PAAVAI ENGINEERING COLLEGE, NAMAKKAL –637 018

(AUTONOMOUS)

B.E. COMPUTER SCIENCE AND ENGINEERING

CURRICULUM

REGULATIONS 2015

SEMESTER – III

Course Code	Course Title	L	T	P	C
MA15301	Transforms and Boundary Value Problems	3	2	0	4
CS15301	Computer Architecture	3	0	0	3
EC15307	Digital Principles and Systems Design	3	0	0	3
CS15302	Object Oriented Programming with C++	3	0	0	3
CS15303	Operating Systems	3	0	0	3
CH15301	Environmental Science and Engineering	3	0	0	3
EC15309	Digital Laboratory	0	0	4	2
CS15304	Operating Systems and Object Oriented Programming Laboratory	0	0	4	2
EN15301	Business English Course Laboratory	0	0	2	1

SEMESTER – IV

Course Code	Course Title	L	T	P	C
MA15401	Probability and Queuing Theory	3	1	0	4
EC15408	Microprocessor and Microcontroller	3	0	0	3
CS15401	Software Engineering	3	0	0	3
CS15402	System Software	3	0	0	3
CS15403	Database Management Systems	3	0	0	3
CS15404	Computer Networks	3	0	0	3
CS15405	Data Base Management Systems Lab	0	0	4	2
EC15409	Microprocessor and Microcontroller Laboratory	0	0	4	2
CS15406	Networks Laboratory	0	0	4	2

SEMESTER III

MA15301 TRANSFORMS AND BOUNDARY VALUE PROBLEMS 3 2 0 4

COURSE OBJECTIVES

- To introduce Fourier series analysis which are common for many engineering applications apart from solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes
- To be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- To develop Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES 15

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.

UNIT II FOURIER TRANSFORMS 15

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 15

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 15

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded).

UNIT V Z TRANSFORMS AND DIFFERENCE EQUATIONS 15

Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem –Formation of difference equations – Solution of difference equations using Z-transform.

TOTAL PERIODS 75

COURSE OUTCOMES

At the end of the course, the students would

- have gained a well-founded knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
- have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair and specialization on Fourier transform pair, their properties.

- have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results.
- be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- have learnt the basics of Z – transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z – transform technique bringing out the elegance of the procedure involved.

TEXT BOOKS

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Grewal B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.

REFERENCES

1. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematic", 7th Edition, Laxmi Publications(P) Ltd. (2009).
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, Wiley India (2007).
5. Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
6. Datta K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd, Delhi, 2013.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	2	3	-	-	-	-	-	-	-	2	3	3
CO2	3	2	3	2	-	-	-	-	-	-	-	3	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	2	3	3
CO4	3	2	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	2	3	-	-	-	-	-	-	-	3	3	3

CS15301 COMPUTER ARCHITECTURE 3 0 0 3

COURSE OBJECTIVES

- To understand the basic structure and operation of digital computer.
- To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- To expose the students with the concept of pipelining.
- To provide the knowledge of memory system.
- To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface –Instruction set architecture – Addressing modes – RISC – CISC.

UNIT II BASIC PROCESSING UNIT & ALU OPERATIONS 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization– Hardwired control – Micro programmed control – ALU-Addition and subtraction–Multiplication–Division.

UNIT III PIPELINING & PARALLELISM 9

Basic concepts – Data hazards – Instruction hazards – Structural Hazards-Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling- Instruction- level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading - Hardware support for exposing parallelism

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache performance – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Programmed Input/ Output -Interrupts – Direct Memory Access– Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to

- design arithmetic and logic unit.
- design and analyse pipelined control units.
- evaluate performance of memory systems.
- understand parallel processing architectures.
- understand Memory access Mode.

TEXT BOOKS

1. David A. Patterson and John L. Hennessey, "Computer organization and design', MorganKauffman / Elsevier, Fifth edition, 2014.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", VITH Edition, Tata McGraw Hill, 2012.

REFERENCES

1. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
4. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
5. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	1	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	1	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	1	-	-	2	-	-	-	-	-	3	3	2

EC15307 DIGITAL PRINCIPLES AND SYSTEM DESIGN 3 0 0 3

COURSE OBJECTIVES

- To learn the basic concepts of Boolean algebra and logic gates
- To know about the analysis and design procedure for combinational circuits
- To familiarize the students with MSI devices and memory devices
- To know about the analysis and design procedure for Asynchronous and synchronous sequential circuits
- To familiarize the students with hazards and ASM Chart.

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Implementation of Boolean functions using logic gates.

