



Sri Krishna College of Engineering and Technology
An Autonomous Institution, Affiliated to Anna University

Coimbatore – 641 008

DEPARTMENT OF INFORMATION TECHNOLOGY



CURRICULUM AND SYLLABI
B.TECH INFORMATION TECHNOLOGY

Regulation 2017

SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY
KUNIAMUTHUR, COIMBATORE-641008

DEPARTMENT OF INFORMATION TECHNOLOGY

Institute Vision

To produce globally competitive engineers with high ethical values and social responsibilities.

Institute 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.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Department Vision

To impart quality education by providing opportunities for shaping and transforming students into eminent and ethical IT professionals, researchers, innovators and entrepreneurs with requisite skill set to excel in the dynamic field of IT.

Department Mission

- To provide state of art computer education.
- To equip staff and students with the latest skills in the field.
- To keep pace with new invention and technology development, thereby set the trend for the futuristic information technology education and research with ethical and moral

DEPARTMENT OF INFORMATION TECHNOLOGY

Programme Educational Objectives

PEO 1: Graduates will have a profound knowledge in the various programming languages and possess globally competent skill sets by inculcating continuous up gradation of their

PEO 2: Graduates will be able to analyze and find solutions to various applications and reconcile the dynamic trends in the field of Information Technology.

PEO 3: Graduates will contribute to the society by their ethical behavior and effective teamwork.

PEO 4: Graduates will excel with different skills like effective communication, leadership qualities, and provide smart solutions in business environment

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DEPARTMENT OF INFORMATION TECHNOLOGY

Program Outcomes

PO a) Graduates will demonstrate knowledge of mathematical, scientific and multidisciplinary approach for problem solving.

PO b) Graduates will be able to apply their knowledge in various programming skills to create solutions for product based and application based software.

PO c) Graduates will possess the ability to create real time solutions for different projects by using modern tools prevailing in the current trends.

PO d) Graduates attain job related skills such as improved oral and written communications and experience in working in teams at a number of levels.

PO e) Graduates attain advanced knowledge in the stream of Information Technology and basic knowledge in Electronics and Communication Engineering to develop and maintain the simple and complex information systems.

PO f) Graduates will demonstrate state of the art technologies by choosing suitable electives, that encourages lifelong learning

PO g) Graduates will possess effective leadership qualities and help the society with their social responsibility, ethical and moral values.

PO h) Graduate perceive the attitude to keep on upgrading themselves in both hardware and software to develop and manage projects in multi disciplines so as to survive in the latest IT field.

PO i) Graduates possess the knowledge to consider the impact of engineering solution to the environment and the demand

R2017

SEMESTER I							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17EN001	Technical Communication skills- I	3/0/2	5	4	40/60	HS
2	17MA101	Linear Algebra and Differential Calculus	3/2/0	5	4	60/40	BS
3	17CS201	Problem Solving Techniques and C Programming	3/0/3	6	5	40/60	ES
4	17IT301	Computer Science Essentials- I	3/0/0	4	3	60/40	PC
5	17PH102	Engineering Physics	3/0/2	5	4	40/60	BS
6	17ME204	Engineering Practices Laboratory	0/0/3	3	2	40/60	ES
Total				28	22	700	

SEMESTER II							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17EN002	Technical Communication Skills – II	3/0/2	5	4	40/60	HS
2	17MA104	Integral Calculus and Laplace Transforms	3/2/0	5	4	60/40	BS
3	17CH103	Engineering Chemistry	3/0/2	5	4	40/60	BS
4	17CS203	Linux and Advanced C Programming	3/0/3	6	5	40/60	ES
5	17IT302	Computer Science Essentials II	3/0/0	4	3	60/40	PC
6	17ME205	Engineering Graphics Laboratory	0/0/3	3	2	40/60	ES
Total				28	22	600	

SEMESTER III							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17MA107	Discrete Structures	3/2/0	5	4	60/40	BS
2	17IT303	Operating Systems	3/0/0	3	3	60/40	PC
3	17IT304	Data Structures	3/0/3	6	5	40/60	PC
4	17CS205	Digital Principles and Systems Design	3/0/2	5	4	40/60	ES
5	17CS206	Object Oriented Programming using Java	3/0/0	3	3	60/40	ES
6	17IT305	Operating Systems Laboratory	0/0/3	3	2	40/60	PC
7	17CS207	Java Programming Laboratory	0/0/3	3	2	40/60	ES
8	17IT701	Mandatory Course-I	2/0/0	2	1	0/100	MC
Total				30	24	700	

SEMESTER IV							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17MA110	Probability and Statistics	3/2/0	5	4	60/40	BS
2	17IT306	Fundamentals of Digital and Mobile Communication	3/0/2	5	4	40/60	PC
3	17IT307	Database Management Systems	3/0/0	3	3	60/40	PC
4	17IT308	Computer Architecture	3/0/0	4	3	60/40	PC
5	17IT309	Design and Analysis of algorithms	3/0/0	4	3	60/40	PC
6	17IT310	DBMS Laboratory	0/0/3	3	2	40/60	PC
7	17IT311	Algorithms Laboratory	0/0/3	3	2	40/60	PC
8	17IT601	Mini Project-I	-	-	2	40/60	PW
9	17IT702	Mandatory Course-II	2/0/0	2	1	0/100	MC
Total				29	24	900	

SEMESTER V							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17MA114	Fourier Series and Computational Methods	3/2/0	5	4	60/40	BS
2	17IT312	Formal Languages and Automata Theory	3/0/0	4	3	60/40	PC
3	17CS208	Microprocessors and Microcontrollers	3/0/0	3	3	60/40	ES
4	17IT313	Computer Networks	3/0/0	3	3	60/40	PC
5	17IT314	Machine Learning	3/0/2	5	4	40/60	PC
6	17IT4XX	Professional Elective-I	3/0/0	3	3	60/40	PE
7	17CS209	Microprocessor Laboratory	0/0/3	3	2	40/60	ES
8	17IT315	Computer Networks Laboratory	0/0/3	3	2	40/60	PC
9	17IT703	Mandatory Course-III	2/0/0	2	1	0/100	MC
Total				31	25	800	

SEMESTER VI							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17IT316	Discrete Time Signal Processing	3/0/0	4	3	60/40	PC
2	17IT317	Software Development	3/0/0	3	3	60/40	PC
3	17IT318	Data Analytics	3/0/0	4	3	60/40	PC
4	17IT319	Virtualization and Cloud	3/0/0	4	3	60/40	PC
5	17IT4XX	Professional Elective-II	3/0/0	3	3	60/40	PE
6	17XX50X	Open Elective	3/0/0	3	3	60/40	PE
7	17IT320	Data Analytics Lab	0/0/3	3	2	40/60	PC
8	17IT321	CASE tools Laboratory	0/0/3	3	2	40/60	PC
9	17IT602	Mini Project-II	-	-	2	40/60	PW
10	17IT322	Virtualization & Cloud Laboratory	0/0/3	3	2	40/60	PC
11	17IT704	Mandatory Course-IV	2/0/0	2	1	0/100	MC
Total				32	27	1000	

