SRI KRISHNA INSTITUTIONS

SRI KRISHNA COLLEGE OF TECHNOLOGY
&
SRI KRISHNA COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF COMPUTER APPLICATIONS

COMMON CURRICULUM

DESIGNED FOR

REGULATION 2016

Applicable for students admitted from

2016-2019

SRI KRISHNA INSTITUTIONS

CURRICULUM DESIGN UNDER REGULATION 2016

College Vision

To produce Globally Competitive Engineers with High Ethical Values and Social Responsibilities.

College Mission

Our mission is to impart highest quality of technical education providing impetus to research and development, foster innovation in the technological growth, encourage entrepreneurship and strive to solve problems of mankind. We also endeavour to embed the greatest values of human life and inculcate the will to attain progress and prosperity in life in socially accepted norms, to remain an asset to our nation and be a part of its pride and heritage.

Department Vision

To enrich the knowledge of students through value based education and to endeavour for constant upgradation of technical expertise of faculty and students to cater to the needs of the society.

Department Mission

- To provide high quality education in the field of Computer Applications to tomorrow's technocrats and software professionals.
- Programmed teaching and hands on training with the state of the art implements.
- To impart highly essential qualities of team spirit, dedication and the art of leadership to its wards.

PROGRAM EVALUATION COMMITTEE MEMBERS

S.NO	NAME	DESIGNATION AND ADDRESS	MAIL ID	CONTACT NO	Expert
1.	Dr.R.Shanmugalakshmi,	Associate Professor, Department of Computer Science and Engineering, Govt College of Technology, Coimbatore-13	drshanmi@gct.ac.in	9443402482	Academician
2.	Dr.Ranga Rajagopal,	Director, ACCENT Technologies,1084/4,Sungam, Trichy road,Coimbatore-641 018.	ranga_gopal1@rediffmail.com	9442631004	Industry

PROGRAM ASSESMENT COMMITTEE MEMBERS

NAME	DESIGNATION AND ADDRESS	MAIL ID	CONTACT NO	Expert
Dr. S. Lovelyn Rose	Associate Professor, Department of Computer Science and Engineering, PSG College of Technology, Coimbatore	slr@ity.psgtech.ac.in	9786300365	Academician
Mr.M.N.Anandan	Senior Associate , CTS, Siruseri, Chennai	Anandanmonnin.narasimachari@cognizant.com	9840981746	Industry
Mr.Ganesh Ram.K	Senior Software Engineer, Siemens, Bangalore	Ganeshram.k@siemens.com	9611833770	Alumni

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1 To prepare the students for gainful employment and engage them in holistic application of the knowledge in the industry.

PEO2 To inculcate in computer graduates academic interest and aptitude to actively pursue research and consultancy appointments.

PROGRAMME OUTCOMES

PO–A Graduates would be able to apply knowledge to solve problems and design efficient software.

PO–B Graduates would be able to identify, formulate, and analyze problems and arrive at solutions.

PO–C Graduates can apply the software technology to solve mathematical, computing, communications/networking and commercial problems.

PO–D Graduates will have an understanding of professional and ethical responsibility.

PO–E Graduates will have the ability to communicate effectively.

PO-F Lifelong learning to update their knowledge in latest technologies.

SEMESTER I							
S No.	**Course Code**	**Course**	**L/T/P**	**Contact hrs/week**	**Credit**	**Ext/Int**	**Category**
1	16MA101	Mathematical Foundations of Computer Science	3/2/0	5	4	60/40	PC
2	16MA102	Digital Principles and Computer Organization	4/0/0	4	4	60/40	PC
3	16MA103	Problem Solving and C Programming	4/0/0	4	4	60/40	PC
4	16MA104	System Software	3/0/0	3	3	60/40	PC
5	16MA105	Fundamentals of Web design	3/0/0	3	3	60/40	PC
6	16PH101	Communication Skills – I	2/0/2	4	3	60/40	FCG
7	16MA106	Programming in C Laboratory	0/0/3	3	2	40/60	PC LAB
8	16MA107	Office Automation Laboratory	0/0/3	3	2	40/60	PC LAB
9	16MA108	Web design Laboratory	0/0/3	3	2	40/60	PC LAB
			Total	**32**	**27**	**900**	

SEMESTER II							
S No.	**Course Code**	**Course**	**L/T/P**	**Contact hrs/week**	**Credit**	**Ext/Int**	**Category**
1	16MA201	Data Structures	4/0/0	4	4	60/40	PC
2	16MA202	Database System concepts	4/0/0	4	4	60/40	PC
3	16MA203	Object Oriented Programming in C++	3/0/0	3	3	60/40	PC
4	16MA204	Operating System concepts	4/0/0	4	4	60/40	PC
5	16MA205	Computer Graphics and Multimedia	3/0/0	3	3	60/40	PC
6	16PH102	Communication Skills – II	2/0/2	3	3	60/40	FCG
7	16MA206	Programming in C++ Laboratory	0/0/3	3	2	40/60	PC LAB
8	16MA207	Data Structures Laboratory	0/0/3	3	2	40/60	PC LAB
9	16MA208	RDBMS Laboratory	0/0/3	3	2	40/60	PC LAB
			Total	**30**	**27**	**900**	

SEMESTER III							
S No.	**Course Code**	**Course**	**L/T/P**	**Contact hrs/week**	**Credit**	**Ext/Int**	**Category**
1	16MA301	Advanced Data Structures and Algorithms	4/0/0	4	4	60/40	PC
2	16MA302	Advanced Web Technology	3/0/0	3	3	60/40	PSC
	16MA303	Object Oriented Analysis and Design					
3	16MA304	Fundamentals of Java Programming	3/0/0	3	3	60/40	PC
4	16MA305	Software Engineering	3/0/0	3	3	60/40	PC
5	16MA306	Computer Communication and Networks	3/0/0	3	3	60/40	PC
6	16MAOE	Open Elective	3/0/0	3	3	60/40	OE
7	16MA307	Java Programming Laboratory	0/0/3	3	2	40/60	PC LAB
8	16MA308	Advanced dataStructures and algorithms Laboratory	0/0/3	3	2	40/60	PC LAB
9	16MA309	Software development Laboratory	0/0/3	3	2	40/60	PC LAB
			Total	**28**	**25**	**900**	

SEMESTER IV							
S No.	**Course Code**	**Course**	**L/T/P**	**Contact hrs/week**	**Credit**	**Ext/Int**	**Category**
1	16MA401	Applied Probability and Statistics	3/2/0	5	4	60/40	BS
2	16MA402	Unix Architecture and Programming	3/0/0	3	3	60/40	PC
3	16MA403	Enterprise computing	3/0/0	3	3	60/40	PC
4	16MA404	Security in Computing	3/0/0	3	3	60/40	PSC
	16MA405	Internet of Things					
5	16MAE1	Professional Elective-I	3/0/0	3	3	60/40	PE
6	16MC409	Mandatory Course	-	-	-	-	MC
7	16MA406	Unix Laboratory	0/0/3	3	2	40/60	PC LAB
8	16MA407	Enterprise Computing Laboratory	0/0/3	3	2	40/60	PC LAB
9	16MA408	Quantitative Aptitude Laboratory	0/0/3	3	2	40/60	PC LAB
		Total		**26**	**22**	**800**	

SEMESTER V							
S No.	**Course Code**	**Course**	**L/T/P**	**Contact hrs/week**	**Credit**	**Ext/Int**	**Category**
1	16MA501	Software Quality and Assurance	3/0/0	3	3	60/40	PC
2	16MA502	Data Mining	4/0/0	4	4	60/40	PC
3	16MAE2	Professional Elective II	3/0/0	3	3	60/40	PE
4	16MAE3	Professional Elective III	3/0/0	3	3	60/40	PE
5	16MA503	Mobile Application Development	3/0/0	3	3	60/40	PSC
	16MA504	Open Source Computing					
6	16MA505	Software Quality and testing Laboratory	0/0/3	3	2	40/60	PC LAB
7	16MA506	Data Mining Laboratory	0/0/3	3	2	40/60	PC LAB
8	16MA507	Open Source Tools Laboratory	0/0/3	3	2	40/60	PC LAB
		Total		**25**	**22**	**800**	

SEMESTER VI							
S No.	**Course Code**	**Course**	**L/T/P**	**Contact hrs/week**	**Credit**	**Ext/Int**	**Category**
1	16MA601	Project Work	0/0/28	0	14	60/40	PW
		Total		**0**	**14**	**100**	

ELECTIVE/AUDIT COURSES (3+9 Credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
OPEN ELECTIVES						
1	16MAO1	Web Graphics	3/0/0	3	3	OE
2	16MAO2	Responsive Web Design	3/0/0	3	3	OE
3	16MAO3	Graph theory	3/0/0	3	3	OE
4	16MAO4	Optimization techniques	3/0/0	3	3	OE
PROFESSIONAL ELECTIVES						
Elective Stream I- Computing Technologies						
1	16MAE41	Design Patterns	3/0/0	3	3	PE
2	16MAE42	Extreme programming	3/0/0	3	3	PE
3	16MAE43	Data Analysis Tool	3/0/0	3	3	PE
4		Special Elective *	3/0/0	3	3	PE
Elective Stream II- Networks & Cloud Computing						
1	16MAE51	Cloud Computing Technology	3/0/0	3	3	PE
2	16MAE52	Storage Systems and Management	3/0/0	3	3	PE
3	16MAE53	TCP/IP	3/0/0	3	3	PE
4		Special Elective *	3/0/0	3	3	PE
Elective Stream III- Knowledge Engineering						
1	16MAE54	Business Intelligence	3/0/0	3	3	PE
2	16MAE55	Artificial Intelligence	3/0/0	3	3	PE
3	16MAE56	Big Data Analytics	3/0/0	3	3	PE
4		Special Elective *	3/0/0	3	3	PE

***Special Elective**

Special Elective will be offered based on the current trends in the industry.
(Syllabus will be updated before offering)

MANDATORY COURSE

S. No	Name of the Course	L/T/P	Contact Hours/Wk	Credits
1.	Business English Course/ IELTS/TOEFL/GATE/GRE/Foreign Language/any international competitive examinations/MOOC Certification//Industry Certification	-	-	-

EMPLOYABILITY ENHANCEMENT SKILLS (2 credits)

S. No	Name of the Course		L/T/P	Contact Hours/Wk	Credits
1.	Industrial Practice	One 1 Credit Courses	-	-	1
2.	Publication in refereed Journals or Conferences (National/International)		-	-	1

Total Number of Credits: 139

ONE CREDIT COURSES

S.No	Course Code	Course Title	Credits
1.	16MA701	Software Testing	1
2.	16MA702	Perl	1
3.	16MA703	Ruby on Rails	1
4.	16MA704	Tally	1
5.	16MA705	ANDROID	1
6.	16MA706	IOS	1
7.	16MA707	NS2	1
8.	16MA708	Networking	1
9.	16MA709	Virtual reality	1
10.	16MA710	Financial Management	1

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

S. No	Stream	Credits/Semester						Credits	Courses		%
		I	II	III	IV	V	VI		Theory	Lab	
1.	Humanities (HS)	3	3	-	-	-	-	6	2	-	4.3
2.	Basic Sciences(BS)	-	-	-	4	-	-	4	1	-	2.9
3.	Professional Core(PC)	24	24	19	12	13	-	92	18	14	66.2
4.	Professional Soft Core(PSC)	-	-	3	3	3	-	9	3	-	6.5
5.	Professional Electives(PE)	-	-	-	3	6	-	9	3	-	6.5
6.	Open Electives(OE)	-	-	3	-	-	-	3	1	-	2.2
7.	Project Work(PW)	-	-	-	-	-	14	14	-	-	10
8.	Employability Enhancement Skills							2	-	-	1.4
Total		27	27	25	22	22	14	139	28	14	100

EMPLOYABILITY ENHANCEMENT SKILLS (2 credits)

S. No	Name of the Course		L/T/P	Contact Hours/Wk	Credits
1.	Industrial Practice	One 1 Credit Courses	-	-	1
2.	Publication in refereed Journals or Conferences (National/International)		-	-	1

HUMANITIES SCIENCES (6 credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.		Communication Skills -I	2/0/2	3	3	FCG
2.		Communication Skills-II	2/0/2	3	3	FCG

BASIC SCIENCES (4 Credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.		Applied Probability and Statistics	3/2/0	5	4	BS

PROFESSIONAL CORE (91 credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.	16MA101	Mathematical Foundations of Computer Science	3/2/0	5	4	PC
2.	16MA102	Digital Principles and Computer Organization	4/0/0	4	4	PC
3.	16MA103	Problem Solving and C Programming	4/0/0	4	4	PC
4.	16MA104	System Software	3/0/0	3	3	PC
5.	16MA105	Fundamentals of Web design	3/0/0	3	3	PC
6.	16MA106	Programming in C Laboratory	0/0/3	3	2	PC LAB
7.	16MA107	Office Automation Laboratory	0/0/3	3	2	PC LAB
8.	16MA108	Web design Laboratory	0/0/3	3	2	PC LAB
9.	16MA201	Data Structures	4/0/0	4	4	PC
10.	16MA202	Database System concepts	4/0/0	4	4	PC
11.	16MA203	Object Oriented Programming in C++	3/0/0	3	3	PC
12.	16MA204	Operating System concepts	4/0/0	4	4	PC
13.	16MA205	Computer Graphics and Multimedai	3/0/0	3	3	PC
14.	16MA206	Programming in C++ Laboratory	0/0/3	3	2	PC LAB
15.	16MA207	Data Structures Laboratory	0/0/3	3	2	PC LAB
16.	16MA208	RDBMS Laboratory	0/0/3	3	2	PC LAB
17.	16MA301	Advanced Data Structures and Algorithms	4/0/0	4	4	PC
18.	16MA304	Fundamentals of Java Programming	3/0/0	3	3	PC
19.	16MA305	Software Engineering	3/0/0	3	3	PC
20.	16MA306	Computer Communication and Networks	3/0/0	3	3	PC
21.	16MA307	Java Programming Laboratory	0/0/3	3	2	PC LAB
22.	16MA308	Advanced Data structures and algorithms Laboratory	0/0/3	3	2	PC LAB
23	16MA309	Software Development Laboratory	0/0/3	3	2	PC LAB

24.	16MA402	Unix Architecture and Programming	4/0/0	4	4	PC
25.	16MA403	Enterprise computing	3/0/0	3	3	PC
26.	16MA406	Unix Laboratory	0/0/3	3	2	PC LAB
27.	16MA407	Enterprise Computing Laboratory	0/0/3	3	2	PC LAB
28.	16MA408	Quantitative Aptitude Laboratory	0/0/3	3	2	PC LAB
29.	16MA501	Software Quality and Assurance	3/0/0	3	3	PC
30.	16MA502	Data Mining	4/0/0	4	4	PC
31.	16MA505	Software Quality and testing Laboratory	0/0/3	3	2	PC LAB
32.	16MA506	Data Mining Laboratory	0/0/3	3	2	PC LAB
33.	16MA507	Open Source tools laboratory	0/0/3	3	2	PC LAB

PROFESSIONAL SOFT CORE (9 Credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.	16MA302	Advanced Web Technology	3/0/0	3	3	PSC
2.	16MA303	Object Oriented Analysis and Design	3/0/0	3	3	PSC
3.	16MA404	Security in Computing	3/0/0	3	3	PSC
4.	16MA405	Internet of Things	3/0/0	3	3	PSC
5.	16MA503	Mobile Application Development	3/0/0	3	3	PSC
6.	16MA504	Open Source Computing	3/0/0	3	3	PSC

L - Lecture T - Tutorial P - Practical

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA101	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	3	2	0	4

Course pre-requisite

NIL

Course Objectives

1. To provide strong foundation to the students to expose various emerging new areas of applied mathematics and appraise them with their relevance in their technological field.
2. To learn the techniques for constructing mathematical proofs

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Read, understand and apply definitions and theorems in basic discrete mathematics.
CO2: Formulate simple definitions, examples and proofs in discrete mathematics.
CO3: Execute the graph algorithm in computer science applications
CO4: Design and Construct the automata and grammars, and the relation between them

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - MATHEMATICAL LOGIC (12 Hours)		
Propositions − Truth table-logical operators- Tautologies and contradiction	CO1	Understanding
Logical equivalences and implications- Laws of logic		Analyzing
Normal forms − Proofs in propositional calculus		Understanding
Direct proof – conditional conclusion		Understanding
Indirect proof − Inconsistent set of premises.		Understanding
UNIT II - RELATIONS AND FUNCTIONS (12 Hours)		
Relations- Properties of relations –-s. Functions – Injective, surjective, bijective functions −	CO2	Applying
Equivalence relation – Equivalence classes- Partition of sets		Applying
Composition of relations − Closure operations on relation		Applying
Functions – Injective, surjective, bijective functions		Understanding
Composition of functions – Inverse functions		
UNIT III - RECURRENCE RELATIONS (12 Hours)		
Recurrence relation models – Solution of linear recurrence relations–	CO2	Understanding
Divide and conquer recurrence relations		Applying
Solution base substitution		Applying

Master's theorem.		Analyzing
UNIT IV - GRAPH THEORY (12 Hours)		
Basic Concepts − Types of graphs − Matrix representation of graphs – Paths – Cycles	CO3	Understanding
Trees − Spanning Trees		Remembering
Algorithms: Dijikstra's shortest path,		Analyzing
Prim's and Kruskal's algorithms for minimum cost spanning tree.		Applying
UNIT V - FORMAL LANGUAGES & FINITE AUTOMATA (12 Hours)		
Formal Languages: Four classes of grammars (Phrase Structure, context sensitive, context free, regular) -	CO4	Understanding
Finite State Automata		Understanding
- Non-Deterministic Finite State Automata (NFSA),		Evaluate
Conversion of NDFSA to DFSA-		Apply
Acceptance of regular set by an FSA-		Apply
Construction of a right linear grammar from a finite automata		Create
SELF STUDY: Graph Mining in Social Network Analysis		

TOTAL HOURS:60

TEXT BOOKS:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Fifth Edition, TMH, 2015
2. Kolman, Busby and Ross, "Discrete Mathematical Structures", Pearson Education,4th edition, 2013.
3. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002.

