Network Security

(08 Hours, 16 marks)

Introduction to Wireless Network: Why Wireless? A Network by Any Other Name.
Overview of 802.11 Networks: IEEE 802 Network Technology Family Tree, 802.11 Nomenclature and Design, 802.11 Network Operations, Mobility Support.
Network Security: 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.

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

COURSE OUTLINE

Course Title	Short Title	Course Code
System Programming	**SP**	

Course Description:
The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per week	No. of Weeks	Total Hours	Semester Credits
Lectures	**03**	**14**	**42**	**03**

Prerequisite Course(s): Discrete Structure and Graph Theory, Data Structures.

COURSE CONTENT

System Programming **Semester-V**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to System Programs and Assembler: (08 Hours, 16 marks)

a. 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. Assemblers: Structure of assembler, basic function, Machine dependent and machine independent features of assembler, Types of assemblers – single pass, multi-pass, cross assembler.
c. General design procedure of assembler, Design of Pass-I and Pass-II assembler (with reference to 8086 assembler).
d. Operating System:- concept, services, types (brief introduction only).

2. Macro processor & Loader: (08 Hours, 16 marks)

a. Macros and Macro Processors: Definition and function of Macro Processor, Macro expansion, Features of macro facility.
b. Design of macro processor – single pass and two pass macro processor, detailed design of two pass macro processor.
c. 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.

3. Loader, Linker & Grammar: (08 Hours, 16 marks)

a. Design of direct linking loaders, specification of problem, specification of data structures, format of databases.
b. Design of a linker, A linker for MS DOS, Linking for overlays.
c. Other loader schemes – Binders, Linking loaders, Overlays, Dynamic binders.
d. Grammar and scanner, Programming language grammar, Derivation, Reduction and Syntax tree, Ambiguity, Regular grammar and Regular expression.

4. Parser and Parsing Techniques (08 Hours, 16 marks)

a. Parsing Techniques: - Concept, Top Down and Bottom up Parsing.
b. Top Down Parsing :- limitations of Top Down Parsing -Recursive descent and Predictive Parsing
c. Bottom Up Parsing:- Concept, Shift Reduce Parser, LR Parser, LALR, SLR Parser
d. Operator Precedence Parser, Syntax directed translation (Concept and introduction only).
e. Introduction to software development tools LEX & YACC.

5. Compiler & Inter Process Communication (08 Hours, 16 marks)

a. Overview of compilation process, Basic functions of complier, Machine dependent and machine independent features of compiler.
b. Types of compilers – single pass, multi-pass, cross compiler and pseudo code compiler,
c. Phase structure of compiler.
d. Introduction to inter process communication in windows(DLL, DDE, OLE, Clipboard:- concept and introduction only).

Reference Books:

1. John J. Donovan, "System Programming", 2nd 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.

Principles of Management

COURSE OUTLINE

Course Title	Short Title	Course Code
Principles of Management	**POM**	

Course Description:
The objective of this course is to introduce the students to the Knowledge of Functions of Management and Project management, life-cycle of project, its scheduling and total quality management enable them to Understood and gain for further study.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

COURSE CONTENT

Principles of Management **Semester- V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Basic Concepts of Management (08 Hours, 16 marks)

a. Management :Definition, classification, Characteristics and Importance of management, Principles of Management
b. Management objectives, Types of objectives
c. Functions of managers, Managerial accounting
d. Development of management thoughts : Functional approach to management by Henry Foyal
e. Scientific Management Approach by Taylor, Gilbreth, Gantt
f. Human Relation Approach by Elton Mayo,Follet
g. Schools of management Thoughts
h. Tools of Management science, Managerial economics

2. Functions of Management and Organisations

(08 Hours, 16 marks)

a. Functions of Management: Planning, Organising
b. Staffing - Concept, Nature, Importance, Steps, Concept of Knowledge worker
c. Directing– Concept, Nature, Importance
d. Controlling-Concept, Nature, Importance, Process of controlling Leadership theories, characteristic and styles of leaderships
e. Management by objectives: 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

f. Organisation and its Concept: Nature, Importance, Principles, Centralization, Decentralization
g. Organization Structures- Line and Staff, Functional, Organizations.

3. Human Resource Management

(08 Hours, 16 marks)

a. Function and objective Personnel Management
b. Manpower Planning, Selection and Recruitment of Employees
c. Needs & Types of Training, Objective and Benefits of training, Training for Craftsman, supervisor and Executive
d. Motivation and motivators: motivations, perspective: self-motivation
e. Motivation: the carrot and the sticks, kinds of Motivation, Herzberg's motivation, Hygien Theory
f. Personal management: concept, principles of good personal policy
g. Communication in industry, suggestion system, discipline in industry, promotion, transfer, layout and discharge

4. Project and Quality Management

(08ours, 16 marks)

a. Introduction, Project Management Terminology, Concept of project Management
b. Role and Responsibilities of Project Manager
c. Types of project, Project Life Cycle Phase
d. Project Planning, Project Scheduling, Project Monitoring and Control
e. Basic tools and Techniques for Project Scheduling
f. Total quality management: Introduction, factors affecting quality,
g. product quality analysis, product quality analysis, causes of quality failure
h. elements of T.Q.M , requirements of T.Q.M, Aims of T.Q.M., quality circles, ISO 9000

