NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Final Year Engineering

(Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VII

W.E.F. 2015– 2016

Annexure - I

BE Semester - VII

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		
Advanced Unix Programming*	D	3	---	---	3	20	80	---	---	100	3
Artificial Intelligence & Expert System	D	3	---	---	3	20	80	---	---	100	3
Interdisciplinary Elective*	E	3	---	---	3	20	80	---	---	100	3
Elective - I	E	3	---	---	3	20	80	---	---	100	3
Embedded System*	D	3	--	---	3	20	80	---	---	100	3
Advanced Unix Programming Lab*	D	---	---	2	2	---	---	25	25**(PR)**	50	1
Embedded System Lab*	D	---	---	2	2	---	---	25	25**(OR)**	50	1
Elective – I Lab #	E	---	---	2	2	---	---	25	25**(OR)**	50	1
Project – I*	D	---	---	2	2	---	---	25	25**(OR)**	50	2
Seminar – II*	D	---	---	2	2	---	---	25	---	25	2
Industrial Visit*	D	---	---	---	---	---	---	25	---	25	1
Total		**15**	**---**	**10**	**25**	**100**	**400**	**150**	**100**	**750**	**23**

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

#Lab for Elective-I

Inter Disciplinary Elective
1 Software Engineering & Project Management
2 Enterprise Resource Planning and SAP

Elective I
1 Advanced Computer Architecture
2 Android Programming*
3 Human Computer Interaction*
4 Advanced Computer Network

*** Common Subjects with BE I.T.**

BE Semester – VIII

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		
Compiler Design	D	3	---	---	3	20	80	---	---	100	3
Data Warehousing & Mining*	D	3	---	---	3	20	80	---	---	100	3
Elective - II	E	3	---	---	3	20	80	---	---	100	3
Elective - III	E	3	---	---	3	20	80	---	---	100	3
Compiler Design Lab	D	---	---	2	2	---	---	25	25**(PR)**	50	1
Data Warehousing & Mining Lab*	D	---	---	2	2	---	---	25	25**(OR)**	50	1
Elective - II Lab#	E	---	---	2	2	---	---	25	25**(OR)**	50	1
Industrial Lecture$	C	---	---	1*	1	---	---	50	---	50	2
Project – II*	D	---	---	4	4	---	---	75	75 **(OR)**	150	6
Total		**12**	**---**	**11**	**23**	**80**	**320**	**200**	**150**	**750**	**23**

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

#Lab for Elective-II

$ Minimum 6 lectures to be conducted by experts from the industry in alternate weeks. Next week group discussion on the lecture conducted.

Elective II

1 Software Metrics & Quality Assurance*
2 Distributed System*
3 Cryptography & Network Security*
4 Neural Network & Fuzzy Logic*

Elective III

1 Mobile Computing*
2 Bio-Informatics*
3 Real Time System
4 iPhone Programming*

*** Common Subjects with BE I.T**

Advanced UNIX Programming

COURSE OUTLINE

Course Title	Short Title	Course Code
Advanced UNIX Programming	**AUP**	

Course Description:

The principle objective of this course is to teach students

a. How UNIX is designed and structured.
b. How to write programs on and for Unix Platforms.
c. How to work efficiently within Unix Environment.
d. Command level view of Unix OS.
e. The important parts of the Unix Operating system's application programming interface.

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

Prerequisite Course(s): Basic Knowledge of operating system (Unix/Linux) and C Programming.

COURSE CONTENT

Advanced UNIX Programming **Semester-VII**

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. **(8 Hrs, 16 Marks)**

a. **Unix System Overview**- Introduction, UNIX Architecture, Logging In, Files and Directories, Input and Output
b. Programs and Processes, Error Handling, User Identification, Signals
c. Time Values, System Calls and Library Functions
d. **File I/O**- Introduction, File Descriptors, open Function, creat Function, close Function, lseek Function, read Function, write Function
e. File Sharing, Atomic Operations- Appending to a file, Creating a file
f. dup and dup2 Functions, sync, fsync, and fdatasync functions, fcntl function

2. **(8 Hrs, 16 Marks)**

- **a.** **Files and Directories**- Introduction, stat, fstat, and lstat Functions, File Types, File Access Permissions, access Function, umask Function
- **b.** chmod and fchmod Functions, Sticky Bit, File Size, File Truncation, File Systems,link,unlink,remove and rename function
- **c.** Symbolic Links, symlink and readlink Functions, File Times, mkdir and rmdir Functions, chdir, fchdir, and getcwd Functions
- **d.** **System Data Files and Information** – Introduction, Password File-getpwuid, getpwnam, getpwent, setpwent, endpwent, Shadow Passwords- getspnam, getspent, setspent, endspent
- **e.** Group File- getgrgid, getgrnam, getgrent, setgrent, endgrent, Login Accounting, System Identification- uname, gethostname
- **f.** Time and Date Routines- time, gettimeofday, gmtime, localtime, mktime, asctime,ctime, strftime

3. **(8 Hrs, 16 Marks)**

- **a.** **Process Environment-** Introduction, main Function, Process Termination- Exit Functions, atexit Function
- **b.** Command-Line Arguments, Environment List, Memory Layout of a C Program, Memory Allocation- malloc , calloc, realloc, free
- **c.** Environment Variables
- **d.** **Process Control** – Introduction, Process Identifiers- getpid, getppid, getuid, geteuid, getgid, getegid
- **e.** fork Function- file sharing, vfork Function, wait and waitpid Functions
- **f.** Race Conditions, exec Functions- execl, execv, execle, execve, execlp, execvp, Process Accounting

4. **(8 Hrs, 16 Marks)**

- **a.** **Signals** – Introduction, Signal Concepts, signal Function, Unreliable Signals
- **b.** Interrupted System call ,Reliable-Signal Terminology and Semantics, kill and raise Functions, alarm and pause Functions
- **c.** Signal Sets- sigemptyset, sigfillset, sigaddset, sigdelset, sigismember, sleep Function
- **d.** **Threads** – Introduction, Thread Concepts, Thread Identification- pthread_equal, pthread_self, Thread Creation- pthread_create, Thread Termination- pthread_exit,pthread_join,pthread_cancel, pthread_cleanup_push, pthread_cleanup_pop, pthread_detach
- **e.** Thread Synchronization-pthread_mutex_init, pthread_mutex_destroy, pthread_mutex_lock, pthread_mutex_trylock, pthread_mutex_unlock
- **f.** **Daemon Processes** – Introduction, Daemon Characteristics, Coding Rules, Error Logging

5. **(8 Hrs, 16 Marks)**

a. Interprocess Communication – Introduction, Pipes, FIFOs- mkfifo, XSI IPC, identifires and keys, ftok

b. Message Queues- msgget, msgctl, msgsnd, msgrcv, Semaphores- semget, semctl, semop, Shared Memory-shmget, shmctl, shmat, shmdt

c. Network IPC- Socket Descriptors- socket, shutdown

d. Associating Addresses with sockets- bind

e. Connection Establishment- connect, listen, accept

f. Data Transfer- send, recv

Text Book:

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

Reference Book:

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

Artificial Intelligence & Expert System

COURSE OUTLINE

Course Title	Short Title	Course Code
Artificial Intelligence & Expert System	**AIES**	

Course Description: The objective of this course is to introduce the students to the fundamentals of Artificial Intelligence and Expert Systems 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): Basic knowledge of finite automata.

COURSE CONTENT

Artificial Intelligence & Expert System **Semester-VII**

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 Artificial Intelligence (08Hrs, 16 Marks)

a. Definitions of AI, History, AI representation
b. Turing test
c. AI Problem and Techniques: Problem as State Space Search, Problem Characteristics
d. Production System: Production Rules ,Water Jug Problem
e. Heuristic Search Techniques: BFS, DFS, A*, AO*, Mean Ends Analysis

2. Knowledge Engineering (08Hrs, 16 Marks)

a. Knowledge Representation Issues
b. Knowledge Representation using Predicate Logic
c. Knowledge Representation using Rules
d. Weak and Strong Filler Structures for Knowledge : Semantic net, Frames, Script, Conceptual dependency

3. Game Playing and Planning (08Hrs, 16 Marks)

a. Minimax Search with Additional Refinements
b. Overview of Planning
c. Goal Stack Planning : Block World, STRIPS
d. Nonlinear, Hierarchical and other Planning Techniques
e. Perception and Action

4. Understanding , NLP and Learning (08Hrs, 16 Marks)

a. Understanding as a Constraint satisfaction: Waltz's algorithm, Constraint determination, Trihedral and Non trihedral figures labeling

b. Natural Language Processing steps

c. Learning techniques

d. Neural Network Learning :Biological neuron, Artificial neuron, Architecture of Neural Network and Learning

5. Expert Systems (08Hrs, 16 Marks)

a. Architecture of Expert System

b. Utilization and functionality

c. Knowledge Representation and Utilization in Expert System

d. Two Case Studies of Expert System

e. Expert System Shell

f. Applications of Expert System

Text Books:

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

Reference Books:

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

Software Engineering & Project Management

(Inter Disciplinary Elective)

COURSE OUTLINE

Course Title	Short Title	Course Code
Software Engineering & Project Management	**SEPM**	