UNIT II COMBINATIONAL LOGIC 9

Combinational circuits - Analysis and design procedures - Circuits for arithmetic operations and Code conversion - Introduction to Hardware Description Language (HDL).

UNIT III DESIGN WITH MSI DEVICES 9

Encoder - decoder - Multiplexer - demultiplexer - HDL for combinational circuits - Memory and programmable logic.

UNIT IV SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters – HDL for Sequential Circuits.

UNIT V ASYNCHRONOUS SEQUENTIAL LOGIC 9

Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables - Race-free state assignment – Hazards - ASM Chart.

TOTAL PERIODS 45

COURSE OUTCOMES

After the completion of the course, the students will be able to

- understand the basic concept of Boolean algebra and logic gates
- design the Combinational Logic circuits
- design MSI Devices
- know about memory and programmable logic
- design the synchronous and asynchronous sequential logic circuits

TEXT BOOK

1. M.Morris Mano, “Digital Design”, 3rd edition, Pearson Education, 2007.

2. Donald D.Givone, “Digital Principles and Design”, Tata McGraw-Hill, 2007.

REFERENCES

1. Charles H.Roth, Jr. “Fundamentals of Logic Design”, 4th Edition, Jaico Publishing House, Cengage Earning, 5th ed, 2005.
2. William H.Gothmann, “Digital Electronics: An Introduction to Theory and Practices”.
3. Roger L.Tokheim, “Digital Electronics: Principles and Applictions”.
4. Jain.R.P, “Modern Digital Electronics”.
5. Salivahanan.S, Arivazhagan.A, “Digital Electronics”. 4th edition.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	-	-	-	1	1	1	1	1	1
CO2	2	2	2	2	2	-	-	-	1	1	1	1	2	2
CO3	3	3	2	2	2	-	-	-	3	2	2	2	3	3
CO4	2	2	2	2	2	-	-	-	2	2	2	1	2	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2

CS15302 OBJECT ORIENTED PROGRAMMING WITH C++ 3 0 0 3

COURSE OBJECTIVES

- To learn the basic concepts of Object Oriented Programming.
- To know about the classes and objects
- To understand the concept of Inheritance and Overloading.
- To familiarize the students with file handling concept.
- To expose the students with the concept of exception handling mechanism.

UNIT I PRINCIPLES OF OOP 9

Programming Paradigms- Basic concepts and benefits of OOP- Structure of C++ program – Applications of C++ - Tokens- Keywords- Identifiers-constants- Data types - Basic, User defined ,Derived - Dynamic initialization -Reference variables- Scope resolution operator-Member dereferencing operators- memory management operators- Type casting- Function Prototyping- call by value, call by reference- Inline function- Default arguments – Function overloading.

UNIT II CLASSES AND OBJECTS 9

Class specification- Access qualifiers - Static data members and member functions - Array of objects- Objects as function arguments-Friend functions- Returning objects- Local classes - Constructors – Parameterized constructors- Overloaded Constructors- Constructors with default arguments-Copy constructors- Dynamic constructors-Dynamic initialization using constructors- Destructors - Operator Overloading: Operator function – Overloading unary and binary operator-Overloading the operator using friend function- Stream operator overloading -Type Conversion.

UNIT III INHERITANCE 9

Basic Principle – Use of Inheritance-Defining Derived classes- Single Inheritance-Protected Data with private inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance- Multipath inheritance- Need for virtual function- Pointer to derived class objects- Definition of virtual functions- Array of pointer to base class objects- Abstract classes- Virtual destructors – Dynamic Binding - Virtual Base Class- Constructors in derived and base class- Pointers- pointers to objects – this pointer.

UNIT IV STREAMS AND FILE HANDLING 9

Stream classes- - Stream classes- Formatted and unformatted data -Formatted I/O- I/O Manipulators- User defined manipulators- File handling -File pointer and manipulation- File open and close- Sequential and random access.

UNIT V GENERIC PROGRAMMING WITH TEMPLATES 9

Function templates, overloaded function templates, user defined template arguments, class templates -

Exception Handling: Exception handling mechanism, multiple catch, nested try, rethrowing an exception – Namespaces – std namespace- Standard Template Library.

TOTAL PERIODS 45

COURSE OUTCOMES

After the completion of the course, the students will be able to

- understand the basic concept of Object Oriented Programming
- know about the C++ Language
- design object oriented solutions for small systems involving multiple objects.
- understand the concepts of Exception Handling.
- know the concepts of File Handling.

TEXT BOOKS

1. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Sixth Edition, 2013.
2. B.Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.

REFERENCES

1. K.R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++ ",Tata McGraw Hill, 2007.
2. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2006.
3. Bjarne Stroustrup, "The C++ Programming Language", Pearson Education, Fourth Edition, 2013.
4. K.S. Easwarakumar, " Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd, First Edition, 2000.
5. S. B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Fourth Edition, Pearson Education, 2005.