REFERENCE BOOKS:

1. Judith L.Gersting, "Mathematical Structures for Computer Science", W.H.Freeman and Company, Newyork, 2006.
2. M.K. Venkataraman, N. Sridharan and N.Chandrasekaran," Discrete Mathematics", The National Publishing Company, 2003.
3. T.Veerarajan, Discrete Mathematics with Graph theory and combinatorics, 2008

WEB REFERENCES:

1. www.nptel.ac.in

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA102	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION	4	0	0	4

Course pre-requisite

NIL

Course Objectives

1. To Introduce the design and organization of digital computers by showing the relationship between hardware and software
2. To focus on the concepts of microprocessors, machine language, instruction set architecture memory hierarchy and input/output communication.
3. To have better understanding and utilization of digital computers

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Describe various data representations and explain how arithmetic and logical operations are performed by computers.
CO2: Describe organization of digital computers and explain the basic principles and operations of different components.
CO3: Test the performance of CPU, memory and I/O operations.
CO4: Design a basic computer system using the major components.
CO5: Design and Construct low-level programs to perform different basic instructions.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION TO DIGITAL DESIGN (12 Hours)		
Data Representation - Data Types - Complements - Arithmetic Operations	CO1	Remember
Representations -Fixed Point, Floating Point , Error detection codes - Binary Codes		Remember
Logic Gates, Boolean Algebra, Map Simplification		Understanding
Combinational Circuits: Half-Adder, Full Adder- Flip Flops - Sequential Circuits		Understanding
UNIT II- DIGITAL COMPONENTS - REGISTER TRANSFER & MICRO OPERATIONS (12 Hours)		
ICs - Decoders - Multiplexers - Registers - Shift Registers	CO2	Remember
Binary Counters -Memory Unit - Bus And Memory Transfers		Remember
Arithmetic, Logic And Shift Micro Operations		Understanding
Arithmetic Logic Shift Unit		Understanding

UNIT III - COMPUTER ORGANIZATION AND PROGRAMMING (12 Hours)		
Instruction Codes - Computer Registers - Computer Instructions - Timing And Control	CO5	Create
Instruction Cycle - Memory Reference Instructions		Create
I/O And Interrupt - Program Loops		Create
Programming Arithmetic and Logic Operations - Subroutines - I/O Programming		Create
UNIT IV - INPUT - OUTPUT ORGANIZATION (12 Hours)		
Peripheral Devices - Input-Output Interface	CO3	Understanding
Asynchronous Data Transfer - Modes Of Transfer		Remembering
Priority Interrupt - DMA		Analyzing
IOP - Serial Communication		Applying
UNIT V - MEMORY ORGANIZATION AND CPU (12 Hours)		
Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory	CO4	Understanding
Cache Memory - Virtual Memory - Memory Management Hardware		Understanding
CPU: General Register Organization - Control Word - Stack Organization		Understanding
Instruction Format - Addressing Modes - Data Transfer And Manipulation - Program Control		Understanding
SELF STUDY: Simple Scalar Package and SMP Cache		

TOTAL HOURS:60

TEXT BOOKS:

1. M.Morris Mano, "Computer System Architecture", Pearson Education, 3rd edition, 2012
2. M.Morris Mano , "Digital Logic & Computer Design", Prentice Hall of India ,2006.

REFERENCE BOOKS:

1. M.Morris Mano , Michael D. Ciletti "Digital Design", Pearson Education, 2012.
2. Alan B.Marcovitz, "Introduction to Logic Design", Tata McGrawHill, Second Edition, 2005.
3. Anil.K.Maini, "Digital Electronics:Principles,DevicesandApplications",John Wiley and Sons,2007.

WEB REFERENCES:

1. http://iitd.vlab.co.in

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA103	PROBLEM SOLVING AND C PROGRAMMING	4	0	0	4

Course pre-requisite

NIL

Course Objectives

1. To study the concept of the problem solving techniques and to solve simple and complex problems.
2. To understand the applicability of different simple and user-defined data types and working of different control structures, function and pointers.
3. To understand the concept of a program in a high-level language being translated by a compiler into machine language program and then executed
4. To develop applications by breaking them into modules and writing efficient and portable code.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the problem solving aspects and fundamental algorithms.

C**O2:** Write, compile and debug programs in C language using loops, Functions and Arrays.

CO3: Design programs involving Pointers and structures.

CO4: Explain preprocessors and develop file handling real time applications.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION TO COMPUTER PROBLEM-SOLVING (12 Hours)		
Introduction - The Problem solving Aspect - Implementation of Algorithms	CO1	Understanding
Fundamental Algorithms-Exchanging the values of Two Variables - Counting		Analyzing
Summation of a set of Numbers - Factorial Computation-		Analyzing
Sine function computation - Generation of the Fibonacci sequence		Analyzing
Reversing the Digits of an Integer - Base Conversion.		Analyzing
UNIT II - C LANGUAGE PRELIMINARIES (12 Hours)		
Overview & History of C language - Data types, Variables and Constants - Operators	CO2	Understanding
Type Modifiers and Expressions - Basic Input/Output. Arithmetic, unary, logical, bit-wise, assignment and conditional operators ,		Understanding
Control and Looping Constructs		Applying
Storage Classes-Automatic, external, register and static		Understanding

variables.		
UNIT III - FUNCTIONS & ARRAYS (12 Hours)		
Defining and accessing, passing arguments, Function prototypes	CO2	Understanding
Recursion, Library functions, Static functions,		Applying
Arrays - its storage structures and operation, Defining and processing		Applying
Passing arrays to functions		Applying
Multi-dimensional arrays.		Analyzing
UNIT IV - DYNAMIC DATA STRUCTURES (12 Hours)		
Structures - Unions	CO3	Understanding
Pointers-Array and Multidimensional array-using Pointers.		Applying
Strings using pointers		Analyzing
Structure using pointers		Applying
Arrays of pointers -Functions and Pointers-Function Pointers-		Creating
DMA.		Understanding
UNIT V - MISCELLANEOUS FEATURES (12 Hours)		
C Preprocessor - Define, include, macro's, ifdef	CO4	Applying
File Handling in C- Concepts - Character and File I/O-Simple File I/O		Creating
The Standard I/O Routines -Random Access Files		Understanding
Command Line Arguments -Operation on Bits		Analyzing
SELF STUDY: TSR Programming		

TOTAL HOURS:60

TEXT BOOKS:

1. R.G.Dromey, "How to Solve it by Computer", Pearson Education, India, 2007.
2. Herbert Schildt, "C - The Complete Reference", Tata McGraw Hill Publishing Company, New Delhi, Fourth Edition, 2005.

REFERENCE BOOKS:

1. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, New Delhi, Second Edition, 2006.
2. Yashavant P. Kanetkar , " Let us C",8th Edition, Infinity Science Press, 2008.
3. Pradip Dey and Manas Ghosh," Programming in C", Oxford University Press, New Delhi, 2007.

WEB REFERENCES:

1. www.tutorialspoint.com/cprogramming
2. www.w3schools.in/c-tutorial

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA104	SYSTEM SOFTWARE	3	0	0	3

Course pre-requisite

NIL

Course Objectives

1. To understand the basic structure and design of an assembler.
2. To understand the working of assemblers, loaders, compilers, and operating systems.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the working of language processors and compilers

C**O2:** Understand the working of Assemblers

CO3: Design machine dependent linkers, loaders and macro processors.

CO4: Explain phases of compiler and develop different utilities.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Basic concepts	CO1	Understanding
Machine structure		Understanding
Simplified Instructional Computer		Remembering
SIC/XE-System programming.		Analyzing
UNIT II - ASSEMBLERS (9 Hours)		
Functions	CO2	Understanding
Machine dependent and Machine independent assembler		Understanding
Features - Design options		Applying
Implementation - Example - MASM Assembler		Understanding
UNIT III - LOADERS AND LINKERS (9 Hours)		
Functions	CO3	Understanding
Machine dependent and Machine independent loader features		Applying
Design options- Implementation		Applying
Example - MSDOS Linker.		Applying
UNIT IV - MACRO PROCESSORS (9 Hours)		
Functions	CO3	Understanding
M/C independent macro processor features		Applying
Macro processor design options		Analyzing
Implementation		Applying
Example - MASM Macro processor		Understanding

UNIT V - COMPILERS AND UTILITIES (9 Hours)		
Introduction to compilers.	CO4	Applying
Different phases of compiler - System software tools		Understanding
Text editors - Interactive debugging systems		Understanding
SELF STUDY: Latest system software tools		

TOTAL HOURS:45

TEXT BOOKS:

1. Dhamdhere D M, "Systems Programming and Operating Systems", Tata McGraw Hill Publishing Company, New Delhi,2nd revised edition 2009.
2. John J Donovan, “Systems Programming”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2009.
3. James E.Smith and Ravi Nair, “Virtual Machines”, Elsevier, 2005.

REFERENCE BOOKS:

1. Leland L Beck, "System Software- An Introduction to System Programming", Pearson Education, New Delhi,3rd edition, (6th Impression)2007.
2. J.Nithyashri, “System Software”, Tata Mc-graw Hill Publishing Company Limited, New Delhi, 2nd Edition 2010.

WEB REFERENCES:

1. www.tutorialspoint.com/systemsoftware

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA105	FUNDAMENTALS OF WEB DESIGN	3	0	0	3

Course pre-requisite

NIL

Course Objectives

1. To produce web site designers whose work far exceeds the industry standard
2. To develop companies' in-house capability in business critical web technologies
3. To enhance companies' strategic independence and profitability by adhering to official website design standards

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1. To Study the Web Technology concepts and developments

CO2. Apply critical thinking and problem solving skills required to successfully design and implement a web site.

CO3. Demonstrate the ability to analyze, identify and define the technology required to build and implement a web site.

CO4. Demonstrate knowledge of artistic and design components that are used in the creation of a web site.

CO5. Utilize and apply the technical, ethical and interpersonal skills needed to function in a cooperative environment.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I Web Design Principles (9 Hours)		
Brief History of Internet	CO1	Understanding
World Wide Web - Web Standards Basic principles involved in developing a web site		Analyzing
Planning process - Five Golden rules of web designing		Understanding
Fundamental of SEO (Search Engine Optimization) - Web Designing Software		Understanding
		Understanding
UNIT – II HTML (9 Hours)		
HTML Documents - Basic structure of an HTML document - Creating an HTML document	CO2	Understanding
Mark up Tags- Heading-Paragraphs - Line Breaks- HTML Tags-Elements of HTML, Working with Text- Working with Lists		Applying
Tables and Frames		Applying
Working with Hyperlinks, Images and Multimedia		Applying
Working with Forms and controls		Applying

UNIT III CASCADING STYLE SHEETS (9 Hours)		
Concept of CSS - Creating Style Sheet - CSS Properties – CSS Styling	CO23	Understanding
Working with block elements and objects Working with Lists and Tables- CSS Id and Class- Box Model		Applying
XML – Fundamentals – XML Syntax- XML Namespaces		Applying
DTD - XSD - XSL-XSLT		Analyzing
UNIT IV JAVA SCRIPT (CLIENT SIDE SCRIPTING) (9 Hours)		
Introduction- Variable, If-Else, Switch -Operators	CO4	Understanding
Pop-ups, Functions, Loops		Remembering
Forms, Events, and Event Handling - Try-Catch		Analyzing
JavaScript Programming - JavaScript Object		Applying
UNIT V PHP(SERVER SIDE SCRIPTING) (9 Hours)		
Introduction to PHP Origins and uses of PHP- Overview of PHP	CO5	Understanding
General Syntactic Characteristics-Primitives-Operations Expressions - Output- Control Statements		Applying
Arrays- Functions		Applying
SELF STUDY: Content Management System		

TOTAL HOURS:45

TEXT BOOKS:

1. Kogent Learning Solutions Inc, “HTML 5 in simple steps”, Dreamtech Press, 2013
2. Murray,Tom/Lynchburg, “Creating a Web Page and Web Site”, College,2013.
3. John Duckett, “Beginning HTML, XHTML, CSS and JavaScript”. Wiley India, 2012
4. Rasmus Lerdorf; Kevin Tatroe,” Programming PHP”, OreillyPublishers and Distributors, 2014

REFERENCE BOOKS:

1. C. Steven M. Schafel, “HTML, XHTML, and CSS Bible”, 5th edition, Wiley India, 2010
2. David Hunter; Andrew Watt; Jeff Rafter, “Beginning XML”, Wiley India,2012
3. Ian Pouncey, Richard York, “Beginning CSS: Cascading Style Sheets for Web Design”, Wiley India, 2012

WEB REFERENCES:

1. www.webtechnologies.co.tz
2. globalwebtechnologies.com
3. https://php.net

Course Code	Course Name	Contact Hours			
		L	T	P	C
16PH101	COMMUNICATION SKILLS I	2	0	2	3

Course pre-requisite

NIL

Course Objectives

1. To equip the students with the LSRW skills
2. To develop communication skills and soft skills
3. To facilitate the students to use the Language efficiently at work place.
4. To prepare the students for all competitive exams like BEC/ IELTS/ TOEFL

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understanding and intensely focus on improving and increasing LSRW Skills.
CO2: Understanding a good command over basic writing and reading skills.
CO3: Remembering language skills for business related situations.
CO4: Remembering and use vocabulary in corporate work environment.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - GENERAL INTRODUCTION (9 Hours)		
Getting to know people- Self introduction-Introducing others- Presenting about job - Presenting about working conditions- Presenting about company history and structure and Presenting about company activities.	CO1	Understanding
Instructions, Recommendations		Remembering
Present simple, Adverb of frequency, Simple past, Prepositions of time, Connectors of addition and contrast, Present Continuous, Parts of Speech, Gerunds and Infinitives.		Understanding
UNIT II - WORD POWER (9 Hours)		
Vocabulary practice- Business Vocabulary- Telephonic Conversation and Etiquette - Requests and obligation- Describing trends- Presenting about company performance- Reasons and consequences through reading practices- Describing products Dimensions, Process description - Presenting about product development - Synonyms-Antonyms.	CO2	Remembering
Jumbled sentences- Compare and contrast		Understanding
Adjectives and adverbs, Present perfect, Reasons and Consequences, Comparatives and superlatives, Question formation, Sequencing words, Present continuous, Articles, Prepositions.		Understanding

UNIT III - ESP / ENGLISH FOR ENGINEERS (9 Hours)		
Presenting about business equipment- Letter Phrases- Writing Test Practice- Presenting about hotel facilities – Presenting about traffic and transport, Making Predictions	CO3	Understanding
Report writing-Writing technical proposals		Understanding
Tenses- Present-Past-Future-Forms of verbs, Prefixes-Suffixes, Word Techniques- Formation.		Understanding
UNIT IV - PRESENTATION SKILLS AND EVENT MANAGEMENT (9 Hours)		
Presenting about conference arrangement–Checking and confirming details-Presentation about a conference before, after, when, until, etc. Listening Test Practice- Presenting about production processes- Presenting about quality control.	CO3	Remembering
Itinerary- Paragraph Writing - Essay Writing- Check list		Remembering
Passive forms and If- Conditionals		Understanding
UNIT V – ENGLISH FOR CORPORATE (9 Hours)		
Language use in call centers, insurance and changes in working practices(Future possibility/ Probability- Presenting about banking- Speaking Test Practice- Presenting about delivery services - Presenting about trading - Presenting about recruitment -Presenting about job applications (Indirect questions)- Reading, Writing and Listening Test)	CO4	Understanding
Job Application Letter and Resume Writing		Understanding
Prepositions of time, Tense review, indirect questions, Conditional 2 (hypothetical)		Understanding
LABORATORY COMPONENTS		
Listening Comprehension	CO1	Understanding
Self Introduction	CO3	Applying
Oral Presentation	CO4	Applying
Telephonic Conversation	CO3	Understanding
Conference Arrangement	CO4	Understanding

TOTAL HOURS: 45

TEXT BOOKS

1. Whitby, Norman, Cambridge English Business Benchmark Pre-Intermediate to Intermediate, Cambridge University Press, second Edition, 2016.
2. Rizvi Ashraf M , “Effective Technical Communication”, McGraw Hill Education
3. (India) PrivateLimited , 2016.
4. Dr Sumanth S, English for Engineers, Vijay Nicole Imprints Private Limited,
5. 2005.
6. Wood, Ian,Paul Sanderson, Anne Williams with Marjorie Rosenberg, Pass Cambridge BEC Preliminary , Cengage learning. Second Edition. 2014.

WEB REFERENCES:

1. http://www.cambridgeindia.org
2. http://www.cambridgeenglish.org/exams/business-certificates/business-preliminary

16MA106	PROGRAMMING IN 'C' LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS

1. Display the following:
(i) Floyd's triangle (ii) Pascal Triangle

2. Generate the following series of numbers:
(i) Armstrong numbers between 1 to 100
(ii) Prime numbers between 1 to 50
(iii) Fibonacci series up to N numbers

3. Manipulate the strings with following operations.
(i) Concatenating two strings (ii) Reversing the string (iii) Finding the substring
(iv) Replacing a string (v) Finding length of the string

4. Find the summation of the following series:
(i) Sine (ii) Cosine (iii) Exponential

5. Create the sales report for M sales persons and N products using two dimensional array.

6. Simulate following Banking operations using functions.
(i)Deposit (ii) Withdrawal (iii) Balance Enquiry

7. Implement using recursion
(i) Find the solution of Towers of Hanoi problem using recursion.
(ii) Fibonacci number generation.
(iii) Factorial

8. Generate Student mark sheets using structures.

9. Porgram to implement Union in C

10. Program to implement Enum in C

11. Create a collection of books using arrays of structures and do the following:
(i) Search a book with title and author name (ii) Sorts the books on title.