5. Industrial Psychology, Ethics and MIS

(08 Hours, 16 marks)

a. Industrial Psychology: Definition and Concepts, Industrial psychology Vs Personal Management
b. Aims and Objectives of Industrial Psychology, Scope
c. Individual difference in behavior, Group Dynamics
d. Theory X and Y, Working Environmental Conditions, Industrial Fatigue
e. Professional and Business Ethics: Concepts, Ethics and Morals, Business Ethics, Professional Ethics
f. Need and Importance of ethics, Ethical problems and business, Ethical Issues, How to make business ethical
g. Definition, Evolution of MIS, Need/Objective/Functions of an MIS, Need for Information, Qualities of Good information
h. Information as an Organizational Resource, Management Information Categories, Application of MIS

Text Books:

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", Dhanpat Rai Publications, 2006.

Reference Books:

1. Koontz and Weihrich, "Management –A Global Perspective", Tenth Edition, Mc Graw-Hill International Editions.
2. Tritaphy and Reddy, "Principles of Management", Second edition, TMH.
3. Hill and Steven, "Principles of Management", McGraw Hill, Special Indian Edition, 2007.
4. M.S.Mahajan," Industrial Engineering and Production Management" Dhanpat Rai and Co.
5. W.S.Jawadekar, "Management Information System", TMH.

Software Engineering Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Software Engineering	**SE**	

Course Description:
This laboratory provides students an ability to apply analysis & design concepts to develop quality software economically.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Prerequisite Course(s) : Knowledge of Object Oriented Concepts and any system programming language.

LAB COURSE CONTENT

The Software Engineering Lab must include any five of following software Mini-Projects covering Problem Definition, Analysis & Design using a CASE Tool and Documentation for each.

1. ATM System
2. Library Management System
3. Inventory Control System
4. Railway Reservation System
5. College Admission System
6. University Result Management System
7. Vehicle Navigation System
8. Hospital Management System
9. Banking System
10. Web based/Online Auction System

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 Laganiere, “Object Oriented Software Engineering – A Practical Software Development using UML and JAVA”, 2nd Edition, Tata McGraw-Hill.
2. Mike O’Docherty, “Object-Oriented Analysis & Design – Understanding System Development with UML 2.0”, Wiley.

Note:-

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

Linux Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Linux	**Linux**	

Course Description:

This laboratory provides students with a basic knowledge of the linux programming environment. So that students able to use basic commands of linux as well as they will able to perform basic operations.

Laboratory	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	02	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Operating system.

LAB COURSE CONTENT

Outline of Content:

Teacher should facilitate learning following lab experiments:

Group A

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

4) Delete a record from File.
5) Delete a file.
6) Update a File.

Group B

1 **Write shell script for displaying user process and system related information using environment variables.**
Displays a user process and system related information using environment variables.

2 **Write a shell script to find the largest among the 3 given numbers.**
To find out largest number among 3 given numbers.

3 **Write a shell script to reverse the contents of a String.**
To print contents of string in reverse order.

4 **Write a shell script to print date and time.**
To print date and time along with greetings depend on time.

5 **Shell script to perform arithmetic operations.**
To perform arithmetic operations such as – Addition, Subtraction, Multiplication, Division**.**

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.

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.

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

Computer Network Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Network	**CN**	

Course Description:

This laboratory provides students with a comprehensive study of the Computer Networking and protocols. Classroom lectures stress the strengths of Computer Networks, which provide students with the means of writing efficient, maintainable, and portable code and simulating protocols and networks.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Computers and Data Communication, C, C++ and Java Programming.

LAB COURSE CONTENT
Outline of Content:

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

PART - A

1. Implementation of Character count/Bit-Stuffing/Byte stuffing framing methods.
2. Implementation of Dijkastra's Shortest Path Network routing algorithm.
3. Implementation of TCP checksum.
4. Socket programming for TCP.
5. Socket programming for UDP.
6. Encryption/Decryption using XOR symmetric-key cryptography algorithm.
7. Encryption/Decryption using RSA asymmetric-key cryptography algorithm.
8. Implementation of RLE data compression algorithm.

PART – B

1. Simulate the Ethernet LAN for wired networks.
2. Simulate the point-to-point wired network.
3. Simulate any Wireless network.

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:
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.

NOTE: -

- Concerned faculty should use any network simulator software like NS-2/NS-3/ OPNET/ NetSim/ OMNeT++ to perform **PART-B** assignments.
- Concerned faculty should suitably frame at least **08 practical** assignments **(SIX from PART – A and TWO from PART – B)** out of the above list.
- Every assignment should include, theory, algorithm, print out of code with proper comments and output. Every student is required to submit the assignments in the form of journal.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

System Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
System Programming	**SP**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of System Programming. In this basic system programs are studied in order to understand the working of system software.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**01**

Total Semester Credits: 01

Prerequisite Course(s): Fundamental knowledge of Discrete Structures and Graph Theory, Data Structures.