Mapping of Course Outcomes with Programming Outcomes
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CO1	1	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	1	-	-	-	-	2	3	3
CO4	1	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2

CS15303 OPERATING SYSTEMS 3 0 0 3

COURSE OBJECTIVES

- To know the basic concepts and functions of operating systems.
- To understand the structure and functions of OS.
- To learn about Processes, Threads and Scheduling algorithms.
- To understand the principles of concurrency and Deadlocks.
- To learn various memory management schemes.

UNIT I INTRODUCTION 9

Introduction: Computer system organization - Introduction to operating systems – operating system structures – services - system calls – system programs. Processes: Process concept – Process scheduling – Operations on processes –Cooperating processes – Inter process communication – Communication in client-server systems. Threads: Multi-threading models – Threading issues. Case Study: Pthreads library.

UNIT II PROCESS MANAGEMENT AND DEADLOCK 10

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling –Algorithm Evaluation. Process Synchronization: The critical-section problem –Synchronization hardware – Semaphores – Classic problems of synchronization – Monitors. Deadlock: System model – Deadlock characterization –Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance –Deadlock detection – Recovery from deadlock. Case Study: Process scheduling in Linux.

UNIT III MEMORY MANAGEMENT 9

Main Memory: Background – Swapping – Contiguous memory allocation –Paging – Segmentation – Segmentation with paging. Virtual Memory: Background –Demand paging – Page replacement – Allocation of frames –Thrashing. Case Study: Memory management in windows and Solaris.

UNIT IV FILE SYSTEMS 9

File-System Interface: File concept – Access methods – Directory structure – File system mounting – File sharing - Protection. File-System Implementation: Directory implementation –Allocation methods – Free-space management – efficiency and performance – recovery– Network file systems. Case studies: File system in Windows XP.

UNIT V I/O SYSTEMS AND MASS STORAGE MANAGEMENT 8

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass-Storage Structure: Disk attachment - Disk scheduling – Disk management –Swap-space management – RAID — stable storage. Case study: I/O in Linux.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to

- design various Scheduling algorithms and apply the principles of concurrency.
- design deadlock, prevention and avoidance algorithms.
- compare and contrast various memory management schemes.
- design and Implement a prototype for file systems.
- schedule and manage the disk effectively.

TEXT BOOK

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt Ltd, 2013.

REFERENCES

1. Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2014.
2. William Stallings, "Operating Systems – internals and design principles", Prentice Hall, 7thEdition, 2011.
3. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2007.
4. Andrew S. Tannenbaum & Albert S. Woodhull, "Operating System Design and Implementation", Prentice Hall, 3rd Edition, 2006.
5. Gary J.Nutt, "Operating Systems", Pearson/Addison Wesley, 3rd Edition, 2004.

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COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO1	2	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2

CH15301 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 3

COURSE OBJECTIVES

- To know the constituents of the environment and the precious resources in the environment.
- To conserve all biological resources.
- To understand the role of human being in maintaining a clean environment and useful environment for the future generations.
- To maintain the ecological balance and preserve bio-diversity.
- The role of government and non-government organizations in environment management.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Environment: Definition- scope - importance – need for public awareness. Forest resources: Use –over exploitation- deforestation - case studies- mining - effects on forests and tribal people. Water resources: Use – over utilization of surface and ground water- floods – drought - conflicts over water. Mineral resources: Use – exploitation - environmental effects of extracting and using mineral resources - case studies. Food resources: World food problems - changes caused by agriculture and overgrazing - effects of modern agriculture-fertilizer-pesticide problems - water logging - salinity -case studies. Energy resources: Growing energy needs - renewable and non renewable energy sources. Land resources: Land as resource - land degradation - soil erosion. Role of an individual in conservation of natural resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY 9

Concept of an ecosystem: Structure and function of an ecosystem – producers - consumers -decomposers – energy flow in the ecosystem – ecological succession – food chains - food webs and ecological pyramids. Types of ecosystem: Introduction - characteristic features - forest ecosystem - grassland ecosystem - desert ecosystem - aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity: Introduction– definition (genetic - species –ecosystem) diversity. Value of biodiversity: Consumptive use - productive use – social values – ethical values - aesthetic values. Biodiversity level: Global - national - locallevels- India as a mega diversity nation- hotspots of biodiversity. Threats to biodiversity: Habitat loss - poaching of wildlife – man wildlife conflicts – endangered and endemic species of India. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity - field study.