Course Description: The objective of this course is to introduce students from other engineering streams to get 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): Software Engineering

COURSE CONTENT

Software Engineering & Project Management **Semester-VII**

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 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

2. Introduction to Project Management (08Hrs, 16 Marks)

a. What is project
b. The triple constraint
c. What is project management , Stakeholders, Project Management Knowledge Area , Project Management tools and techniques
d. Role of a Project Manager , Project Manager's job description, Suggested Skills for Project Manager , Importance of people and leadership skills
e. Project Management
f. Organizational Structure
g. Project Life Cycle and Phases
h. Nature of IT projects
i. Characteristics of IT project Team members
j. Trends affecting IT Project Management, Globalization , Outsourcing ,

Virtual Teams

3. Project Integration & Scope Management (08Hrs, 16 Marks)

a. Project Selection
b. Developing Project Charter
c. Developing Project Management Plan
d. Collecting Requirements
e. Creating Work Breakdown Structure
f. Controlling Scope

4. Project Time & Cost Management (08Hrs, 16 Marks)

a. Defining and Sequencing Project Activities and Dependencies
b. Developing Schedule, Gantt Chart, Critical Path Method , Incorporating Project Uncertainty - PERT , Critical Chain Method
c. Resource loading and Resource Leveling
d. Schedule Controlling
e. Estimating Techniques
f. Earned Value Management
g. Project Quality Management
h. Planning Quality
i. Performing Quality Assurance
j. Quality Control, Tools and Techniques

5. Project Resource & Communication Management (08Hrs, 16 Marks)

a. Development of Human Resource Plan
b. Project Organizational Chart and Responsibility Assignment
c. Multi project Scheduling and Resource Allocation
d. Identifying Stakeholders
e. Planning Communication

Text Books:

1. Pressman Roger S., "Software Engineering: A Practitioners Approach", 7th Edition, Tata McGraw Hill.
2. Joseph Phillips, PMP Project Management Professional Study Guide, Third Edition McGraw Hill.

Reference Books:

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

Enterprise Resource Planning and SAP

(Inter Disciplinary Elective)

COURSE OUTLINE

Course Title	Short Title	Course Code
Enterprise Resource Planning and SAP	**ERP & SAP**	

Course Description: This course is aimed at introducing foundation understanding of enterprise systems and how these systems fit into today's business operations. Enterprise Systems are now essential infrastructure to both large corporate entities, as well as to small-to-medium organization, as they remove the need to have a large number of separate individual computer-based applications.

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

Prerequisite Course(s): Industrial Management

COURSE CONTENT

Enterprise Resource Planning and SAP **Semester-VII**

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. **ERP Introduction (08 Hours, 16 marks)**
   a. Enterprise – An Overview: Introduction, Business Function and Business Processes, Integrated management Information, Role of enterprising ERP system, Business Modeling, Integrated data model
   b. Introduction to ERP: Introduction, Common ERP Myths, A Brief History of ERP, The Advantages of ERP, Roadmap for the successful ERP Implementation

2. **ERP Risk, Benefits and Related Technologies (08 Hours, 16 marks)**
   a. Risks and Benefits of ERP: The quantifiable benefits from ERP system, The Intangible Benefits of ERP, Risks of ERP, Risks factor of ERP implementation, Benefits of ERP
   b. ERP and Related Technologies: Introduction, BPR, Data warehousing, Data Mining, OLAP, PLM, SCM, CRM, GIS, Internet and Extranet

3. **ERP Functional Modules and Implementation (08 Hours, 16 marks)**
   a. ERP Functional Modules: Introduction, Functional Modules of ERP software, Supply chain and customer relationship application
   b. ERP Implementation Life Cycle: Introduction, Objective of ERP Implementation, Different phases of ERP Implementations

4. **ERP Consultants, Vendor & Employees, eBusiness and Future Direction (08 Hours, 16 marks)**
   a. Consultants, Vendors and Employees: Introduction, In-house implementation-Pros and Cons, Vendors, Consultants, Employee and Employee resistance, Reason for employee resistance, Dealing with employee resistance
   b. ERP and eBusiness: Introduction, ERP and eBusiness, eBusiness-supply chain integration, The eBusiness process model, Components of the eBusiness supply chain, ERP/eBusiness integration, ERP internet and WWW
   c. Future Direction and Trends in ERP: Introduction, New market new channel and faster implementation methodologies

5. **SAP Introduction and Architecture of Web Application Server (08 Hours, 16 marks)**
   a. SAP Introduction: SAP Transformation into a Global Business, SAP for industries, SAP R/3 Releases and Fundamentals, SAP Enterprise Core Application Overview, SAP Services Overview
   b. The Architecture of the SAP Web Application Server: The SAP Web Application Server, Basic Architectural Concepts, Services Work Process Types, Building the Client/Server SAP web AS System

Text Books:

1. Alexis Leon, " Enterprise Resource Planning", Second Edition, Tata Mcgraw Hill
2. Jose A. Hernandez, Jim Keogh, Franklin Foster Mertinez, " SAP R/3 Handbook", Third Edition, Tata McGraw Hill

Reference Books:

1. V.K. Garg, N .K. Venkita Krishnan, "ERP Ware: ERP Implementation Framework" , PHI.
2. Annetta Clewwto and Dane Franklin, "Guide to Planning ERP Application", McGRaw-Hill, 1997.
3. George Anderson, Danielle Larocca, "Teach yourself SAP in 24 hours", Pearson Education.

Advanced Computer Architecture (Elective I)

COURSE OUTLINE

Course Title	Short Title	Course Code
Advanced Computer Architecture	**ACA**	

Course Description:

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

Prerequisite Course(s): Computer Architecture
Computer Organization

COURSE CONTENT

Advanced Computer Architecture **Semester-VII**

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 Parallel Processing (08Hrs, 16 Marks)

a. Evolution of parallel processors with future trends & applications
b. Parallelism in uniprocessor system
c. Parallel computer structure
d. Architectural classification schemes
e. System Attributes to Performance
f. Program and Network Properties

2. Memory Hierarchy and Processor (08Hrs, 16 Marks)

a. Hierarchical Memory Technology
b. Back Plan Bus System
c. Shared Memory Organization
d. Advance Processor Technology
e. RISC and CISC Scalar Processor
f. Superscalar and Vector Processors

3. Pipelining Processors and its Super Scalars Technique (08Hrs, 16 Marks)

a. Principles of Linear Pipelining
b. Linear and Non-linear pipelining processors
c. General Pipelining & Reservation Table

d. SIMD Array Processors
e. Parallel Algorithm for array processor
f. Associative array Processing

4. Multiprocessors Architecture (08Hrs, 16 Marks)

a. Loosely and Tightly coupled multiprocessor
b. Processor characteristics for multiprocessing
c. Parallel algorithm for multiprocessors
d. Synchronized and Asynchronous parallel algorithm
e. Vector processing

5. Principles of Multithreading (08Hrs, 16 Marks)

a. Principles of Multithreading
b. Parallel Programming modules
c. Parallel Languages
d. Data Flow Computer Architecture
e. Data driven computing and languages

Text/Reference Books:

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

Android Programming (Elective I)

COURSE OUTLINE

Course Title	Short Title	Course Code
Android Programming	**AP**	

Course Description: This course provides the students the platform to learn and understand the Android technology and encourage them to design, develop and deploy Android applications.

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

Prerequisite Course(s): Basics knowledge of object oriented concepts.

COURSE CONTENT

Android Programming **Semester-VII**

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 Mobile Operating Systems and Mobile Application Development (08 Hrs. 16 Marks)**
   a. **Introduction to Mobile OS:** Palm OS, Windows CE, Embedded Linux, J2ME (Introduction), Symbian (Introduction)
   b. **Overview of Android:** Devices running android, Why Develop for Android, Features of Android, Architecture of Android, Libraries.
   c. **Setup Android Development Environment:**
   Android development Framework- - Android-SDK Eclipse, Emulators – What is an Emulator / Android AVD? , Creating & setting up custom Android emulator, Android Project Framework

2. **Android Activities, UI Design and Database (08 Hrs. 16 Marks)**
   a. Understanding Intent**,** Activity, Activity Lifecycle and Manifest, Form widgets, Text Fields
   b. **Layouts:** Relative Layout, Table Layout, Frame Layout, Linear Layout, Nested layouts
   c. **UI design:** Time and Date, Images and media, Composite, Alert Dialogs & Toast, Popup

d. **Menu:** Option menu, Context menu, Sub menu
e. **Database:** Introducing SQLite, SQLite Open Helper, SQLite Database, Cursor
f. **Content providers:**defining and using content providers, example-Sharing database among twodifferent applications using content providers, Reading and updating Contacts, Reading bookmarks

3. Preferences, Intents and Notifications (08 Hrs. 16 Marks)

a. **Preferences:**Shared Preferences, Preferences from xml
b. **Intents:** Explicit Intents, Implicit intents
c. **Notifications:** Broadcast Receivers, Services (Working in background) and notifications, Alarms

4. Telephony, SMS and Location Based Services (08 Hrs. 16 Marks)

a. **Telephony:** Accessing phone and Network Properties and Status, Monitoring Changes in Phone State, Phone Activity and data Connection
b. **SMS:** Sending SMS and MMS from your Application, sending SMS Manually, Listening for incoming SMS
c. **Location based Services:** Using Location Based Services, Working with Google Maps, Geocoder