12. Perform function pointer, string operations using pointers.

13. Program to demonstrate dynamic memory management malloc, calloc, realloc and free

14. Create, Reading and displaying a sequential and random access file.

16.Program to solve puzzles.

Package creation

16MA107	OFFICE AUTOMATION LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS

Word

1. Creating and Formatting a simple document (using bulleted and Numbered list, adding Headers, Footers and Page numbers).
2. Navigating Long document with the Document Map Working with Tables (Create tables, editing tables, formatting tables, converting tables, sorting table contents, etc.,)
3. Mail Merge.

MS-EXCEL

1. Working with functions and formulae.
2. Presenting Data with Charts.
3. Performing What-If analysis with data table.
4. Summarize the data using pivot table.
5. Macros and its use in an application.
6. Import external data, use sort and filter options.

POWER POINT

1. Presentation using Text, images, graph, media file with animation
2. Creating self running presentations
3. Hiding and showing the slides

ACCESS

1. Creating a database (create a table, setting field properties and setting the key)
2. Retrieving data from more than one related table using queries (using Query Wizard)
3. Generating Report using Report Wizards.

Package creation

16MA108	WEB DESIGN LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS

1. Design a simple webpage using html tags to demonstrate the use of different tags
2. Design a web page which contains images, tables, Frames and also link within a page
3. Design web pages with forms and tables.
4. Design a web page by applying the different styles using inline, external & internal style sheets
5. Write a Javascript program to define a user defined functions and array
6. Design a web page to explain the use of various predefined functions in a string and math object in java script
7. Design a web page to explain the use of various predefined functions in a array & Date object in Javascript
8. Design a web page to demonstrate exception handling in JavaScript
9. Design an interactive session using Dream Weaver.
10. Design a web page with registration form and to validate the form using JavaScript code.
11. Create an web page using XML file
12. Create external style sheet and using the style sheet in xml file
13. Design a web page using PHP to demonstrate the different file handling methods.
14. Design a web page using PHP to demonstrate the different predefined function in array, Math, Data & Regular Expression

MINIPROJECT- HTML, DHTML, PHP, XML

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA201	DATA STRUCTURES	4	0	0	4

Course pre-requisite

NIL

Course Objectives

1. To provide the students a clear knowledge about, how different types of operations can be applied on various data structures.
2. It also provides different types of algorithms specifically available for sorting and searching, and how they can be applied on different types of data structures.
3. It also provides an analysis of advanced data structure problems.
4. After completing this course the students will be knowing about the different types of data structures available and how to implement them using a programming language.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Explain the operations for maintaining common data structures.
CO2: Write programs using linked structures such as List, trees, and graphs
CO3: Understand basic algorithms such as heap sort, graph traversal-based, sorting, hashing and write the program.
CO4: Design and apply appropriate data structures for solving computing problems.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (12 Hours)		
Abstract data types- List ADT-Stack ADT-Applications of Stack-Recursion	CO1	Understanding
Parenthesis Matching, Evaluation of Expressions		Understanding
Conversion of Infix to Postfix, Evaluation of Postfix Expressions		Understanding
Queue ADT -Priority Queues		Understanding
UNIT II- LINEAR DATA STRUCTURES (12 Hours)		
LISTS-Singly linked lists	CO2	Applying
Doubly linked lists-Circular lists		Applying
Polynomial Addition		Applying
Sparse Matrix representation		Applying
UNIT III - TREES (12 Hours)		
Trees - General, Binary trees	CO4	Create
Representation of Trees, Tree Traversals		Create
Binary Search trees		Create

UNIT IV - SORTING AND SEARCHING (12 Hours)		
Sorting - Internal Sorting	CO3	Understanding
Quick Sort, Heap Sort, Radix Sort		Remembering
External Sorting - Merge Sort		Understanding
Multi-way Merge Sort, Polyphase Sorting-Hashing		Understanding
UNIT V - GRAPHS AND THEIR APPLICATIONS (12 Hours)		
Graphs - Definitions - Traversals- Topological sort	CO4	Create
Shortest Path Algorithms - Dijkstra's Algorithm		Create
Network flow problems-Minimum Spanning Tree-Prim's Algorithm - Kruskal's Algorithm		Create
Applications		Create
SELF STUDY: Multidimensional and Metric data structures		

TOTAL HOURS:60

TEXT BOOKS:

1. Mark A Weiss, "Data Structures and Algorithm Analysis in C++", Addison Wesley, Fourth Edition, 2014.
2. Aaron M.Tanaenbaum, Yedidyah Langsam, Moshe J. Augenstein, "Data Structures using C" , Prentice Hall of India, 2007.

REFERENCE BOOKS:

1. Seymour Lipschutz, " Data Structures", Schaums Outline series, Tata McGraw Hill, NewDelhi, 2007.

WEB REFERENCES:

1. http://www.cplusplus.com/doc/tutorial/structures/

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA202	DATABASE SYSTEM CONCEPTS	4	0	0	4

Course pre-requisite

NIL

COURSE OBJECTIVES

1. To develop background knowledge as well as core expertise in Database Management Systems.
2. To understand database design and normalization techniques
3. To use standard query language and its various versions.
4. To understand importance of transaction, backup and recover techniques.
5. To develop database system to handle the real world problem.

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1: Understand database concepts and data modeling of applications.
CO2: Design and Implement SQL: Data definition, constraints, schema, queries and operations in SQL
CO3: Understand data models, schemas and instances, storage organizations concepts.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (12 Hours)		
Database Systems vs. File Systems-View of Data	CO1	Understand and Remember
Data Models-Database Languages-Transaction Management		Remember
Database Systems Structure-History of Database Systems- l		Understand and Remember
Database Systems Applications-Entity Relationship Mode		Apply
UNIT II - RELATIONAL DATABASES (12 Hours)		
SQL-Basic Structure	CO2	Apply
Set Operations-Complex Queries		Apply
Joined Queries- DDL		Apply
Embedded SQL Dynamic SQL-Other SQL Functions		Apply
Query by Example		Apply
-Integrity and Security -		Understand and Apply
Relational Database Design - Normalization - INF, 2NF, BCNF, 3NF		Apply, evaluate and design

UNIT III - DATA STORAGE AND INDEXING (12 Hours)		
Storage & File Structure-Disks	CO2	Understand
-RAID-		Understand
File Organization-		Apply
Indexing &Hashing		Apply
-B+ TREE-B Tree-		Apply
Static Hashing-Dynamic Hashing-Multiple Key Access		Apply
UNIT IV - QUERY EVALUATION & OPTIMIZATION (12 Hours)		
Query Processing	CO3	Understand & Apply
Selection Operation-Sorting-Join Operation		Apply
Evaluation of Expressions		Analyze & Construct
Query Optimization		Apply, Analyze & Construct
UNIT V - TRANSACTION MANAGEMENT & RECENT TRENDS (12 Hours)		
Transaction Concept-Static Implementation	CO3	Analyze
Concurrency Control-Protocols - Deadlock Handling		Analyze
Recovery Systems-Recovery with Concurrent Transactions		Analyze
Shadow Paging-Buffer Management		Analyze & Construct
Basic concepts: Distributed Databases, Parallel Databases.		Apply, Analyze & Construct
SELF STUDY: NoSQL		

TOTAL HOURS:60

TEXT BOOKS:

1. Abraham Silberschatz, Hentry F.Korth and S.Sudharssan,"Database System Concepts", 4th Edition, Tata McGraw Hill, 2014
2. Raghu Ramakrishnan & Johannesgerhrke, "Data Base Management Systems", Tata Mc Graw Hill International Edition, 2012)

REFERENCE BOOKS:

1. Ramez Elmasri and Shamkant B.Navathe, "Fundamental Database Systems", Third Edition, Pearson Education, 2003.ited, 2015

WEB REFERENCES:

1. www.oracle.com

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA203	OBJECT ORIENTED PROGRAMMING IN C++	3	0	0	3

Course pre-requisite

Problem Solving and C Programming

Course Objectives

1. To study the concept Object Oriented Programming Concepts with special emphasis on Object Oriented Programming in C++.
2. To implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++.
3. To develop applications by breaking them into modules and writing efficient and portable code in C++.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the object oriented programming concepts in C++.

C**O2:** Design and develop programs using friend functions, operator overloading and inheritance.

CO3: Design applications relating to templates and file management systems.

CO4: Understand the concept of standard template library and apply it for solving complex problems in data structures.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION TO C++ (9 Hours)		
Overview of C++-Classes and Objects	CO1	Understanding
C++ objects as data types- objects as function arguments-Default constructors -constructor and destructor		Analyzing
Copy constructor- Inline Function – Static Members – Default Arguments		Creating
Array of objects –-Pointers to objects		Applying
References-Dynamic Memory Allocation		Analyzing
UNIT II - FRIENDS CONCEPT AND OVERLOADING (9 Hours)		
Friend Functions- Friend Classes-Overloading Constructor, Functions-	CO2	Understanding
Operator Overloading: Overloading Unary Operators – Overloading Binary Operator-Member Operator Overloading-Overloading new and delete.		Creating
Data conversion-Conversion between basic types-Conversion between object and basic types-Conversion between objects of different classes-Pitfalls of operator overloading and Conversion.		Applying
Explicit and Mutable.		Understanding

UNIT III - INHERITANCE (9 Hours)		
Inheritance-Base Class and Derived Class	CO2	Creating
Access Control – Derived Class Constructors- Virtual Functions		Applying
Pure Virtual Functions		Applying
Multiple Inheritance and Ambiguity		Applying
Abstract classes-Aggregation.		Analyzing
UNIT IV - TEMPLATES, ERROR HANDLING AND FILES (9 Hours)		
Templates-Generic Functions	CO3	Understanding
Applying Generic Functions-Generic Classes		Creating
Exception Handling		Analyzing
C++ I/O Streams		Applying
File I/O		Creating
String Class.		Understanding
UNIT V STANDARD TEMPLATE LIBRARY (9 Hours)		
Introduction to STL	CO4	Understanding
Algorithms-Sequence containers-Iterators		Applying
Specialized Iterators-Associative containers		Understanding
Function Objects.		Creating
SELF STUDY: Multithreading		

TOTAL HOURS:45

TEXT BOOKS:

1. Herbert Schildt, "C++ The Complete Reference", Tata McGrawHill, 3rd Edition, 2003 .
2. Robert Lafore, Object Oriented Programming In C++, Fourth Edition, Tech Media, 2002.
3. Stanley.B.Lipman, Josiee Lajoie, "C++ Primer, 5th edition, Addison-WesleyProfessional,2013.

REFERENCE BOOKS:

1. Richard Johnsonbaugh; Martin kalin, "Object-Oriented Programming in C++", 2nd Edition, 2001.
2. Stevan Holzner , C++ Programming-Black Book, 1st Edition, Dreamtech press, 2007.

WEB REFERENCES:

1. www.cplusplus.com
2. www.tutorialspoint.com/cplusplus

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA204	OPERATING SYSTEM CONCEPTS	4	0	0	4

Course pre-requisite

NIL

Course Objectives

1. To study the concept of computer system and operating system.
2. To understand the the concepts of processes and processor management, concurrency and synchronization, memory management schemes, file system and secondary storage management, security and protection, etc.
3. To develop the fundamental algorithms and analyze the behavior.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the concepts, structure and design of operating Systems.
CO2: Understand the working of process and analyzing the scheduling algorithms.
CO3: Explain deadlock detection, recovery, Paging and Segmentation.
CO4: Understand the concepts of Files and disk management.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (12 Hours)		
Introduction - Mainframe systems - Desktop Systems - Multiprocessor Systems	CO1	Understanding
Distributed Systems - Clustered Systems - Real Time Systems - Handheld Systems		Analyzing
Hardware Protection - System Components		Analyzing
Operating System Services		Analyzing
System Calls - System Programs		Analyzing
UNIT II – Process and Scheduling (12 Hours)		
Process Concept - Process Scheduling	CO2	Understanding
Operations on Processes - Cooperating Processes - Inter-process Communication.		Understanding
Threads - Overview - Threading issues		Applying
CPU Scheduling - Basic Concepts - Scheduling Criteria - Scheduling Algorithms		Understanding
Multiple-Processor Scheduling - Real Time Scheduling		Applying
UNIT III – Deadlock-Detection and Recovery (12 Hours)		
The Critical-Section Problem - Synchronization Hardware	CO2	Understanding
Semaphores - Classic problems of Synchronization - Deadlock Characterization		Applying
Methods for handling Deadlocks -Deadlock Prevention -		Applying

Deadlock avoidance - Deadlock detection		Applying
Recovery from Deadlocks.		Analyzing
UNIT IV – Paging and Segmentation (12 Hours)		
Storage Management - Swapping	CO3	Understanding
Contiguous Memory allocation - Paging		Applying
Segmentation - Segmentation with Paging		Analyzing
Virtual Memory - Demand Paging -		Applying
Process creation - Page Replacement		Understanding
Allocation of frames – Thrashing.		Understanding
UNIT V – Files and Disk Management (12 Hours)		
File Concept - Access Methods	CO4	Applying
Directory Structure - File System Structure		Understanding
Allocation Methods - Free-space Management		Understanding
Disk Structure - Disk Scheduling - Disk Management		Analyzing
SELF STUDY: Android operating system		

TOTAL HOURS:60

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.
2. Harvey M. Deitel, "Operating Systems", Second Edition, Pearson Education Pvt. Ltd, 2002.

REFERENCE BOOKS:

1. William Stallings, "Operating System", Prentice Hall of India, 4th Edition, 2003.
2. Pramod Chandra P. Bhatt - "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003.
3. Ramez Elmasri, A.G.Carrick and David Levine, "Operating Systems-A Spiral approach",2010.

WEB REFERENCES:

1. www.tutorialspoint.com/operating system

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA205	COMPUTER GRAPHICS AND MULTIMEDIA	3	0	0	3

Course pre-requisite

Knowledge of C Programming

Course Objectives

1. Introduce the programming principles of computer graphics, including fundamental data-structures and algorithms for rendering and modeling.
2. It provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
3. To improve the full digital content chain, covering creation, acquisition, management and production, through effective multimedia technologies enabling multi-channel, cross-platform access to media, entertainment and leisure content in the form of film, music, games.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Demonstrate an understanding of contemporary graphics hardware.
CO2: Create interactive graphics applications in C++ using one or more graphics application programming interfaces.
CO3: Write program functions to implement graphics primitives, geometrical transformations and image processing.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - OUTPUT PRIMITIVES (9 Hours)		
Introduction - Line - Curve and Ellipse Drawing Algorithms	CO1	Remember
Attributes		Remember
Two-Dimensional Clipping and Viewing.		Understanding
UNIT II- GEOMETRICAL TRANSFORMATIONS (9 Hours)		
Basic transformations - translation, scaling, rotation	CO2	Create
2D and 3D-Matrix representation		Create
Homogeneous coordinates - Composite transformation		Create
other transformations - shear, reflection.		Create
UNIT III - THREE-DIMENSIONAL OBJECT REPRESENTATION (9 Hours)		
Polygon surfaces - polygon tables – plane equations	CO1	Understanding
polygon meshes - parametric representation of curves (Bezier, B-Spline curves)		Understanding
parametric representation of surfaces - Octrees		Understanding
Fractals-Color Models		

UNIT IV - MULTIMEDIA FILE HANDLING (9 Hours)		
Animation-Compression & Decompression	CO3	Analyzing
Data & File Format standards – Multimedia I/O technologies		Applying
Digital voice and audio		Analyzing
Video image and animation – Full motion video		Applying
Storage and retrieval Technologies		
UNIT V - HYPERMEDIA (9 Hours)		
Multimedia Authoring & User Interface – Hypermedia messaging	CO1	Understanding
Mobile Messaging – Hypermedia message component		Understanding
Creating Hypermedia message – Integrated multimedia message standards		Understanding
Integrated Document management – Distributed Multimedia Systems.		Understanding
SELF STUDY: Computer Graphics with OpenGL		

TOTAL HOURS:45

TEXT BOOKS:

1. Donald Hearn and M.Pauline Baker, "Computer Graphics C Version", Pearson Education,2003.
2. Donald Hearn and M.Pauline Baker, "Computer Graphics with OpenGL(4th edition)", Pearson Education, 2010.
3. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003.

REFERENCE BOOKS:

1. Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice", Pearson Education, second edition 2003.
2. Judith Jeffcoate, "Multimedia in practice technology and Applications",PHI, 1998.
3. John F. Hughes, Andries van Dam and Morgan McGuire,David F. Sklar, James D.Foley,
4. Steven K. Feiner and Kurt Akeley, "Computer graphics: principles and practice (3rd ed.), Addison-Wesley Professional,2013.

WEB REFERENCES:

1. *https://www.**opengl**.org/*

Course Code	Course Name	Contact Hours			
		L	T	P	C
16PH102	COMMUNICATION SKILLS-II	2	0	2	3

Course pre-requisite

NIL

Course Objectives

1. To develop the prominence of listening and reading practices using authentic business vocabulary.
2. To instill analytical thinking and logical reasoning to use LSRW skills in Business related situations.
3. To urge the need of effective communication in corporate sector with Business English.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understanding and gain proficiency with business vocabulary.

CO2: Understanding Task- Based activity to enhance an effective communication.

CO3: Remembering LSRW skills and employ cross-cultural communication in business related situations.