UNIT III ENVIRONMENTAL POLLUTION 9

Pollution: Definition –air pollution - water pollution - soil pollution - marine pollution - noise pollution - thermal pollution – nuclear hazards. Solid waste management: Causes - effects - control measures of urban and industrial wastes. Role of an individual in prevention of pollution - pollution case studies - Disaster management: Floods – earthquake - cyclone - landslides. Electronic wastes--Sources-Causes and its effects.

UNIT IV SOCIAL ISSUES AND ENVIRONMENT 9

Sustainable development: Unsustainable to sustainable development – urban problems related to energy. Water conservation - rain water harvesting - watershed management. Resettlement and rehabilitation of

people. Environmental ethics: Issues - possible solutions – climate change - global warming and its effects on flora and fauna - acid rain - ozone layer depletion - nuclear accidents - nuclear holocaust - wasteland reclamation - consumerism and waste products. Environment protection act: Air (Prevention and Control of Pollution) act – water (Prevention and control of Pollution) act – wildlife protection act – forest conservation act – issues involved in enforcement of environmental legislation.

UNIT V HUMAN POPULATION AND ENVIRONMENT 9

Human population: Population growth - variation among nations – population explosion – family welfare programme and family planning – environment and human health – Human rights – value education – HIV / AIDS, Swine flu – women and child welfare. Role of information technology in environment and human health.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student will be able to

- know the relationship between the human population and environment.
- understand the basic concepts of environment studies and natural resources.
- gaining the knowledge about ecosystem and biodiversity.
- have knowledge about causes, effects and control measures of various types of pollution.
- understand the social issues and various environmental acts.

TEXT BOOKS

1. T.G.Jr. Miller, Environmental Science, 10thEdn, Wadsworth Publishing Co., 2004.
2. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2ndEdn, Tata McGraw Hill Education Private Limited, New Delhi, 2010.
3. Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, 2010.

REFERENCES

1. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India,2010 .
2. S. Divan, Environmental Law and Policy in India, Oxford University Press, New Delhi, 2001.
3. K.D. Wager, Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
4. W.P. Cunningham, Environmental Encyclopedia, JaicoPublising House, Mumbai, 2004.
5. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, "Chemistry for Environmental Engineering and Science", McGraw Hill Science, 2010.

Mapping of Course Outcomes with Programming Outcomes **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**														
COs	**Programme Outcomes(POs)**												**Programme Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	1	3	3	2	-	-	3	1	-
CO2	-	-	2	-	-	1	-	3	-	2	-	3	1	-
CO3	2	-	2	-	2	1	-	3	-	2	-	3	1	-
CO4	2	2	2	-	2	1	3	3	-	2	-	3	1	-
CO5	-	2	-	-	-	1	3	3	2	2	-	2	1	-

EC15309 **DIGITAL LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

- To understand the concept of Boolean theorems & combinational circuits using digital logic gates.
- To design & implement the concept of combinational circuits using MSI devices
- To design & implement the sequential logic circuits.
- To simulate combinational & sequential logic circuits using VHDL/Verilog

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of code converters (i) BCD to Excess-3 code and Excess-3 code to BCD, (ii) Binary to Gray code and Gray code to Binary.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates
4. Design and implementation of parity generator / checker using basic gates
5. Design and implementation of magnitude comparator
6. Design and implementation of application using multiplexers/ Demultiplexers
7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters
9. Simulation of combinational circuits using Hardware Description Language

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student will be able to

- know about the Boolean theorems using logic gates
- design and implement Shift registers
- design and implement Synchronous and Asynchronous counters
- simulate combinational and sequential circuits using VHDL/Verilog HDL

Mapping of Course Outcomes with Programming Outcomes
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CO1	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO2	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2

CS15304 OPERATING SYSTEMS AND OBJECT ORIENTED PROGRAMMING LABORATORY **0 0 4 2**

COURSE OBJECTIVES

- To acquire knowledge of the C++ language.
- To understand the concepts of Object Oriented Programming.
- To understand the concepts of Operating Systems.
- To learn about the concepts of stack and queue classes

LIST OF EXPERIMENTS

OOPS

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication)
2. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.
3. Design stack and queue classes with necessary exception handling.
4. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism and RTTI.
5. Write a C++ program that randomly generates complex numbers (use previously designed Complex class) and writes them two per line in a file along with an operator (+, -, *, or /). The numbers are written to file in the format (a + ib). Write another program to read one line at a time from this file, perform the corresponding operation on the two complex numbers read, and write the result to another file (one per line).