LAB COURSE CONTENT
Outline of Content:

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

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:

- 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.

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

Java Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Java Programming	**JPL**	

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**01**

Group-A

1 **Write a program that demonstrates string operations.**

2 **Write a program that demonstrate package creation and use in program.**

3 **Write a program to demonstrate the abstract class and abstract method**.

4 **Write a Java program that illustrates the concepts of Java class that includes**

(a) constructor with and without parameters.
(b) Overloading methods.
(c) Overriding methods

5 **Write a Java program to demonstrate inheritance by creating suitable classes.**

6 **Create a Java package, interface and implement in Java program.**

7 **Write a program to demonstrate**

- Use of implementing interfaces.
- Use of extending interfaces.

Group- B

1 **Write a program to implement the concept of threading.**

2 **Write a program to demonstrate the predefined and User defined exception handling.**

3 **Write a program using Applet**

- to display a message in the Applet.
- for configuring Applets by passing parameters.

4 **Write programs for using Graphics class**

- to display basic shapes and fill them.
- draw different items using basic shapes

- set background and foreground colors.

5 **Write a program in Java that demonstrates JDBC**

6 **Write a program that demonstrates JDBC on applet/application**

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.

Reference Books:

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

Note:

- Concerned faculty should suitably frame at least **08 practical** assignments **(FIVE from PART – A and THREE 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.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Industrial Training / EDP / Special Study
COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V **Examination Scheme**
Total Semester Credits: 02 **Internal Continuous Assessment (ICA): 25 Marks**

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.
- Department should allot guide to all such students, for monitoring their progress and

guide them for literature survey / report writing etc.

- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VI

W.E.F. 2014 – 2015

Operating System

COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:
The objective of this course is to introduce the students to the concepts of Operating Systems functions, types and their working details.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Computer Organization, System Programming.

COURSE CONTENT

Operating System **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Operating System Overview

(08 Hours, 16 marks)

a. Introduction: Computer system organization, Architecture, Evolution of OS, Need of OS, User view and System view of OS.
b. Types of Operating System: Batch, Timesharing, Multiprogramming, Multitasking, RTOS, Distributed.
c. Operating System Services and Components: Different OS services and OS components, System calls and its types.
d. Operating System Structures: Monolithic, Layered, Kernel, Microkernel, Virtual Machine.
e. Threads: Overview, Benefits, Models (Introduction Only).

2. Process and Process Management

(08 Hours, 16 marks)

a. Process Concept: The process, Process states, Process Control Block, Context Switching, SPOOLING, CPU & I/O burst.
b. Scheduling: Concept, Objectives, Queuing diagram.
c. Types of Schedulers: Long term Scheduler, Middle term Scheduler, Short term Scheduler.

d. Scheduling Algorithm (For Uniprocessor System): FCFS, SJF (preemptive & non preemptive), Priority (preemptive & non preemptive), Round Robin, MLQ with and without feedback.

e. IPC: Concept and Types.

f. Critical Section: Critical section problem, Solution to critical section problem, Mutual exclusion with busy waiting, TSL, Peterson's solution for two processes, Dijkstra's semaphore.

g. Problem in Concurrent Programming: Producer-Consumer problem, Readers–Writers problem, Dinning Philosopher problem, Monitors.

3. Deadlocks

(08 Hours, 16 marks)

a. Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

b. Memory Management: Memory Management Requirements.

c. Memory Partitioning: Fixed and Dynamic Partitioning.

d. Memory Allocation: Allocation strategies (First Fit, Best Fit and Worst Fit), Fragmentation, Swapping, Paging and Segmentation.

e. Virtual Memory Management: Background, Demand Paging, Page Replacement (FIFO, LRU, Optimal LRU), Thrashing.

4. Storage Management

(08 Hours, 16 marks)

a. File concept: File Organization, Access Methods and Directory Structure.

b. Allocation of Disk Space: Contiguous allocation, Non-contiguous allocation (chaining and indexing).

c. Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK.

5. Secondary Storage Structure, Protection and Security, Introduction to UNIX.

(08 Hours, 16 marks)

a. Disk Management: Disk formatting, Boot block, Bad blocks.

b. Swap Space Management: Swap Space Use, Swap Space.

c. System Protection: Goals of protection, Domain of protection, Threats, Security attacks.

d. Introduction to UNIX: History, System architecture.

e. Internal Representation of File: Inode, Structure of regular file, Super block, Pipes (No Algorithms).

f. Process Control: Process creation, Process States and Transitions, Process system calls (exec, fork).

Text Books:

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

Reference Books:

1. Maurice J. Bach, “The Design of the Unix Operating System”, 1st edition, PHI.
2. Dhananjay M. Dhamdhere, “Operating Systems-A Concept-Based Approach”, 3rd edition, TMH, 2012.
3. A. S. Tanenbaum, “Modern Operating System”, 2nd edition, Pearson publication”, 2001.
4. H. M. Deitel, P. J. Deitel, D. R. Choffnes, “Operating System”, 3rd edition, Pearson publication, 2013.
5. Rajiv Chopra, “Operating Systems-A Practical Approach”, 1st edition, S. Chand Publication, 2009.
6. Sibsankar Haldar, Alex A. Arvind, “Operating Systems”, 1st edition, Pearson Publication, 2009.

