PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637018
(AUTONOMOUS)
B.E COMPUTER SCIENCE ENGINEERING
CURRICULUM
CBCS REGULATIONS 2016
SEMESTER III & IV

SEMESTER III

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA16301	Transforms and Boundary Value Problems	3	2	0	4
2	PC	CS16301	Computer Architecture	3	0	0	3
3	PC	CS16302	Object Oriented Programming with C++	3	0	0	3
4	PC	CS16303	Design and Analysis of Algorithms	3	0	0	3
5	ES	EC16308	Digital Principles and Systems Design	3	0	0	3
6	BS	CH16301	Environmental Science and Engineering	3	0	0	3
Practical							
7	ES	EC16309	Digital Laboratory	0	0	4	2
8	PC	CS16304	Object Oriented Programming Laboratory	0	0	4	2
9	HS	EN16301	Business English Course Laboratory	0	0	2	1
			TOTAL	**18**	**2**	**10**	**24**

SEMESTER IV

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA16401	Probability and Queuing Theory	3	2	0	4
2	PC	CS16401	Software Engineering	3	0	0	3
3	PC	CS16402	Database Management Systems	3	0	0	3
4	PC	CS16403	System Software	3	0	0	3
5	PC	CS16404	Computer Networks	3	0	0	3
6	ES	EC16408	Microprocessor and Microcontroller	3	0	0	3
Practical							
7	PC	CS16405	Data Base Management Systems Laboratory	0	0	4	2
8	PC	CS16406	Networks Laboratory	0	0	4	2
9	ES	EC16409	Microprocessor and Microcontroller Laboratory	0	0	4	2
			TOTAL	**18**	**2**	**12**	**25**

SEMESTER III

MA16301 **TRANSFORMS AND BOUNDARY VALUE PROBLEMS** **3 2 0 4**

COURSE OBJECTIVES

- To introduce fourier series analysis which is central to many applications in engineering apart from solving boundary value problems.
- To acquaint the student with fourier transform techniques used in many engineering systems..
- To familiarize effective application of mathematical tools for the solutions of partial differential equations that model several physical processes.
- To apply one dimensional equation of heat conduction and study about wave equation.
- To learn and apply 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 identity – 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 four 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.

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 this course, students will be able to

- comprehend fourier series, their different possible forms and the frequently needed practical harmonic analysis from discrete data.
- describe the concept of a function as a double integral under certain conditions and apply in the fourier transform pair and their properties.
- solve certain boundary value problems and apply the methods and results in engineering applications.
- employ partial differential equations to solve one dimensional wave and heat equations.
- demonstrate the knowledge of differential equations gained and solve them using Z transforms.

TEXT BOOKS

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Narayanan S., Manickavasagam Pillai.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" ,Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998

REFERENCES

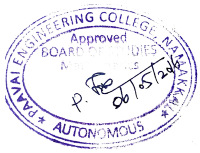
1. Larry C. Andrews, Bhimsen K. Shivamoggi, "Integral Transforms for Enginears", SPIE Optical Engineering press, Washington USA (1999).
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition,Wiley Publications
5. Ray Wylie C and Barrett.L.C, "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.

WEB LINKS

1. https://www.youtube.com/watch?v=coe-UA5ONI0
2. https://www.youtube.com/watch?v=gZNm7L96pfY
3. http://172.16.100.200/NPTEL/displayweb.html?type1=111103021%2F35.pdf
4. https://www.youtube.com/watch?v=4GHY8sRKPaU
5. http://172.16.100.200/NPTEL/displayweb.html?type1=111104031%2Flectures.pdf%23page%3D101.

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

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



CS16301 **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 acquire knowledge about the concept of pipelining.
- To understand the concept of virtual and catch memory.
- To apply knowledge about 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, and USB), I/O devices and processors.

TOTAL HOURS 45

COURSE OUTCOMES

At the end of this course, students will be able to

- understand instruction and addressing modes.
- design arithmetic and logic unit.
- design and analyses pipelined control units.
- evaluate performance of memory systems.
- understand parallel processing architectures.

TEXT BOOKS

1. David A. Patterson and John L. Hennessey, "Computer organization and design', Morgan Kauffman / Elsevier, Fifth edition, 2014.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.