OPERATING SYSTEM

1. Simulate the following CPU scheduling algorithms
    a. Round Robin b. SJF c.FCFS d. Priority
2. Implement the producer – consumer problem using semaphores.
3. Simulate Bankers Algorithm for Dead Lock Avoidance
4. Simulate all page replacement algorithms
    a. FIFO b. LRU c. Optimal
5. Implementation of paging technique in memory management

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student should be able to

- apply the concepts of Object Oriented Programming.
- compare the performance of various CPU Scheduling Algorithm.

- implement deadlock avoidance, and Detection Algorithms.
- apply the concept of paging technique in memory management

REFERENCES

1. Spoken-tutorial.org,
2. Laboratory Manual.

Mapping of Course Outcomes with Programming Outcomes **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**														
COs	**Programme Outcomes(POs)**												**Programme Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO2	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2

EN15301 BUSINESS ENGLISH COURSE LABORATORY 0 0 2 1

COURSE OBJECTIVES

- To develop the reading skills and get familiarized in skimming and scanning.
- To install the communication concepts to enhance the students conversational skills through various practice sessions.
- To inculcate the receptive skills i.e. Listening and Reading and get well versed in the Productive skills.
- To assist the students in improving their vocabulary and comprehension of grammar.

UNIT I READING & VOCABULARY

Understanding short, real world notices, messages - Detailed comprehension of factual material- Skimming & Scanning skills - Interpreting visual information - Reading for detailed factual information - Reading for gist and specific information - Reading for grammatical accuracy and understanding of text structure - Reading and information transfer.

UNIT II WRITING

Re-arranging appointments - Asking for permission - Giving instructions - Apologizing and offering compensation - Making or altering reservations - Dealing with requests - Giving information about a product.

UNIT III LISTENING

Listening for short telephonic conversation - Listening for short conversation or monologue - Listening for specific information - Listening for conversation- Interview, Discussion.

UNIT IV SPEAKING

Conversation between the interlocutor and each candidate - General interaction and social language - A mini presentation by each candidate on a business theme - Organizing a larger unit of discourse - giving information and expressing opinions - two way conversation between candidates followed by further prompting from the interlocutor- Expressing opinions- agreeing and disagreeing

TOTAL: 30 PERIODS

COURSE OUTCOMES

At the end of the course, the student should be able to

- enrich the vocabulary reading and develop their pronunciation skills.
- speak effectively in English in all occasions.
- prepare flawless Reports and proposals.
- To familiarize the students with a variety of business correspondence.

TEXT BOOKS

1. Cambridge BEC Preliminary, Self Study Edition, Cambridge University Press, New York, 2012.
2. Whitby, Norman. Business Benchmark, Pre-intermediate to intermediate, Business Preliminary, Shree Maitrey Printech Pvt. Ltd., Noida, 2014.

REFERENCES

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice.
2. Oxford University Press, New Delhi. 2011.
3. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
4. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO3	3	3	2	2	2	-	-	-	3	2	2	2	3	3
CO4	2	2	2	2	2	-	-	-	2	2	2	1	2	2

SEMESTER IV

MA15401 PROBABILITY AND QUEUEING THEORY 3 1 0 4

COURSE OBJECTIVES

- To acquire knowledge of the random variable and manipulate.
- To understand the concepts of some standard distributions.
- To analysis the relationship between the two random variables.
- To provide necessary basic concepts in probability and random processes for applications.
- To provides models for a number of situations that arise in real life.

UNIT I RANDOM VARIABLES 12

Axioms of probability – Conditional probability – Total probability – Baye‟s theorem Random variable- Probability mass function – Probability density function – Properties - Moments –Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTION 12

Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions and their properties – Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables.

UNIT IV RANDOM PROCESS AND MARKOV CHAIN 12

Classification - Stationary process - Poisson process-Markov Chain- Transition probabilities-Limiting Distributions.

UNIT V QUEUEING MODELS 12

Markovian models-(M/M/1), (M/M/C), finite and infinite capacity - (M/G/1) queue- Pollaczek -Khintchine Formula.

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student should be able to

- have a fundamental knowledge of the basic probability concepts.
- have a well-founded knowledge of standard distributions which can describe the real life phenomena.
- acquire skills in handling situations involving more than one random variable and functions of random variables.

- review Queuing Theory and its empirical analysis based on the observed data of checking out sales service unit of ICA Supermarket
- be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

TEXT BOOKS

1. Gross, Donald Harris and M Carl, "Fundamentals of Queuing Theory", 3rd ed., Wiley Publications, New Delhi, 2008.
2. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint, 2010.
3. T Veerarajan, "Probability, Statistics and Random Processes", 2nd ed., Tata McGraw- Hill, New Delhi, 2008.