5. Accessing Android Hardware (08 Hrs. 16 Marks)

a. **Networking:** An overview of networking, checking the network status, communicating with a server socket, Working with HTTP, Web Services
b. **Bluetooth:** Controlling local Bluetooth device, Discovering and bonding with Bluetooth devices, Managing Bluetooth connections, communicating with Bluetooth
c. **Audio and Video:** Playing Audio and Video, Recording Audio and Video, Using Camera and Taking Picture

Text/Reference Books:

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

Human Computer Interaction (Elective –I)

COURSE OUTLINE

Course Title	Short Title	Course Code
Human Computer Interaction (Elective-I)	**HCI**	

Course Description:

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

Prerequisite Course(s): Software Engineering

COURSE CONTENT

Human Computer Interaction **Semester-VII**

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 (08Hrs, 16 Marks)

a. Importance of user interface
b. Importance of good design
c. GUI-Benefits of good UI
d. Concept of Direct Manipulation
e. Graphical systems :Advantage and disadvantage
f. Characteristics of GUI
g. The web user Interface
h. Characteristics of Web UI

2. Design Process (08Hrs, 16 Marks)

a. The Human interaction with computer
b. Important human characteristics in design
c. Human consideration in design
d. Human Interaction Speeds
e. Understand the Principles of Good Screen Design

3. Models in HCI (08Hrs, 16 Marks)

a. Cognitive models
b. Goals and task hierarchies
c. Design focus, GOMS
d. Linguistics models
e. Physical and device models
f. Cognitive Architectures

4. Interaction styles (08Hrs, 16 Marks)

a. Menus
b. Windows
c. Device based controls
d. Screen based controls

5. Communication (08Hrs, 16 Marks)

a. text messages
b. feedback and guidance
c. Graphics
d. Icons and images
e. colours

Text Books:

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

Reference Books:

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

Advanced Computer Network (Elective I)

COURSE OUTLINE

Course Title	Short Title	Course Code
Advanced Computer Network	**ACN**	

Course Description:
This course is aimed at introducing the advanced of Computer Networking to undergraduate students. The objective of the course is to understand the basics and knowledge about the Wireless Computer Network concepts and its Security, Ad Hoc wireless network and Sensor Network with its routing protocols.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	3	**15**	**45**	**3**

Prerequisite Course(s): Undergraduate introductory class to networking required.

COURSE CONTENT

Advanced Computer Network **Semester-VII**

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. Wireless Networking, Overview of 802.11 Networks, 802.11 MAC Fundamentals. (08Hrs, 16 Marks)

a Introduction to wireless Networking: Why Wireless? What makes Wireless Network different? A Network by Any other name.

b Overview of 802.11 Networks: IEEE 802 Network Technology Family tree, 802.11 Nomenclature and design, 802.11 Network Operation, Mobility Support.

c 802.11 MAC Fundamentals: Challenges for the MAC,MAC Access Modes and Timing, Contention-Based Access Using the DCF, Fragmentation and Reassembly, Frame Format, Encapsulation of Higher-Layer Protocols Within 802.11,Contention-Based Data Service, Frame Processing and Bridging

2. 802.11 Framing in Detail and Management Operations. (08Hrs, 16 Marks)

a 802.11 Framing in Detail: Data Frames, Control Frames, Management Frames, Frame Transmission and Association and Authentication States

b Management Operations: Management Architecture, Scanning, Authentication, Pre-authentication, Association, Power Conservation, Timer Synchronization, Spectrum Management

3. Contention-Free Service with the PCF,Wired Equivalent Privacy, User Authentication with 802.1X (08Hrs, 16 Marks)

a Contention-Free Service with the PCF: Contention-Free Access Using the PCF, Detailed PCF Framing, Power Management and the PCF

b Wired Equivalent Privacy (WEP): Cryptographic Background to WEP, WEP Cryptographic Operations, Problems with WEP, Dynamic WEP

c User Authentication with 802.1X: The Extensible Authentication Protocol, EAP Methods, 802.1X: Network Port, Authentication, 802.1X on Wireless LANs

4. 802.11i, Ad Hoc Wireless Networks, Routing Protocols for Ad Hoc Wireless Networks

(08Hrs, 16 Marks)

a 802.11i: Robust Security Networks, TKIP, and CCMP: The Temporal Key Integrity Protocol (TKIP), Counter Mode with CBC-MAC (CCMP), Robust Security Network (RSN) Operations

b Ad Hoc Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.

c Routing Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols

5 Routing Protocols for Ad Hoc Wireless Networks, Wireless Sensor Networks

(08Hrs, 16 Marks)

a Routing Protocols for Ad Hoc Wireless Networks: Table-Driven Routing Protocols, On Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Power-Aware Routing Protocols

b Wireless Sensor Networks: Introduction, Sensor Networks Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network.

Text Books:

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

Embedded System

COURSE OUTLINE

Course Title	Short Title	Course Code
Embedded System	**ES**	

Course Description: The objective of this course is to introduce students the knowledge of Embedded System, Architecture of embedded system, programming, and process of embedded system development, interfaces, real time OS concept and creation of target image.

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

Prerequisite Course(s): Knowledge of Microprocessor/Microcontroller and Operating System

COURSE CONTENT

Embedded System **Semester-VII**

Teaching Scheme **Examination Scheme**

Lecture: 3 Hours/Week

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

1. Introduction to Embedded System (08Hrs, 16 Marks)

a. What is Embedded System?
b. Application areas
c. Categories of the Embedded System
d. Overview of Embedded System architecture
e. Specialties of Embedded System
f. Recent trends in Embedded System
g. Hardware architecture-CPU, Memory, Clock Circuitry, WDT, Chip Select, Communication Interfaces.
h. Communication Protocols-I^2C, SPI & CAN

2. Process of Embedded System Development (08Hrs, 16 Marks)

a. The development process
b. Requirement engineering
c. Design
d. Implementation
e. Integration and Testing
f. Packaging
g. Configuration Management
h. Managing Embedded System development projects

3. ARM System Architecture (08Hrs, 16 Marks)

a. RISC design philosophy, ARM design philosophy
b. Embedded system hardware, Embedded system software
c. Registers, Current program status register
d. Pipeline, Exception, Interrupts Vector table
e. Core Extensions
g. Architecture revision
h. ARM Processor families

4. Real Time Operating System (08Hrs, 16 Marks)

a. Architecture of kernel
b. Tasks & Task Scheduler
c. Interrupt Service Routines, Semaphores, Mutex, Mailbox, Message queues
d. Pipes, Event Register, Timers, Signals, Memory management
e. Priority Inversion Problem
f. RTOS services in contrast with traditional OS.
g. Introduction to uCOSII RTOS, Salient Features of uCOSII, Study of kernel structure of uCOSII
h. Synchronization in uCOSII, Inter-task communication in uCOSII, Porting of RTOS.

5. Embedded Linux (08Hrs, 16 Marks)

a. Introduction to the Linux kernel,
b. Configuring and booting the kernel
c. The root file system
d. Root file directories, /bin, /lib etc.,
e. Linux file systems,
f. Types of file system: Disk, RAM, Flash and Network
g. Some debug techniques- Syslog and Strace, GDB
h. TCP/IP Networking- Network configuration

Text Books:

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

Reference Books:

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

Advanced UNIX Programming Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Advanced UNIX Programming Lab	**AUP Lab**	

Course Description:

This laboratory provides students with a comprehensive study of Unix commands. The practical's make students able for designing program for process creation, atexit function, file management and status information and various interprocess communications because of these students able to write efficient, maintainable, and portable code.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**1**

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

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

Group A

1. Write a program for File Management (any 7 option)
2. Write a program for Simulation of various commands(any7 option)
3. Write a program to display user and system information
4. Write a program to display file status flags on specified descriptor
5. Write any program using atexit function
6. Write a program for process creation using fork and vfork function

Group B

1. Write a program for Inter Process Communication using pipe
2. Write a program for catching of Signals
3. Write a program for Daemon process
4. Write a program for multithreading
5. Write a program for client server communication using socket
6. Write a program for Inter Process Communication using Message Queue

Guidelines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will

assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Text Book:

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

Reference Book:

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

Note:-

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

Embedded System Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Embedded System Lab	**ES Lab**	

Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	**14**	**28**	**1**

LAB COURSE CONTENT

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

Group A

1. Writing basic C-programs for I/O operations.
2. Program to interface LCD.
3. Program to demonstrate I2C Protocol.
4. Program to demonstrate CAN Protocol.
5. Program to interface Keyboard and display key pressed on LCD.
6. Program to interface stepper motor.
7. Program to interface Graphics LCD.

Group B

1. Program to interface Touch Panel.
2. Program to implement AT commands and interface of GSM modem.
3. Interfacing 4 x 4 matrix keyboards and 16 x 2 character LCD display to microcontroller /Microprocessor and writing a program using RTOS for displaying a pressed key.
4. Writing a scheduler / working with using RTOS for 4 tasks with priority. The tasks may be keyboard LCD, LED etc. and porting it on microcontroller/ microprocessor.
5. Implement a semaphore for any given task switching using RTOS on microcontroller board.
6. Create two tasks, which will print some characters on the serial port, Start the scheduler and observe the behavior.
7. Program for exploration of (Process creation, Thread creation) using Embedded Real Time Linux.