REFERENCES

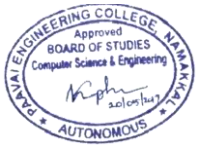
1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", VI edition, Mc Graw-Hill Inc, 2012.
2. William Stallings "Computer Organization and Architecture" , Seventh Edition , Pearson Education, 2006.
3. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
4. William Stallings, "Computer Organization and Architecture – Designing forPerformance", Sixth Edition, Pearson Education, 2003.
5. John P. Hayes, "Computer Architecture and Organization", Third Edition, TataMcGraw Hill, 1998.

WEB LINKS

1. https://www.tutorialspoint.com/computer_organization/index.asp
2. http://nptel.ac.in/courses/106103068/1
3. http://web.cs.iastate.edu/~prabhu/Tutorial/title.html

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	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



CS16302 OBJECT ORIENTED PROGRAMMING WITH C++ 3 0 0 3

COURSE OBJECTIVES

- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++.
- To develop the problem solving skills by applying object-oriented concepts inheritance and virtual classes.
- To create programs using streams and file handling
- To learn templates and exception handling in C++

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- variables - Data types - Basic, User defined ,Derived - Dynamic initialization -Reference variables- Scope resolution operator- Function Prototyping- Inline function- Default arguments – Function overloading.

UNIT II CLASSES, OBJECTS AND CONSTRUCTORS 9

Class specification- Static data members and member functions - Array of objects- Objects as function arguments- Friend functions- Returning objects- Local classes - Constructors –Parameterized constructors- MultipleConstructors- Constructors with default arguments-Copy constructors- Destructors - Operator Overloading-Overloading unary and binary operator.

UNIT III INHERITANCE AND VIRTUAL CLASS 9

Introduction – types- Single Inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance. Virtual base class – Abstract class – this pointer-Dynamic binding- virtual function – pure virtual function.

NIT IV STREAMS AND FILE HANDLING 9

Stream classes- Formatted and unformatted I/O operations- Manipulators- File handling - File open and close- File pointers and their manipulators- Sequential and random access-Error Handling.

UNIT V TEMPLATES AND EXCEPTION HANDLING 9

Class templates-Function templates- overloading of template functions- Exception Handling: Exception handling mechanism-throwing mechanism- catching mechanism- rethrowing an exception. Standard Template Library.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of this course, students will be able to

- explain the object-oriented concepts
- understand object oriented programming through C++.
- create programs using inheritance and virtual classes.
- develop programs using streams and file handling.
- know function and class template and way of handling exception.

TEXT BOOKS

1. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Sixth Edition, 2013

REFERENCES

1. B.Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
2. K.R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++ ",Tata McGraw Hill, 2007.
3. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2006
4. BjarneStroustrup, "The C++ Programming Language", Pearson Education, Fourth Edition, 2013.
5. K.S. Easwarakumar, " Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd, First Edition, 2000.

WEB LINKS

1. http://www.desy.de/gna/html/cc/Tutorial/tutorial.html
2. http://thatchna.weebly.com/uploads/4/1/9/3/4193382/std_c_notes_03.pdf
3. https://www.youtube.com/watch?v=CzWZYwOvrcE

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	PSO 2
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2
CO5	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16303 DESIGN AND ANALYSIS OF ALGORITHMS 3 0 0 3

COURSE OBJECTIVES

- To study the principles of algorithm design.
- To know the importance of computational complexity of the algorithm.
- To become familiar with dynamic programming, divide and conquer, branch and bound and backtracking techniques.
- To understand the limitations of algorithm power.
- To study about notions of P, NP, NPC, and NP-hard.

UNIT I INTRODUCTION 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem- Knapsack Problem - Assignment problem. Divide and conquer methodology – Merge sort – Quick sort –Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication-Closest-Pair and Convex-Hull Problems.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Computing a Binomial Coefficient – Warshall's and Floyd's algorithm – Optimal Binary Search Trees-Knapsack Problem and Memory functions. Greedy Technique– Prim's algorithm- Kruskal's Algorithm-Dijkstra's Algorithm-Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 9

The Simplex Method-The Maximum-Flow Problem – Maxim Matching in Bipartite Graphs- The Stable marriage Problem.