Object Oriented Modeling & Design

Course Title | Short Title | Course Code

Object Oriented Modeling and Design **OOMD**

Course Description:
The objective of this course is to introduce students the knowledge about Modeling and Design of Software firmware and business processes. It introduces UML 2.0 and its diagrams as a modeling tool for large and complex systems. It also gives understanding of the concepts being modeled in UML.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of software engineering and object oriented concepts.

COURSE CONTENT

Object Oriented Modeling and Design **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction of Object Oriented Modeling (08 Hrs, 16 Marks)

Introduction:

a. What is object-oriented?
b. What is Object oriented development? : Modeling Concept , Not Implementation , Object- Oriented Methodology , Three Models
c. Object oriented themes

Why We Model:

d. The Importance of Modeling
e. Principles of Modeling
f. Object-Oriented Modeling

4+1 View architecture,

Architectural approaches: Use case driven, Architecture-centric, Iterative and Incremental,

Rational Unified Process:

g. Characteristics of the process

Phases and Iterations:

h. Inception Phase
i. Elaboration Phase
j. Construction Phase
k. Transition Phase
l. Iterations
m. Process Workflows
n. Artifacts
o. Other Artifacts

2. Introduction to UML (08 Hrs, 16 Marks)

a. An Overview of the UML: Visualizing, Specifying, Constructing, Documenting
b. Background , UML Basics

c. Introducing UML 2.0

A Conceptual Model of the UML:

d. Building Blocks of the UML
e. Rules of the UML
f. Common Mechanisms in the UML: Specifications, Adornments, Common divisions
g. Extensibility Mechanisms: stereotypes, tagged values, constraints

Object Constraint Language:

h. OCL Basics, OCL Syntax, Advanced OCL Modeling

3. Class Diagram and Composite Structure Diagram (08 Hrs, 16 Marks)

Object Diagram:

a. **Terms and Concepts:**
Common Properties, Contents, Common Uses
b. **Common Modeling Techniques:** Modeling Object Structures

Class Diagram:

c. Classes, Attributes, Operations, Abstract Classes
d. **Relationships:** Dependency, Association, Aggregation, Composition, Generalization, Association Classes, Association Qualifiers
e. **Advanced Relationships:**
Stereotypes on Dependency, Stereotypes and Constraints on Generalization, Constraints on Association, Realization
f. Interfaces
g. Templates
h. Class Diagram: Common Properties, Contents, Common Uses
i. Common Modeling Techniques : Modeling Simple Collaborations, Modeling a Logical Database Schema
j. Forward and Reverse Engineering

Composite Structures Diagram:

k. Connectors, Ports, Structured classes and Properties

4. Behavioral Diagrams (08 Hrs, 16 Marks)

a. **Use case Diagram**
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
b. **Sequence Diagram**
c. **Communication Diagram**
d. **Timing Diagram**
e. **State chart Diagram:**
Behavioral State Machines, States, Composite States, Submachine States, Transitions, Activities, Protocol State Machines ,Pseudo States , Event Processing
f. **Activity Diagram:**
Common Properties, Contents, Action States and Activity States, Transitions, Branching, Forking and Joining, Swimlanes, Object Flow, Common Uses

5. Package Diagram, Component Diagram, Deployment Diagram (08 Hrs, 16 Marks)

Package Diagram:

a. **Terms and Concepts**
Names, Owned Elements, Visibility, Importing and Exporting
b. **Common Modeling Techniques:** Modeling Groups of Elements, Modeling Architectural Views

Component:

c. **Terms and Concepts**
Names, Components and Classes, Components and Interfaces, Kinds of Components

Component Diagram:

d. Common Properties, Contents, Common Uses
e. **Common Modeling Techniques:** Modeling Source Code, Modeling an Executable Release, Modeling a Physical Database, Modeling Adaptable Systems
f. Forward and Reverse Engineering

Deployment:

g. **Terms and Concepts**
Names, Nodes and Components, Connections

Deployment Diagram:

h. Common Properties, Contents, Common Uses
i. **Common Modeling Techniques:** Modeling an Embedded System, Modeling a Client/Server System, Modeling a Fully Distributed System
j. Forward and Reverse Engineering

Text Books:

1. James Rumbaugh , Michael Blaha , William Premerlani, Frederick Eddy, William Lorensen ,"Object- Oriented Modeling and Design", Pearson Education.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education.
3. Dan Pilone, Neil Pitman, "UML 2.0 in a Nutshell", SPD ,O'Reilly.