Guidelines for ICA:

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

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Text Books:

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

Reference Books:

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

Note:-

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

Advanced Computer Architecture Lab (Elective I Lab)

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Advanced Computer Architecture Lab	**ACA Lab**	

Course Description:

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

Prerequisite Course(s): Computer Architecture, Computer Organization

LAB COURSE CONTENT

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

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

Reference Books:

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

Guidelines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Note:-

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

Android Programming Lab (Elective I Lab)

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Android Programming Lab	**AP Lab**	

Course Description: This course provides the students the platform to learn and understand the Android technology and encourage them to design, develop and deploy Android applications.

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

Prerequisite Course(s) : Basic knowledge of object oriented concepts.

LAB COURSE CONTENT

Term Work:

Any **SIX** lab assignments should be framed by concern staff member based on above syllabus. The Practical should be carried out using JDK 6.0 or above, Android SDK and Eclipse.

These tools are available for free download at

1. www.developer.android.com
2. www.eclipse.org
3. www.sun.com

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

Guidelines for ICA:

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

Guidelines for ESE:

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical

aspect of the problem.

Text Books/Reference Books:

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

Note:-

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

Human Computer Interaction Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Human Computer Interaction Lab	**HCI Lab**	

Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	**14**	**28**	**1**

Prerequisite Course(s): Web Technology lab

LAB COURSE CONTENT

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

Group A

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

Group B

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

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

Guidelines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Text Books:

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

Reference Books:

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

Note:-

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

Advanced Computer Network Lab (Elective I Lab)

LAB COURSE OUTLINE

Course Title	Short Title Course Code
Advanced Computer Network Lab	**ACN Lab**

Course Description:
This laboratory provides students with a comprehensive study of the Advanced 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.

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	**14**	**28**	**1**

Prerequisite Course(s): Fundamental knowledge of computer network and wireless networking protocols.

LAB COURSE CONTENT

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

Guidelines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Text Books:

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

Note:-

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

Project-I

Project-I	**P-I**	
Course Title	Short Title	Course Code

Course Description:
The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

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

COURSE CONTENT

Project-I **Semester-VII**

Lab:2 Hrs/week **Examination Scheme**

Total Semester Credits: 02
Internal Continuous Assessment (ICA): 25 Marks
End Semester Examination (ESE)-Oral:25 Marks
Total: 50Marks

1. It is expected that the broad area of Project-I shall be finalized by the student in the beginning of the VII semester / extension of Minor project undertaken may be Project-I.
2. A group of Minimum 3 and Maximum 5 students shall be allotted for Project-I and same project group for Project-II.
3. Exhaustive survey of literature based on a clear definition of the scope and focus of the topic should be carried out by the students. The **Synopsis/Abstract** on the selected topic, after detail literature survey should be submitted to the Project coordinator appointed by Head of the department.
4. Project-I may involve literature survey, problem identification, work methodology preparing specification and material procurement, collection of data , conduction of experiments and analysis. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.
5. Approximately more than 50% work should be completed by the end of VII semester.
6. Each student group is required to maintain log book for documenting various activities of Project-I and submit group project report in the form of thermal bound at the end of semester –VII. Submit the progress report in following format:

1. *Title*
2. *Abstract*
3. *Introduction*
4. *Problem identification and project objectives*
5. *Literature survey*
6. *Analysis*
7. *Design Methodology*
8. *Expected result and conclusion*
9. *References.*

7. Evaluation Committee comprising of the Guide, Project Coordinator and Expert appointed by the Head of the department will award the marks based on the work completed by the end of semester and the presentation based on the project work.

Guide lines for ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Assessment of the project-I for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**

Guide lines for ESE: The End Semester Examination for Project shall consist of demonstration if any, presentation and oral examinations based on the project report**.**

Assessment of Project-I (ICA)

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

Table-A

SN	Name of Student	Problem Identification and project objectives	Literature Survey	Project Methodology/ Design/PCB/ hardware/ simulation/ programming	Progress Status	Present ation	Tota l
		5	**5**	**5**	**5**	**5**	**25**

Seminar-II
COURSE CONTENT

Seminar-II Course Title | **S-II** Short Title | Course Code

Course Description: The course explores the knowledge of presentation and effective communication. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

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

COURSE CONTENT

Seminar-II **Semester-VII**

Examination Scheme

Practical : 2 Hrs/Week **Total Semester Credits: 02**

Internal Continuous Assessment (ICA): 25 Marks

1. Each Student shall select a topic for seminar which is not covered in curriculum. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
2. Topic of Seminar shall be registered within a three weeks from commencement of VII Semester and shall be approved by the committee.
3. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-II. Seminar shall be related state of the art topic of his choice approved by the committee.
4. Each student should deliver a seminar in scheduled period (Specified in time table or time framed by department) and submit the seminar report (paper bound copy/Thermal bound)in following format:
    1. *Title*
    2. *Abstract*
    3. *Introduction*
    4. *Literature survey*
    5. *Concept*
    6. *Functional and Technical Details*
    7. *Applications*
    8. Comparison with similar topics / methods
    9. *Future scope*
    10. *References*

ASSESSMENT OF SEMINAR-II

Guide lines for ICA: ICA shall be based on topic selection, presentation and Seminar-II report submitted by the student in the form of thermal bound. Assessment of the Seminar-II for award of ICA marks shall be done jointly by the guide and a departmental committee, as per the guidelines given in **Table- B**

Name of Guide: _____

Table-B

SN	Name of Student	Seminar Topic	Topic Selection	Literature survey	Report writing	Depth of under-standing	Presentation	Total
			5	5	5	5	5	25

Industrial Visit

Industrial Visit	**IV**	Course Title
Short Title	Course Code	

Course Description: The course explores the knowledge industry organization, new trends in manufacturing, maintenance and safety. The industrial visit provides the practical visualization of theoretical study of various engineering subject.

COURSE CONTENT

Semester-VII **Examination Scheme**

Total Semester Credits: 01

Internal Continuous Assessment (ICA): 25 Marks

1. Industry visits to minimum two industries shall be carried out by each student preferably or college shall arrange the industrial visit during the vacation period otherwise during the regular VII semester.
2. The student should obtain appropriate certificates of visit from the concerned organizations just after the visits.
3. Every Student should submit Industrial Visit report individually at the end of Semester-VII(First Term of Final Year)
4. The report(Thermal Bound) should contain information about the following points:
   a. *The organization - activities of organization and administrative setup technical personnel and their main duties.*
   b. *The project / industry brief description with sketches and salient technical information.*
   c. *The work / processes observed with specification of materials, products, equipments etc. and role of engineers in that organization.*
   d. *Suggestions (if any) for improvement in the working of those organizations.*
5. The evaluation of the report of technical visits will be made by panel of three teachers appointed by Head of the department based on following points:

Guide lines for ICA: ICA shall be based on knowledge gain by student and Industrial Visit Report submitted by the student in the form of Thermal bound. Assessment of the Industrial Visit for award of ICA marks shall be done jointly by industrial visit coordinators departmental committee based on viva -voce as per the guidelines given in **Table- C**

Table-C

SN	Name of Student	Name of Industry	Report writing	Depth of Under-standing	Total
			15	**10**	**25**

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Final Year Engineering

(Computer)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VIII

W.E.F. 2015– 2016

Compiler Design

COURSE OUTLINE

Course Title	Short Title	Course Code
Compiler Design	**CD**	

Course Description:

This course is aimed at introducing the fundamentals of Compiler Design to undergraduate students. The objective is to learn the major phases of compilers such as lexical analysis, syntax analysis, intermediate code generation and code generation, understand the role and necessity of runtime environment and apply this knowledge for implementing the programs for various phases and system softwares using engineering tools.

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

Prerequisite Course(s): Fundamentals of System Programming, Formal Language & Automata Theory

COURSE CONTENT

Compiler Design **Semester- VIII**

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: **(08 Hrs, 16 Marks)**

a. Language Processors
b. The Structure if a Compiler
c. Application of Compiler Technology

Lexical Analysis:

d. The Role of Lexical Analyzer
e. Specification of Tokens
f. Recognition of Tokens
g. Lexical Analyzer Generator LEX

2. Syntax Analysis: **(08 Hrs, 16 Marks)**

a. Role of the Parser
b. Representative Grammar
c. Syntax Error Handling
d. Error-recovery Strategies

e. Context Free Grammars: Definition, Notational Conventions
f. Derivations
g. Parse Trees and Derivations
h. Ambiguity
i. Eliminating Ambiguity
j. Elimination of Left Recursion
k. Elimination of Left Factoring

3. Parsing Methods (08 Hrs, 16 Marks)

a. Top Down Parsing: Recursive-Descent Parsing, FIRST and FOLLOW, LL(1) grammar
b. Nonrecursive Predictive Parsing
c. Construction of Nonrecursive Predictive Parsing Table
d. Error Recovery in Predictive Parsing
e. Bottom-up Parsing: Shift-Reduce Parsing, Conflicts during Shift-Reduce Parsing
f. Introduction to LR Parsing, L-R Parsing Algorithm, Viable Prefixes
g. Simple LR Parser (SLR), Construction of Simple LR Parsing Table
h. Canonical LR(1), Construction of LR(1) Parsing Table
i. Look Ahead LR (LALR), Construction of LALR Parsing Table
j. Parser Generator - Yacc

4. Syntax-Directed Translation: (08 Hrs, 16 Marks)

a. Syntax-Directed Definitions
b. Dependency Graphs
c. S-attributed Definitions
d. L-attributed Definitions
e. Application of Syntax Directed Translation
f. Syntax Directed Translation Schemes

Intermediate Code Generation:

g. Variants of Syntax Trees
h. Three Address Code
i. Control Flow
j. Backpatching

5. Runtime Environment: (08 Hrs, 16 Marks)

a. Storage Organization
b. Activation Trees
c. Activation Records
d. Calling Sequence
e. Heap Management
f. Introduction to Garbage Collection

Code Generation:

g. Issues in Code Generator
h. The Target Language
i. Basic Blocks and Flow Graphs
j. Optimization of Basic Blocks
k. A simple Code Generator
l. Peephole Optimization

Text Books -

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

Reference Books -

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

Data Warehousing & Mining

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Warehousing & Mining	**DWM**	

Course Description: The objective of this course is to introduce the students to Learn and practice data modeling using the multidimensional database schemas and developing data warehouse to extract knowledgeable information for decision support system.