UNIT V LIMITATIONS OF ALGORITHM POWER 9

Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP-CompleteProblems--Coping with the Limitations – Backtracking - n-Queens problem – Hamiltonian CircuitProblem –Subset SumProblem-Branch and Bound - Assignment problem – Knapsack Problem –Traveling Salesman Problem.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the significance of algorithms in problem solving process.
- analyze asymptotic runtime complexity of algorithms.
- describe and apply dynamic programming and divide and conquer algorithms.
- design efficient algorithms for new situations, using as building blocks the techniques learned.
- apply algorithm design techniques to solve certain np-complete problems.

TEXT BOOK

1. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

REFERENCES

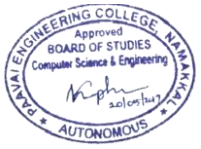
1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
4. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

WEBLINKS

1. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm

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	PSO 2
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	1	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	-	2	-	-	-	-	-	2	1	2	2
CO5	2	2	2	-	2	-	-	-	-	-	2	1	2	2



EC16308 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 memory devices.
- To know about the analysis and design procedure for synchronous sequential circuits.
- To acquire knowledge about the analysis and design procedure of asynchronous sequential circuits.

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Review of binary number systems - Binary arithmetic – Binary codes – Boolean laws 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- Encoder - decoder – Multiplexer- Introduction to Hardware Description Language (HDL). HDL for combinational circuits.

UNITIII MEMORY AND PROGRAMMABLE LOGIC 9

Classification of memory-ROM-ROM organization-RAM-Static and Dynamic RAM-Memory decoding and expansion-Programmable logic devices-PLA,PAL.

UNIT V 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

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of this course, students will be able to

- understand the basic concept of Boolean algebra and logic gates.
- design combinational logic circuits.
- evaluate the memory and programmable logic devices.
- analyze and design the synchronous sequential logic circuits.
- analyze and design the asynchronous sequential logic circuits.

TEXT BOOK

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

REFERENCES

1. Charles H.Roth, Jr. “Fundamentals of Logic Design”, 4th Edition, Jaico Publishing House, Cengage Earning, 5th ed, 2005.
2. Donald D.Givone, “Digital Principles and Design”, Tata McGraw-Hill, 2007.

WEB LINKS

1. http://nptel.ac.in/video.php?subjectid=117106086
2. http://www.electronics-tutorials.ws/combination/comb_1.html

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	PSO 2
CO1	3	1	1	1	1	-	-	-	-	-	1	1	3	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	1	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2
CO5	2	2	1	2	2	-	-	-	-	-	2	1	2	2

CH 16301 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 3

COURSE OBJECTIVES

At the end of this course the student is expected

- 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 – Food resources: World food problems - changes caused by agriculture and overgrazing – effects of modern agriculture - fertilizer-pesticide problems - water logging - salinity. Energy resources: Growing energy needs - renewable and non renewable energy sources. 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 (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 - local levels- 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.

UNIT III POLLUTION 9

Pollution: Definition –air pollution - water pollution - soil pollution - marine pollution - noise pollution - thermal pollution – nuclearhazards. Solid waste management: Causes - effects - control measures of urban and industrial wastes. Role of an individual in prevention of pollution - pollution. Disaster management :Floods – earthquake - cyclone - landslides. Electronic waste-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 - Environment protection act: Air (Prevention and Control of Pollution) act – water (Prevention and controlof 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

Upon the completion of the course, students 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

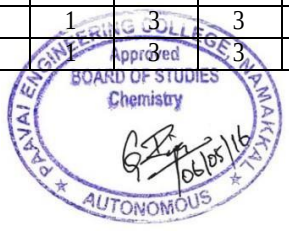
1. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2nd Edn, Tata McGraw Hill Education Private Limited, New Delhi,(2010).
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw Hill, (2010).

REFERENCES

1. S. Divan, Environmental Law and Policy in India, Oxford University Press, New Delhi, 2001.
2. A.K.De, Environmental Chemistry, VI edition,2015 New Age International (P) ltd Publication,NewDelhi.
3. C.S.Rao, Environmental Pollution and Control engineering, Vedition,New Age International (P) ltd Publication, NewDelhi 110002
4. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, "Chemistry for Environmental Engineeringand Sciences, V Edition,2013,Tata M'c Graw Hill pub,Newdelhi110008

Mapping of course outcome with Programme Outcomes
(S/M/W indicates strength of correlation) S-Strong-3, M-Medium=2 , W-Weak=1.