Reference Books:

1. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third Edition ,Addisioh Wesley.
2. Tom Pender, "UML 2 Bible", Wiley.
3. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education.
4. Pascal Roques, "Modeling Software Systems Using UML2", Wiley.
5. Atul Kahate, "Object Oriented Analysis & Design", The McGraw-Hill Companies.
6. Mark Priestley, "Practical Object-Oriented Design with UML", TATA McGraw-Hill.
7. Craig Larman, "Appling UML and Patterns: An introduction to Object–Oriented Analysis and Design and Iterative Development", Pearson Education.
8. Mike O'Docherty, "Object-Oriented Analysis & design understanding system development with UML 2.0", John Wiley and Sons.

Database Management System

COURSE OUTLINE

Course Title	Short Title	Course Code
Database Management System	**DBMS**	

Course Description:
The objective of this course is to introduce the students to Learn and practice data modeling using the entity-relationship and developing database designs, apply normalization techniques to normalize the database, learn techniques for controlling the consequences of concurrent data access also understand the needs of Object based Database and Database System Architecture.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Knowledge of data structures.

COURSE CONTENT

Database Management System **Semester-VI**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
	Paper Duration (ESE)	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1) Introduction to DBMS **(08 Hrs, 16 Marks)**

a. Database-System Applications
b. Purpose of Database Systems
c. View of Data: Data Abstraction ,Instances and Schemas, data independence
d. Data Models: Relational Model , Entity-Relationship Model ,Object-Based data model, Semistructured Data Model
e. Database Languages
f. Data Storage and Querying
g. Transaction Management
h. Database Architecture
i. Database Users and Administrators

Database Design and E-R Model

j. Overview of the Design Process
k. The Entity Relationship Model: Entity Sets , Relationship Sets, Attributes, Constraints
l. Entity-Relationship Diagram: Basic Structure , Mapping Cardinality, Roles, Weak Entity sets
m. Extended E-R Features: Specialization, Generalization, Attribute Inheritance, Constraints on Generalizations, Aggregation

2) Structured Query Language **(08 Hrs, 16 Marks)**

a. Introduction to relational Model: structure of relational Databases, Database Schema, Keys, Schema Diagrams
b. Overview of the SQL Query Language
c. SQL Data Definition

d. Basic Structure of SQL Queries
e. Additional Basic Operations
f. Set Operations
g. Null Values
h. Aggregate Functions
i. Nested Subqueries
j. Modification of the Database

Intermediate SQL:

k. Joined Expressions: Join Conditions , Outer Joins
l. Views
m. Integrity Constraints

3) Formal Relational Query Languages (08 Hrs, 16 Marks)

The Relational Algebra:

a. Fundamental Operations:
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
b. Additional Algebra Operations:
The Set-Intersection Operation, The Natural-Join Operation, The Assignment Operation, Outer Join Operations
c. Extended Relational-Algebra Operations:
Generalized Projection, Aggregation

The Tuple Relational Calculus:

d. Formal Definition
e. Example Queries

The Domain Relational Calculus:

f. Formal Definition
g. Example Queries

Functions and Procedures

Triggers

4) Relational Database Design and Transaction Management (08 Hrs, 16 Marks)

Relational Database Design:

a. Features of Good Relational Designs
b. Atomic Domains and First Normal Form
c. Decomposition Using Functional Dependencies:
Keys and Functional Dependencies, Boyce-Codd Normal Form, BCNF and Dependency Preservation, Third Normal Form
d. Decomposition Using Multivalued Dependencies: Multivalued Dependencies, Fourth Normal Form

Transaction Management:

e. Transaction Concept
f. A simple Transaction Model
g. Transaction Atomicity and Durability

Concurrency Control:

h. Lock-Based Protocols: Locks, Granting of Locks, The Two Phase Locking protocol
i. Timestamp–Based Protocols: Timestamps , The Timestamps-Ordering Protocol

Recovery System:

j. Failure Classification
k. Storage
l. Recovery and Atomicity: Log records, Database Modification, Concurrency Control and Recovery ,Transaction Commit , Using the Log to Redo and Undo Transactions

5) Object–Based Databases and Database- System Architectures (08 Hrs, 16 Marks)
Object–Based Databases

a. Overview,
b. Complex Data Types
c. Structure Types and Inheritance in SQL
d. Table Inheritance
e. Array and Multiset Types in SQL: Creating and Accessing Collection Values, Querying Collection-Valued Attributes
f. Object–Identity and Reference Types in SQL
g. Persistent Programming Languages: Persistence of Objects, Object Identity and Pointers

Database-System Architectures

h. Centralized and Client–Server Architectures
i. Server System Architectures
j. Parallel Systems
k. Distributed Systems

Text Book:

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

Reference Books:

1. R. Ramkrishnan , J. Gehrke, "Database Management Systems", 3rd Edition, McGraw-Hill.
2. C. J. Date, "Introduction to Database Management Systems", 8th Edition, Pearson.
3. V.K.Jain, " Database Management System", Dreamtech Press (Wiley India).
4. Atul Kahate, "Introduction to Database Management System", 3rd Edition, Pearson.
5. G. K. Gupta, "Database Management Systems", McGraw–Hill.
6. S. K. Singh, "Database Systems Concepts, Design and Applications", Pearson.
7. Bipin Desai, "Introduction to database management systems", Galgotia.