REFERENCES

1. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", PHI, New Delhi, 2nd Edition, 2009.
2. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill, New Delhi, 9th Reprint, 2010.
3. Yates. R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd.,Bangalore, 2nd Edition, 2012.
4. Venkatachalam. G, "Probability and Queueing Theory",Hitech Publishing Company Pvt.Ltd.,Chennai,3rd Edition, 2012.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2

EC15408 MICROPROCESSOR AND MICROCONTROLLER 3 0 0 3

COURSE OBJECTIVES

- To study the Architecture of 8086 microprocessor.
- To have a knowledge about programming of 8086 microprocessor.
- To learn the design aspects of I/O and Memory Interfacing circuits.
- To be familiar with the Architecture of 8051 microcontroller.
- To learn the concepts of system design using microcontroller.

UNIT I THE 8086 MICROPROCESSOR 9

Introduction to microprocessor, Bus-Address bus, Data bus and Control bus, Connecting Microprocessor to I/O devices, Introduction to 8086 – Microprocessor architecture, 8086 signals – Basic configurations and Interrupts.

UNIT II 16 BIT MICROPROCESSOR INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING 9

Addressing modes - Operand types- Instruction set and assembler directives – Assembly language programming.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller.

UNIT IV MICROCONTROLLER 9

Architecture of 8051 – Signals - Special Function Registers (SFRs) - I/O Ports – Memory-Interrupts - Instruction set - Addressing modes - Assembly language programming.

UNIT V SYSTEM DESIGN USING MICROCONTROLLER 9

Case studies – Traffic light control, washing machine control, DC & Stepper Motor & Keyboard Interfacing - ADC, DAC - External Memory Interface.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to:

- design and implement programs on 8086 microprocessor.
- analyze and design multiprocessor system.
- design I/O circuits.
- design Memory Interfacing circuits.
- design and implement 8051 microcontroller based systems.

TEXT BOOKS

1. Krishna Kant, "Microprocessors and Microcontrollers Architecture, programming and system design using 8085, 8086, 8051 and 8096". PHI 2007.
2. Kenneth J.Ayala, "The 8051 Microcontroller Architecture, Programming and applications", Second edition, Penram International.

REFERENCES

1. Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware:, TMH
2. A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Tata Mc Graw Hill , 2006.
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson Education, 2011
4. Nagoor kani.A, "Microprocessor and its Applications".
5. Mohamed Rafiquzzaman, "Microprocessor and Microcontroller based system design".

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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CO4	2	2	2	2	2	-	-	-	2	2	2	1	2	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2

CS15401 SOFTWARE ENGINEERING 3 0 0 3

COURSE OBJECTIVES

- To know about the various phases in a software project.
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the major considerations for enterprise integration and deployment.
- To learn various testing and maintenance measures.
- To be familiar with software estimation techniques.

UNIT I SOFTWARE PROCESS 9

The Evolving role of Software – Software – The changing Nature of Software – Legacy Software —A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment – Personal and Team Process Models. Product and Process. Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – the Unified Process.

UNIT II SOFTWARE REQUIREMENTS 9

Software Engineering Practice – communication Practice – Planning practice modeling practice– Construction Practice –Deployment Requirements Engineering - Requirements Engineering tasks – Initiating the requirements Engineering Process-Eliciting Requirements – Developing Use cases – Building the Analysis Models –Elements of the Analysis Model – Analysis pattern – Negotiating Requirements – Validating Requirements.

UNIT III REQUIREMENTS ANALYSIS 9

Requirements Analysis – Analysis Modeling approaches – data modeling concepts – Object oriented Analysis – Scenario based modeling – Flow oriented Modeling – Class based modeling – creating a behavior model.

UNIT IV SOFTWARE DESIGN AND SOFTWARE TESTING 9

Design Engineering – Design process -Design Quality-Design model-Agile Methods – Extreme Programming-Rapid Application development – Software Prototyping- Software Reuse – The Reuse Landscape – Design Patterns – Generator-Based Reuse –Application Frameworks – Application System Reuse - Software Evolution Program Evolution Dynamics – Software Maintenance – Evolution Processes – Legacy system evolution Planning -Verification and Validation – Software Inspections – Automated Static analysis – Verification and Formal methods - Software Testing – System Testing – Component Testing – Test case Design –Test Automation.

UNIT V SOFTWARE PROJECT MANAGEMENT 9

Software Cost Estimation – productivity – Estimation Techniques – Algorithmic Cost Modelling –Project Duration and Staffing - Process and Product Quality – Quality Assurance and Standards –Planning –

Control- Software Measurement and Metrics - Process Improvement – Process Classification – Measurement –Analysis and Modelling –Change – The CMMI process improvement Framework - Configuration Management. –Planning Change Management – Version and Release Management – System Building – CASE tools for configuration management.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to

- identify the key activities in managing a software project and compare different process models.
- understand the concepts of requirements engineering and Analysis Modeling.
- apply systematic procedure for software design and deployment.
- compare and contrast the various testing and maintenance.
- understand the concept of Software Project Management.