SEMESTER VII							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17IT323	Internet of Things	3/0/0	3	3	60/40	PC
2	17IT324	Internet Programming	3/0/0	3	3	60/40	PC
3	17T4XX	Professional Elective-III	3/0/0	3	3	60/40	PE
4	17IT4XX	Professional Elective-IV	3/0/0	3	3	60/40	PE
5	17IT4XX	Professional Elective-V	3/0/0	3	3	60/40	PE
6	17IT4XX	Professional Elective-VI	3/0/0	3	3	60/40	OE
7	17IT325	Internet of Things (IoT) Laboratory	0/0/3	3	2	40/60	PC
8	17IT326	Internet Programming Laboratory	0/0/3	3	2	40/60	PC
Total				24	22	800	

SEMESTER VIII							
S No.	Course Code	Course	L/T/P	Contact hrs/week	Credit	Ext/Int	Category
1	17IT603	Project	0/0/24	24	12	40/60	PW
Total				24	12	100	

HUMANITIES (9 credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.	17EN001	Technical Communication skills – I	3/0/2	5	4	HS
2.	17EN002	Technical Communication Skills – II	3/0/2	5	4	HS

BASIC SCIENCES (28 Credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.	17MA101	Linear Algebra, Calculus and its Application	3/2/0	5	4	BS
2.	17PH103	Engineering Physics	3/0/2	5	4	BS
3.	17MA104	Integral Calculus and Laplace Transform	3/2/0	5	4	BS
4.	17CH103	Engineering Chemistry	3/0/2	5	4	BS
5.	17MA107	Discrete Structures	3/2/0	5	4	BS
6.	17MA110	Probability and Statistics	3/2/0	5	4	BS
7.	17MA114	Fourier Series and Computational Methods	3/2/0	5	4	BS

ENGINEERING SCIENCES (26 Credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.	17CS201	Problem Solving Techniques and C Programming	3/0/2	5	4	ES
2.	17ME204	Engineering Practices Laboratory	0/0/3	3	2	ES
3.	17CS203	Linux and Advanced C Programming	3/0/2	5	4	ES
4.	17ME205	Engineering Graphics Laboratory	0/0/3	3	2	ES
5	17CS205	Digital Principles and Systems Design	3/0/3	6	4	ES
6.	17CS206	Object Oriented Programming using Java	3/0/0	3	3	ES
7.	17CS207	Java Programming Laboratory	0/0/3	3	2	ES
8.	17CS208	Microprocessors and Microcontrollers	3/0/0	3	3	ES
9.	17CS209	Microprocessor Laboratory	0/0/3	3	2	ES

PROFESSIONAL CORE (74 Credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
1.	17CS301 / 17IT301	Computer Science Essentials	3/0/0	4	3	PC
2.	17IT302	Computer Science Essentials II	3/0/0	4	3	PC
3.	17IT303	Operating Systems	3/0/0	3	3	PC
4.	17IT304	Data Structures	3/0/3	6	5	PC
5.	17IT305	Operating Systems Laboratory	0/0/3	3	2	PC
6.	17IT306	Fundamentals of Mobile and Wireless Communication	3/0/3	6	5	PC
7.	17IT307	Database Management Systems	3/0/0	3	3	PC
8.	17IT308	Computer Architecture	3/0/0	4	3	PC
9.	17IT309	Design and Analysis of algorithms	3/0/0	4	3	PC
10.	17IT310	DBMS Laboratory	0/0/3	3	2	PC
11.	17IT311	Algorithms Laboratory	0/0/3	3	2	PC
12.	17IT312	Formal Languages and Automata Theory	3/0/0	4	3	PC
13.	17IT313	Computer Networks	3/0/0	3	3	PC
14.	17IT314	Machine Learning	3/0/3	6	4	PC
15.	17IT315	Computer Networks Laboratory	0/0/3	3	2	PC
16.	17IT316	Discrete Time Signal Processing	3/0/0	4	3	PC
17.	17IT317	Software Development	3/0/0	3	3	PC
18.	17IT318	Data Analytics	3/0/0	4	3	PC
19.	17IT319	Virtualization and Cloud	3/0/0	4	3	PC
20.	17IT320	Data Analytics Laboratory	0/0/3	3	2	PC
21.	17IT321	CASE tools Laboratory	0/0/3	3	2	PC
22.	17IT322	Virtualization & Cloud Laboratory	0/0/3	3	2	PC
23.	17IT323	Internet of Things	3/0/0	3	3	PC
24.	17IT324	Internet Programming	3/0/0	3	3	PC
25.	17IT325	Internet of Things (IoT) Laboratory	0/0/3	3	2	PC
26.	17IT326	Internet Programming Laboratory	0/0/3	3	2	PC

ELECTIVE/AUDIT COURSES (18 + 3 Credits)

S. No	Course Code	Course Title	L/T/P	Contact Hrs/Wk	Credits	Category
PROFESSIONAL ELECTIVES						
Networking						
1.	17IT401	Wireless Sensor networks	3/0/0	3	3	PE
2.	17IT402	Cryptography and Network Security	3/0/0	3	3	PE
3.	17IT403	Distributed Systems	3/0/0	3	3	PE
4.	17IT404	Mobile Application Development	3/0/0	3	3	PE
5.	17IT405	Embedded Systems	3/0/0	3	3	PE
6.	17IT406	Quantum Computing	3/0/0	3	3	PE
Programming Languages , Multimedia and Software Engineering						
1.	17IT407	Advanced Java Programming	3/0/0	3	3	PE
2.	17IT408	R Programming	3/0/0	3	3	PE
3.	17IT409	Computer Graphics and Multimedia	3/0/0	3	3	PE
4.	17IT410	Image and Vision Computing	3/0/0	3	3	PE

5.	17IT411	Free Open Source Software	3/0/0	3	3	PE
6.	17IT412	Software Performance Testing	3/0/0	3	3	PE
Data Science and latest trends						
1.	17IT413	Data Warehousing and Mining	3/0/0	3	3	PE
2.	17IT414	Design patterns and design thinking	3/0/0	3	3	PE
3.	17IT415	Data visualization	3/0/0	3	3	PE
4.	17IT416	User Experience Design	3/0/0	3	3	PE
5.	17IT417	Business Intelligence	3/0/0	3	3	PE
6.	17IT418	Game Theory and its Applications	3/0/0	3	3	PE
7.	17IT419	Deep Learning	3/0/0	3	3	PE
OPEN ELECTIVES						
1.	17IT501	Mobile Applications Development using Android	3/0/0	3	3	OE
2.	17IT502	Cyber Security and Ethical Hacking	3/0/0	3	3	OE
3.	17IT503	Fundamentals of Database Technologies	3/0/0	3	3	OE
4.	17IT504	Virtual Reality and Augmented Reality	3/0/0	3	3	OE