Analysis & Design of Algorithms

COURSE OUTLINE

Course Title	Short Title	Course Code
Analysis and Design of Algorithms	**ADA**	

The objective of this course is to introduce the students to the fundamentals of Algorithm and their analysis. In this basic system program are studied in order to understand the working of system program.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Fundamental knowledge of Algorithm and their analysis.

COURSE CONTENT

Analysis and Design of Algorithms **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Course Description:

1. Introduction to Algorithm

(08 Hours, 16 marks)

a. Defination
b. Role of Algorithm in computing
c. Performance analysis: space and time complexity
d. Asymptotic notation and complexity issues
e. Analysis of Algorithm: Insertion sort and bubble sort
f. Recurrence: The Master Method

2. Divide and Conquer

(08 Hours, 16 marks)

a. General strategy, analysis
b. Merge sort, Quick Sort, Binary Search- Analysis of algorithm
c. Hiring Problem
d. Indicator Random variable Problem
e. Randomized algorithms

3. Backtracking

(08 Hours, 16 marks)

a. Backtracking: Introduction and Analysis
b. N Queens Problem, graph coloring Problem
c. Branch and Bound: General Strategy and analysis
d. Traveling salesman's problem, knapsack problem
e. Single Source Shortest Path in directed acyclic Graph

4. Advanced Design and Analysis Techniques

(08 Hours, 16 marks)

a. Greedy Algorithms: General strategy, analysis
b. Huffman Code
c. Job sequencing, optimal merge patterns
d. Dynamic Programming: Elements of dynamic programming.
e. Multistage graph, Traveling salesman problem, 0/1 Knapsack Problem, Optimal Binary Search Tree

5. Classification of problems

(08 Hours, 16 marks)

a. Non- deterministic algorithm
b. Satisfiability Problem
c. P, NP-Hard and NP- complete class with example
d. NP-Hard problems: code generation Problems
e. Approximation algorithm for NP-hard problems
f. Parallel Sorting Networks: The zero-one Principle, Parallel Merging Networks, Improved Sorting Networks

Text Books:

1. E. Thomas H. Cormen and Charles E.L. Leiserson, "Introduction to Algorithm", Third Edition, PHI.
2. Horowitz/Sahani, "Fundamentals of Computer Algorithm", Second Edition,Galgotia.
3. Gilles,Brassard and Paul Bratley, " Fundamentals of Algorithmics", PHI.

Reference Books:

1. Aho, "Design & Analysis of Computer Algorithms", Pearson LPE.
2. Russ Miller, "Algorithms: Sequential and Parallel", Dreamtech Press.
3. Goodrich, "Algorithm Design: Foundation and Analysis", Wiley India.
4. Grama , "An Intro to Parallel Computing : Design & Analysis of Algorithms", Second Edition, Pearson LPE.
5. Baase , "Computer Algorithms: Intro to Design & Analysis", Third Edition, Pearson LPE.
6. A. V. Aho and J.D. Ullman, "Design and Analysis of Algorithms", Pearson LPE.
7. Bressard, Bratly, "Fundamentals of Algorithm", Pearson LPE/PHI.
8. Simon Harris, "Beginning Algorithms" Wrox Press (Wiley India).

Management Information System

COURSE OUTLINE

Course Title	Short Title	Course Code
Management Information System	**MIS**	

Course Description:

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems, the role of information systems in enhancing business processes and management decision making across the enterprise, and the process of building and managing systems in organizations. The course will focus on topics such as Management of the Digital Firm, Internet and Internet technology, the Electronic Business and Electronic Commerce, the Information Technology (IT) Infrastructure, the Ethical and Security Issues related to Information Systems, and the Enterprise Applications. The course will provide students with information systems knowledge that is essential for creating successful and competitive firms.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**14**	**42**	**03**

Prerequisite Course(s): Principles of Management.

COURSE CONTENT

Management Information Systems **Semester-VI**

Teaching Scheme
Lecture: 3 hours / week

Examination Scheme
End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Information Systems

(08 Hours, 16 marks)

i. Introduction

a) Data Vs Information
b) Functions of Management
c) Managerial Roles
d) Levels of Management
e) Classification of Information System
f) Framework for Information System

ii. Systems

a) System concepts
b) System and their Environments
c) How system works
d) System approach for problem solving

2. E Business Enterprise:

(08 Hours, 16 marks)

i. E Business Technology

a) Introduction to E Business
b) Models of E Business
c) Internet and WWW
d) Security in E Business
e) Electronic Payment System
f) Web Enabled Business Management
g) Enterprise Portal
h) MIS in Web Environment

ii. Organization of Business in Digital Firm

a) E Business
b) E Commerce
c) E Communication
d) E Collaboration
e) Real Time Enterprise

3. Applications To Functional Business Areas

(08 Hours, 16 marks)

i. Operational Information System

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

ii. Tactical Information System

a) Accounting / Finance
b) Marketing
c) Production
d) Human Resource

iii. Strategic Information System

a) Accounting / finance
b) Marketing
c) Production
d) Human Resource

4. DSS, EMS And ES:

(08 Hours, 16 marks)

i. Decision Support System

a) Characteristics of Decision Making Process
b) Features of DSS
c) Development of DSS
d) Benefits and Risks of DSS
e) GDSS

ii. Enterprise Management System

a) ERP System
b) ERP Model and Modules
c) Benefits of ERP
d) Supply Chain Management
e) Customer Relationship Management

iii. Expert Systems

a) Characteristics
b) How an Expert System Works
c) Advantages
d) Expert System and DSS
e) Expert Systems and AI.