CO	Programmes Outcomes(POs)													
	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	-



EC16309 **DIGITAL LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

- To understand the concept of boolean theorems.
- To study the concept of combinational circuits using digital logic gates
- To learn the concept of combinational circuits using MSI devices.
- To simulate combinational and sequential logic circuits using VHDL/verilog.

LIST OF EXPERIMENTS

1. Verification of Boolean laws and theorems using logic gates
2. Design and verification of adders and sub tractors using basic gates.
3. Design and implementation of code converter: Binary to Gray code and Gray code to Binary code.
4. Design and implementation of 4-bit binary adder / subtractor using IC7483
5. Design and implementation of encoder and decoder using basic gates.
6. Design and implementation of multiplexers and Demultiplexers using basic gates.
7. Design and implementation of Shift registers.
8. Design and implementation of Synchronous and Asynchronous counters.
9. Simulation of Combinational circuits using Verilog HDL

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of this course, students will be able to

- evaluate the basic laws.
- analyse the combinational logic circuits using logic gates.
- analyse the combinational logic circuits using MSI devices.
- explain the working of sequential logic circuits.

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	PSO 2
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16304 OBJECT ORIENTED PROGRAMMING LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To acquire knowledge about the features of object oriented programming such as classes, objects, data abstraction.
- To explain the various concepts of overloading such as function overloading and operator overloading
- To introduce the levels of inheritance & ambiguity problems in them
- To familiarize the students with polymorphism& their implementation in C++.

LIST OF EXPERIMENTS

1. Simple C++ programs.
2. Programs using Functions and classes.
3. Friend Functions.
4. Function Overloading.
5. Operator Overloading.
6. Simple and Multiple Inheritances.
7. Multilevel & Hybrid Inheritance.
8. Virtual Functions.
9. Constructors and Destructors
10. File Handling.
11. Templates.
12. Exception Handling.

TOTAL PERIODS 60

COURSE OUTCOMES

At the of this course, students will be able to

- explain procedure as well as object oriented programming concepts and their differences.
- familiar with how to make programs using function overloading and operator overloading.
- get the capability to implement the different types of inheritance and done problems related to them.
- implement various types of polymorphism and the use of pointers for virtual functions.

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	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2

EN16301 **BUSINESS ENGLISH COURSE LABORATORY** **0 0 2 1**

COURSE OBJECTIVES

- To develop the reading skills of the students and to familiarize them in skimming and scanning.
- To instill the communication concepts and enhance the students' conversational skills through various practice sessions .
- To familiarize them with a variety of business correspondence.
- To develop the receptive skills such as listening and reading and to make the students well versed in the productive skills(writing and speaking) and to assist them in improving their vocabulary and comprehension of grammar.

UNIT I READING AND VOCABULARY **6**

Understanding short, notices, messages - detailed comprehension of factual material- skimming and scanning skills- interpreting visual information- reading for gist and specific information - reading for grammatical accuracy and understanding of text structure - reading and information transfer.

UNIT II WRITING **9**

Fixing 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 **6**

Listening to short telephonic conversation - Listening to short conversation or monologue -Listening to specific information - Listening to recordered interview, discussion.

UNIT IV SPEAKING **9**

Conversation between the interlocutor and the candidate - interaction in social contexts - A mini presentation by each candidate on a business theme - organizing a larger unit of discourse –giving information and expressing opinions– interactive communication conversation between candidates followed by further prompting from the interlocutor- Expressing opinions-agreeing and disagreeing.

TOTAL HOURS 30

COURSE OUTCOMES

At the end this course, students will be able to

- enrich the business vocabulary through reading and to develop their pronunciation skills.
- speak effectively in english in various occasions
- prepare flawless reports and proposals.
- listening and reading and to make the students well versed in the productive

TEXT BOOKS

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

REFERENCES

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

WEB SOURCE

1. http://www.cambridge.org/us/cambridgeenglish/catalog/cambridge-english-exams-ielts/business-benchmark

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	PSO 2
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CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2

SEMESTER IV

MA16401 PROBABILITY AND QUEUEING THEORY 3 2 0 4

COURSE OBJECTIVES

- To acquire knowledge of the random variables and manipulate.
- To understand the concepts of standard distributions methods.
- To analyse the relationship between the two random variables.
- To provide necessary basic concepts in probability and random processes related to communication engineering domain.
- To use various queuing theory models for real time situations.