TEXT BOOKS

1. Roger S.Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill International edition, Eighth edition, 2015.
2. Ian Sommerville, Software Engineering, 9 th Edition, Pearson Education, 2011.
3. Watts S.Humphrey,"A Discipline for Software Engineering", Pearson Education, 2007.

REFERENCES

1. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited, 2009.
2. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
3. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.
5. James F.Peters and Witold Pedrycz,"Software Engineering, An Engineering Approach", Wiley-India, 2007.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO3	3	2	3	3	3	-	-	-	3	2	3	2	3	2
CO4	3	3	2	3	3	-	-	-	3	2	3	2	3	3
CO5	3	3	2	3	3	-	-	-	3	2	3	2	3	3

CS15402 **SYSTEM SOFTWARE** **3 0 0 3**

COURSE OBJECTIVES

- To understand the relationship between system software and machine architecture
- To know the design and implementation of assemblers.
- To understand the major concept of loader and linker.
- To have an understanding of macro processors.
- To understand the major concept of Interactive debugging systems and software tools.

UNIT I INTRODUCTION 8

System software and machine architecture – The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes -instruction sets - I/O and programming.

UNIT II ASSEMBLERS 10

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals –Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT III LOADERS AND LINKERS 9

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader -Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features –Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

UNIT IV MACRO PROCESSORS 9

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features -Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example -MASM Macro Processor – ANSI C Macro language.

UNIT V SYSTEM SOFTWARE TOOLS 9

Text editors - Overview of the Editing Process - User Interface – Editor Structure. -Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User- Interface Criteria.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to

- identify the approach of machine architecture.

- compare assembler and macro assemblers and understand the concepts of machine independent loader.
- compare and contrast the concept of linker.
- apply systematic procedure for interactive debugging system.
- understand the concept system software tools.

TEXT BOOK

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd Edition,PearsonEducation Asia, 2006.

REFERENCES

1. John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 2000.
2. John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000.
3. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 2000.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO1	3	1	2	1	3	-	-	-	1	2	2	1	3	1
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CO3	2	2	3	3	3	-	-	-	3	2	2	2	2	2
CO4	2	2	3	3	3	-	-	-	3	2	2	2	2	2
CO5	3	2	3	3	3	-	-	-	3	2	2	3	3	2

CS15403 DATABASE MANAGEMENT SYSTEMS 3 0 0 3

COURSE OBJECTIVES

- To expose the students to the fundamentals of Database Management Systems.
- To make the students understand the relational model.
- To familiarize the students with ER diagrams.
- To familiarize the students the SQL and different types of databases.
- To make the students understand the Security Issues in Databases.

UNIT I INTRODUCTION 9

Purpose of Database System -– Views of data – Data Models – Database Languages – Database System Architecture – Database users and Administrator – Entity–Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases.

UNIT II RELATIONAL MODEL 9

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional l/O operations- SQL fundamentals - Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases.

UNIT III DATABASE DESIGN 9

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/ Code Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT IV TRANSACTIONS 9

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery –Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking –Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

UNIT V IMPLEMENTATION TECHNIQUES 9

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing –Query Processing Overview – Catalog Information for Cost Estimation – Selection Operation – Sorting – Join Operation – Database Tuning.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to

- design Databases for applications.

- use the Relational model, ER diagrams.
- apply concurrency control and recovery mechanisms for practical problems.
- design the Query Processor and Transaction Processor.
- apply security concepts to databases.

TEXT BOOKS

1. Silberschatz, H.Korth and Sudarshan S., "Database System Concepts", 6th Edition, McGraw-Hill International, 2010.
2. Elmasri R. and Shamakant B. Navathe, "Fundamentals of Database Systems", 6th Edition, Addision Wesley , 2011.

REFERENCES

1. Atul Kahate, "Introduction to Database Management Systems", Pearson Education, New Delhi, 2006.
2. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata Mc Graw Hill, 2010.
3. Rob Cornell, "Database Systems Design and Implementation", Cengage Learning, 2011.
4. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems",Eighth Edition, Pearson Education, 2006.
5. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, "Database Systems: The Complete Book", Pearson Education, Second Edition, 2008.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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CO4	3	2	2	2	2	-	-	-	2	2	2	1	3	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2

CS15404 COMPUTER NETWORKS 3 0 0 3

COURSE OBJECTIVES

- To understand the concepts of data communications
- To be familiar with the Transmission media and Tools
- To study the functions of OSI layers
- To learn about IEEE standards in computer networking
- To get familiarized with different protocols and network components.