MANDATORY COURSES (4 credits)

S.No	Course Code	Course Title	Category
1.	17IT701	Life Skills and Ethics	MC
2.	17IT702	Quantitative aptitude and soft skills	MC
3.	17IT703	Foreign Language/Spoken Hindi	MC
4.	17IT704	MOOC Certification	MC

ONE CREDIT COURSES

S.No	Course	Course Title	Credits
1.	17IT801	Ruby on Rails	1
2.	17IT802	J2ME	1
3.	17IT803	J2EE	1
4.	17IT804	Interactive Programming in Python	1
5.	17IT805	MATLAB Programming	1
6.	17IT806	Angular JS	1
7.	17IT807	Open source Testing	1
8.	17IT808	Linux Shell Scripting	1
9.	17IT809	SPSS	1
10.	17IT810	SAP	1

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

S. No	Stream	Credits/Semester								Credits	%	AICTE Norms % (Min- Max)
		I	II	III	IV	V	VI	VII	VIII			
1.	Humanities (HS)	4	4							8	4.4	5-10
2.	Basic Sciences(BS)	8	8	4	4	4				28	15.56	15-20
3.	Engineering Sciences(ES)	7	7	9		5				28	15.56	15-20
4.	Professional Core(PC)	3	3	10	17	12	18	10		73	40.56	30-40
5.	Professional Electives(PE)					3	6	9		18	10	10-15
6.	Open Electives(OE)							3		3	1.67	5-10
7.	Project Work(PW)				2		2		12	16	8.89	10-15
8.	Employability Enhancement Skills									2	1.11	
9.	Mandatory Course (MC)			1	1	1	1			4	2.22	-
Total		22	22	24	24	25	27	22	12	180	100	176 Credits

Nature of Course : E (Theory Skill Based)

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 in practical mode.
- 4 To prepare the students for all competitive program like BEC/ IELTS/ TOEFL.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Remember language skills for business related situations. | [R] |
| CO2 | Understand and intensely focus on improving and increasing LSRW skills | [U] |
| CO3 | Apply a good command over basic writing and reading skills. | [AP] |
| CO4 | Analyze and use vocabulary in corporate work environment. | [U] |

Course Contents:

INTRODUCTION Basics of English language- History of English language- Etymology of scientific terms - Importance of LSRW skills – Getting to know people- How to talk about personality types- Self introduction-Introducing others.

LISTENING Importance of listening skills -Listening to short conversations or monologues- Seeking and supplying information -Listening for specific information- Active listening- Telephonic Conversation and Etiquette -Talking and conveying messages (over the phone)- Listening to speeches / talks- Giving directions / instruction.

SPEAKING Importance of Speaking skills-Grammar and Vocabulary- Pronunciation - Business topics- Talk about preferences-Agree and disagree- Giving opinions- Listening and responding- Sense of persuasion- Situational approaches- Reasons and Consequences -Making Predictions- Short presentation -Interactive communication-Discourse markers and management.

READING Importance of reading skills - Reading short texts such as notices, advertisements, memos, emails- Skimming and scanning -Identifying relationship between characters, facts and ideas-Comparing facts and figures-Reading and understanding specific meaning in a text - Cloze reading- Identifying relevant information- Identifying reasons and consequences through reading practices -Vocabulary practice.

WRITING Importance of writing skills - Brevity of communication -Notes- Memo- Email - Formal and informal – Letter writing- Job application Letter - Resume Writing - Itinerary- Paragraph Writing - Essay Writing- Check list- -Requests and Obligation- Letter Phrases – Instructions- Recommendations- Jumbled sentences.

PARTS OF SPEECH Present simple- Simple past- Connectors of addition and contrast- Present Continuous- Gerunds and Infinitives- Vocabulary development through prefixes-suffixes and word roots- Synonyms-Antonyms - Auxiliary Verbs - Countable and Uncountable Nouns - Present perfect -Future possibility/ Probability - Question formation-Sequencing words- Prepositions- If- Conditionals.

Lab Component

1	Listening Comprehension	[E]
2	Writing Emails and Letters	[E]
3	Mini Presentation	[E]
4	Telephonic Conversation	[E]
5	Reading Comprehension	[E]

Total Hours: 60**Text Books:**

- 1 Whitby, Norman. Cambridge University Press- Students Book. 2013
- 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 2015.

Reference Books:

- 1 Wood, Ian, Paul Sanderson, Anne Williams with Marjorie Rosenberg, Pass Cambridge BEC Preliminary, Cengage learning. Second Edition. 2014.
- 2 Sharma R.C, Mohan Krishna, Business Correspondence and Report Writing, McGraw Hill Education (India) Private Limited, 2016.
- 3 Lewis, Norman, Word Power Made Easy, Pocket Books, New York, 1979.

Web References:

- 1 <http://www.cambridgeindia.org>
- 2 <http://www.cambridgeenglish.org/exams/business-certificates/business>
- 3 <https://steptest.in>

Online Resources:

- 1 <https://www.coursera.org/specializations/business-english>
- 2 <http://www.academiccourses.com/Courses/English/Business-English>

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory			Practical	
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	Rubric based CIA [40 Marks]	
Remember	20	20	20	20	20
Understand	40	40	40	40	40
Apply	40	40	40	40	40
Analyse	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Nature of Course J (Problem analytical)

Course Objectives:

- 1 To develop the skill to use matrix algebra techniques that are needed by engineers for practical applications.
- 2 To familiarize with functions of several variables applicable in many branches of engineering
- 3 To find the solution of ordinary differential equations as most of the engineering problems are characterized in this form.
- 4 To acquire sound knowledge of techniques in solving ordinary differential equations using numerical methods

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Recall the concepts of matrices, ordinary and partial derivatives | [R] |
| CO2 | Express a square matrix in the diagonal form | [U] |
| CO3 | Evaluate the extreme values of the given function | [AP] |
| CO4 | Apply the knowledge of differential equation to solve the engineering problems | [AP] |
| CO5 | Apply numerical method techniques to find the solution of ordinary differential equations | [AP] |

Course Contents:

Matrices- Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties and Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a real symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation- **Functions of several variables**- Total derivatives – Differentiation of implicit functions – Jacobians – Taylor series expansion – Maxima and Minima – Method of Lagrangian multipliers-**Ordinary differential equations**- Second and Higher order linear differential equations with constant coefficients –Cauchy's and Legendre's linear differential equations- Method of variation of parameters - **Applications of second order differential equations**- Free and forced oscillations – Undamped and Damped system - Solution of specified differential equations connected with electric circuits and bending of beams (Differential equations and associated conditions need to be given)-**Numerical solution to first order ordinary differential equations**- Single step methods: Taylor series method - Euler's Method -Modified Euler's Method – Runge - Kutta Method of fourth order - Multistep method - Milne's Predictor- Corrector Method-Adam-Bashforth Predictor- Corrector Method.