UNIT I RANDOM VARIABLES 15

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 15

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

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 15

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

UNIT IV RANDOM PROCESS AND MARKOV CHAIN 15

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

UNIT V QUEUEING MODELS 15

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

TOTAL PERIODS 75

COURSE OUTCOMES

At the end of this course, the students will be able to

- understand the basic probability concepts.
- know the standard distribution for real time applications.
- acquire skills in handling situations involving more than one random variable and functions of random variables.
- evolve with respect to time in a probabilistic manner.
- acquire the fundamental skills to analyze queuing models and systems.

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.

WEB LINKS

1. https://www.youtube.com/watch?v=IYdiKeQ9xEI
2. https://www.youtube.com/watch?v=xGkpXk-AnWU
3. https://www.youtube.com/watch?v=l-rRtmNpdkU
4. https://www.youtube.com/watch?v=J70dP_AECzQ
5. http://172.16.100.200/NPTEL/displayvideo.html?type1=111105041%2Fmod01lec16.mp4

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

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

CS16401 **SOFTWARE ENGINEERING** **3 0 0 3**

COURSE OBJECTIVES

- To understand the 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 understand fundamental concepts of requirements engineering and analysis modeling.

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 – EvolutionaryProcess Models – Prototyping – The Spiral Model – The Concurrent Development Model– Specialized Process Models – the Unified Process - Agile Development.

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 **TESTINGTECHNIQUES** **9**

A strategic Approach for Software testing – Test Strategies for conventional software – Validation Testing–System Testing – The Art of Debugging. Testing Conventional Applications: Software testing Fundamentals –Internal and External Views Testing – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Model Based testing – Testing for Specialized Environments – Architectures and Applications –Patterns for Software Testing.

UNIT V **SOFTWARE PROJECT MANAGEMENT** 9

Software Cost Estimation – productivity – Estimation Techniques – Algorithmic Cost Modeling –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 Modeling –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 this course, the students will be able to

- identify the key activities in managing a software project.
- compare different process models.
- understand the Concepts of requirements engineering and Analysis Modeling.
- compare and contrast the various testing and maintenance.
- understand the concept of Software Project Management

TEXT BOOKS

1. RogerS.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. PankajJalote, "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 WitoldPedrycz,"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)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
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CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2
CO5	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16402 **DATABASE MANAGEMENT SYSTEMS** **3 0 0 3**

COURSE OBJECTIVES

- To explore the fundamentals of database management systems.
- To make the students understand the relational model.
- To familiarize database design.
- To familiarize with the different types of transaction concepts.
- To make the students understand the implementation and security issues in databases.

UNIT 1 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-RDiagrams -- 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 solation Levels –ISQL 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 this course, the students will be able to

- use the relational model, ER diagrams.
- write queries in structural query language.
- design the database using various normal forms.
- understand the transaction concepts and locking protocols.

- implement database concepts with security.

TEXT BOOKS

1. Silberschatz, H.Korth and Sudarshan S., "Database System Concepts", 6th Edition, McGraw-Hill International, 2010.

REFERENCES

1. Elmasri R. and Shamakant B. Navathe, "Fundamentals of Database Systems", 6th Edition, AddisionWesley ,2011.
2. AtulKahate, "Introduction to Database Management Systems", Pearson Education, New Delhi, 2006.
3. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata McGraw Hill, 2010.
4. G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 2011.
5. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems",Eighth Edition, Pearson Education, 2006.

WEB LINKS

1. http://www.nptelvideos.in/2012/11/database-management-system.html
2. https://www.youtube.com/watch?v=1057YmExS-I
3. http://freevideolectures.com/Course/2668/Database-Management-System

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	PSO 2
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
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CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2
CO5	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16403 **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 if this course, students will be able to

- identify the approach of different machine architecture.
- study of machine dependent and independent assembler algorithms and program relocation.
- design of various linker loader and program linking.
- study of machine independent macro processors.
- understand the text editors and debugging systems.