5. Information Security and Information Technology

(08 Hours, 16 marks)

i. Information Security Challenges in E Enterprise

a) Risks
b) Common Threats
c) Common Controls
d) Protection of information system

ii. IT: Impact on Society

a) Impact of IT on Privacy
b) Ethics
c) Technical Solution for Privacy Protection
d) Intellectual Property
e) Copyright and Patents
f) Impact of IT on the Workplace
g) Impact of quality on Life

Text Books:

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

Reference Books:

1. Sahil Raj "Managament Information Systems" PearsonEducation
2. Kenneth C Laudon and Jane Laudon, "Management Information System", Pearson Education
3. James A. O'Brien, "Management Information Systems", Tata McGraw Hill
4. S. Sadagopan, "Management Information System", PHI.

Operating System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Operating System	**OS**	

Course Description:

This laboratory provides students with a comprehensive study of the operating system functions, its working details and implementation of various algorithms used in the operating systems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**14**	**28**	**03**

Total Semester Credits: 03

Prerequisite Course(s): C Programming, Basic Knowledge of Linux Operating System.

LAB COURSE CONTENT

Outline of Content:

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

Group A

1. **Study of Commercial and Open Source Operating Systems (01 each) and Design structure of these of Operating Systems.**
   a. Study the basic structures.
   b. Study the File systems.
   c. Study the Security aspects of Operating Systems.
   d. e. g. Windows OS, Linux OS.
2. **Write a program to implement Command Interpreter using system calls.**
   Implementation of Command Interpreter using various system calls showing working of Command Line Interpreter.
3. **Write a program to implement concept of Threading.**
   Demonstrate the concept of Threading in process. (Without using System Call/ Kernel Functions).
4. **Write a program to implement CPU Scheduling algorithms**
   Demonstrate the working of CPU Scheduling algorithms (any two).
   a. FCFS
   b. SJF(Preemptive & non-preemptive)
   c. Round Robin
   d. Priority(Preemptive & non-preemptive)
5. **Write a program to implement algorithmic solution for Critical Section Problem**

Demonstrate solution to overcome the critical section problem.

Group B

1. **Write a program to implement Memory Management algorithms – best fit, first fit, worst fit**
   Demonstrate the working of Memory Management algorithms (any two).
   a. First Fit
   b. Best Fit
   c. Worst Fit
2. **Write a program to implement Page Replacement algorithms**
   Demonstrate the working of Page Replacement algorithms (any two).
   a. FIFO(First In First Out)
   b. LRU(Least Recently Used)
   c. Optimal
3. **Write a program to implement Inter process communication**
   Demonstrate the working of Inter Process Communication (any one).
   a. Full Duplex pipes
   b. Half Duplex pipes
4. **Write a program for Banker's algorithm**
   Demonstrate the working of Banker's algorithm.
5. **Write a program to demonstrate disk scheduling algorithms**
   Demonstrate the working of the Disk Scheduling algorithms (any two).
   a. FCFS
   b. SSTF
   c. SCAN
   d. C-SCAN

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.

Guide lines 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", 7th/ 8th edition, John Wiley Publications, 2008.
2. William Stalling, "Operating System Internals and Design Principles", 6th edition, Pearson Publication, 2013.

3. Maurice J. Bach, “The Design of the Unix Operating System”, 1st edition, PHI.
4. Dhananjay M. Dhamdhere, “Operating Systems-A Concept-Based Approach”, 3rd edition, TMH, 2012.
5. A. S. Tanenbaum, “Modern Operating System”, 2nd edition Pearson publication, 2001.
6. H. M. Deitel, P. J. Deitel, D. R. Choffnes, “Operating System” 3rd edition, Pearson publication, 2013.
7. Rajiv Chopra, “Operating Systems-A Practical Approach”, 1st edition, S. Chand Publication, 2009.
8. Sibsankar Haldar, Alex A. Arvind, “Operating Systems”, 1st edition, Pearson Publication, 2009.

Note:-

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

Object Oriented Modeling & Design Lab

LAB COURSE OUTLINE

Course Title | Short Title Course Code

Object Oriented Modeling and Design | **OOMD**

Course Description:

The objective of this course is to introduce the students to learn how to understand the requirements of a system, its analysis, its scope, good design and good modeling practices and to document them. Students are being able to discuss the pros and cons of system design and issues in modeling large and complex systems. It explores UML 2.0 Basic and advanced concepts and notation for the same & diagrams for modeling different aspects of a system throughout the SDLC lifecycle.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01

Prerequisite Course(s): Knowledge of software engineering.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum Six Experiments out of eight)

To meet above objectives teachers will help students choose a following system for modeling. The students will try and identify scope of such a system as realistically as possible. Students will learn to draw, discuss different UML 2.0 diagrams, concepts, notation, advanced notation, forward and reverse engineering aspects. As far as possible draw as many diagrams for one single system, unless they are not applicable for the chosen system in which case other systems may be chosen for specific diagrams.