Total Hours: 60

Text Books:

- 1 Kreyszig. E, "Advanced Engineering Mathematics" Tenth Edition, John Wiley and Sons (Asia) Limited, Singapore 2014.
- 2 Grewal. B.S, "Higher Engineering Mathematics", 43rd edition, Khanna Publications, Delhi, 2014.
- 3 N.P.Bali and Dr.Manish Goyal,"A Text book of Engineering Mathematics" 8th edition, Laxmi publications Ltd, 2011.

Reference Books:

- 1 Veerarajan. T, "Engineering Mathematics for first year", 3rd edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2011.
- 2 Glyn James, —Advanced Modern Engineering Mathematics, Pearson Education, 4th

edition, 2012.

- 3 Jain M.K. Iyengar, K & Jain R.K., Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd, Publishers 2013.

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>

Online Resources:

- 1 <https://www.coursera.org/learn/linearalgebra2>
- 2 <https://www.coursera.org/learn/differentiation-calculus>
- 3 <https://www.coursera.org/learn/single-variable-calculus>
- 4 <https://alison.com/courses/Algebra-Functions-Expressions-and-Equations>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Classroom or Online Quiz		2
CO2	Understand	Class Presentation/Power point presentation		4
CO3	Apply	Group Assignment		6
CO4 & CO5	Apply	Group activities		8
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination
	CIA1	CIA2	Term End Assessment	
Remember	20	20	20	20
Understand	30	30	30	30
Apply	50	50	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

17CS201

**PROBLEM SOLVING TECHNIQUES AND
C PROGRAMMING**

3/0/3/5

Nature of Course: F (Theory Programming)

Course Objectives:

1. To understand problem solving concepts .
2. To gain knowledge about the control structures in C
3. To use arrays and pointers in C Programs
4. To write functions in C .

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Apply problems solving techniques to real world problems. | [AP] |
| CO2 | Design programs using fundamental C constructs. | [U] |
| CO3 | Use the concepts of pointers , arrays and structures in programs | [AP] |
| CO4 | Do modular programming with functions | [U] |

Course Contents:

Computational Thinking: Introduction to Computational Thinking –From abacus to machine – The first Software –First Modern Computer-Information and data - Converting information into data -Data Capacity **Problem Solving Techniques:** General problem Solving concepts:- Algorithm, Pseudo-code and Flowchart Problem Solving with Sequential Logic Structure - Problem Solving with Decisions - Problem Solving with Loops **Case Study:** Raptor and Scratch Tools. C Character Set – Identifiers and Keywords– Data Types- Constants Variables and Arrays-Declarations-Operators and Expressions Data input and output-Preparing and running a Complete C Program. **Branching:** if-else Looping: while-do while-for nested control structures - switch-break-continue-comma-goto. **Arrays:** Defining an array- Processing an array- Multi dimensional arrays Strings: Defining a string-Null character-initialization of strings – reading and writing a string- processing the string **Pointers:** fundamentals – Pointer Declaration& Usage. **Functions and Structures:** Defining a Function – Accessing a function – Function Prototypes Passing arguments to a function – Recursion Structures: Defining a structure – processing a structure. **SELF STUDY:**Unions

Total Hours:

75

Lab Component

1. Office Automation – Resume preparation , Spreadsheet processing
Draw Flowchart using Raptor Tool
 - a. Simple Flow Chart
 - b. Decision Making
 - c. Looping[Pre test & Post test]
3. Create Animation / Gaming /Application using Scratch Tool
4. Program to process data types, format input and output.
4. Program to evaluate an expression
5. Program using decision making statements
6. Program using looping statements
7. Program using single and two dimensional arrays
8. Program for string manipulation
9. Program using call by value and call by reference.
9. Program using recursion
10. Program using structures

Text Books:

1. David Riley and Kenny Hunt, "Computational Thinking for the Modern Problem Solver", Chapman & Hall/CRC, 2014.
2. M. Sprankle, "Problem Solving and Programming Concepts", 9th Edition, Pearson Education, New Delhi, 2011.
3. Byron, S. Gottfreid, "Programming with C", Tata McGraw Hill, Schaum's outlines, 3rd Edition, 2014.

Reference Books:

1. Herbert Schildt, "The Complete Reference C", 4th edition, TMH, 2015.
2. S.ThamaraiSelvi and R.Murugesan, "Programming in ANSI C", 6E, TMH, 2012.
3. K.R.Venugopal and SudeepR.Prasad, "Mastering C", TMH, Second edition, 2015

Web References:

1. <http://nptel.ac.in/courses/106105085/>
2. <http://nptel.ac.in/courses/106106127/>
3. <http://raptor.martincarlisle.com/>
4. <https://scratch.mit.edu/>

Online Resources:

1. www.leetcode.com
2. www.thenewboston.com
3. www.codesdope.com

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory			Practical	
	CIA1 [6 marks]	CIA2 [6 marks]	Term End Assessment [8 marks]	Rubric based CIA [40 Marks]	
Remember	30	30	20	-	20
Understand	40	30	30	30	30
Apply	30	40	50	70	50
Analyse	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Nature of Course : C (Theory Concept)

Course Objectives:

- 1 To study and understand the basics of computing
- 2 To get an overall understanding of the different facets of computer science
- 3 To know about the different domains in Computer Science
- 4 To gain insight on computer hardware and software

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|-----|
| CO1 | Know the role of algorithms and history of computing | [R] |
| CO2 | Realize abstraction and organization of data | [U] |
| CO3 | Understand the fundamentals of networking and internet | [U] |
| CO4 | Know about basics of Computer Graphics and Artificial intelligence | [U] |

Course Contents:

Computer and Data: Role of Algorithms, History of Computing, Science of Algorithms, Abstractions, Basics of data encoding and storage: Bits and their storage, Main memory, Mass Storage, Representing Information as Bit Patterns. **Machine Architecture:** CPU Basics, Stored Program concepts, Machine Language Introduction with example, Program Execution with illustrative example. **Operating Systems:** History of OS, OS Architecture, Coordinating Machine Activities. **Networking and the Internet:** Network Fundamentals, The Internet, The World Wide Web, **Software Engineering:** Introduction, Software Life Cycle. **Data Abstractions:** Basic data Structures, Related Concepts Database Systems: Database Fundamentals, Relational Model, Data Mining. **Computer Graphics:** Scope of Computer Graphics, Overview of 3D Graphics. Artificial Intelligence: Intelligence and Machines, Perception, Reasoning.