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

Prerequisite Course(s): Knowledge of Database Management System

COURSE CONTENT

Data Warehousing & Mining **Semester-VIII**

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 Data Warehousing (08Hrs, 16 Marks)

a. What is a Data Warehouse?
b. A Multidimensional data model
c. Data Warehouse Architecture
d. From Data Warehousing to Data Mining
e. Why preprocess data?
f. Data Cleaning
g. Data Integration and Transformation
h. Data Reduction
i. Data discretization and concept hierarchy generation

2. Introduction to Data Mining (08Hrs, 16 Marks)

a. What is Data Mining?
b. Data Mining Functionalities: What kinds of Patterns can be Mined?
c. Classification of Data Mining Systems
d. Data Mining Task Primitives
e. Integration of Data Mining system with a Data Warehouse System
f. Major issues in Data Mining
g. Data Mining statics: Guidelines for successful Data Mining
h. Applications and Trends in Data Mining

3. Mining Frequent Patterns (08Hrs, 16 Marks)

a. Mining frequent pattern
b. Associations: Basic concepts
c. Market basket analysis
d. Apriori Algorithm
e. Association rules from frequent item sets
f. Mining multilevel association rules
g. Constraint based association mining
h. Association mining to correlation analysis

4. Classification and Prediction (08Hrs, 16 Marks)

a. Introduction to Classification and Prediction
b. Classification by Decision tree Induction
c. Bayesian classification
d. Rule based classification
e. Classification by Back propagation
f. Other classification methods
g. Prediction: Linear Regression
h. Non-linear regression

5. Cluster Analysis (08Hrs, 16 Marks)

a. What is Cluster Analysis and Outliers
b. Types of data in cluster analysis
c. Categorization of clustering methods
d. Classical Partitioning methods: k-Means and k-Medoids
e. Hierarchical Methods: Agglomerative and divisive
f. Density Based Methods: DBSCAN
g. Grid Based Methods: STING
h. Outlier analysis

Text Books -

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Morgan Kaufmann.

Reference Books -

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining",Person Education, 2007.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

Software Metrics and Quality Assurance (Elective II)

COURSE OUTLINE

Course Title	Short Title	Course Code
Software Metrics and Quality Assurance	**SMQA**	

Course Description:

This course introduces the students about the concepts software measurement and metrics. It includes scope of software metrics, internal product attributes, and external product attributes Software quality and quality assurance techniques. This course also describes about cost estimation, documentation and testing tools, etc.

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

Prerequisite Course(s): Software Engineering.

COURSE CONTENT

Software Metrics and Quality Assurance **Semester-VIII**

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 Software Measurement: (08Hrs, 16 Marks)

a. Measurement in everyday life
b. Measurement in Software Engineering
c. The scope of software metrics
d. The representational theory of measurement
e. Measurement and Models
f. Measurement scales and scales types
g. Meaningfulness in measurement
h. Classifying software measures & Determining what to measure

2. Measuring internal product attributes: (08Hrs, 16 Marks)

a. Measuring internal product attributes: Size
b. Aspects of software size, Length & Reuse
c. Functionality & Complexity
d. Measuring internal product attributes: Structure
e. Types of Structural measures - Control Flow Structures
f. Modularity and Information Flow attributes & Data structures

g. Difficulties with general "complexity" measures

3. Measuring external product attributes: (08Hrs, 16 Marks)

a. Software Quality - Modelling Software Quality & Measuring aspects of Quality
b. Software Reliability:
c. Basics of Reliability Theory
d. The Software Reliability Problem
e. Parametric Reliability Growth Models
f. Predictive Accuracy
g. The importance of the operational environment

4. Cost estimation & Documentation: (08Hrs, 16 Marks)

a. Making Process Predictions - Good Estimates
b. Cost estimation-Problems and approaches
c. Models of Effort and cost
d. Software Documentation

5. Quality Assurance Techniques: (08Hrs, 16 Marks)

a. Quality Assurance Techniques- Testing Principles, Goals, Testing Life Cycle, Phases of Testing Manual Testing- Test case design criteria.
b. Automated Testing Introduction of Testing Tools- J-Meter, Win Runner, QTP, Selenium etc.
c. ISO-9000 Model
d. SEI's CMM Model
e. Comparison of the ISO-9000 model with SEI's CMM model

Text Books:

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

Reference Books:

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

Distributed System (Elective II)

COURSE OUTLINE

Course Title	Short Title	Course Code
Distributed Systems	**DS**	

Course Description:

This course introduces students to the principles, design and implementation of distributed systems. The lectures focus primarily on the principles and design of distributed systems and cover processes, communication, naming, synchronization, security, access control and security management.

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

Prerequisite Course(s): Operating Systems, Computer Networks.

COURSE CONTENT

Distributed System **Semester-VIII**

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 Distributed Systems and Architectures

(08Hrs, 16 Marks)

a. Introduction: Definition of a Distributed system.
b. Goals: Making Resources Accessible, Distribution Transparency, Openness, Scalability, Pitfalls.
c. Types of Distributed System: Distributed Computing Systems, Distributed Information Systems, Distributed Pervasive Systems.
d. Architectural Styles: Layered architectures, Object-based architectures, Data-centered architectures, Event-based architectures.
e. System Architectures: Centralized Architectures, Decentralized Architectures, Hybrid Architectures.

2 Processes

(08Hrs, 16 Marks)

a. Threads: Introduction to Threads, Threads in Distributed Systems.
b. Virtualization: The Role of Virtualization in Distributed Systems, Architectures of Virtual Machines.
c. Clients: Networked User Interfaces, Client-Side Software for Distribution Transparency.
d. Servers: General Design Issues, Server Clusters, Managing Server Clusters.
e. Code Migration: Approaches to Code Migration , Migration and Local Resources , Migration in Heterogeneous Systems.

3 Communication

(08Hrs, 16 Marks)

a. Fundamentals: Layered Protocols , Types of Communication.
b. Remote Procedure Call: Basic RPC Operation, Parameter Passing , Asynchronous RPC.
c. Message-Oriented Communication: Message-Oriented Transient Communication, Message-Oriented Persistent Communication.
d. Stream-Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.

4 Synchronization and Election

(08Hrs, 16 Marks)

a. Clock Synchronization: Physical Clocks, Global Positioning System, Clock Synchronization Algorithms.
b. Logical Clocks: Lamport's Logical Clocks, Vector Clocks.
c. Mutual Exclusion: A Centralized Algorithm, A Decentralized Algorithm, A Distributed Algorithm, A Token Ring Algorithm.
d. Global State: Needs, Properties and Various Global States
e. Election Algorithm: Bully and Ring Algorithm.

5 Security, Access Control and Security Management

(08Hrs, 16 Marks)

a. Introduction to Security: Security Threats, Policies and Mechanisms, Design Issues, Cryptography.
b. Secure Channels: Authentication, message integrity and confidentiality.
c. Access Control: General Issues in Access Control, Firewalls, Denial of Service.
d. Security Management: Key Management, Authorization Management.

Text Books:

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

Reference Books:

1. Pradeep K. Sinha, "Distributed Operating Systems", Prentice Hall of India Private Limited.

2. Sunita Mahajan, Seema Shah, " Distributed Computing", Oxford, Second Edition.
3. Randay Chow, Theodore Johnson, "Distributed Operating System and Algorithm Analysis", Publisher: Pearson (LPE). ISBN – 978-81-317-2859-8.
4. G. SudhaSadasivam, Radha Shankarmani, "Middleware and Enterprise Integration Technologies " , Wiley Precise Textbook.
5. Tom white, "Hadoop: The Definitive Guide" , 2nd E, O'Reilly Media, 2011.