CO4: Remembering and understanding Business English in working environment.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - IMPROVING COMMUNICATION (9 Hours)		
Introduction- Teamwork- Making Arrangements- Improving Communication in spoken Language- Taking and Leaving Voice mail messages – Presenting about Business Hotel- (Speaking Activity)- Presenting about Corporate Hospitality	CO1	Understanding
Formal and Informal Language-Letter writing (accepting and declining invitations), email writing		Understanding
Focus on Language: Present Tense, Past Tense and Present Perfect, Auxiliary Verbs, Countable and Uncountable Nouns, Definitions, Extended Definitions		Understanding
UNIT II – INTERPERSONAL COMMUNICATION (9 Hours)		
Placing orders – Clarity in Written Language- Phone and Letter Phrases- Company Finances- Managing Cash Flow (Intention and arrangements - Brands and Marketing – Ethical Banking- Public Relations –	CO2	Understanding

Organizing a PR Event- Describing Duties and Responsibilities-		
Writing memo, circular, agenda and minutes.		Understanding
Focus on Language: Future Tense, Articles, Modal verbs, Active and Passive, Impersonal Passive voice, Conditional 1 and 2		Understanding
UNIT III - BUSINESS ENGLISH (9 Hours)		
Relocation- Report Phrases- Presenting about Similarity and Difference- Giving Directions – Asking for Information and Making Suggestions- Location - Company Performance	CO3	Understanding
Describing Trends- Describing Cause and Effect- Environmental Impact- Discussing Green Issues- Language of Presentations - Homophones- Homonyms- Acronyms- Abbreviations- British and American words.		Remembering
Focus on Language: Comparatives and Superlatives, Participles, Future Tense and Articles, Adjectives Adverbs and Determiners		Understanding
UNIT IV – CORPORATE COMMUNICATION (9 Hours)		
About Health and Safety- Expressing Obligation- Discussing Regulations- personnel Problems- Passives- Problem at Work- Claims- Air Travel	CO3	Understanding
Transcoding (Bar Chart, Flow Chart).		Remembering
Focus on Language: Modal Verbs and Passives, Relative Pronouns, Indirect Questions		Understanding
UNIT V – WORK ENVIRONMENT (9 Hours)		
Staff Benefits- Appraisal Systems - Marketing Disasters- Expressing hypothetical Situations- Foreign Markets-.	CO4	Remembering
Letter for calling quotations, Replying for quotations- Placing an order and complaint- Presentation strategies- Group Discussion		Understanding
Focus on Language: Gerunds and Infinitives, Reported Speech, Conditional 3, Grammar Review		Understanding
LABORATORY COMPONENTS		
Building Conversation	CO 1	Understanding
Logical Reasoning and Ethics in a Given Situation	CO 2	Understanding
Technical Presentation	CO 3	Understanding
Group Discussion	CO 4	Applying

TOTAL HOURS:45

TEXT BOOKS:

1. Hart,GuyBrook, Cambridge English Business Benchmark Upper Intermediate, Cambridge University Press, United Kingdom, Second Edition, 2014.

2. Rizvi Ashraf M , “Effective Technical Communication”, McGraw Hill Education (India) Private Limited, 2016.
3. Dr Sumanth S, English for Engineers, Vijay Nicole Imprints Private Limited, 2005.
4. Wood, Ian,Paul Sanderson, Anne Williams with Marjorie Rosenberg, Pass Cambridge BEC Vantage, Cengage learning. Second Edition. 2014.

REFERENCE BOOKS:

1. Whitby, Norman. Cambridge University Press- Students Book. 2013.
2. Jawahar, Jewelcy, Rathna P, English Work book, VRB Publications Pvt Ltd 2006.
3. Gunasekaran S, ‘A Text and Workbook of Technical English I”, United Global Publishers, June 2010.

WEB REFERENCES:

1. http://www.cambridgeindia.org
2. http://www.cambridgeenglish.org/exams/business-certificates/business-vantage

16MA206	PROGRAMMING IN C++ LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS
1. Programs using Constructor and Destructor.
2. Creation of classes and use of different types of functions.
3. Count the number of objects created for a class using static member function.
4. Write programs using function overloading.
5. Programs using operator overloading.
6. Program to implement conversion between object and basic types
7. Program to implement conversion between objects of different classes
8. Programs using inheritance.
9. Program using friend functions.
10. Program using virtual function.
11. Program using exception handling mechanism.
12. Programs using files.
13. Programs using function templates.
14. Program using string class
15. Mini Project on any information system like Employee Payroll, Hospital information system

16MA207	DATA STRUCTURES LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS
1. Program to represent sparse matrix manipulation using arrays.
2. Program to represent Singly Linked List(Search n^{th} node in the list, reverse a list, delete a node in a list, detect loop in list, remove duplicates in a list)
3. Program to represent Doubly Linked List.
4. Program to represent Circular Linked List.
5. Program to represent Stack operations using array and linked list
6. Program to represent Queue operations using array and linked list
7. Polynomial addition using linked lists.
8. Program for Conversion of infix to postfix.
9. Program for Evaluation of Expressions.
10. Program to represent Binary Tree Traversals and BST.
11. Program to represent Searching procedures (Linear search , Binary search)
12. Program to represent sorting procedures (Selection, Bubble , Insertion ,Quick , Heap , Merge)
13. Program to Perform graph traversals.
14. Program to Perform Shortest Path Algorithms
15. Program to Perform Minimum Spanning Tree
Package creation

16MA208	RDBMS LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS
1. Table designing with related queries.
2. Database designing with constraints for
i. functional dependency
ii. referential integrity
iii. Multi-valued dependency
iv. Check constraint
3. DDL, DML, TCL statements
4. Date and Time Zone
5. Aggreagate Functions, Conditional Expressions using order by and group by
6. Sub-queries
7. Joins
8. Creation of views for a table.
9. PL/SQL control structures
10. Application using explicit cursors.
11. PL/SQL exception handling
12. Applications using triggers.
13. Application using stored procedures
14. Application using stored functions
15. Application using dynamic SQL
16. Design and devlop an application using any frond end and back end tool (make use of
ER diagram and DFD)
(Typical application - banking, Electricity billing, Library operation, Personal
bank account, Results management ,Hostel accounting)

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA301	ADVANCED DATA STRUCTURES AND ALGORITHM	4	0	0	4

Course pre-requisite

Data Structures

Course Objectives

1. To study fundamentals of algorithmic problem solving and framework for algorithm analysis.
2. To understand how to mathematically analyse recursive and non-recursive algorithms to calculate the time complexity.
3. To study about the various algorithm design techniques and their applications

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1 : Analyze worst-case running times of algorithms using asymptotic analysis.

CO2 : Explain the different types of tree data structure and their analyses. Employ trees to model engineering problems, when appropriate.

CO3: Describe the divide-and-conquer and Greedy paradigm and explain when an algorithmic design situation calls for it. Derive and solve recurrences describing the performance of divide-and- conquer algorithms.

CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Synthesize dynamic-programming algorithms, and analyze them.

CO5: Explain what an approximation algorithm is, and the benefit of using approximation algorithms. Analyze the approximation factor of an algorithm.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I (12 Hours)		
Algorithms	CO1	Understanding
Fundamentals of Algorithmic problem Solving		Analyzing
Important Problem types		Understanding
Analysis Framework		Understanding
Asympt`otic Notations		Analyzing
Basic Efficiency Classes		Analyzing
UNIT II (12 Hours)		
Binary Search tree-Implementation	CO2	Understanding
AVL Trees		Applying
Multiway search tree		Applying
B Trees		Applying
Red Black Trees		Applying
UNIT III (12 Hours)		
Divide and Conquer - Introduction	CO3	Understanding
Merge Sort, Quick Sort		Applying

Multiplication of Large Integers - Strassen's matrix multiplication		Applying
Greedy Method- Knapsack problems		Understanding
Minimum cost spanning tree- Kruskal's and prim's algorithms		Applying
Single Source shortest path algorithms – Dijkstra's algorithm		Applying
UNIT IV (12 Hours)		
Dynamic Programming Introduction	CO4	Understanding
Warshall's and Floyd's Algorithm		Remembering
Optimal Binary Search Trees		Remembering
Knapsack Problems and Memory Functions		Analyzing
Back Tracking-Eight queen's problem		Applying
Hamiltonian Cycles		Understanding
Subset Sum Problems		Understanding
UNIT V (12 Hours)		
Branch and Bound Algorithms	CO5	Understanding
Assignment Problem – Knapsack Problem		Analyzing
Travelling Salesman Problem		Analyzing
NP – Hard and NP- Complete Problems – Basic Concepts		Analyzing
NP –Hard Problems		Analyzing

TOTAL HOURS:60

TEXT BOOKS:

1. Anany Levitin "Introduction to the Design and Analysis of Algorithms", Pearson Education, 3rd Edition, 2012(Unit I to V)
2. Ellis Horowitz and Sahni Sartaj, " Fundamental of Computer Algorithms", Galgotia publications Pvt.Ltd, 2012.
3. Pai, GA Vijayalakshmi. Data Structures and Algorithms: Concepts, Techniques and Applications. Tata McGraw-Hill, 2008.

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2002.
2. T3: Adam Drozdek, "Data Structures and Algorithms in C++", Vikas Publishing House Pvt.Ltd., 2002.
3. Sahni Sartaj, " Data Structures, Algorithms and Application in C++", WCB / Mc Graw Hill, 2000.
4. Rao, Akepogu Ananda. Data Structures and Algorithms Using C+. Pearson Education India, 2011.
5. T3: Thomas H.Cormen, Charles E. Leiserson, and Ronald L.Rivest "Introduction to Algorithms", Tata McGraw Hill, 2002.

WEB REFERENCES:

1. http://nptel.ac.in/courses

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA302	ADVANCED WEB TECHNOLOGY	3	0	0	3

Course pre-requisite

Basic of web technology

COURSE OBJECTIVES

1. Demonstrate an understanding of the steps involved in producing a dynamic multi-page website.
2. Understand basics of server side technologies and apply them to develop dynamic web applications.

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1: Understand, analyze and create web pages using HTML, DHTML and Cascading Styles sheets.

CO2: Understand, analyze and build dynamic web pages using AJAX and JSON

CO3: Understand, analyze and create XML documents , XML Schema and JQuery.

CO4: Understand, analyze and build and consume web services.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Introducing the Web, HTML and XHTML - HTML Tags and Document Creation	CO1	Understand and Remember
HTML/ XHTML Authoring Fundamentals		Remember
Images, Page layout with tables, Frames		Understand and apply
Forms, Multimedia		Apply
Controlling presentation with CSS		Apply
UNIT II - DHTML & JAVA SCRIPT (9 Hours)		
Dynamic DHTML	CO2	Apply
Advanced web Authoring		Apply
Javascript		Understand & Apply
Dynamic HTML with CSS		Apply

Database driven web publishing- Creating a Weblog		
UNIT III - XML & JQuery (9 Hours)		
Introduction to XML	CO3	Understand
Document type Definitions		Understand
XML Schemas		Apply
Processing XML- XML implementation		Analyze
JQuery basics- JQuery attributes, selectors		Apply
JQuery DOM traversing		Apply
UNIT IV - AJAX (9 Hours)		
Introduction to AJAX-XMLHttpRequest Object	CO2	Understand & Apply
Fundamental of JSON		Apply
JSON with AJAX		Analyze
MVC Frameworks- Angular JS, NodeJS, ReactJS		Apply
UNIT V - WEB SITE DEVELOPMENT (9 Hours)		
Testing and Validating your Documents	CO4	Understand, Analyze
Web Development Software		Analyze
Choosing a Service Provider		Analyze
Uploading your site with FTP- Publishing and Maintaining your site		Apply
SELF STUDY: CodeIgnitor, Wordpress		

TOTAL HOURS:45

TEXT BOOKS:

1. Bryan Pfaffenberger, Steven M.Schafer, Chuck White and Bill Karow "HTML, XHTML & CSS Bible" Willey ,2015
2. Kogent "Ajax Black book" , dreamtech publications, 2011
3. jQuery Community Experts "JQuery Cook book ", Oreilliy ,2010

REFERENCE BOOKS:

1. Chris Bates, "Web Programming Building Internet Application", John Wiley and Sons, 2006

WEB REFERENCES:

1. www.w3schools.com
2. http://www.tutorialspoint.com/jquery/jquery_tutorial.pdf

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA303	OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	0	3

Course pre-requisite

Object Oriented Programming in C++

Course Objectives

1. To understand the fundamental concepts of object oriented systems
2. To study the different object oriented methodologies
3. To learn and apply the various UML diagrams notations
4. To learn the process of object oriented analysis, design and software quality

Course Outcomes

Upon successful completion of this course, the student will be able to:
CO1: Understand benefits of using the widely adopted graphical modelling language
CO2: Design a model for the given problem using UML diagrams
CO3: Analyse the complexity of the artefacts describing the problem and proposed sol

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
An Overview of Object Oriented Systems Development	CO1	Understanding
Object Basics		Remembering
Object Oriented Systems		Remembering
Development Life Cycle.		Understanding
UNIT II - OBJECT ORIENTED METHODOLOGIES (9 Hours)		
Rumbaugh Methodology - Booch Methodology - Jacobson Methodology	CO2	Understanding
Patterns – Frameworks		Understanding
Unified Approach – Unified Modelling Language		Understanding
Use case - class diagram - Interactive Diagram - Package Diagram – Collaboration Diagram - State Diagram - Activity Diagram.		Applying
UNIT III - OBJECT ORIENTED ANALYSIS (9 Hours)		
Identifying use cases	CO2	Remembering
Object Analysis		Analyzing
Classification		Applying
Identifying Object relationships Attributes and		Remembering

Methods		
UNIT IV - OBJECT ORIENTED DESIGN (9 Hours)		
Design axioms	CO3	Remembering
Designing Classes		Creating
Access Layer		Understanding
Object Storage		Understanding
Object Interoperability.		Understanding
UNIT V - SOFTWARE QUALITY AND USABILITY (9 Hours)		
Designing Interface Objects	CO3	Creating
Software Quality Assurance		Understanding
System Usability		Understanding
measuring User Satisfaction		Understanding
SELF STUDY: Applications		

TOTAL HOURS:45

TEXT BOOKS:

1. Ali Bahrami, "Object Oriented Systems Development using the unified modeling language", 1stEdition, TMH, 2008.
2. Martin Fowler, "UML Distilled", Second Edition, PHI/Pearson Education, 2002.\
3. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2003..

REFERENCE BOOKS:

1. James Rumbaugh, Ivar Jacobson, Grady Booch "The Unified Modeling Language Reference Manual", Addison Wesley, 2005.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", 2nd Edition, Pearson Education, 2007.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, "UML Toolkit", OMG Press Wiley Publishing Inc., 2004.

WEB REFERENCES:

1. *www.oodesign.com*
2. http://nptel.ac.in/courses/106105153/#

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA304	FUNDAMENTALS OF JAVA PROGRAMMING	3	0	0	3

Course pre-requisite

OBJECT ORIENTED PROGRAMMING IN C++

Course Objectives

1. To study the concept and techniques which form the object oriented programming paradigm.
2. To understand the basic syntax and semantics of the Java language and programming environment.
3. To create and develop Java programs that leverage the object oriented features of the Java language.
4. To develop and to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the concepts of object oriented programming in java.
CO2: Design and develop concrete classes and string handling applications.
CO3: Design programs involving Exceptions, Threads and Sockets.
CO4: Develop real time applications using Applets and AWT.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Introduction to Java - Features of Java	**CO1**	Understanding
Object Oriented Concepts		Remembering
Data Types - Variables		Understanding
Arrays		Analyzing
Operators - Control Statements		Analyzing
UNIT II – Classes Objects and Strings (9 Hours)		
Classes – Objects	**CO2**	Understanding
Constructors- Overloading method- Access Control		Understanding
Static Methods-final class- Strings		Applying
Inheritance- Using super-Overriding-Dynamic method overriding –final methods		Creating
Packages and interfaces-Collections		Applying
UNIT III – Exception Handling and Multi-threaded programming (9 Hours)		

Exception Handling fundamentals	**CO3**	Understanding
Throw and Throws		Applying
Thread –Life cycle of thread- Multithreaded programming		Applying
Thread Priority		Applying
Synchronization-Inter thread Communication		Creating
UNIT IV – IO Streams and Networking (9 Hours)		
I/O Streams	**CO3**	Understanding
File Streams- Networks basics		Remembering
Socket Programming-		Analyzing
Address- TCP/IP server sockets		Applying
Datagram		Creating
UNIT V – Applets and AWT (9 Hours)		
Applets	**CO4**	Applying
Classes - Event handling		Understanding
Working with windows using AWT		Creating
AWT Controls- Layout Managers- Menus.		Analyzing
SELF STUDY: Android Applications.		

TOTAL HOURS:45

TEXT BOOKS:

1. H.Schildt-Java, "The Complete Reference – Ninth Edition", TMH 2014. (Units 1,2,3,4,5)

REFERENCE BOOKS:

1. **K.** Arnold and J. Gosling - The Java Programming Language - Second Edition, Addison Wesley, 1996.
2. Cay S.Horstmann, Gary Cornell - Core Java 2 Volume I Fundamentals, 5th Edition. PHI, 2000.