Total Hours: 45

Text Books:

- 1 J. Glenn Brookshear- "Computer Science: An Overview"- Addison-Wesley- Eleventh Edition- 2012(Unit I- Chapter 0 &1, Unit II- Chapter 2&3, Unit III- Chapter 4&7, Unit IV- Chapter 8 &9, Unit V- Chapter 10&11).

Reference Books:

- 1 Nell B. Dale, John Lewis, "Computer Science illuminated ", Jones and Bartlett Learning , 2013
- 2 Anita Goel , "Computer Fundamentals", Pearson Education , 2010
- 3 Robert Sedgewick, Kevin Wayne , "An introduction to Computer Science", Princeton University, 2012

Web References:

- 1 <http://web.stanford.edu/class/cs101/>
- 2 http://www.bbc.co.uk/learning/subjects/information_technology.shtml
- 3 <http://www.cambridgecsecomputing.org>

Online Resources:

- 1 <http://web.stanford.edu/class/cs101/>

- 2 http://www.bbc.co.uk/learning/subjects/information_technology.shtml
- 3 <http://www.cambridgegcsecomputing.org>
- 4 <http://study.com/academy/lesson/what-is-a-computer-algorithm-design-examples->

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Online Quiz		5
CO2	Understand	Assignment		5
CO3	Understand	Class Presentation		5
CO4	Understand	Technical Writing		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	20	30	30
Understand	80	80	70	70
Apply	-	-	-	-
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : E (Theory skill based)

Course Objectives:

- 1 To learn the basic concepts of physics needed for all branches of engineering
- 2 To understand the concepts and working principles of laser, fibre optics, quantum physics and crystal physics.
- 3 To identify suitable materials to be used in the engineering field.
- 4 To implement and visualize theoretical aspects in the laboratory
- 5 To familiarize the students to handle various instruments and equipment

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Recall the basic concepts of laser, fibre optics and quantum physics used in various engineering applications | [R] |
| CO2 | Understand the crystal structure of the various materials | [U] |
| CO3 | Understand the fundamental concepts of electrical and magnetic properties of materials. | [U] |
| CO4 | Interpret the behaviour of nano materials and shape memory alloys | [U] |
| CO5 | Apply the gained knowledge to solve the problems related to their field of study | [AP] |

Course Contents:

Laser: Principle of absorption and emission - Types of laser: CO₂, Nd-YAG, semiconductor laser - Industrial applications - Holography. Fiber optics: Principle and propagation-numerical aperture and acceptance angle – classification of optical fibers - splicing - fiber optic communication system - light source - PIN detector. Fiber optic sensors: temperature and displacement. Quantum mechanics: Matter waves, de-Broglie wavelength, uncertainty principle – Schrödinger's wave equation – time independent and time dependent - physical significance - particle in a one dimensional potential box. Conducting materials: Classical free electron theory of metals - Electrical and thermal conductivity- Wiedemann-Franz law - Band theory of solids- Fermi distribution function –Effect of temperature on Fermi function. Semiconducting materials: Intrinsic and extrinsic semiconductors – carrier concentration derivation – Fermi level – variation of Fermi level with temperature in intrinsic – electrical conductivity for intrinsic semiconductor – Band gap determination – Hall effect. Magnetic materials: Origin of magnetic moment –ferro magnetic material – domain theory – hysteresis – soft and hard magnetic materials – Ferrites. Dielectric materials: properties- Electronic and ionic polarisation – frequency and temperature dependence – internal field-Claussius-Mosotti relation-dielectric loss –dielectric breakdown mechanisms - ferro electric materials – piezo electric materials - insulating materials - applications. Crystallography: Atomic packing factor for SC, BCC, FCC and

HCP structures – miller indices. Advanced materials: Shape memory alloys-characteristics - properties of Ni-Ti alloy. Characterisation techniques: SEM, TEM and X-ray diffraction. Nanomaterials: Properties – synthesis techniques: ball milling, chemical vapour deposition and sol-gel method. Carbon nanotubes: structure - properties and applications.

Lab Component

1	Laser and optical fiber parameters	[E]
2	Lattice constant using x-ray diffraction pattern	[E]
3	Specific resistance-Carey Foster's Bridge	[E]
4	Band gap of a semiconductor	[E]
5	Characteristics of a solar cell /Photo diode	[E]
6	Thermal conductivity of a bad conductor	[E]
7	Young's modulus	[E]
8	Rigidity modulus	[E]
9	Thickness of a thin material using air wedge	[E]
10	Coefficient of viscosity for a liquid	[E]
Total Hours:		75

Text Books:

- 1 R. K. Gaur and S.C. Gupta, "Engineering Physics", Dhanpat Rai Publications (P) Ltd, New Delhi, 2014.
- 2 Rajendran, V 'Engineering Physics' Mc Graw Hill Publications Ltd, New Delhi, 2014.

Reference Books:

- 1 Serway and Jewett, "Physics for Scientists and Engineers with Modern Physics", 6th Edition, Thomson Brooks/Cole, Indian reprint (9 th Edition) 2013.
- 2 M.N. Avadhanulu, P.G. Kshirshagar – "A Text Book of Engineering Physics"- S.Chand & Co Ltd, 2016.
- 3 P.K. Mittal, " Applied Physics ", I.K. International Publishing House pvt.Ltd.

Web References:

- 1 <http://www.nanotech-now.com/Nanomat-Preso2.pdf>
- 2 <http://nptel.ac.in/courses/108106073>
- 3 <https://www.corning.com/in/en/products/communication-networks/.../fiber.html>
- 4 <https://physics.stanford.edu/node/201>
- 5 <https://www.amazon.com/Semiconductor-Materials-Physical...References/.../0849389...>
- 6 <https://books.google.co.in/books?isbn=1482238888>
- 7 <https://www.generalplastics.com/polyurethane-foam-dielectric-materials-f...>
- 8 <https://www.asme.org/.../nanotechnology/carbon-nanotube-super-fabric>
- 9 <https://web.iit.edu/.../web/.../Academic%20Resource%20Center/.../Miller...>
- 10 <https://www.boundless.com/physics/.../the-hall-effect-559-10926/>

Online Resources:

- 1 <https://www.coursera.org/learn/ap-physics-1>
- 2 www.cleanroom.byu.edu > Semiconductor Properties
- 3 <https://www.urmc.rochester.edu> > ... > Our Resource Laboratories
- 4 <https://www.jic.ac.uk/microscopy/links.html>

- 5 <https://www.merlot.org/merlot/materials.htm>
- 6 www.fiberopticsonline.com/
- 7 <https://ocw.mit.edu/courses/physics/8-04-quantum-physics-i-spring-2013/>

Nature of Course :M (Practical application)

Co requisites : Engineering Drawing/Graphics

Course Objectives:

1. To learn the use of basic hand tools and to know the need for safety in work place and to gain hands on experience on Carpentry, Fitting, Sheet metal, Plumbing, welding and Foundry.
2. To learn about basic electrical devices, meters and Electronics devices and meters and to gain knowledge about the fundamentals of various electrical and electronic gadgets, basic electronic instruments, their working and trouble shooting.
3. To gain knowledge about the basics of computer hardware and various operating systems

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|--------|--|------|
| C204.1 | Identify, formulate and solve the basic engineering problems at home and in workplace | [Ap] |
| C204.2 | Develop the surfaces and make simple components like tray, cylinder, funnel etc. | [C] |
| C204.3 | Make simple metal joints using welding equipment and wooden joints using carpentry tools. | [Ap] |
| C204.4 | Prepare pipe connections and sand moulds | [Ap] |
| C204.5 | Examine and troubleshoot electrical and electronics circuits | [A] |
| C204.6 | Identify various computer parts and learn to operate the various operating systems in computers. | [E] |

Course Contents:

1. Fabrication of rectangular tray, cylindrical container and cone
2. Preparation of butt, lap and T joint using welding (Arc, MIG, TIG)
3. Preparation of Cross lap joint and T joint using carpentry tools
4. Preparation of connection of basic pipe lines
5. Preparation of Sand mould (Solid and Split Pattern)
6. Troubleshooting of electrical and electronics components
7. Preparation of Residential wiring.
8. Soldering of electronic circuits
9. Operation of Cathode Ray Oscilloscope
10. PC Repair Fundamentals
11. Hard disk Partitioning, Installing Windows OS, Linux & Maintaining Windows OS, Linux and Disk De fragmentation.
12. Upgrading Memory and Hard Drives, Securing the PC and LAN.

Total Hours: 45

REFERENCE BOOKS:

1. Suyambazhahan "Engineering Practices Laboratory Manual" PHI Learning, Second Edition, 2011.
2. Sekhar Dash & K.Vijayakumar, "Electrical Engineering Practice Lab Manual". Vijay Nicole Imprints Private Ltd., First Edition, 2013.
3. Scott Mueller "Upgrading and Repairing PCs", 22nd Edition, QUE, Pearson Education, New Delhi, 2015.

Web References:

1. <http://www.allaboutcircuits.com/education/>
2. <http://www.nptel.ac.in/courses/112107090/>
3. nptel.ac.in/courses/112101005/14

Online Resources:

- 1 <http://www.electrical4u.com/>
 - 2 <http://vlab.co.in/>
-

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment [60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	0	0
Understand	0	0
Apply	30	30
Analyse	30	20
Evaluate	20	10
Create	20	30

Nature of Course: E (Theory Skill Based)

Course Objectives

1. To develop the prominence of listening and reading practices using authentic business vocabulary.
2. To instil analytical thinking and logical reasoning to enhance LSRW skills in Business related situations.
3. To urge the need of effective communication in corporate sector with Business English.
4. To prepare students for competitive program like BEC, IELTS, TOEFL.

Course Outcomes

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

CO1	Remember LSRW skills and employ cross-cultural communication in business related situations.	[R]
CO2	Understand and gain proficiency with business vocabulary.	[U]
CO3	Apply Task- Based activity to enhance an effective communication.	[AP]
CO4	Analyse and apply Business English in working environment.	[AP]

Course Contents with Course Outcomes/Blooms Taxonomy/Assessment Methods

LISTENING -Taking and Leaving Voice mail messages –Identifying the information before listening-Infering ideas- Listening to short monologues -Longer listening tasks -Recognise functions. **SPEAKING** -Expressing hypothetical Situations – Expressing obligation -Aspects of business – Giving examples- Giving reasons- Giving extra information- Presentation at a business meeting- Connecting ideas- Collaborative task – Short talk on a business topics- Film Reviews. **READING** - Science texts - Terms related about science and scientists - Scanning for specific information- Understanding cohesive features - Skimming the reading comprehensions - Interpret opinions and ideas expressed – Collocations - Identifying dependent preposition - Identifying the extra words. **WRITING** - Definitions, Extended Definitions -Letter writing (accepting and declining invitations)- Internal communication (notes/memo/E-mail writing to the head of the department, colleague, assistant , staff in the department etc) Report writing- Business proposal- circular- agenda and minutes- Appropriate linking words- Report Phrases - Asking for Information and Making Suggestions- Transcoding (Bar Chart, Flow Chart)- Letter for calling quotations, Replying for quotations- Placing an order and complaint letter. **PARTS OF SPEECH**- Tenses - Adjectives - Adverbs - Articles- Modal verbs, Active and Passive, Impersonal Passive voice, Homophones- Homonyms- Acronyms- Abbreviations- British and American words- Comparatives and Superlatives- Gerunds- infinitives – Participles - Modal Verbs - Relative Pronouns- Reported Speech - Indirect Questions- Spotting errors.

LABORATORY COMPONENTS				
EXP NO.	NAME OF THE EXPERIMENT	TEXT BOOK	PAGES	LAB HOURS
1	MINI PRESENTATION	T2	117-130	3
2	LOGICAL REASONING AND ETHICS IN A GIVEN SITUATION	T2	91-100	3
3	TECHNICAL PRESENTATION	T2	195-213	3
4	GROUP DISCUSSION	T2	165-187	3
5	EXTEMPORE	T2	117-130	3
Total Hours				45+15

Text Books

1. Whitby, Norman. Cambridge University Press- Students Book. 2013.

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, 2015.

Reference Books:

1. Wood, Ian, Paul Sanderson, Anne Williams with Marjorie Rosenberg, Pass Cambridge BEC Vantage, Cengage learning. Second Edition. 2014.

2. Gunasekaran S, "A Text and Workbook of Technical English II", United Global Publishers, June 2010.

3. Lewis, Norman, Word Power Made Easy, Pocket Books, New York, 1979.

Web References:

1. <http://www.cambridgeindia.org>

2. <http://www.cambridgeenglish.org/exams/business-certificates/business-vantage>

3. <https://steptest.in>

Online Resources:

1. <https://www.coursera.org/specializations/business-english>

2. <http://www.academiccourses.com/Courses/English/Business-English>

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative assessment based on Capstone Model (Max. Marks:20)			
Course Outcome	Bloom's Level	Assessment Component	Marks
CO1	Remember	Extempore	5
CO2	Understand	Mini presentation	5
CO3	Apply	Technical presentation	5
CO4	Apply	Group Discussion	5

Blooms Taxonomy based Assessment Pattern:

Bloom's Category	Continuous Assessment Tests			End Semester Examination
	CIA1	CIA2	Term Examination	
Remember	30	20	20	20
Understand	30	30	30	30
Apply	40	50	50	50
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

Nature of Course J (Problem analytical)

Course Objectives:

- 1 To gain knowledge in improper integrals, Gamma and Beta functions which are needed in engineering applications
- 2 To develop logical thinking and analytical skills in evaluating multiple integrals
- 3 To acquaint with the concepts of vector calculus needed for problems in all engineering disciplines
- 4 To apply numerical methods to evaluate integrals when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information
- 5 Solve the differential equations using Laplace transform technique

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Recall basic integration formulae, scalar and vector point function concepts | [R] |
| CO2 | Differentiate and integrate vector point functions | [U] |
| CO3 | Evaluate integrals using Beta and Gamma functions | [AP] |
| CO4 | Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure | [AP] |
| CO5 | Find the gradient, divergence and curl of vector point functions and related theorems useful for evaluation of engineering problems | [AP] |
| CO6 | Apply the Laplace transform technique to solve ordinary differential equations | [AP] |

Course Contents:

Definite integrals-Evaluation of definite integrals using Bernoulli's formula-Beta and Gamma Integrals- Relation between Beta and Gamma Functions-Evaluation of Integrals using Beta and Gamma Functions-**Multiple integrals** - Double integration in Cartesian coordinates –Area as double integral –Change the order of integration-Triple integration in Cartesian co-ordinates – Volume as triple integral-**Vector calculus** - Vector differential operator- Gradient of a scalar point function - Directional derivatives –Divergence and Curl of a vector point function – Irrotational and solenoidal vector fields –Simple problems– Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem(statements)– Simple applications involving cubes and rectangular parallelopipeds-**Numerical integration** - Trapezoidal rule – Simpson's 1/3 and 3/8 rules – Two and three point Gaussian Quadrature formulae –Trapezoidal rule and Simpson's rule to evaluate double integrals-**Laplace transform** –Conditions for existence – Transform of elementary functions – Basic properties (without proof) – Derivatives and integrals of Laplace transform -Transforms of derivatives and integrals - Periodic functions - **Inverse Laplace transform**-Partial fraction method - convolution theorem , Initial and Final value theorems (statements)– Problems - Solution of second order differential equations with constant coefficients.

Total Hours: 75

Text Books:

- 1 Kreyszig, E, "Advanced Engineering Mathematics" 10th Edition, John Wiley and Sons (Asia) Limited, Singapore 2014

- 2 Grewal. B.S, "Higher Engineering Mathematics", 43rd edition, Khanna Publications, Delhi, 2014
- 3 N.P.Bali and Dr.Manish Goyal,"A Text book of Engineering Mathematics", 8th edition Laxmi publications Ltd, 2011

Reference Books:

- 1 Veerarajan. T, "Engineering Mathematics for first year", 3rd edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2011
- 2 Glyn James, , "Advanced Modern Engineering Mathematics", Pearson Education, 4th edition, 2012
- 3 Jain M.K. Iyengar, K & Jain R.K., "Numerical Methods for Scientific and Engineering Computation", New Age International (P) Ltd, Publishers 2013

Web References:

- 1 <http://nptel.ac.in/video.php?subjectId=122107037>
- 2 <http://nptel.ac.in/courses/122107036/>
- 3 <http://nptel.ac.in/video.php?subjectId=117102060>

Online Resources:

- 1 <https://www.coursera.org/learn/pre-calculus>
- 2 <https://www.coursera.org/learn/linearalgebra1>
- 3 <https://alison.com/courses/Advanced-Mathematics-1>
- 4 <https://www.edx.org/course/algebra-lineal-mexicox-acf-0903-1x>.
- 5 https://www.edx.org/course?search_query=laplace+transform

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component	Marks	
CO1	Remember	Classroom or Online Quiz	2	
CO2	Understand	Class Presentation/Power point presentation	4	
CO3, CO4	Apply	Group Assignment	7	
CO5,CO6	Apply	Group activities	7	
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination
	CIA1	CIA2	Term End Assessment	
Remember	20	20	20	20
Understand	30	30	30	30
Apply	50	50	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : E (Theory skill based)

Course Objectives:

- 1 To make the students conversant with boiler feed water requirements, water treatment techniques, the principles and applications of electrochemistry.
- 2 To understand the working principles of electrodes and the significances of various component analyzer.
- 3 To learn the effect of corrosion in materials and the methods for prevention of corrosion.
- 4 To acquire knowledge in applications of plastics and rubber in engineering field.
- 5 To understand the concepts of photophysical and photochemical processes in spectroscopy
- 6 To gain knowledge about non conventional the energy sources, fuel cells and storage Devices.

Course Outcomes:

Upon completion of the course, students shall have ability to

CO1	Recall the requirements of boiler feed water, water treatment procedures for industries.	[R]
CO2	Understand the working principle of Ion Selective Electrodes, pH electrodes and conductivity meters as an analyzer.	[U]
CO3	Apply the various corrosion control techniques in real time industrial environments.	[A]
CO4	Use the knowledge of polymers, various energy sources and storage devices in engineering field.	[U]
CO5	Understand the principle and working of certain analytical techniques	[U]
CO6	Solve theoretical problems based on the concepts acquired from the module in various engineering field.	[A]

Course Contents:

Water Treatment-Boiler feed water-Requirements-disadvantages of hard water - demineralization process- desalination-reverse osmosis. Applied electrochemistry: Electrochemical cells – electrolytic cell-reversible and irreversible cells -electrode potential - single, standard - oxidation and reduction potentials - emf of a cell - emf series-significances-pH measurement, glass electrodes, hydrogen electrodes, reference electrodes. Corrosion and its control: Mechanism - types-galvanic corrosion-differential aeration-pitting corrosion – factors-Corrosion control-cathodic protection-corrosion inhibitors-protective coatings- electroplating -electroless plating. Engineering polymers: Polymerisation -free radical mechanism-Plastics-types-preparation, properties and uses of PTFE- Polyurethane - Poly Carbonate -Nylon 6,6 and Nylon 6 - Rubber-Vulcanization of rubber-synthetic rubber -Butyl rubber and SBR Spectrophotometry: Beer-Lambert law – UV Visible – IR Spectrophotometers – Flame emission photometers - Atomic absorption spectrophotometers. Energy Sources: Nuclear energy-reactor-breeder reactor- Photovoltaic cells-Wind energy -Fuel cells. Storage Devices: Batteries-alkaline -Lead acid, nickel cadmium and lithium-TiS₂ batteries.