Cryptography & Network Security (Elective II)

COURSE OUTLINE

Course Title	Short Title	Course Code
Cryptography & Network Security	**CNS**	

Course Description:

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

Prerequisite Course(s): Basics of computer networks and security

COURSE CONTENT

Cryptography & Network Security **Semester-VIII**

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 (08 Hrs. 16 Marks)

a. The Need for Security, Security Approaches
b. Security Attacks
c. Security Services
d. Security Mechanisms
e. Network Security Model
f. Basics of Cryptography: Symmetric Cipher Model
g. Substitution Techniques
h. Transposition Techniques

2. Cipher Properties & Secret Key Cryptography (08 Hrs. 16 Marks)

a. Other Cipher Properties- Confusion, Diffusion
b. Block and Stream Ciphers
c. Data Encryption Standard(DES)
d. Strength of DES
e. Block Cipher Design Principles
f. Modes of Operations
g. Triple DES
h. International Data Encryption algorithm(IDEA)

3. Public Key Cryptography & IP Security (08 Hrs. 16 Marks)

a. Principles of Public Key Cryptosystems
b. RSA Algorithm

c. Diffie-Hellman Key Exchange
d. IP Security Overview
e. Architecture
f. Authentication Header
g. Encapsulating Security Payloads
h. Service provided by IP Security

4. Cryptographic Hash Functions (08 Hrs. 16 Marks)

a. Applications of Cryptographic Hash Functions
b. Secure Hash Algorithm
c. Message Authentication Codes – Message Authentication Requirements and Functions
d. HMAC
e. Digital signatures
f. Digital Signature Schemes
g. Authentication Protocols
h. Digital Signature Standards

5. Authentication Applications (08 Hrs. 16 Marks)

a. Kerberos
b. Key Management and Distribution
c. X.509 Directory
d. Authentication service
e. Public Key Infrastructure
f. Electronic Mail Security
g. Pretty Good Privacy
h. S/MIME

Text Books:

1. William Stalling, "Cryptography and Network and Network security-Principals and practices", Pearson Education
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill

Reference Books:

1. Bernard Menezes, "Network Security and Cryptography", Cengage Learning,
2. King, Dalton, and Osmanoglu, "Security Architecture", TMH edition
3. Kaufman, Perlman, and Spenciner, "Network Security", PHI

Neural Networks and Fuzzy Logic (Elective II)

COURSE OUTLINE

Course Title	Short Title	Course Code
Neural Networks and Fuzzy Logic	**NNFL**	

Course Description:

i. To expose the students to the concepts of artificial neural networks.

ii. To provide comprehensive knowledge of fuzzy logic control.

iii. Provide adequate knowledge of application of ANN and fuzzy logic control to real time systems.

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

Prerequisite Course(s): Linear Algebra, DSGT, Artificial Intelligence.

COURSE CONTENT

Neural Networks and Fuzzy Logic **Semester-VIII**

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 Neural Network (08Hrs, 16 Marks)

a. Human Brain, Biological Neural Networks
b. Model of Artificial Neuron, McCulloch and pitts models of neuron, Perceptron model, Adaline model
c. Neural Network Architectures
d. Neural Learning Laws, Hebb's Law, Perceptron learning Law, Widrow and Hoff Learning, Corelation learning, InStar and out Star learning.
e. Neural Network Learning Methods, Hebbian learning, Competitive Learning Error Correction Learning, Reinforcement Learning, Stochastic Learning

2. Multilayer Perceptron Model (08Hrs, 16 Marks)

a. Multilayer Perceptron
b. Non-Linear Activation function
c. Architecture of Backpropagation Network
d. Backpropagation Learning
e. Illustration of Backpropagation Learning
f. Applications of Backpropagation

3. Associative Memory and Adaptive Resonance Theory (08Hrs, 16 Marks)

a. Autocorrelators
b. Hetrocorrelators
c. Exponential BAM

d. ART1
e. ART2
f. Applications of Associative Memory
g. Applications of Adaptive Resonance Theory

4. Unsupervised Learning (08Hrs, 16 Marks)

a. Hamming Net and Maxnet
b. Unsupervised Learning of clusters- clustering and similarity measures, Winner take all Learning
c. Counter Propogation network
d. Feature Mapping
e. Self-Organizing Features Map

5. Fuzzy Logic (08Hrs, 16 Marks)

a. Fuzzy Versus Crisp
b. Crisp Relations and Fuzzy Relations
c. Crisp Logic
d. Fuzzy Logic
e. Fuzzy Rule Based System
f. Defuzzification
g. Applications of Fuzzy Logic

Text Books:

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

Reference Books:

1. S. Haykin, "Neural Networks", Pearson Education, 2nd Ed., 2001.
2. Klir& Yuan, "Fuzzy Sets and Fuzzy Logic", PHI, 1997.
3. Chin-Teng Lin & C. S. George Lee, "Neural Fuzzy Systems", Prentice Hall PTR.
4. V. Kecman, "Learning and Soft Computing", MIT Press, 2001.
5. S. N. Sivanandam& S. N. Deepa, "Principles of Soft Computing", Wiley - India, 2007
6. B.Yegnanarayana, "Artificial Neural Networks ",Prentice Hall of India, 1999.

Mobile Computing (Elective III)

COURSE OUTLINE

Course Title	Short Title Course Code
Mobile Computing	**MC**

Course Description:
The objective of this course is to introduce students the knowledge about Mobile Computing Architecture, Mobile Technologies: GSM, Bluetooth, GPRS, CDMA and security issues in Mobile Computing.

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

Prerequisite Course(s): Knowledge of Computer Networks.

COURSE CONTENT

Mobile Computing **Semester-VIII**

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 **(08 Hrs, 16 Marks)**

a. Mobility of Bits and Bytes,
b. Wireless -The Beginning,
c. Mobile Computing,
d. Dialogue Control,
e. Networks,
f. Middleware and Gateways,
g. Application and Services (Contents),
h. Developing Mobile Computing Applications,
i. Security in Mobile Computing,
j. Standards - Why is it Necessary? , Standard Bodies

Mobile Computing Architecture

k. Internet – The Ubiquitous Network,
l. Architecture for Mobile Computing,
m. Three-Tier Architecture.

2) Emerging Technologies **(08 Hrs, 16 Marks)**

a. Design considerations for Mobile Computing,
b. Mobile Computing through Internet,

c. Making Existing Applications Mobile -Enabled,
d. Bluetooth,
e. Radio Frequency Identification,
f. Wireless Broadband (WiMAX),
g. Mobile IP,
h. Internet Protocol Version 6 (IPv6),
i. Java Card.

3) GSM and GPRS (08 Hrs, 16 Marks)

Global System for Mobile Communications (GSM):

a. Global System for Mobile Communications,
b. GSM Architecture,
c. GSM Entities,
d. Call Routing in GSM,
e. PLMN Interfaces,
f. GSM Addresses and Identifiers,
g. Network Aspects in GSM,
h. GSM Frequency Allocation,
i. Authentication and Security.

General Packet Radio Service (GPRS):

j. Introduction,
k. GPRS and Packet Data Network,
l. GPRS Network Architecture,
m. GPRS Network Operations,
n. Data Services in GPRS,
o. Applications for GPRS,
p. Limitations of GPRS,
q. Billing and Charging in GPRS.

4) WAP, CDMA and 3G (08 Hrs, 16 Marks)

WAP:

a. Introduction,
b. WAP,
c. MMS,
d. GPRS Application,

CDMA and 3G

e. Introduction,
f. Spread-Spectrum Technology,
g. Is-95,
h. CDMA versus GSM,
i. Wireless Data,
j. Third Generation Networks,
k. Applications on 3G.

5) Security Issues in Mobile Computing (08 Hrs, 16 Marks)

a. Introduction,
b. Information Security,
c. Security Techniques and Algorithms,
d. Security Protocols,
e. Public Key Infrastructure,
f. Trust,
g. Security Models,

h. Security Frameworks for Mobile Environment.

Text Book:

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

Reference Books:

1. Raj Kamal, “Mobile Computing”, Oxford University Press-New Delhi
2. Yi-Bang Lin, ImrichChlamtac, “Wireless and Mobile Network Architectures”, Wiley Publication.
3. Charles Perkins, “Mobile IP”, Addison Wesley.

Bio-Informatics (Elective III)

COURSE OUTLINE

Course Title	Short Title Course Code
Bio Informatics	**BI**

Course Description:
This course provides a comprehensive view of the Bio Informatics principles and its applications in engineering.

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

Prerequisite Course(s): Basic knowledge of Biological terms and concepts of database management system.

COURSE CONTENT

Bio Informatics **Semester-VIII**

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 Bioinformatics (08 Hrs. 16 Marks)**
   a. Introduction and Historical overview of Bioinformatics,
   b. Bioinformatics Applications,
   c. Molecular biology Basic concepts-Protein and amino acid, DNA and RNA
   d. Tools for web search,
   e. Bioinformatics Major databases,
   f. Data mining of biological databases.

2. **Data Structure & Data Analysis (08 Hrs. 16 Marks)**
   a. Sequence Visualization, Structure visualization,
   b. statistical concepts, micro arrays,
   c. Imperfects data, quantitative randomness, data analysis,
   d. Tool selective, Statistics of alignment,
   e. Clustering and classification.