WEB REFERENCES:

1. https://docs.oracle.com/javase/tutorial/
2. http://tutorialpoint.com

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA305	SOFTWARE ENGINEERING	3	0	0	3

Course pre-requisite

NIL

Course Objectives

1. To understand the different software processes and how to choose between them
2. To design in the large, including principled choice of software architecture, the use of modules and interfaces to enable separate development, and design patterns.
3. To learn the various quality assurance techniques, including unit testing, functional testing, and automated analysis tools
4. To study the version control, configuration management, debugging and CASE tools

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the process to be followed in the software development life cycle
CO2: Define, formulate and analyze a problem
CO3: Manage a project from beginning to end

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - SOFTWARE PROCESS (9 Hours)		
Introduction – A Generic Process Model , Prescriptive Process Model, Specialized Process Model	CO1	Understanding
Agile Development: Agility,cost,process,		Understanding
Extreme Programming,other models		Understanding
A Tool set for the Agile Process,		Understanding
Agile Project Management		Understanding
Scaling Agile Methods		Understanding
UNIT II - REQUIREMENTS MODELING (9 Hours)		
Scenario Based Methods : Requirements Analysis, ScenarioBased Modeling, UML models that supplement the use case	CO2	Applying
Class Based Methods: Identifying Analysis Classes, Specifying Attributes, Defining Operations		Applying
Class Responsibility- Collaborator Modeling		Understanding
Associations and Dependencies, Analysis		Understanding

Packages		
UNIT III - DESIGN CONCEPTS AND PRINCIPLES (9 Hours)		
Design process and concepts, design model, Architectural design – software architecture ,styles, architectural design, Designing class based components	CO2	Applying
User interface design: Rules, Analysis and design, interface analysis, design steps, WebApp and Mobile Interface Design		Applying
Pattern Based Design: Design Patterns, Pattern Based Software Design,Architectural Patterns, Component Level Design Patterns, User interface desing patterns, WebApp design Patterns, Patterns for Mobile apps		Applying
Design Pyramid for WebApps		Remembering
Developing MobileApps		Creating
Software configuration Management		Understanding
UNIT IV - TESTING (9 Hours)		
Software Testing Strategies : A Strategic Approach to Software testing, Test strategies for Conventional software	CO3	Remembering
OO software		Remembering
WebApps, MobileApps		Applying
Validation Testing, System Testing, The Art of Debugging.		Understanding
Testing Conventional Applications: Testing Fundamentals, White Box testing, Basis path testing, Control Structure Testing, Black Box testing		Applying
Formal Modeling and verification		Understanding
UNIT V - SOFTWARE PROJECT MANAGEMENT (9 Hours)		
Software Measurements , Metrics for software quality	CO3	Understanding
Estimation for Software Projects: Software Project Estimation, Decomposition Techniques, Empirical Estimation Models		Applying
Project Scheduling ,Risk Management,		Applying
Software Reengineering, Reverse Engineering Restructuring , Forward Engineering,		Understanding
SELF STUDY: Taxonomy of CASE tools		

TOTAL HOURS:45

TEXT BOOKS:

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 8th edition, 2015.

2. Ian Sommerville, Software engineering, Addison-Wesley, 9th edition, 2011.
3. Bob Hughes and Mike Cotterell , "Software Project Management", Third Edition, Tata McGraw- Hill,2004.

REFERENCE BOOKS:

1. Pankaj Jalote- An Integrated Approach to Software Engineering, Narosha Publishers,3rd edition,2005.
2. James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach",John Wiley and Sons, New Delhi, 2007.

WEB REFERENCES:

1. http://www.tutorialspoint.com/software_engineering/software_engineering_pdf_version.htm
2. http://nptel.ac.in/courses/Webcourse-contents/IIT Kharagpur/Soft Engg

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA306	COMPUTER COMMUNICATION AND NETWORKS	3	0	0	3

Course pre-requisite

NIL

Course Objectives

1. Students will develop an understanding of the general principles of networking as implemented in networks connected to the Internet.
2. Specific attention will be given to the principles of network architecture and layering, multiplexing, network addressing, routing and routing protocols.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the basic taxonomy of data communications and computer networks.

CO2: Understand and apply a wide range of error correction, routing, addressing, and network security algorithms.

CO3: Identify the different types of network devices and their functions within a network

CO4: Understand and building the skills of subnetting and routing mechanisms

CO5: Simulate and implement some of the existing networking protocols and also the ability to design and develop new protocols.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - DATA COMMUNICATION (9 Hours)		
Introduction: Networks – Protocols and standards – Standards organizations – Line configurations – Topology	CO1	Remember
Transmission mode – Categories of networks – Inter networks.OSI model: Functions of the layers.		Remember
Encoding and modulating: Digital-to-digital conversion – Analog-to-digital conversion – Digital-to-analog conversion –Analog-to-analog conversion		Understanding
Transmission media: Guided media – Unguided media – Transmission impairment – Performance.		Understanding
UNIT II- ERROR CONTROL AND DATA LINK PROTOCOLS (9 Hours)		
Error detection and correction: Types of errors – Detection – Vertical Redundancy Check (VRC) – Longitudinal Redundancy	CO2	Applying

Check (LRC) – Cyclic Redundancy Check (CRC) –Check sum – Error correction.		
Data link control: Line discipline – Flow control – Error control		Understanding
HDLC, Project 802 – Ethernet – Token ring		Understanding
FDDI- Bridges		Understanding
UNIT III - NETWORKS AND SWITCHING, NETWORKING DEVICES (9 Hours)		
Switching: Circuit switching–Packet switching – Message switching.	CO4	Create
Internetworks- IP addressing methods – Subnetting –Networking and internetworking devices: Repeaters – Bridges – Gateways – Other devices		Create
Routing algorithms – Distance vector routing – Link state routing.		Understanding
UNIT IV - TRANSPORT LAYER (9 Hours)		
Duties of transport layer – Multiplexing – Demultiplexing	CO3	Remember
Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP)		Remembering
Congestion Control – Quality of services (QOS) – Integrated Services.		Understanding
UNIT V - APPLICATION LAYER (9 Hours)		
Domain Name Space (DNS) – SMTP – FTP – HTTP	CO5	Applying
WWW-SNMP		Applying
Network Security		Applying
SELF STUDY: Security in Internet architecture		

TOTAL HOURS:45

TEXT BOOKS:

1. BehrouzA.Forouzan, 'Data Communication and Networking', Fifth Edition, Tata McGraw Hill, 2013.
2. William Stallings, 'Data and Computer Communication', Tenth Edition, Pearson Education, 2013.

REFERENCE BOOKS:

1. Andrew Tannenbaum.S. 'Computer Networks', Pearson Education, 5th Edition, 2011.

WEB REFERENCES:

1. www.networkcomputing.com
2. www.networkworld.com
3. http://nptel.ac.in/courses/106105082/

16MA307	JAVA PROGRAMMING LABORATORY	L/T/P/C 0/0/3/2
LIST OF EXPERIMENTS		
1. Introduction to IDE- Object and Class.		
2. Control and Decision statements,Arrays and strings		
3. Polymorphism, Abstract Class.		
4. Inheritance.		
5. Interface and Package.		
6. Collections.		
7. Exception Handing.		
8. I/O and File handing.		
9. Multithreading.		
10. GUI application(swing/ awt).		
11. Open learning- Package Development.		

16MA308	ADVANCED DATASTRUCTURES AND ALGORITHMS LABORATORY	L/T/P/C 0/0/3/2
LIST OF EXPERIMENTS		
1. Implement Binary search operations		
2. Apply the divide and Conquer technique to arrange a set of numbers using Quick sort method.		
3. Apply the divide and Conquer technique to arrange a set of numbers using merge sort method.		
4. Perform Strassen's matrix multiplication using divide and conquer method.		
5. Solve the knapsack problem using greedy method.		
6. Construct a minimum spanning tree using greedy method.		
7. Find the solution for traveling salesperson problem using dynamic programming approach.		
8. Implement the 8-Queens Problem using backtracking.		
9. Find the solution of traveling salesperson problem using branch and bound technique.		
Package creation		

16MA309	SOFTWARE DEVELOPMENT LABORATORY	L/T/P/C 0/0/3/2
LIST OF EXPERIMENTS		
1. Identification of real time problem.		
2. Literature survey and exploring different solutions for the problem.		
3. Model development and Design methodologies.		
4. System requirements and specification.		
5. Implementation and Testing.		
6. Report preparation.		

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA401	APPLIED PROBABILITY AND STATISTICS	3	2	0	4

Course pre-requisite

Fundamentals of Statistics

Course Objectives

1. To understand the application of descriptive statistics in the various fields of Computer applications.
2. To understand the concepts of correlation and regression in knowing relationship between variables and prediction of variables.
3. To Understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
4. To make inference on statistical analysis for given data.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: To apply the concepts of descriptive statistics in various fields of Computer applications.
CO2: To apply correlation and regression in identifying relationship between variables and prediction of variables
CO3: To apply the concepts of probability in decision making.
CO4: To apply the statistical tools in data analysis.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT- I MEASURES OF CENTRAL TENDENCY(12 Hours)		
Introduction, Classification And Tabulation Of Statistical Data	CO1	Understanding
Diagrammatic And Graphical Representation Of Data		Applying
Mean, Median, Mode		Applying
Range, Quartile Deviation , Mean Deviation, Standard Deviation		Applying
Measure Of Skewness.		Applying
UNIT - II CORRELATION AND REGRESSION (12 Hours)		
Correlation	CO2	Applying
Regression		Applying
UNIT- III PROBABILITY & DISTRIBUTION (12 Hours)		
Probability, Basic Concepts, Addition And Multiplication Theorem And Conditional Probability	CO3	Understanding
Random Variables		Understanding
Discrete Distributions - Binomial , Poisson		Applying

Continuous Distribution - Normal		Applying
UNIT- IV TESTING OF HYPOTHESIS (12 Hours)		
Sampling, Parameters And Statistics	CO4	Understanding
Testing of Hypothesis, Level of Significance		Understanding
Test of Significance of Small Samples – t test		Applying
Chi square Test		Applying
F test		Applying
UNIT- V ANALYSIS OF VARIANCE (12 Hours)		
Analysis Of Variance	CO4	Analysis
Design Of Experiments – CRD,RBD,LSD		Analysis

TOTAL HOURS:60

TEXT BOOKS:

1. L.Devore, "Probability & Statistics for Engineering and & Sciences",Thomson Asia Pvt Ltd.,Singapore,2002.
2. RonaldE.Walpole et al "Probability & Statistics for Engineers & Scientists ", Pearson Education, 2002.

REFERENCE BOOKS:

1. Veerarajan T.,"Probability, Statistics and Random Processes",Tata McGraw-Hill,New Delhi,2002.
2. S.C.Gupta & V.K.Kapoor, "Fundamentals of Mathematical Statistics ", Sultan Chand and Sons, New Delhi,2002.

WEB REFERENCES:

1. http://www.nptel.ac.in/courses/111105035
2. http://www.nptel.ac.in/courses/122104017
3. http://nptel.ac.in/courses/122102009
4. http://nptel.ac.in/courses/111107063

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA402	UNIX ARCHITECTURE AND PROGRAMMING	3	0	0	3

Course pre-requisite

Knowledge about Operating System

Course Objectives

1. To develop conceptual understanding of UNIX commands and UNIX Shell programming.
2. To provide a practical exposure of all algorithms and behaviour of processes in the system with respect to all its timings.
3. To develop understanding about signal, interprocess communication and semaphore

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand the UNIX commands and Shell programming**.**
CO2: Analyze and evaluate different process scheduling techniques.
CO3: Analyze and evaluate inter process communication.
CO4: Implement socket programming.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION & FILE SYSTEM (9 Hours)		
Introduction- Shell programming - File I/O – File Descriptors – File sharing - Files and directories – File types - File access permissions – File systems – Symbolic links	CO1	Remember
Standard I/O library - System data files and information - Password file – Group file		Remember
Login accounting – System Identification		Understanding
UNIT II- DESIGN ASPECTS (9 Hours)		
Architecture of UNIX OS , UNIX Kernel, Kernel data structures- The buffer Cache-Internal Representation of files	CO2	Analyzing
Environment of a UNIX process – Process termination – command line arguments – Processcontrol – Process identifiers		Analyzing
Process relationships – Signals -threads		Evaluate

UNIT III - INTERPROCESS COMMUNICATION (9 Hours)		
Introduction - Message passing (SVR4) - pipes – FIFO – message queues	CO3	Evaluate
Synchronization(SVR4)– read – write locks – file locking – record locking		Analyzing
semaphores –Shared memory(SVR4)		Evaluate
UNIT IV - SOCKETS (9 Hours)		
Introduction – transport layer – socket introduction - TCP sockets – UDP sockets - raw sockets	CO4	Create
Socket options - I/O multiplexing - Name and address conversions		Create
UNIT V - APPLICATIONS (9 Hours)		
Debugging techniques - TCP echo client server - UDP echo client server	CO4	Create
Ping - Trace route		Create
SELF STUDY: Client server applications like file transfer and chat.		

TOTAL HOURS:45

TEXT BOOKS:

1. W.Richard Stevens, Advanced programming in the UNIX environment, AddisonWesley,2013.
2. W. Stevens, Bill Fenner, Andrew Rudoff, "Unix Network Programming", Volume1,The Sockets Networking API, 3rd Edition, Pearson education, Nov 2003.
3. Sumicarl Das, "UNIX Concepts & Application:", Tata McGraw Hill ,2nd edition,New Delhi, 2000.

REFERENCE BOOKS:

1. Kenneth Rosen, "The Complete Reference",2nd edition, MonmouthUniversity, 2007.
2. Jeny peek, Grace Todino, "Learning the Unix Operating System", O' Reily Publications, 5th edition, New Delhi, 2001.

WEB REFERENCES:

1. *www.tldp.org/HOWTO/Reading-List-HOWTO/b80.html*

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA403	ENTERPRISE COMPUTING	3	0	0	3

Course pre-requisite

Java programming

COURSE OBJECTIVES

1. To provide knowledge on multi-tier enterprise architecture, enterprise database connectivity and distributed enterprise communications
2. To provide knowledge for building scalable, secure, web enabled, and distributed enterprise systems with enterprise technologies and the Java 2 Platform Enterprise Edition (J2EE).
3. To use technologies such as JavaBeans & EJB and tools to rapidly build e-commerce such as business-to-consumer systems, business-to business systems, enterprise application integration approaches, and general distributed and Internet-based enterprise wide systems.

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1: Understand the multi-tier and distributed enterprise architecture
CO2: Apply concepts such as object oriented and components for software development for enterprises.
CO3: To acquire knowledge and to design enterprise systems.
CO4: To practice enterprise technologies and tools by conducting experiments.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - ENTERPRISE FOUNDATIONS (9 Hours)		
Enterprise Architectural overview - Java Enterprise System	CO1	Understand and Remember
Object oriented software development for enterprise		Remember
Component Based software development for enterprise		Understand and apply
UNIT II - Java Foundations for Enterprise Development (9 Hours)		
Java Files and Tools - Core Java Language APIs - Collection APIs - Input/Output and State Persistence APIs - Threading APIs - Date and Time APIs	CO2	Apply
Enterprise User Interfacing-The Distributed Enterprise User Interface • Java AWT Components • Java Swing Components • Utility and Accessibility Components • Graphics and Multimedia		Apply
Components • Web Page Interfaces		Apply

UNIT III - Java Enterprise System Architecture with the J2EE (9 Hours)		
The J2EE Model • Enterprise Java and J2EE Architecture • Data Connectivity • Communication Mechanisms • Assurance Mechanisms • Client Connectivity • Web Connectivity • Application Connectivity	CO2	Apply
Modeling Components with JavaBeans JavaBeans Overview • JavaBeans Containers • JavaBeans Events • JavaBeans Properties • JavaBeans Introspection • JavaBeans Persistence • JavaBeans Customization.		Apply
UNIT IV - Enterprise Data (9 Hours)		
Database Basics - Relational Databases- Object Databases - RDBMSs Versus ODBMSs - Relational/Object Translations - CLIs	CO3	Analyze
Embedded SQL -ODBC - JDBC- JDBC Architecture - JDBC Drivers and th-JDBC Driver Configuration		Analyze
JDBC Connections- JDBC Statements -JDBC Result Sets - SQL and Java Mappings - JDBC MetaData- Advanced JDBC		Analyze
UNIT V - Distributed Enterprise Communications (9 Hours)		
Distributed Systems - Distribution Mechanisms - The Network Client - The Network Server-Network Communications	CO4	Apply
Network Computing -TCP/IP Protocol Suite - Socket Programming- Communication Streams-Web Communications Cloud		Analyze
SELF STUDY: Patterns AND Framework		

TOTAL HOURS:45

TEXT BOOKS:

1. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, “Building Java Enterprise Systems with J2EE "Techmedia, NewDelhi, 2010

REFERENCE BOOKS:

1. George Reese, “Database programming, with JDBC and Java" Second Edition, O'Reiliy,2012.
2. Dustin R. Callaway - "Inside Servlets " - Addison Wesley Longman Inc New Delhi, 2001.
3. Tom Valesky - "Enterprise Java Beans" - Addison Wesley Longman Inc.New Delhi, 2000.

WEB REFERENCES:

1. https://docs.oracle.com/javase/tutorial/
2. http://tutorialpoint.com

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA404	SECURITY IN COMPUTING	3	0	0	3

Course pre-requisite

The student should have Knowledge about database, networks and operating systems.

Course Objectives

1. Understand security concepts, Ethics in Network Security.
2. Understand security threats, and the security services and mechanisms to counter them.
3. Comprehend and apply relevant cryptographic techniques.
4. Comprehend computer and network access control .

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1 : Analyze a problem, and identify and define the computing requirements appropriate to its solution.
CO2: To identify network security threats and determine efforts to counter them
CO3: To write code for relevant cryptographic algorithms.
CO4: Use current techniques, skills, and tools necessary for computing practice.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - SECURITY PROBLEM IN COMPUTING (9 Hours)		
Protecting variables - Characteristics of computer intrusion - Attacks - Security goals - Vulnerabilities - Computer criminals - methods of defense	CO3	Create
Elements of cryptography : Terminology and background - Substitution ciphers - Transpositions		Create
Encryption algorithms - Data encryption standard - AES encryption algorithm - uses of encryption		Create
UNIT II- PROGRAM SECURITY (9 Hours)		
Secure program - Non Malicious program errors - Virus and other malicious code – controls against program threats	CO1	Analyzing
Protection in general purpose operating system: protected objects and methods of protection - Memory and address protection		Analyzing
Control of access to general objects - file protection mechanism - user authentications		Analyzing
UNIT III DESIGNING TRUSTED OPERATING SYSTEM (9 Hours)		

Security policy - Models of security	CO1	Analyzing
Trusted OS Design - Assurance in trusted OS-implementation		Analyzing
Database security		Analyzing
UNIT IV - SECURITY IN NETWORKS (9 Hours)		
NT concepts - Threads in NT - Network Security controls - firewalls - Intrusion detection system	CO2	Understanding
Secure Email - Administering security: Security planning - Risk analysis		Understanding
Organisation security policies - Physical security		Understanding
UNIT V LEGAL,PRIVACY AND ETHICAL ISSUES IN COMPUTER SECURITY (9 Hours)		
Protecting programs and data - Information of Computer objects - Rights of employees and Employers	CO1	Analyzing
Software failure - Privacy - Ethical issues in Computer Security		Analyzing
Cryptography: Mathematics for Cryptography - Symmetric encryption - Public key encryption system - Quantum Cryptography	CO4	Applying
SELF STUDY: : Computer crime		

TOTAL HOURS:45

TEXT BOOKS:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies "Security in Computing",Fifth edition, Pearson Education Pvt Ltd., 2013.
2. Eric Maiwald, "Network Security A Beginner's Guide", , Second Edition, Tata - McGraw Hill Pub. Ltd., New Delhi, 2003.