TEXT BOOKS

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

REFERENCES

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill 2000.
2. John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 2000.
3. John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000shing company,1994

WEB LINKS

1. .http://study.com/academy/topic/systems-software.html
2. https://www.youtube.com/watch?v=VG9VopzV_T0
3. https://www.youtube.com/watch?v=6ipFf3vLifU&list=PLRjiB7KcljoS22wmROkUKZ8zD4_Fj8U2R

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**	**PSO 2**
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
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CO5	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16404 **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 AND 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 AND 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 this course, students will 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. Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011
2. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 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", McGraw Hill Publisher, 2011.
5. William Stallings, "Data and Computer Communication", Sixth Edition, Pearson Education, 2000

WEB LINKS

1. https://www.youtube.com/watch?v=3DZLItfbqtQ&list=PL1EC310A0BF4B2CA7
2. https://www.youtube.com/watch?v=zzXs0EnCin0
3. https://www.youtube.com/watch?v=aNqiTCZ-nko

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

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CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2
CO5	2	2	2	2	2	-	-	-	-	-	2	1	2	2

EC16408 MICROPROCESSOR AND MICROCONTROLLER 3 0 0 3

COURSE OBJECTIVES

- To study the architecture of 8086 microprocessor.
- To learn the design aspects of I/O and memory interfacing circuits.
- To have a knowledge about programming of 8086 microprocessor
- To study the architecture of 8051 microcontroller.
- To study the keyboard interfacing.

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.

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

Addressing modes –Basic configuration and Interrupts – 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 Motor – Stepper Motor – Keyboard Interfacing – ADC, DAC – External Memory Interface.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of this course, the students will be able to

- design and implement programs on 8086 microprocessor.
- design i/o circuits.
- design memory interfacing circuits.
- design and implement 8051 microcontroller based systems.
- design and implement ADC and DAC

TEXT BOOKS

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

REFERENCES

1. DoughlasV.Hall, “Microprocessors and Interfacing, Programming and Hardware”,TMH,2012

2. A.K.Ray& K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Tata McGraw Hill , 2006.

WEB LINKS

1. http://nptel.ac.in/courses/108107029
2. https://www.youtube.com/watch?v=liRPtvj7Bfu
3. http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/microcontrollers/micro/ui/Course_home2_5.htm
4. http://nptel.ac.in/courses/117104072/
5. https://www.smartzworld.com/notes/microprocessors-and-microcontrollers-mpmc/

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

CS16405 DATA BASE MANAGEMENT SYSTEMS LABORATORY 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 a query language

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 this course, students will 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

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	PSO 2
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16406 NETWORKS LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To learn socket programming.
- To be familiar with simulation tools.
- performance of the protocols in different layers
- To have hands on experience on various networking protocols.

LIST OF EXPERIMENTS

1. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
2. Study of Socket Programming and Client – Server model
3. Write a code simulating ARP /RARP protocols.
4. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
   - Link State routing
   - Distance vector
5. Applications using TCP Sockets like
   - Echo client and echo server
   - File transfer
   - Remote command execution
   - 5.4 Chat
6. Applications using TCP and UDP Sockets like
   - DNS
7. Applications using Raw Sockets like
   - Ping
   - 7.2. Trace route
8. Write a program to implement RPC (Remote Procedure Call)
9. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS
10. Study of TCP/UDP performance

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of this course, students will be able to

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

REFERENCE: Spoken-tutorial.org.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE

- C / C++ / Java / Equivalent Compiler 30
- Network simulator like NS2/Glomosim/OPNET/ Equivalent

HARDWARE: Standalone desktops

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**	**PSO 2**
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2

EC16409 MICROPROCESSOR AND MICROCONTROLLER LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To implement the assembly language programming of 8086 and 8051.
- To experiment the interface concepts of various peripheral device with the processor.
- To understand the basic idea about the data transfer schemes and its applications.
- To develop skill in simple program writing for 8051 & 8086 and applications

Assembly Language programming using 8086 and MASM

1. Basic arithmetic and Logical operations.
2. Move a data block without overlap.
3. String manipulations
4. Sorting and searching

Interfacing with 8086 microprocessor

5. Stepper motor control.
6. Key board and

Display.7.Serial

interface 8.Parallel

interface

Programming using 8051 microcontroller

9. Basic arithmetic and Logical

operations.10.ADC and DAC

INTERFACE

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of this course, students will be able to

- write assembly language programmes for various applications.
- interface different peripherals with microprocessor.
- execute programs in 8051.
- develop strong competencies in physics and its applications in a technology-rich, interactive.

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**	**PSO 2**
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2