3. **Bioinformatics Databases and Data mining (08 Hrs. 16 Marks)**
   a. Introduction, Primary & Secondary database,

b. Biological databases, Protein pattern databases and structure classification databases
c. Methods & Technology overview, infrastructure,
d. Pattern recognition &discovery, machine learning, text mining & tools,
e. Dot matrix analysis,substitution matrices, dynamic programming, word methods,
f. Multiple sequence, alignment, tools for pattern matching.

4. Data Representation, Simulation & Collaboration (08 Hrs. 16 Marks)

a. Drug discovery, fundamentals
b. Protein structure
c. System biology
d. Collaboration & communications, standards
e. Bioinformatics Issues.

5. Human Genome Project and Bioinformatics Tools (08 Hrs. 16 Marks)

a. History, Nucleic Acids, Genes, Genomes
b. Introduction of National Institutes of Health (NIH),
c. Introduction of National Library of Medicine (NLM)
d. Introduction of National center for Biotechnology Information(NCBI)
e. Human Genome Project, it's need, goal, uses and applications
f. Introduction, working with FASTS, working with BLAST,
g. FASTA & BLAST algorithms & comparison

Text Books:

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

Reference Books:

1. A.D. Baxevanis and B.F.F. Ouellette, "Bioinformatics: A practical guide to the analysis of genes and proteins" (Eds). 2002 John Wiley and Sons.
2. D.W. Mount, "Bioinformatics: Sequence and Genome Analysis", 2001, Cold Spring Harbor Laboratory Press.
3. S.C. Rastogi, Namita Mendirata, Parag Rastogi ''Bioinformatics concepts Skills and application, CBS publisher.
4. Imtiyaz Alam Khan (IAK) "Elementary Bioinformatics", Pharma Book Syndicate.
5. InduShekhar Thakur (IST) "Environmental Biotechnology", IK International Publication.
6. A.D. Baxevanis and B.F. Ouellettee ,"Bioinformatics, A Practical Guide to the Analysis of Genes and Proteins"
7. David W. Mount,"Bioinformatics: Sequence and Genome Analysis".
8. Stuart M. Brown,"Essentials of Medical Genomics".
9. Jean-Michel Claverie& Cedric Notredame ,'Bioinformatics for Dummies".

Real Time Systems (Elective III)

COURSE OUTLINE

Course Title	Short Title	Course Code
Real Time Systems	**RTS**	

Course Description: The objective of this course is to introduce students the knowledge of Real Time Systems, Task Assignments and Scheduling, Real Time Programming Languages & Tools, Real Time Databases, Communications and Fault Tolerance Techniques.

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

Prerequisite Course(s): Knowledge of Microprocessor/Microcontroller and Operating System

COURSE CONTENT

Real Time System **Semester-VIII**

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 Real Time Systems (08Hrs, 16 Marks)

a. Issues in Real Time Computing
b. Structure of Real Time System
c. Performance Measures for Real Time Systems
d. Estimating Program Run Times

2. Task Assignments and Scheduling (08Hrs, 16 Marks)

a. Classical Uniprocessor Scheduling
b. Task Assignment-Utilization balancing algorithm
c. Next Fit and Bin Packing Assignment Algorithms
d. Myopic offline Scheduling
e. Focused addressing and bidding(FAB) Algorithm
f. Buddy Strategy
g. Assignments with Precedence Conditions

3. Real Time Programming Languages & Tools (08Hrs, 16 Marks)

a. Desired language characteristics
b. data typing, control structures
c. hierarchical decomposition
d. Packages

e. Run Time Error Handling
f. Multitasking
g. Task Scheduling
h. Timing Specification
i. Programming Environment and Run Time Support

4. Real Time Databases and Communications (08Hrs, 16 Marks)

a. Real Time Vs. Generic Purpose Databases
b. Main Memory Databases
c. Concurrency Control Issues
d. Communication Media
e. Real Time Communication Protocols

5. Fault Tolerance Techniques (08Hrs, 16 Marks)

a. Fault Types
b. Fault Detection
c. Fault and Error Containment
d. Redundancy
e. Data Diversity
f. Integrated Failure Handling

Text Books:

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

Reference Books:

1. Jane W.S Liu, Real time systems, Pearson education, 2003
2. Jane W.S Liu, Real time systems, Prentice Hall, 2000
3. Phillip A. Laplante , Real Time Systems Design and Analysis 3rd Edition Wiley India Edition
4. Stuart Bennelt, Real time computer control and introduction, Pearson education, 2003

iPhone Programming (Elective III)

COURSE OUTLINE

Course Title	Short Title	Course Code
iPhone Programming	**IPP**	

Course Description:

This course provides the students the platform to learn and understand the iPhone technology and encourage them to design, develop and deploy Android applications.

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

Prerequisite Course(s): Basic knowledge of C, C++, JAVA.

COURSE CONTENT

iPhone Programming **Semester-VIII**

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: Basic concepts of Objective C (08 Hrs. 16 Marks)**
   a. What is objective C and Xcode , Installing Xcode and compiling objective C
   b. Object oriented programming in objective –C, similarities and differences from C and C++
   c. Objective**-C:** Classes, Objects, Methods, Data Types & Expressions, Program Looping, Decision Making.

2. **The Foundation Framework of Objective-C (08 Hrs. 16 Marks)**
   a. Introduction to the Foundation Framework, inheritance, Polymorphism
   b. Dynamic Typing & Binding, Categories and Protocols
   d. The Preprocessor, Numbers, Strings and Collections
   e. Working with Files, Memory Management, Copying Objects

3. **Cocoa, Cocoa Touch and the iOSSDK (08 Hrs. 16 Marks)**
   a. **Introduction to Cocoa and Cocoa Touch:** Framework Layers of Cocoa and Cocoa Touch
   b. **Introduction to iOS:** overview of the iOS 5 Architecture, Features of iOS, Registering as a Apple Developer

c. **iOS -Environment Setup:**XCode Installation, Interface Builder, iOS simulator
d. **Writing iOS Applications:** Creating first iOS application, Outlets, Actions and View Controllers

4. Introduction to iPhone application programming (08 Hrs. 16 Marks)

a. A simple iPhone Application
b. Basic UI Elements: UITextField, UIButton, Labels, UIToolbar, UIStatusBar, UITabBar, UIAlert, UISwitch, UISlider, Action Sheet, Accelerometer, Image View, Web View, KeyBoard Inputs

5. iPhone Multimedia and Webservices (08 Hrs. 16 Marks)

a. Accessing Built-in Application, Multimedia (audio and video),
b. Animation with views
c. Webservices, SQLite

Text Books:

1. Stephen G.Kochan ,"Programming in Objective-C" Sixth Edition, ,Addison-Wesley Publications.
2. Wei-Meng Lee ,“Beginning iPhone SDK Programming with Objective-C”, Wiley Publication.

Reference Books:

1. Joe Conway ,"iPhone Programming THE BIG NERD RANCH GUIDE ", Aaron Hillegass. The Big Nerd Ranch Inc.
2. Gary Bennett, Mitch Fisher, Brad Less, "Objective-C for Absolute Beginners", Apress Publication.
3. Neil Smyth,"iPhone iOS 5 Development Essentials".

Compiler Design Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Compiler Design	**CD Lab**	

Course Description:
This laboratory provides students practical approach for the Compiler process. Lab assignments cover the various phases of compiler.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**1**

Prerequisite Course(s): Fundamental knowledge of Compilation Process in each phase, C, C++.

LAB COURSE CONTENT

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

Group A

1. Implement a lexical analyzer for a subset of C using LEX Implementation should support Error handling
2. Implement a lexical analyzer of identification of numbers (Numbers can be binary, octal, decimal, hexadecimal, float or exponential)
3. Write an ambiguous CFG to recognize an infix expression and implement a parser that recognizes the infix expression using YACC. Provide the details of all conflicting entries in the parser table generated by LEX and YACC and how they have been resolved
4. Implement a Calculator using LEX and YACC.
5. Implementation of Syntax Tree

Group B

1. Implementation of Context Free Grammar
2. Design of a Predictive parser
3. Implementation of code generator
4. Implementation of code optimization for Common sub-expression elimination, Loop invariant code movement.
5. Implement Deterministic Finite Automata

Guide lines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Text Books:

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

References Books:

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

Note:-

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

Data Warehousing and Mining Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Data Warehousing and Mining Lab	**DWM Lab**	

Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	**14**	**28**	**1**

LAB COURSE CONTENT

Group A

1. Develop a program to construct a multidimensional data model (Star, Snowflake or Fact constellations)
2. Develop a program to implement data pre-processing techniques.
3. Develop a program to implement data integration techniques.
4. Implement Apriori algorithm for frequent item set.

Group B

1. Develop a program to implement data generalization and summarization techniques.
2. Develop a program to extract association mining rules.
3. Develop a program for classification of data.
4. Develop a program for implementing one of the clustering techniques.

Note: Concerned Faculty should suitably frame at least **6** practical assignments (**Three** from Group A and **Three** from Group B) out of the above list.
Use of open source Tool/ Technology (like Weka) for Laboratory Assignments is recommended.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Text Books -

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Second Edition, Morgan Kaufmann.

Reference Books -

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining",Person Education, 2007.
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

Note:-

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

Software Metrics and Quality Assurance Lab (Elective II Lab)

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Software Metrics and Quality Assurance	**SMQA Lab**	

Course Description:
This laboratory provides students with a comprehensive study of software engineering. The practical's make students able to calculate length, cost, effort size etc. of program.