REFERENCE BOOKS:

1. AtulKahate ,"Cryptography and Network Security", Tata - McGraw Hill Pub. Ltd., New Delhi, 2003.

WEB REFERENCES:

1. http://www.interhack.net/pubs/network-security/

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA405	INTERNET OF THINGS	3	0	0	3

Course pre-requisite

Advanced Web Technology
Fundamentals of Java Programming

Course Objectives

1. To study the building blocks of Internet of Things (IoTs), characteristics and taxonomy of IoT levels
2. To learn a generic design methodology and programming aspects of IoT.
3. To gain knowledge on the real world applications of IoT.
4. To know about various packages, frameworks and cloud services
5. To get acquainted with data analytics for IoT.

Course Outcomes

Upon successful completion of this course, the student will be able to:
CO1: Identify and design the new models for market strategic interaction
CO2. Design business intelligence and information security for WoB
CO3. Analyze various protocols for IoT
CO4. Design a middleware for IoT

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION TO IoT (9 Hours)		
Definition and Characteristics, Physical Design Things	CO1	Remembering
Protocols, Logical Design		Understanding
Functional Blocks, Communication Models		Understanding
Communication APIs		Understanding
Introduction to measure the physical quantities, IoT Enabling Technologies		Remembering
Wireless Sensor Networks, Cloud Computing		Understanding
Big Data Analytics, Communication Protocols		Understanding
Embedded Systems		Understanding
IoT Levels and Deployment Templates		Applying
UNIT II - DEVELOPING INTERNET OF THINGS (9 Hours)		
Introduction to Smart Systems using IoT	CO4	Remembering
IoT Design Methodology		Applying
Case Study: Weather Monitoring		Applying
Logical Design using Python, Data types & Data		Analyze

Structures		
Control Flow, Functions		Understanding
Modules		Understanding
Packages, File Handling		Applying
Date/Time Operations, Classes		Applying
Python Packages of Interest for IoT		Applying
UNIT III - DOMAIN SPECIFIC IoTs (9 Hours)		
Home Automation and Cities	CO2	Applying
Environment, Energy		Applying
Retail, Logistics		Applying
Agriculture, Industry		Applying
Health and Lifestyle		Applying
IoT and M2M		Analyze
UNIT IV - IoT PHYSICAL DEVICES, ENDPOINTS AND CLOUD OFFERINGS (9 Hours)		
IoT Device, Raspberry Pi	CO3	Creating
Interfaces, Programming Raspberry Pi with Python, Other IoT Devices		Creating
IoT Physical Servers and Cloud Offerings, Cloud Storage Models and communication APIs		Applying
WAMP		Applying
Xively Cloud, Django		Applying
Amazon Web Services for IoT		Applying
SkyNet IoT Messaging Platform		Applying
Basics of Secure IoT Programming		Understanding
Case Study: Home Automation		Applying
UNIT V - DATA ANALYTICS FOR IoT (9 Hours)		
Introduction	CO3	Remembering
Apache Hadoop		Understanding
Using Hadoop MapReduce for Batch Data Analysis		Understanding
Apache Oozie		Understanding
Apache Spark		Understanding
Apache Strom		Understanding
Using Apache Strom for Real-time Data Analysis		Applying
Case Study: Structural Health Monitoring.		Creating
SELF STUDY: : Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments		

TOTAL HOURS:45

TEXT BOOKS:

1. Arshadeep Bahga, Vijay Madisetti, “Internet of Things: A Hands-On Approach”,Published by Arshdeep Bahga & Vijay Madisetti, 2014

REFERENCE BOOKS:

1. Smart Things: Ubiquitous Computing User Experience Design. Mike Kuniavsky. Morgan Kaufmann Publishers. 2010.
2. Meta Products: Building the Internet of Things. Sara Cordoba, Wimer Hazenberg, Menno Huisman. BIS Publishers. 2011.

3. Getting Started with Arduino (Make: Projects). Massimo Banzi. O'Reilly Media. 2008. Emotional Design: Why We Love (or Hate) Everyday Things. Donald A. Norman. Basic Books, 2004.
4. Physical Computing: Sensing and Controlling the Physical World with Computers. Tom Igoe, Dan O'Sullivan. Premier Press. 2004.
5. Marc-André Isenberg, "Architecting the Internet of Things", Springer Link, 2011.

WEB REFERENCES:

1. http://www.iot-a.eu

16MA406	UNIX LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS
1. Program using system calls : create, open, read, write, close, stat, fstat, lseek
2. Program to implement inter process communication using pipes
3. Program to perform inter process communication using message queues
4. Program to perform inter process communication using shared memory
5. Program to perform synchronization using semaphores
6. Program using TCP sockets (Client and Server)
7. Program using UDP sockets (Client and Server)
8. Program using TCP sockets (Echo Client Server)
9. Chat applications
10. Program using URL class to download webpages
Package creation

16MA407	ENTERPRISE COMPUTING LABORATORY	L/T/P/C 0/0/3/2

LIST OF EXPERIMENTS
1.Create a Database Driven package using JDBC
2. Package development using RMI
3. Package development using servlets / JSP
4. Servlet with session management and tracking
5. Create a Package using Custom tag in JSP
6. Create a AJAX based package using JSP
7.Package development using EJB.
8.Package development using Web Services
9. Package using patterns
10. Package using frameworks
Open learning:
* Applications using Java script library- AngularJS, NodeJS, Reactjs
* Frameworks: Struts & Hibernate
* Cloud Services services- Amazon services, Google App Engine.
* Building software using GitHub

16MA408	QUANTITATIVE APTITUDE LABORATORY	L/T/P/C 0/0/3/2

Number Theory

Number Systems – Development – HCF and LCM of Numbers – Decimal Fractions – Simplification – Square Root and Cube Root of a number – Surds and Indices – Problems on numbers – Percentage – Ratio and Proportion – Divisibility – Mixtures – Averages.

Complex Numbers – Modulus and Amplitude form – Demoivre's theorem – Applications.

Algebra

Polynomials – Solving Equations and Inequalities – Descart's rule of signs – Problems on ages – Chain rule – Time and Work – Time and Distance – Problems on Trains – Problems on Boats and Streams.

Sequence and Series – Arithmetic progression and Geometric progression – Convergence and divergence – Binomial theorem - Applications.

Geometry and Mensuration

Lines and Angles – Triangles – Quadrilaterals and Other Polygons – Circles

Volume and Surface Areas of three dimensional shapes – Cuboid and Cube – Sphere, Hemi sphere, Cone and Cylinder.

Statistics and Interest Calculations

Measures of central tendency – Mean, Median and Mode – Variance and Standard deviation Logarithms – Profit and Loss – Simple Interest – Compound Interest.

Counting and Probability

Counting using Arithmetic – Permutation and Combinations – Circular Permutations – Seating Arrangement Problem – Mapping and Best Routes – Selections and Conditionals

Probability – Laws in Probability – Addition and Multiplication Laws – Conditional Probability – Independent Events – Theorem of Absolute probability – Baye's theorem.

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA501	SOFTWARE QUALITY ASSURANCE	3	0	0	3

Course pre-requisite

Basics of Software Engineering

Course Objectives

1. To understand the basic, scope, goals and purpose of software quality assurance
2. To study the standards, practices and metrics
3. To study the models, tools and techniques

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Apply the techniques learned to improve the quality of their own software development,

CO2: Explain the requirements of ISO 9000 Certification and other process evaluation models

CO3: Prepare a software quality plan for a software project - to include sections on change management, configuration management, defect elimination, validation and verification and measurement.

CO4: Discuss the role of Risk Mangement to avoid unexpected situation in the software development process

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I (9 Hours)		
Introduction to quality: Introduction to concepts of quality - definitions of quality Cost implications and quality	CO1	Understanding
Core components of the quality of a product quality gaps		Analyzing
TQM concepts - 'q'and'Q' organization total quality management(TQM) - Characteristics of a successful organization		Understanding
six sigma quality - quality control, quality assurance and quality management		Understanding
Product quality		Understanding
UNIT – II (9 Hours)		
Quality models and standards:introduction-the organizational inputs-types of standards-documentation for standards and models-Quality models/standards	CO2	Applying
Types of models-ISO standards-capability maturity model integration.		Applying
Quality management at the organization level : introduction-characteristics of software-software		Applying

development process		
Product classification-problematics areas of software development lifecycle-software/system development lifecycle		Analyzing
Configuration management		Understanding
UNIT III (9 Hours)		
Quality assurance	CO3	Understanding
Quality planning		Understanding
Developing process framework: introduction-process concept-best practices-types of processes on the basis of their level in the organization		Applying
Process classification on the basis of type of production - process continuum - process of implementation of process framework		Analyzing
Process improvement teams - the process improvement process steps - problems with quality improvement		Analyzing
UNIT IV (9 Hours)		
Software verification and validation: introduction - verification - methods of verification - superior review - walkthroughs - inspection - audit - types of review - reviews in testing lifecycle	CO3	Understanding
Coverage in verification - validation - prerequisites for validation - validation workbench - levels of validation - acceptance testing		Remembering
Principles of software testing - salient features of good testing - test policy - test strategy or test approach - test planning - test estimation.		Applying
Metrics - introduction - data categories - metrics - efficiency/productivity data		Analysing
Categories of test metrics - estimated, budgeted, approved and actual - resources - effectiveness of development/testing		Analyzing
Defect density - defect leakage ratio - Residual Defect Density - Test team Efficiency - Test case Efficiency		Applying
UNIT V (9 Hours)		
Risk Analysis:Risk Definition - Constraints - Project Risks - Product Risks	CO4	Understanding
Definition of Risk - Risk analysis Process -		Understanding
Types of Software Risk - Handling of risks.		Understanding
Auditing and control: Audit - Internal audit - Control - Internal System Control - Different Levels of control - McFarlan's Strategic Grid - Application Control - Accounting Standards - Building Controls into software Systems		Applying
Enterprise Risk Management - ERM component- COSO model- Characteristics of Effective Control.		Understanding
SELF STUDY: CMM Model		

TOTAL HOURS:45

TEXT BOOKS:

1. Milind Limaye, Software Quality Assurance, Tata Mc Graw Hill, New Delhi, 2011.Rao, Akepogu Ananda. *Data Structures and Algorithms Using C+*. Pearson Education India, 2011

REFERENCE BOOKS:

1. John W. Horch, Practical Guide to Software Quality Management, second Edition, Artech House, 2012.

WEB REFERENCES:

1. http://www.softwareqatest.com/qatbks1.html
2. http://www.computersciencezone.org/software-quality-assurance/

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA502	DATA MINING	4	0	0	4

Course pre-requisite

DBMS

COURSE OBJECTIVES

1. To understand the concept of data mining with in detail coverage of basic tasks, metrics, issues, and implication.
2. To understand the core topics like classification, clustering and association rules are exhaustively dealt with.

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1: Understand and remember the Data Mining Concepts.

CO2: To identify the algorithms for various concepts and to implement on various tools in data mining.

CO3: Understand and apply Data ware house concept

CO4: Understand and apply all mining concepts

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (12 Hours)		
Introduction - Data Warehouse	CO1	Understand and Remember
Multidimensional Data Model-Data Warehouse Architecture-Implementation - Further Development-Data Warehousing to Data Mining-		Remember
Multidimensional Analysis and Descriptive Mining of Complex Data Objects- Spatial Databases		Understand and apply
- Multimedia Databases- Time Series and Sequence Data- Text Databases- World Wide Web-		Apply
Applications and Trends in Data Mining		Apply
UNIT II - DATA PREPROCESSING (12 Hours)		
Why Preprocessing – Cleaning - Integration-Transformation - Reduction – Discretization	CO2	Apply
Concept Hierarchy Generation- Data Mining Primitives - Query Language		Apply
Graphical User Interfaces-Architectures - Concept Description - Data Generalization-Characterizations, Class Comparisons, Descriptive		Apply
Statistical Measures		Understand & Apply

UNIT III - ASSOCIATION RULE MINING (12 Hours)		
Association Rule Mining-	CO2	Understand
Single-Dimensional Boolean Association Rules from Transactional Databases-		Understand
Multi-Level Association Rules from Transaction Databases		Apply
UNIT IV - CLASSIFICATION (12 Hours)		
Classification and Prediction- Issues	CO3	Understand & Apply
Decision Tree Induction,		Apply
Bayesian Classification		Analyze
Association Rule Based,		Apply
Other Classification Methods-Prediction, Classifier Accuracy-Cluster Analysis- Types of data		Apply
UNIT V - APPLICATIONS (12 Hours)		
Multidimensional Analysis and Descriptive	CO4	Understand,analyze
Mining of Complex Data Objects-Spatial Databases .		Analyze
SELF STUDY: CodeIgnitor, Wordpress		

TOTAL HOURS:60

TEXT BOOKS:

1. J. Han, M. Kamber, "Data Mining: Concepts and Techniques", Harcourt India / Morgan Kauffman, 2006.
2. Margaret H.Dunham, S.Sridhar "Data Mining: Introductory and Advanced Topics", Pearson Education 2008.

REFERENCE BOOKS:

1. W.H.Inmon, "Building the Data Warehouse", 4th Edition, Wiley, 2005.
2. Alex Bezon, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", McGraw-Hill Edition, 2004.

WEB REFERENCES:

1. https://rapidminer.com/
2. www.cs.waikato.ac.nz/ml/weka/

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA503	MOBILE APPLICATION DEVELOPMENT	3	0	0	3

Course pre-requisite

Fundamentals of Java Programming

Course Objectives

1. To understand the concepts of mobile operating system and applications
2. To remember and understand Mobile application development using J2ME
3. To understand different applications that Android software offers to people, employees, and businesses

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1. Knowledge on the concepts related to mobile application development

CO2. Understand and analyse how Android applications work, their life cycle, manifest, Intents, and using external resources

CO3. Build the Android applications

CO4. Knowledge on secure, tune, package, and deploy Android applications

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - MOBILE COMPUTING AND OPERATING SYSTEMS (9 Hours)		
Concept of Mobile Computing	CO1	Remembering
Developing Mobile Computing Applications		Understanding
Mobile Computing Architecture-Basics of GSM architecture and services like voice call, SMS, GPRS,WAP,CDMA and 3G- Mobile UID,		Understanding
Introduction to Open Source Mobile OS and Closed		Understanding
UNIT II - BASICS OF J2ME (9 Hours)		
Introduction	CO2	Understanding
J2ME Architecture		Remembering
Introduction to MIDlets		Understanding
Manifest File JAD -J2ME user interface		Remembering
Screens-Canvas		Understanding
UNIT III - INTRODUCTION TO ANDROID (9 Hours)		
Android Fundamentals-Android SDK Features	CO2	Understanding
Android Development Framework and Libraries		Remembering
Install and configuring ADK using Eclipse		Applying
Designing Application Framework -Building Forms to Collect User Input-Using Dialogs to Collect User Input		Applying
UNIT IV - ANDROID APPLICATION AND UI DESIGN (9 Hours)		
Creating Views-Creating New Views and Layouts-	CO3,CO4	Creating

Creating and using menus		
Introduction to Android database		Understanding
Database using SQLite		Applying
Intents-Adapters, Playing Audio and Video		Applying
UNIT V - ADVANCED ANDROID CONCEPTS (9 Hours)		
Paraniod-Using AID L to Support IPC for Services-Using Internet Services	CO4	Remembering
Building Rich User Interfaces-Android user interface testing with Espresso and Robotium		Creating
Creating App using App Inventor 2.0		Creating
SELF STUDY: Versions of Android		

TOTAL HOURS:45

TEXT BOOKS:

1. Asoke K Taluder, Mobile Computing, Technology, Applications and service creations, Second Edition, 2010.
2. J2ME-The Complete Reference by James Keogh
3. Professional Android 2 Application Development by Reto Meier
4. Lauren Darcey Shane Conder, SamsTeachYourself Android™ Application Development, Second Edition, 2012.