UNIT I FUNDAMENTALS & LINK LAYER 9

Building a network – Requirements – Layering and protocols – Internet Architecture – Network software – Performance ; Link layer Services – Framing – Error Detection – Flow control

UNIT II MEDIA ACCESS & INTERNET WORKING 9

Media access control – Ethernet (802.3) – Wireless LAN' s – 802.11 – Bluetooth – Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP,ICMP)

UNIT III ROUTING 9

Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM, MSDB, MPLS) – Routing among Mobile Devices.

UNIT IV TRANSPORT LAYER 9

Overview of Transport layer – UDP – Reliable byte stream (TCP) – Connection management – Flow control – Retransmission – TCP Congestion control – Congestion avoidance (DECbit, RED) – QoS – Application requirements

UNIT V APPLICATION LAYER 9

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP – Overlay networks.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to:

- identify the components required to build different types of networks.
- choose the required functionality at each layer for given application.
- identify solution for each functionality at each layer.
- trace the flow of information from one node to another node in the network.
- understanding the Applications of Networks and data communications.

TEXT BOOKS

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.
2. Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011.

REFERENCES

1. AndrewS.Tanenbaum, Computer Networks, PearsonEducation, 2008
2. James F. Kurose, Keith W. Ross, "Computer Networking – A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher, 2011.
5. William Stallings, "Data and Computer Communication", Sixth Edition, Pearson Education, 2000

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CO4	2	2	2	2	2	-	-	-	2	2	2	1	2	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2

CS15405 DATA BASE MANAGEMENT SYSTEMS LAB 0 0 4 2

COURSE OBJECTIVES

- To create and use a database
- To have hands on experience on DDL Commands
- To have a good understanding of DML Commands and DCL commands
- To be Familiarize with advanced SQL queries.

LIST OF EXPERIMENTS

1. Data Definition, Table Creation, Constraints,
2. Insert, Select Commands, Update & Delete Commands.
3. Nested Queries & Join Queries
4. Views
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Front end tools
7. Forms
8. Triggers
9. Menu Design
10. Reports.
11. Database Design and implementation (Mini Project).
    a. Personal Information System.
    b. Web Based User Identification System.
    c. Timetable Management System.
    d. Hotel Management System

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student should be able to

- design and implement a database schema for a given problem-domain
- populate and query a database
- create and maintain tables using PL/SQL.
- prepare reports.

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CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2

EC15409 MICROPROCESSOR AND MICROCONTROLLER LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To perform Basic arithmetic and Logical operations using 8086 and MASM.
- To execute Floating point operations, string manipulations, sorting and searching using 8086 and MASM.
- To experiment the interface concepts of Stepper motor control and traffic light control with the processor.
- To implement the assembly language programming for Basic arithmetic and Logical operations using 8051.

LIST OF EXPERIMENTS

Assembly Language programming using 8086 and MASM

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Floating point operations, string manipulations, sorting and searching
4. Counters and Time Delay

Interfacing with 8086 microprocessor

5. Traffic light control
6. Stepper motor control
7. Digital clock
8. Key board and Display
9. Serial interface and Parallel interface

Programming using 8051 microcontroller

10. Basic arithmetic and Logical operations
11. Unpacked BCD to ASCII

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student should be able to

- write Assembly language Programmes for various applications
- interface different peripherals with microprocessor
- execute Programs in 8051
- explain the difference between simulator and Emulator

Mapping of Course Outcomes with Programming Outcomes **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**														
COs	**Programme Outcomes(POs)**												**Programme Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO2	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2

CS15406 NETWORKS LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To experiment about the socket programming
- To be familiar with the simulation tools.
- To have hands on experience on various networking protocols.
- To know about TCP and UDP performance.

LIST OF EXPERIMENTS

1. Applications using TCP Sockets like
    a. Echo client and echo server
    b. File transfer
    c. Remote command execution
    d. Chat
    e. Concurrent server
2. Applications using UDP Sockets like
    a. DNS
    b. SNMP
3. Applications using Raw Sockets like
    a. Ping
    b. Trace route
4. RPC
5. Experiments using open source simulators:
    a. Performance comparison of MAC protocols
    b. Performance comparison of routing protocols
    c. Study of TCP/UDP performance

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student should be able to

- use simulation tools
- implement the various protocols.
- analyze the performance of the protocols in different layers.
- analyze various routing algorithms

Mapping of Course Outcomes with Programming Outcomes **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**														
COs	**Programme Outcomes(POs)**												**Programme Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO2	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2