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

Prerequisite Course(s): Fundamental knowledge of software engineering and testing.

Any **FIVE** appropriate assignments from following list:

1. To perform the effort estimation based on project specification.
2. Program for finding Length of program.
3. Implementation of program for finding Length of program using Lines of Code.
4. Program for measuring Size of program using Albrecht's Method.
5. Implementation of program for measuring size of program using Function Point Calculation Albrecht's method.
6. Software testing using J-Meter testing tool.
7. Software testing using Selenium testing tool.
8. Schedule estimation using Gantt chart.

Guidelines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Note:-

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

Distributed System Lab (Elective II Lab)

LAB COURSE OUTLINE

Course Title	Short Title Course Code
Distributed Systems	**DS Lab**

Course Description:

This laboratory provides students with a comprehensive study of the Distributed Systems. Classroom lectures stress the strengths of Distributed Systems, which provide students with the means of writing efficient, maintainable and portable code and simulating Distributed Systems concepts like Remote Procedure Call (RPC), Client-Server application, Distributed Mutual Exclusion, Distributed Chat Server, Lamport's Logical Clock, Bully and Ring election algorithms and Hadoop.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**1**

Prerequisite Course(s): C/C++/Java,Operating Systems and Computer Networks.

(Note: Minimum SIX Experiments from the given list)

1. **Write a Program for Remote Procedure Call (RPC).**
   Implementation of Remote Procedure Call (RPC) concept in C/C++/Java.
2. **Write a Program to implement Echo Client-Server application.**
   Implementation of Echo Client-Server application in C/C++/Java.
3. **Write a Program to find length of given string using thread.**
   Implementation of to find length of given string using thread in C/C++/Java.
4. **Simulate the Distributed Mutual Exclusion.**
   Simulation of the Distributed Mutual Exclusion concept in C/C++/Java.
5. **Implementation of Distributed Chat Server.**
   Implementation of the Distributed Chat Server in C/C++/Java.
6. **Simulate the function of Lamport's Logical Clock.**
   Simulation of the function of Lamport's Logical Clock in C/C++/Java.
7. **Implementation of Date and Time server using Java RMI.**
   Implementation of the Date and Time server using Java RMI.
8. **Implementation of server that adds given two values by the clients using Java RMI.**
   Implementation of the server that adds given two values by the clients using Java RMI.
9. **Write a program for word count using Hadoop.**
   Implementation of the program for word count using Hadoop.
10. **Implement merge sort algorithm and run it using Hadoop for large data set.**
    Implementation of the merge sort algorithm and run it using Hadoop for large

data set.

11. **Write simulation program for synchronization using Bully and Ring election algorithm.**

    Simulation for synchronization concept using Bully and Ring election algorithm.

Guidelines for ICA:

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

Guidelines for ESE:

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Note:-

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

Cryptography & Network Security Lab (Elective II Lab)

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Cryptography & Network Security	**CNS Lab**	

Course Description:

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**14**	**28**	**1**

Prerequisite Course(s): Basic knowledge of computer networks and security.

(Note: Minimum FIVE Experiments from the given list)

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

Guidelines for ICA:
Students must submit ICA in the form of journal. Each experiment should be well documented. Faculty in charge will assess the experiments continuously and will assign grade or mark for each experiment on date of completion, declared for each experiments.

Guidelines for ESE:
In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Note:-

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

Neural Networks and Fuzzy Logic Lab (Elective II Lab)

LAB COURSE OUTLINE

Course Title — Short Title Course Code

Neural Networks and Fuzzy LogicLab — **NNFL Lab**

Course Description:

Laboratory	Hours/Week	No. of Weeks	Total Hours	Semester Credits
	2	**14**	**28**	**1**

LAB COURSE CONTENT

Group A

1. Implementation of Perceptron Learning
2. Implementation of McCulloh-Pitts model.
3. Implementation of Hopfield model.
4. Implement Delta rule.
5. Implement model for multilayer perceptron.

Group B

1. To implement crisp set
2. To implement Fuzzy Sets.
3. To implement Fuzzy Relations
4. Simulation of Neural supervised Learning in any soft Computing tool.
5. Simulation of Neural unsupervised Learning in any soft Computing tool.

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

Text Books:

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

Reference Books:

1. S. Haykin, "Neural Networks", Pearson Education, 2nd Ed., 2001.
2. Klir& Yuan, "Fuzzy Sets and Fuzzy Logic", PHI, 1997.
3. Chin-Teng Lin & C. S. George Lee, "Neural Fuzzy Systems", Prentice Hall PTR.
4. V. Kecman, "Learning and Soft Computing", MIT Press, 2001.
5. S. N. Sivanandam& S. N. Deepa, "Principles of Soft Computing", Wiley - India, 2007.
6. B. Yegnanarayana, "Artificial Neural Networks ",Prentice Hall of India, 1999.

Guidelines for ICA:

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

Guidelines for ESE:

In the ESE, the students may be asked to perform the practical assignment with minor modification. Questions will be asked during the practical examination to judge the understanding of the student. It is expected that student knows theoretical aspect of the problem.

Note:-

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

Industrial Lecture
COURSE CONTENT

Industrial Lecture **IL**
Course Title Short Title Course Code

Course Description:
The gap between industry's needs and the academic community's aspirations appears to be considerably large. There exists a strong feeling, at least in the academic circles, that unless technology driven initiatives find a surer place in the industrial sector in this country, the academia-industry interaction is likely to remain confined to developmental activities with limited exploratory or research-based content As institutes committed primarily to creation and growth of technological knowledge, technical institutes have an important role to play in the industrial sector of the country's economy. This fact by way of encouraging mechanisms to foster interaction between the academia and industry. Typically, academic interest in the multidimensionality of a problem leads to a tendency to explore a variety of options to arrive at a solution. This industrial lecture develops ability of student for expectations of the industrialists from the fresh engineers.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**1**	**14**	**14**	**2**

COURSE CONTENT

Semester-VIII **Examination Scheme**
Total Semester Credits: 02
Internal Continuous Assessment (ICA): 50 Marks

1. There is a need to create avenues for a close academia and industry interaction through all the phases of technology development, starting from conceptualization down to commercialization.
2. List of renowned persons from industry shall be prepared by the committee appointed by Head of the department. After approval from the Principal, Minimum five Industrial lectures in alternate week shall be arranged, which shall be delivered by the experts/Officials from Industries/Govt. organizations/ Private Sectors/Public Sectors / R&D Labs covering the various aspects.
3. Topics of Industrial Lectures shall be Technical in nature and should not be the specific contents from the curriculum.
4. Students shall submit the report based on minimum five lectures giving summary of the lecture delivered.
5. The summary should contain brief resume of the expert, brief information of his organization and brief summary of the lecture in bullet point form.

Guide lines for ICA: Assessment of the Industrial Lecture for award of ICA marks shall be done jointly by departmental committee as per attendance in industrial lecture, report submitted by student and overall performance in semester as per the guidelines given in **Table- D**

Table-D

SN	Name of Student	Attendance (05 Marks per Lecture)	Dept of Understanding (03 Marks per Lecture)	Report Writing	Total
		25	**15**	**10**	**50**

Project-II

Course Title	Short Title Course Code
Project-II	**Project-II**

Course Description:
The course explores the knowledge of design, experiment and analysis of data. The course develops ability to work on multidisciplinary teams, Identify, formulate, and solve engineering problems in view of economic, environmental and societal context.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**4**	**14**	**56**	**6**

COURSE CONTENT

Semester-VIII **Examination Scheme**

Total Semester Credits: 06
Internal Continuous Assessment (ICA): 75 Marks
End Semester Examination (ISE):75 Marks
Total: 150Marks

1. Project-I work decided in VII semester shall be continued as Project-II
2. Students should complete implementation of ideas given in synopsis/Abstract, so that project work should be completed before end of semester.
3. Project-II may involve fabrication, design, experimentation, data analysis within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability, and sustainability. The stage also includes testing , possible results and report writing
4. Each students project group is required to maintain log book for documenting various activities of Project-II and submit group project report at the end of Semester-VIII in the form of Hard bound.
    1. *Title*
    2. *Abstract*
    3. *Introduction*
    4. *Problem identification and project objectives*
    5. *Literature survey*
    6. *Analysis*
    7. *Design*
    8. *Coding*
    9. *Testing*
    10. *Results & conclusions*
    11. *Future Scope*
    12. *References*

Guide lines for ICA : ICA shall be based on continuous evaluation of students performance throughout semester in project-II and report submitted by the students project group in the form Hard bound. Assessment of the project-II for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-D.**

Guide lines for ESE:-
In ESE the student may be asked for demonstration and questions on Project. Evaluation will be based on answers given by students in oral examination.

Assessment of Project-II

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

Table-D

		Assessment by Guide (50 Marks)				Assessment by Committee (25 Marks)		
SN	**Name of Student**	**Attendance , Participa-tion and team work**	**Material procurement / assembling/ Designing/Programming**	**Case study/ Execution**	**Project Report**	**Dept of Understan-ding**	**Presentation**	**Total**
Marks		**10**	**15**	**15**	**10**	**10**	**15**	**75**