REFERENCE BOOKS:

1. Begining Android, Ed Burnette
2. Hello, Android: Introducing Google's Mobile Developemet Platform,Ed Burnette

WEB REFERENCES:

1. http://www.vogella.com/tutorials/android.html
2. http://www.tutorialspoint.com/android/
3. http://www.tutorialspoint.com/android/android_overview.htm
4. developer.android.com/training/basics/firstapp

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MA504	OPEN SOURCE COMPUTING	3	0	0	3

Course pre-requisite

Knowledge about operating systems, Database Management System

Course Objectives

1. To explore the open source tools.
2. Introduction to developing programs and integrating with other technologies to develop Open Source web applications.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.
CO2: Understand the open source operating systems and write programs to access the kernel of the operating system.
CO3: Understand and implement open source databases.
CO4: Understand and implement open source programming languages.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Introduction of Open Sources – Need of Open Sources	CO1	Remember
Advantages and applications of Open sources – Commercial aspects of Open source movement		Remember
		Understanding
UNIT II OPEN SOURCE OPERATING SYSTEM (9 Hours)		
Linux: Introduction – General Overview – Kernel Mode and user mode – Process– Advanced Concepts	CO2	Applying
Scheduling – Personalities – Cloning		Understanding
Signals		Applying
UNIT III OPEN SOURCE DATABASE (9 Hours)		
MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time	CO3	Create
Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web		Create
		Create

UNIT IV - OPEN SOURCE PROGRAMMING LANGUAGES (9 Hours)		
PHP: Introduction – Programming in web environment – variables – constants –data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression	CO4	Applying
File handling and data storage – PHP and SQL database –PHP Connectivity		Applying
Sending and receiving Emails – Debugging and error handling – Security – Templates.		Applying
UNIT V OPEN SOURCE TOOLS AND TECHNOLOGIES (9 Hours)		
Overview of PYTHON	CO4	Applying
WEB SERVER: Apache Web server – Working with Web Server		Understanding
SELF STUDY: : Configuring and Using apache web services-Eclipse IDE platform		

TOTAL HOURS:45

TEXT BOOKS:

1. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003
2. Steve Suchring, "MySQL Bible", John Wiley, 2002
3. RasmusLerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
4. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2001

REFERENCE BOOKS:

1. Peter Wainwright, "Professional Apache", Wrox Press, 2002

WEB REFERENCES:

1. https://www.lynda.com/Programming-Languages-training-tutorials/1467-0.html

16MA505	SOFTWARE QUALITY AND TESTING LABORATORY	L/T/P/C 0/0/3/2
LIST OF EXPERIMENTS		
Take any of the following system (e.g. ATM system) and study its system specifications and report the various bugs.		
1. Passport automation system.		
2. Book bank		
3. Exam Registration		
4. Stock maintenance system.		
5. Online course reservation system		
6. E-ticketing		
7. Software personnel management system		
8. Credit card processing		
9. e-book management system		
10. Recruitment system		
11. Foreign trading system		
12. Conference Management System		
13. BPO Management System		
14. Library Management System		
15. Student Information System		
Write the test cases for any known application (e.g. Banking application)		
Create a test plan document for any application (e.g. Library Management System)		
Implement White Box Testing Methods		
Implement Black Box Testing Methods		
Study of any testing tool (e.g. Win runner)		
Study of any web testing tool (e.g. Selenium)		
Study of any bug tracking tool (e.g. Bugzilla, bugbit)		
Study of any test management tool (e.g. Test Director)		
. Study of any open source-testing tool (e.g. Test Link)		

16MA506	DATA MINING LABORATORY	L/T/P/C 0/0/3/2
LIST OF EXPERIMENTS		
1. SQL Queries		
2. To perform multi-dimensional data model using SQL queries. Star and snowflake		
3. To perform multi-dimensional data model using SQL queries Fact constellation schema		
4. Classification – using Decision tree induction		
5. Classification – using Bayesian classification		
6. Classification – using neural networks		
7. Association rule mining – Apriori algorithm		
8. Association rule mining FP Tree growth		
9. Clustering – K – Means		
10. Prediction		
11. Clustering Using Rapid Miner tools		
12. R Programming		
Package Creation		

16MA507	OPEN SOURCE TOOLS LABORATORY	L/T/P/C 0/0/3/2
LIST OF EXPERIMENTS		
1. Application development under Linux		
2. Application development using PHP		
3. Programs using Python		
4. Programs with data base connectivity using My SQL		
5. Configuring and Using apache web services		
6. Application development in Eclipse IDE platform		
7. Web application and web service creation using any existing open source tools.		
Package creation		

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE41	DESIGN PATTERNS	3	0	0	3

Course pre-requisite

Knowledge about Object Oriented Programming

Course Objectives

1. This course is an introduction to design patterns.
2. Each pattern represents a best practice solution to a software problem in a specific context.
3. The rationale and benefits of object oriented software design patterns are discussed.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Apply each pattern to the overall software quality of a system.

CO2: Enumerate which patterns are related to this pattern and what type pattern each pattern is.

CO3: Implement this pattern in Java or C# to a real world problem.

CO4: Understand the consequences of mixing patterns on the overall quality of a system.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - (9 Hours)		
Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns	CO1	Applying
The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems		Applying
How to Select a Design Pattern, How to Use a Design Pattern		Applying
UNIT II (9 Hours)		
A Case Study: Designing a Document Editor : Design Problems, Document Structure, Formatting, Embellishing the User Interface	CO2	Analyzing
Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation		Analyzing
		Analyzing
UNIT III (9 Hours)		
Creational Patterns: Abstract Factory, Builder, Factory Method	CO3	Applying
Prototype, Singleton, Discussion of Creational Patterns.		Applying

		Applying
UNIT IV - (9 Hours)		
Structural Pattern Part-I: Adapter, Bridge, Composite	CO3	Applying
Structural Pattern Part-II: Decorator, açade, Flyweight, Proxy.		Applying
UNIT V (9 Hours)		
Behavioral Patterns Part-I: Chain of Responsibility, Command, Interpreter, Iterator	CO4	Understanding
Behavioral Patterns Part-II: Mediator, Memento, Observer, State, Strategy, Template Method , Visitor		Understanding
Discussion of Behavioral Patterns.		Understanding
SELF STUDY: : Antipatterns		

TOTAL HOURS:45

TEXT BOOKS:

1. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, "Elements of Reusable Object- Oriented Software", 2nd Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. Mark Grand , "Pattern's in JAVA Vol-I", 2nd Edition ,WileyDreamTech,2002.
2. Mark Grand , "Pattern's in JAVA Vol-II", 2nd Edition, WileyDreamTech,2002.
3. Mark Grand . "JAVA Enterprise Design Patterns Vol-III", WileyDreamTech, 2002.
4. Eric Freeman , "Head First Design Patterns", Oreilly Publications, 2004.

WEB REFERENCES:

1. *www.oodesign.com/*
2. https://sourcemaking.com/design_patterns

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE42	EXTREME PROGRAMMING	3	0	0	3

Course pre-requisite
OBJECT ORIENTED PROGRAMMING IN C++

Course Objectives
1. To study object-oriented (class-based), and component-oriented programming developed by Microsoft within the .NET initiative.
2. To understand and develop software components suitable for deployment in distributed environments
3. To understand the CLR and .NET Framework.
4. To develop real time applications viz., windows based applications, Web based applications and Web Services.

Course Outcomes
Upon successful completion of this course, the student will be able to:
CO1: Understand the .NET Framework.
CO2: Develop and implement Web Applications, Windows-based Applications and XML Web Services with Microsoft Visual C# .NET and Microsoft Visual Studio .NET
CO3: Develop and implement data base applications using ADO.NET
CO4: Develop software components suitable for deployment in distributed environments using C# and .Net Framework

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION TO C# (9 Hours)		
Introducing C#, Understanding .NET	CO1	Understanding
Overview of C#, Literals, Variables		Remembering
Data Types, Operators, Expressions		Analyzing
Branching, Looping, Methods		Analyzing
Arrays, Strings, Structures, and Enumerations		Analyzing
UNIT II - OBJECT ORIENTED ASPECTS OF C# (9 Hours)		
Classes, Objects,	CO2	Understanding
Inheritance, Polymorphism		Understanding
Interfaces, Operator Overloading		Applying
Delegates, Events		Creating
Errors and Exceptions, Threads		Analyzing
UNIT III - APPLICATION DEVELOPMENT ON .NET (9 Hours)		
Building Windows Applications	CO2	Understanding
Creating the Application-Adding a Binding Source		Creating
Controls-Docking and Anchoring-Data Binding		Applying

Event Handling		Applying
Accessing Data with ADO.NET-Linq and databases		Creating
UNIT IV - WEB BASED APPLICATION DEVELOPMENT ON .NET (9 Hours)		
Programming Web Applications Using ASP.NET	CO3	Understanding
Web Forms Fundamentals -Web Forms Events- Web Forms Life Cycle-Creating a Web Application		Applying
Code-Behind Files-Adding Controls Server Controls-		Creating
Data Binding-Examining the Code-		Applying
Adding Controls and Events		Applying
Programming Web Services		Creating
UNIT V - MISCELLANEOUS FEATURES (9 Hours)		
Assemblies, Versioning	CO4	Understanding
Attributes, Reflection		Understanding
Viewing MetaData, Type Discovery, Reflecting on a Type.		Understanding
Marshaling, Remoting		Creating
SELF STUDY: Mobile Applications on .NET		

TOTAL HOURS:45

TEXT BOOKS:

1. E. Balagurusamy, "Programming in C#", 2ndEditionTata McGraw-Hill, 2008.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C#", 6nd ed., O'Reilly, 2010.

REFERENCE BOOKS:

1. Herbert Schildt, " C# 4.0 -The Complete Reference ", Tata McGraw-Hill, 2010.
2. Julia Case Bradley, Anita Millspaugh, “Programming in Visual C# with Visual Studio ProfessionalEdition Software”, 2008.

WEB REFERENCES:

1. https://channel9.msdn.com/Series/C-Sharp-Fundamentals-Development-for-Absolute-Beginners
2. https://msdn.microsoft.com/en-us/library/aa288436(v=vs.71).aspx

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE43	DATA ANALYSIS TOOL	3	0	0	3

Course pre-requisite

NIL

COURSE OBJECTIVES

1. Understand the concept of data analytics
2. Identify the features that describe a data distribution
3. Understanding the analysis and statistical thinking
4. Use an appropriate softwares for data summary and exploratory data analysis.

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1 : Analyze quantitative data and interpret the results.
CO2 : Perform and practise data analyses
CO3 : Extract and visualize the results of data analyses
CO4 : Use tools to interpret the results.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Introduction to data analytics - Quantitative Data- Qualitative Data-	CO1	Analyzing
Data handling- Charting data		Analyzing
UNIT II - ELEMENTARY MODELLING (9 Hours)		
Creating general algebraic models- Expressions involving logical tests- Linear functions in business- Combining conditional statements with lookup functions	CO2	Apply
Frequency distributions, Cumulative frequency distribution, Categorizing data		Apply
UNIT III - DATA DESCRIPTION (9 Hours)		
Arithmetic mean, median, mode, weighted averages- Range, Variance and Standard deviation- Interquartile range	CO2	Apply
Statistical analysis of selected data subsets Pearson's correlation coefficient- Spearman's rank correlation coefficient- Cross-tabulation and contingency tables		Analyze
UNIT IV - REGRESSION ANALYSIS (9 Hours)		

Simple linear Regression- Scatter diagram- Non linear regression- Regression using data analysis –routine- Time series analysis	CO3	Apply
UNIT V - FINANCIAL ARITHMETIC (9 Hours)		
Simple Interest,Compound Interest, Fractional years- Variations in compounding period- Annuities	CO4	Applying
Sinking Funds- Debt repayment - R Programming for Data Analysis		Applying
SELF STUDY: Prediction, market analytics		

TOTAL HOURS:45

TEXT BOOKS:

1. David Whigman, "Business Data Analysis Using Excel", Oxford University Press, 2010.

REFERENCE BOOKS:

1. R. Lyman Ott, Michael Longnecker, An Introduction to Statistical Methods and Data Analysis, Texas A&M University, Brooks/Cole, Cengage Learning, 2010
2. Seema Acharya, Subhashini Chellapan, "Big Data and Analytics", Wiley India Pvt Ltd, 2013

WEB REFERENCES:

1. https://www.edx.org/course/data-analytics-learning-utarlingtonx-link5-10x

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE51	CLOUD COMPUTING TECHNOLOGY	3	0	0	3

Course pre-requisite

Basic Knowledge of Web Technology

Course Objectives

1. To Introduce the design and architecture of Cloud Computing.
2. To understand the Cloud Services which will reduce the cost of Software.
3. To have better understanding of Cloud Computing for everyone.
4. The main objective focuses on technologies specific to the networked, distributed dimension of software and access to services and data.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understanding of the technical foundations of cloud computing such as Cloud Architecture

CO2: Understanding of different cloud computing service models, and their role for modern application development.

CO3: Understanding the various Cloud services and its applications

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I (9 Hours)		
Cloud Computing – History of Cloud Computing	CO1	Understanding
Cloud Architecture – Cloud Storage – Why Cloud Computing Matters		Understanding
Advantages of Cloud Computing – Disadvantages of Cloud Computing		Understanding
Companies in the Cloud Today		Analyzing
Cloud Services		Analyzing
UNIT – II (9 Hours)		
Web-Based Application – Pros and Cons of Cloud Service Development	CO2	Understanding
Types of Cloud Service Development – Software as a Service –Platform as a Service		Remembering
Web Services – On-Demand Computing – Discovering Cloud Services		Remembering
Development Services and Tools – Amazon Ec2		Applying
Google App Engine – IBM Clouds		Applying
UNIT III (9 Hours)		
Centralizing Email Communications	CO2	Understanding

Collaborating on Schedules – Collaborating on To-Do Lists		Applying
Collaborating Contact Lists		Applying
Cloud Computing for the Community		Analyzing
Collaborating on Group Projects and Events		Analyzing
Cloud Computing for the Corporation		Analyzing
UNIT IV (9 Hours)		
Collaborating on Calendars, Schedules and Task Management	CO3	Understanding
Exploring Online Scheduling Applications – Exploring Online Planning and Task Management		Remembering
Collaborating on Event Management		Analyzing
Collaborating on Contact Management		Analyzing
Collaborating on Project Management		Analyzing
Collaborating on Word Processing		Analyzing
Collaborating on Databases – Storing and Sharing Files		Analyzing
UNIT V (9 Hours)		
Collaborating via Web-Based Communication Tools	CO3	Analyzing
Evaluating Web Mail Services		Analyzing
Evaluating Web Conference Tools		Analyzing
Collaborating via Social Networks and Groupware		Analyzing
Collaborating via Blogs and Wikis		Analyzing
SELF STUDY: Data Centers		

TOTAL HOURS:45

TEXT BOOKS:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2012.

REFERENCE BOOKS:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing – A Practical Approach, T McGraw 2012
2. Rajkumar Buyya,James Broberg, Andrzej Goscinski, "Cloud Computing Principles Paradigms", Wiley Publishers, 2013
3. K. Chandrasekaran, "Essentials of Cloud Computing", CRC Press, 2014.

WEB REFERENCES:

1. Cloudcomputing.ieee.org/
2. Cloud.google.com/

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE52	STORAGE SYSTEMS AND MANAGEMENT	3	0	0	3

Course pre-requisite

Basic of web technology

Course Objectives

1. To understand the types of data storage systems.
2. Utilize redundant array of independent disks (RAID) technologies effectively.
3. Setup data protection.
4. 4 .Configure replication for information storage.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Design, analyze storage systems and select an optimal storage network.
CO2: Apply the best storage configuration to protect users data.
CO3: Apply the best techniques for facilitation backup and recovery of lost or corrupted data

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I Introduction to Information Storage and Management (9 Hours)		
Information storage, Evolution of storage technology and architecture, Data center infrastructure- Key challenges in managing information, Information lifecycle	CO1	Analyzing
Storage System Environment Components of a storage system environment, Disk drive components, Disk drive performance and fundamental laws of governing disk performance, Logical components of the Host, Application requirements and disk performance		Analyzing
UNIT – II Data Protection using RAID (9 Hours)		
RAID and its implementation aspects, RAID array components, RAID levels and comparison, RAIP impact of disk performance, Hot spares	CO2	Applying
Intelligent Storage System- Intelligent Storage System- Components of an Intelligent Storage System- Intelligent Storage Array		Applying
UNIT III Cloud Architecture and services (9 Hours)		
Hadoop Distributed File System (HDFS), GFS,Windows Azure file systems, Amazon S3 file systems, Map Reduce	CO2	Applying
UNIT IV Direct-attached storage and introduction to SCSI (9 Hours)		
Benefits, limitations and types of direct-attached	CO3	Applying

storage (DAS), Disk drive interfaces- Introduction to SCSI and its command model		
Storage Area Networks: Fiber channel, Evolution and components of SAN, Fiber channel (FC), connectivity, FC ports and architecture, Zoning, FC login types, FC topologies.		Applying
UNIT V Network-attached storage (9 Hours)		
General purpose servers versus network attached storage (NAS) devices, NAS file I/O, NAS components and implementation	CO3	Applying
NAS file-sharing protocols and I/O operations, Factors affecting NAS performance and availability.		Applying
SELF STUDY: Amazon Dynamo db, Google GFS		

TOTAL HOURS:45

TEXT BOOKS:

1. G. Somasundaram, AlokShrivastava, EMC Education Services, Information Storage and Management, 2nd Edition, Wiley, 2012.
2. Barrie Sosinsky, "Cloud Computing Bible" Wiley, 2010.

REFERENCE BOOKS:

1. Ulf Troppen, Rainer Erkens, Wolfgang Muller, Storage Networks Explained: Basic and Applications of Fibre Channel SAN, NAS, ISCSI and Infiniband, Wiley, 2008.
2. Robert Spalding, Storage Networks: The Complete Reference, Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, Building Storage Networks, Tata McGraw Hill,Osborne, 2001

WEB REFERENCES:

1. www.coursera.org

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE53	TCP/IP	3	0	0	3

Course pre-requisite

NIL

Course Objectives

1. This course provides an introduction to the theory and practice of the design of computer and communications networks.
2. The TCP/IP Protocol Suite is used as the framework with the course progressing through the physical, data link, and network and transport layers.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Understand and explain Data Communications System and its components.
CO2: Identify the different types of network topologies and protocols.
CO3: Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO4: Identify the different types of network devices and their functions within a network.
CO5: Understand and building the skills of subnetting and routing mechanisms.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Standards – Internet – History- OSI model – Protocol suite	CO1	Remember
Addressing – Transmission media – Local Area and Wide Area Networks		Remember
Switching – Connecting devices – IP addressing		Understanding
UNIT II INTERNET PROTOCOL (9 Hours)		
Subnetting – Supernetting – IP packets – Delivery	CO5	Applying
Routing – Routing model – Routing table – Datagram – Fragmentation – Checksum – IP Design		Applying
ARP – RARP – Internet control message protocol – Internet group management protocol		Understanding
UNIT III TRANSMISSION CONTROL PROTOCOL (9 Hours)		
User Datagram protocol – UDP operation – Use – UDP design	CO3	Understanding
TCP services – Flow control – Error control – TCP operation and design		Understanding
connection – Transition diagram – Congestion control		Understanding
UNIT IV - APPLICATION LAYER AND CLIENT SERVER MODEL (9 Hours)		
Concurrency – BOOTP – DHCP	CO4	Analyze

Domain name system – Name space – Distribution – Resolution – Messages		Analyze
Telnet – Rlogin – Network Virtual Terminal – Character Set – Controlling the server – Remote login		Analyze
UNIT V APPLICATION PROTOCOLS (9 Hours)		
File Transfer Protocol – Connections – Communication – Simple Mail Transfer Protocol	CO2	Analyze
Simple Network Management Protocol – Hyper Text Transfer Protocol – Transaction –Request and Response messages		Analyze
SELF STUDY: : Network Routing		

TOTAL HOURS:45

TEXT BOOKS:

1. Behrouz A. Forouzan, "TCP/IP Protocol Suite", 4th edition,Tata McGraw Hill Edition 2010.

REFERENCE BOOKS:

1. Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP – Volume I, II and III", Prentice-Hall of India Pvt. Ltd., 2nd Edition 1994.