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

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.

Guide lines 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.

Note:-

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

Database Management System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Database Management System	**DBMS**	

Course Description:

The objective of this course is to introduce the students to learn and practice Structure Query Language for creation, Manipulation, controlling database, apply normalization techniques to normalize the database also learn different types of Join, view, PL/SQL, Trigger, Stored Procedure, Stored function and enable them to apply these concepts for solving real world problems.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	14	28	01

Total Semester Credits: 01

Prerequisite Course(s): knowledge of Data Structures

LAB COURSE CONTENT

Outline of Content:

(Note: Group A is Mandatory and Minimum Three experiments from Group B.)

GROUP A

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.
2. SQL DML queries: Use of SQL DML queries to retrieve, insert, delete and update the database created in experiment No. 1.
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.
4. SQL Queries: The queries should involve Set Operations and Set Comparisons the database created in experiment No. 1.
5. Screen design and Report generation: Sample forms and reports should be generated using any front end tools.

GROUP B

1. Write a program to demonstrate different types of JOIN.
2. Write a program to demonstrate use of Trigger.
3. Write a program to demonstrate view.
4. Write a program to demonstrate PL/SQL block.
5. Write a program to demonstrate stored function.
6. Write a program to demonstrate stored procedure.

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.

Guide lines 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 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, 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.

Note:-

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

Web Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code

LAB COURSE CONTENT

Teacher should facilitate learning following lab experiments:

(Note: 07 practical assignments from Group A and 03 from Group B)

GROUP A

1. **Develop a complete web page using HTML basic tags, CSS, Table and Layout**
   - A simple web page that includes basic tags such as head, body, text formatting tags, lists, paragraph, image tags, css, table and layout etc.
2. **Design a page web using JavaScript to demonstrate, if statement, if...else statement and Switch statement**
   - A simple web page that include JavaScript statements such as if, if...else and switch.
3. **Design a page web using JavaScript to demonstrate, Alert box Alert box with line breaks, Confirm box and Prompt box**
   - A simple web page that include JavaScript alert box, alert box with line breaks, confirm box and prompt box.
4. **Design a page web using JavaScript to demonstrate, Call a function ,Function with an argument, Function that returns a value**
   - A simple web page that include JavaScript call a function, function with arguments, function that return a value.
5. **Design a page web using JavaScript to demonstrate, For loop, While loop, Do While loop, Break a loop, Break and continue a loop**
   - A simple web page that include JavaScript for loop, while loop , do while loop, break a loop, break and continue a loop.
6. **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**
   - A simple web page that include JavaScript events like onclick, onmouseover, onblur, onchange, ondblclick, onkeydown, onkeypress, onkeyup, onresize, onunload etc.
7. **Design a page web using JavaScript to demonstrate, Sort an array (alphabetically and ascending), Sort numbers (numerically and ascending), Sort numbers (numerically and descending)**
   - 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.
8. **Design a page web using PHP to demonstrate, variables, echo/print, data types, string functions and operators**
   - A simple web page that include PHP variables, echo/print, data types, string functions and operators.
9. **Design a page web using PHP to demonstrate, if-else-elseif, switch, for loop, while loop, functions and arrays**
   - A simple web page that include PHP if-else-elseif, switch, for loop, while loop, functions and arrays.
10. **Design a page web using PHP to demonstrate, form handling, form validation and form URL/E-mail**

- A simple web page that include PHP form handling, form validation and form URL/E-mail.

GROUP B

1 **Web server installation and configuration**
   - Installation and configuration of any web server like IIS, Apache, WAMP, XAMP etc.

2 **Design a page web using PHP to demonstrate, date, file, file upload, cookies and sessions**
   - A simple web page that include PHP date, file, file upload, cookies and sessions.

3 **Design a page web using PHP to demonstrate, MySQL connect, create DB/Table, insert into, select, where, order by, update and delete**
   - A simple web page that include PHP MySQL connect, create DB/Table, insert into, select, where, order by, update and delete.

4 **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)**
   - Design a website on the above listed topics with the help of HTML and JavaScript.

5 **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)**
   - Design a website on the above listed topics with the help of HTML and PHP.

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.

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.

Note:
- Concerned faculty should conduct at least 07 practical assignments from group A and 03 from group 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.
- Use of Open Source Tool/Technology is recommended for laboratory assignments of concern subject.

Minor Project
COURSE CONTENT

Minor Project	**MIP**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	10	20	02

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of design or analysis.
- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: _____
Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Seminar-I

COURSE CONTENT

Seminar-I **S-I**

Course Title Short Title Course Code

Semester-VI

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

7. **ASSESSMENT OF SEMINAR-I**

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: _____
Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25