WEB REFERENCES:

1. *www.tcpipguide.com/*

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE54	BUSINESS INTELLIGENCE	3	0	0	3

Course pre-requisite

NIL

COURSE OBJECTIVES

1. This course is intended to expose an overview of Business Intelligence and the challenges on BI and data warehousing.
2. To understand Challenges and Issues on BI

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1 : Use BI systems and technology to support decision making
CO2 : Design and build BI applications based on users' needs
CO3 : Identify business and technical requirements for a BI solutions
CO4 : Apply relevant theories, concepts and techniques to solve real-world BI problems

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Overview – Datawarehouse, Decision support system, BI, Knowledge Management-Building Datawarehouse	CO1	Apply
Modeling Techniques-Building Metadata-Populating Datawarehouse- Anomalies		Apply
UNIT II - DATA WAREHOUSE (9 Hours)		
Accessing data warehouse- Usage, Exploiting –Data warehouse, OLAP, Information Mining, Data Mining-Integrated Data warehouse	CO2	Create
Knowledge Management Process-BI- Evolution, Requirements and Challenges-Intelligent Miner for Data		Create
UNIT III - DECISION SUPPORT SYSTEM (9 Hours)		
Decision support System overview-Decision making system- Modelling and support-Methodologies and Technologies	CO3	Understand
UNIT IV - VISUALIZATION (9 Hours)		
Business Analytics and Visualization- Overview-Multidimensionality	CO3	Understand & Apply
Advanced BA-Data Visualization- BA and Web		Apply
UNIT V - BIG-DATA (9 Hours)		
Introduction to BigData -Integrating Hadoop into	CO4	Apply

BI/DW- Use cases for Hadoop into BI/DW		
SELF STUDY: Best Practices- Tools- Priorities		

TOTAL HOURS:45

TEXT BOOKS:

1. IBM, Introduction to Business Intelligence and Data Warehousing, 2004
2. IBM, Getting Started with Data Warehouse and Business Intelligence August 1999
3. Efraim Turban, Ramesh Sharda, Dursun Delen, Decision Support and Business Intelligence Systems , 2013.
4. Philip Russom, Integrating Hadoop Into Business Intelligence And Data Warehousing dwi Best Practices Report, 2013.

REFERENCE BOOKS:

1. Efraim Turban, Ramesh Sharda, Jay E. Aronson, Business Intelligence: A Managerial Approach , 2007

WEB REFERENCES:

1. *https://en.wikipedia.org/wiki/Business_intelligence*

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE55	ARTIFICIAL INTELLIGENCE	3	0	0	3

Course pre-requisite

NIL

Course Objectives

1. To learn the basics of designing intelligent agents that can solve general purpose problems.
2. To represent and process knowledge, plan , act and reason under uncertainty.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Learn the basics of the theory and practice of Artificial Intelligence as a discipline about intelligent agents capable of deciding what to do, and do it.

CO2: Apply knowledge representation techniques and problem solving strategies to common AI applications.

CO3: Design simple software to experiment with various AI concepts and analyze results.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - PROBLEM SOLVING (9 Hours)		
Introduction – Agents – Problem formulation	CO1	Remember
uninformed search strategies – heuristics		Remember
informed search strategies – constraint satisfaction		Understanding
UNIT II LOGICAL REASONING (9 Hours)		
Logical agents – propositional logic – inferences	CO1	Remember
first-order logic – inferences in firstorder logic		Remember
forward chaining – backward chaining – unification – resolution		Understanding
UNIT III PLANNING (9 Hours)		
Planning with state-space search – partial-order planning	CO2	Applying
planning graphs – planning and acting in the real world		Applying
UNIT IV UNCERTAIN KNOWLEDGE AND REASONING (9 Hours)		
Uncertainty – review of probability - probabilistic Reasoning	CO2	Applying
Bayesian networks –inferences in Bayesian networks		Applying
Temporal models – Hidden Markov models		Applying
UNIT V LEARNING (9 Hours)		
Learning from observation - Inductive learning	CO3	Create
Decision trees – Explanation based learning		Create
Statistical Learning methods - Reinforcement Learning		Create
SELF STUDY: : Artificial Intelligence for Robotics		

TOTAL HOURS:45

TEXT BOOKS:

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education, 2010.

REFERENCE BOOKS:

1. David Poole, Alan Mackworth, Randy Goebel, ”Computational Intelligence : a logical approach”, Oxford University Press, 2004
2. G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem solving”, Fourth Edition, Pearson Education, 2002
3. J. Nilsson, “Artificial Intelligence: A new Synthesis”, Elsevier Publishers, 1998.

WEB REFERENCES:

1. http://www.philocomp.net/links/ai.htm

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAE56	BIG DATA ANALYTICS	3	0	0	3

Course pre-requisite

Java programming and Data Mining

COURSE OBJECTIVES

1. Understand the Big data and analytics
2. Understand the Hadoop platform and MapReduce
3. To understand usage of reporting
4. Identify and successfully apply appropriate techniques and tools to solve actual big data problems

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1: Apply big data technologies in business intelligence
CO2: Practice and apply NOSQL dams
CO3: Design algorithm for big data mining
CO4: Analysing and to generate report

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Introduction to Big Data - Types of Digital Data- Characteristics of Data	CO1	Apply
Business Intelligence (BI) versus Big Data- Introduction to Big Data Analytics- Classification of Analytics - Modern Data Analytic Tools		Apply
UNIT II - NoSQL (9 Hours)		
Introducing NoSQL- Introducing Hadoop- Features of Hadoop- High Level Architecture of Hadoop- Hadoop Distributed File System- Processing Data with Hadoop- MapReduce Daemons	CO2	Analyze and Apply
UNIT III - MongoDB (9 Hours)		
Introducing MongoDB- Using JSON -Support for Dynamic Queries- Data Types- MongoDB Query Language - Apache Cassandra Overview- Features of Cassandra- CQL Data Types - Collections	CO2	Analyze and Apply
UNIT IV - Hive (9 Hours)		
History of Hive - Hive Architecture- Hive Data Types -Hive File Format- Hive Query Language	CO3	Create
Hive partitions- Hive user defined functions		Create
UNIT V - Pig (9 Hours)		

Introducing Pig- Data Types in Pig-- Running Pig- Execution Modes of Pig -HDFS Commands	CO4	Analyze
Pig versus Hive- Introduction to Jasper Report using Jasper Soft- Reporting using MongoDB- Reporting using Cassandra		Analyze
SELF STUDY: Market and web analytics		

TOTAL HOURS:45

TEXT BOOKS:

1. Seema Acharya, Subhashini Chellapan, "Big Data and Analytics", Wiley India Pvt Ltd, 2013

REFERENCE BOOKS:

1. Jenn Webb and Tim O'Brien, "Big Data Now ", O'Reilly Media, 2014

WEB REFERENCES:

1. https://www.mongodb.org/downloads
2. http://cassandra.apache.org/download/
3. http ://apache.bytenet.in/hadoop/common/hadoop-2.6.0/
4. http://apache.bytenet.in/hive/
5. http://apache.bytenet.in/pig/
6. https://community.jaspersoft.com/download

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAO1	WEB GRAPHICS	3	0	0	3

Course pre-requisite

NIL

Course Objectives

The concepts and principles significant to web graphics design and delivery
Create compressed graphics in GIF and JPEG formats.

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO1: Learn and use painting, drawing and retouching tools
CO2: Manipulate the customizable palettes
CO3 : Create animated GIF images
CO4: Synthesize web graphics design principles and production skills to create attractive and readable web design elements such as rollover buttons, titles and photos

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Photoshop program Window	CO1	Remember
Screen Modes- File creation		Remember
		Understanding
UNIT II IMAGES (9 Hours)		
Vector and Bitmap Images- Image Size, Editing Images	CO1	Applying
Color Models- Setting Foreground and Background Colors- File formats		Applying
Selection Tools- Magnetic Lasso Tool- Editing Selection- Transforming Selection		Applying
UNIT III PAINTING, DRAWING AND RETOUCHING TOOLS (9 Hours)		
Painting Tools- Drawing Tools- Retouching tools	CO1	Create
UNIT IV - LAYERS (9 Hours)		
Layers Palette- Working with Layers- Hiding/Showing Layers	CO2, CO3	Analyzing
Repositioning layers- Working with adjustment layers- Layer Effects		Analyzing
UNIT V FILTERS AND TYPE TOOL (9 Hours)		
Type Tool- Converting Point Type to Paragraph type- Filter Menu	CO4	Create
- Filter Gallery- Extract filter, Artistic Filters, Blur Filters, Distort Filters,Noise		Create
Filters- Lighting Effects, Difference Clouds, Sharpen		Create

filters, Sketch Filters, Stylize filters		
SELF STUDY: : Optimize Photoshop files for the web		

TOTAL HOURS:45

TEXT BOOKS:

1. Shalini Gupta, Adity Gupta, “Photoshop in simple steps”, Dreamtech press, 2008.

REFERENCE BOOKS:

1. Richard Schrand, Photoshop 6 Visual Jumpstrat, Adobe Press 2000.
2. James L. Mohles, Flash 5.0 Graphics, Animation & Interaction, Macromedia 2000.

WEB REFERENCES:

1. *www.webreference.com › Developer's Corner › graphics*

Course Code	Course Name	Contact Hours			
		L	T	P	C
16MAO2	RESPONSIVE WEB DESIGN	3	0	0	3

Course pre-requisite

Basic of web technology

COURSE OBJECTIVES

1. To develop background knowledge as well as core expertise in Database
2. Management Systems. To understand database design and normalization techniques
3. To use standard query language and its various versions.
4. To understand importance of transaction, backup and recover techniques.
5. To develop database system to handle the real world problem.

COURSE OUTCOMES

Upon completion of the course, students shall have ability to

CO1: Understand, analyze and create web pages using HTML, DHTML and Cascading Styles sheets.

CO2: Understand, analyze and build dynamic web pages using AJAX,JSON and JQuery

CO3: Understand, analyze and create XML documents and XML Schema.

Topics

Description	Course Outcome	Level of Bloom's Taxonomy
UNIT I - INTRODUCTION (9 Hours)		
Defining responsive web design- Examples of responsive web design- Introduction to HTML5- CSS3 enables responsive designs	CO1	Understand and Analyze
HTML/ XHTML Authoring Fundamentals- Images, Page layout with tables, Frames, Forms, Multimedia- Controlling presentation with CSS		Create
UNIT II - Responsive design (9 Hours)		
HTML5 for Responsive Designs- New semantic elements in HTML5- Practical usage of HTML5's structural elements	CO1	Understand and Analyze
Embedding Media, Audio, Responsive video, Offline Web applications		Create
UNIT III - CSS (9 Hours)		
CSS3 color formats and alpha transparency- CSS3- Text shadows- Box Shadows, Gradients, Background Images-	CO1	Create
CSS3 Transitions- CSS3 2D Transformations- CSS3 3D Transformations- Animating with CSS3		Create
UNIT IV - Forms (9 Hours)		
HTML5 forms- HTML5 input types- Date and time	CO2	Create

inputs- Polyfill non-supporting browsers- Styling HTML5 forms with CSS3		
UNIT V - Web documents (9 Hours)		
Testing and Validating your Documents- Web Development Software- Choosing a Service Provider	CO4	Understand,analyze
Uploading your site with FTP- Publishing and Maintaining your site. Recent trends-Node JS.		Create
SELF STUDY: MVC architecture		

TOTAL HOURS:45

TEXT BOOKS:

1. Ben Frain , "Responsive Web Design with HTML5 and CSS3" 2012, PACKT publishing
2. Bryan Pfaffenberger, Steven M.Schafer, Chuck White and Bill Karow "HTML,XHTML & CSS Bible" Willey ,2015

REFERENCE BOOKS:

Chris Bates, "Web Programming Building Internet Application", John Wiley and Sons, 2006

WEB REFERENCES:

www.udemy.com/design-and-develop-a-killer-website-with-html5-and-css3/
www.w3schools.com

16MA03	GRAPH THEORY	3/0/0/3

PREREQUISITES: Higher secondary Mathematics

COURSE OBJECTIVES

1. Formulate a real-world problem as a mathematical programming model
2. Understand the applications of graph theory in real world problems.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Write precise and accurate mathematical definitions of objects in graph theory

CO2: Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.

CO3: Validate and critically assess a mathematicalproof.

CO4: Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.

COURSE CONTENTS

UNIT NO.	TOPICS		COURSE OUTCOME	LEVEL OF BLOOMS TAXONOMY
I	**INTRODUCTION (9 Hours)**			
	Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness		CO1	Understanding
	Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees		CO1	Understanding
	Distance and centers in tree –Rooted and binary trees.		CO1	Understanding
II	**TREES, CONNECTIVITY & PLANARITY (9 Hours)**			
	Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets		CO2	Create
	Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism		CO2	Create
	Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.		CO2	Create
III	**MATRICES, COLOURING AND DIRECTED GRAPH(9 Hours)**			
	Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem		CO4	Create
	Directed graphs – Types of directed graphs – Digraphs and binary relations		CO4	Create
	Directed paths and connectedness – Euler graphs		CO4	Create
IV	**PERMUTATIONS & COMBINATIONS (9 Hours)**			
	Fundamental principles of counting - Permutations and combinations - Binomial theorem		CO3	Analyze
	combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion		CO3	Analyze

	Derangements - Arrangements with forbidden positions.		CO1	Understanding
V	**GENERATING FUNCTIONS (9 Hours)**			
	Generating functions - Partitions of integers - Exponential generating function – Summation operator		CO2	Create
	Recurrence relations - First order and second order		CO1	Understanding
	Non-homogeneous recurrence relations - Method of generating functions.		CO1	Understanding
TOTAL LECTURE HOURS:45				

TEXT BOOKS:

1. Narsingh Deo, “Graph Theory: With Application to Engineering and Computer Science”, Prentice Hall of India, 2003.
2. Grimaldi R.P. “Discrete and Combinatorial Mathematics: An Applied Introduction”, Addison Wesley, 1994.

REFERENCE BOOKS:

1. Clark J. and Holton D.A, “A First Look at Graph Theory”, Allied Publishers, 1995.
2. Mott J.L., Kandel A. and Baker T.P. “Discrete Mathematics for Computer Scientists and Mathematicians” Prentice Hall of India, 1996.
3. Liu C.L., “Elements of Discrete Mathematics”, Mc Graw Hill, 1985.
4. Rosen K.H., “Discrete Mathematics and Its Applications”, Mc Graw Hill, 2007.

16MA04	OPTIMIZATION TECHNIQUES	3/0/0/3

PREREQUISITES: Higher secondary Mathematics

COURSE OBJECTIVES

1. Formulate a real-world problem as a mathematical programming model
2. Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand
3. Solve specialized linear programming problems like the transportation and assignment problems
4. Model a dynamic system as a queuing model and compute important performance measures

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

1. recognize the importance and value of Operations Research and mathematical modelling in solving practical problems in industry
2. formulate a managerial decision problem into a mathematical model
3. understand Operations Research models and apply them to real-life problems
4. Identify the bottleneck activities of the project and to minimize the total project duration

COURSE CONTENTS

UNIT NO.	TOPICS	TEXT BOOK	CHAPTER	LECTURE HOURS
I	**LINEAR PROGRAMMING MODELS**			
	Mathematical Formulation - Graphical Solution of linear programming models	T1	3	3
	Simplex method – Artificial variable Techniques	T1	4-5	5
	Dual Simplex method	T1	5	1
II	**TRANSPORTATION AND ASSIGNMENT MODELS**			
	Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution	T1	10	3
	optimum solution - degeneracy	T1	11	3
	Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem	T1	11	3
III	**INTEGER PROGRAMMING MODELS**			
	Formulation – Gomory's IPP method	T1	7	3
	Gomory's mixed integer method	T1	7	3
	Branch and bound technique	T1	7	3
	SCHEDULING BY PERT AND CPM			

IV	Network Construction – Critical Path Method	T1	24	4
	Project Evaluation and Review Technique	T1	25	3
	Resource Analysis in Network Scheduling	T1	25	2
V	**QUEUEING MODELS**			
	Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / ∞ /∞)	T3	6	3
	(M / M / 1) : (FIFO / N / ∞), (M / M / C) : (FIFO / ∞ / ∞)	T3	6	3
	(M / M / C) : (FIFO / N / ∞) models.	T3	6	3
			TOTAL LECTURE HOURS:45	

TEXT BOOKS:

1. Taha H.A., "Operations Research: An Introduction " 7th Edition, Pearson Education, 2004.
2. Palaniammal, S., ―Probability and Random Processes, Prentice hall of India, New Delhi, 2014,Reprint 2015.
3. Kanti Swarup, P.K.Gupta, Man Mohan, "Operations Research", ninth edition, S. Chand, New Delhi, 2001.

REFERENCE BOOKS:

1. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
2. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3rd Edition, 2003.
3. Veerarajan., T ―Probability, Statistics and Random Processes, Tata McGraw-Hill, Second Edition, New Delhi, 2010.

WEB REFERENCES:

1. http://nptel.ac.in/courses/110106059/
2. http://www.nptelvideos.in/2012/12/probability-random-variables.html
3. https://**online**courses.**nptel**.ac.in/noc15mg01
4. *www.**nptel**videos.in/2012/12/fundamentals-**of-operations-research**.html*