Lab Component

1	Water hardness	[E]
2	Alkalinity	[E]
3	Chloride content	[E]
4	Dissolved oxygen in water	[E]
5	pH meter	[E]
6	Conductivity meter	[E]
7	Potentiometer	[E]
8	Spectrophotometer	[E]
9	Electroplating of Nickel	[E]
10	Corrosion rate of a metal	[E]
Total Hours:		75

Text Books:

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2013.
2. N.Krishna murthy,Vallinayagam D., "Engineering Chemistry" PHI Learning Pvt Ltd.,2014
3. R.V.Gadag, A.Nithyananda Shetty "Engineering Chemistry" 3rd edition PHI Learning Pvt Ltd.,2014

Reference Books:

1. Shikha Agarwal., "Engineering Chemistry and Applications", Cambridge University press, 2016.
2. Liliya,Bazylak.I.,Gennady.E.,Zaikov.,Haghvi.A.K., "PolymersandPolymeric Composites" CRC Press,2014.
3. Lefrou.,Christine.,Fabry.,Pierre.,Poignet.,Jean-claude., "Electrochemistry - The Basics, with examples" 2012 ., Springer.
4. Zaki Ahmad, Digby Macdonald, "Principles of Corrosion Engineering and Corrosion Control", Elsevier Science, 2nd Edition 2012.
5. Perez, Nestor, "Electrochemistry and Corrosion Science", Springer, 2016.
6. Ghazi A.Karim. "Fuels, Energy and the Environment", CRC Press, Taylor and Francis group, 2012.

Web References:

- 1 <http://www.analyticalinstruments.in/home/index.html>
- 2 www.springer.com > Home > Chemistry > Electrochemistry
- 3 <https://www.kth.se/.../electrochem/welcome-to-the-division-of-applied-electrochemistry>
- 4 www.edx.org/
- 5 <https://www.ntnu.edu/studies/courses>
- 6 www.corrosionsource.com/

Online Resources:

- 1 nptel.ac.in/courses/105104102/hardness.htm
- 2 <https://ocw.mit.edu/courses/chemistry>
- 3 nptel.ac.in/courses/105106112/1_introduction/5_corrosion.pdf
- 4 <https://alison.com> - Spectroscopic technique, Colorimetry
- 5 <https://ocw.mit.edu/courses/chemistry>
- 6 nptel.ac.in/courses/113108051

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory			Practical	
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	Rubric based CIA [40 Marks]	
Remember	30	30	30	10	20
Understand	60	50	40	20	50
Apply	10	20	30	40	30
Analyse	-	-	-	30	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Nature of Course : F (Theory Programming)

Pre requisites : 17CS201 Problem Solving Techniques & C Programming

Course Objectives:

- 1 To understand the essential Linux command line operations and to manage user services with file access
- 2 To learn the fundamentals of shell scripting/programming
- 3 To apply pointers to arrays, strings and pass pointers to functions in C.
- 4 To gain knowledge about structures and pointer to structures.
- 5 To develop the ability to apply file I/O operations.
- 6 To acquire knowledge in pre-processor commands and bitwise operations in C.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | |
|--|------|
| CO1 Recall the programming structures | [R] |
| CO2 Understand and work in Linux command line interface | [U] |
| CO3 Write shell programs | [AP] |
| CO4 Apply pointer for effective memory access in C | [AP] |
| CO5 Employ structure and pointers to structures | [AP] |
| CO6 Illustrate file access. | [AP] |
| CO7 Demonstrate and apply the pre-processor commands and bitwise operations in C | [AP] |

Course Contents:

Introduction to Linux- Linux kernel and architecture-Accessing shell based commands File System permission-Configuring and securing open ssh services- Installation of software in Linux-Shell -Types of shell-Shell scripting Pointers - pointers to array - Pointer and functions-Pointer to strings – Array of pointers –pointers to pointers-Dynamic memory allocation Structure - Type Definition -Structures and functions - return-Pointer to structures - Self -referential Structure-Bit Fields – union Files –Text versus Binary Streams – State of a File- File I/O operations – Error Handling During I/O Operations –Binary files- Random Access to Files -Bitwise Operators-Pre-processor Commands- Command Line Arguments

List of Experiments

- 1 Linux Bash commands- system, file, help, search- process, network and Miscellaneous commands
- 2 Shell Scripting
- 3 Pointers- Pointer to array – pointer arithmetic
- 4 Pointer and function
- 5 Pointer and string
- 6 Dynamic Memory Allocation- array of pointers
- 7 Structures-array of structures
- 8 Structure and functions
- 9 Pointers to structure - self-referential structures
- 10 Text and Binary File operations
- 11 MACROS

Text Books:

- 1 Mark B Sobel, "Practical Guide to Linux Commands Editor and Shell Programming", Pearson education, 2013
- 2 Kenneth A. Reek, "Pointers on C, First Edition", Pearson education, 2007.
- 3 Yashavant Kanetkar, "Understanding Pointer in C", 3E, BPB Publication, 2011.

Reference Books:

- 1 Yashwant Kanetkar, "Let us C", 12th Edition, BPB Publications, 2014
- 2 B Stephen G. Kochan "Programming in C", Fourth edition, Addison Wesley publishing, 2014.
- 3 Behrouz A. Forouzan & Richard F. Gilberg, "A Structured Programming Approach Using C", 3E, Cengage Learning, 2008
- 4 E Balagurusamy, "Programming in ANSI C", 6E, TMH, 2012, "Computer System Architecture", 3rd Edition, Pearson Education, 2007

Web References:

- 1 <http://vic.gedris.org/Manual-ShellIntro/1.2/ShellIntro.pdf>
- 2 <https://knowstuffs.wordpress.com/2012/06/11/linux-kernel-and-architecture/>
- 3 <http://redhat.lsu.edu/manuls.php>
- 4 https://www.tutorialspoint.com/cprogramming/cprogramming_tutorial.pdf
- 5 <http://students.iitk.ac.in/programmingclub/course/#notes>

Online Resources:

- 1 <https://alison.com/courses/Diploma-in- Programming-in- C>
- 2 <https://www.edx.org/course/programming-basics- iitbombayx-cs101- 1x- 0?gclid=CIXj9JKQh9ACFdeGaAodIX4MMw>
- 3 <https://www.coursera.org/learn/intro-programming>
- 4 https://onlinecourses.nptel.ac.in/iitk_cs_101/preview <https://www.edx.org/course/signals-systems-part-2-iitbombayx-ee210-2x-2>

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory			Practical	
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	Rubric based CIA [40 Marks]	
Remember	20	20	20	20	10
Understand	30	30	30	20	30
Apply	50	50	50	60	60
Analyse	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

Nature of Course : E (Theory Skill Based)

Course Objectives:

- 1 To understand the basic concepts of structure of computer hardware & networking.
To identify the existing configuration of the computers and peripherals.
- 2 To allow students to configure internetworking components.
- 3 To understand the storage area network management principles and protocols.
- 4 To enable the knowledge of Data protection in Storage area environment.
- 5

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Describe the relationship between hardware and Software. | [R] |
| CO2 | Classify and explain the functions of different computer hardware components. | [U] |
| CO3 | Understand the various methods to implement Storage Area Network. | [U] |
| CO4 | Apply configuration procedure to implement Local Area Network and internetworking components. | [AP] |
| CO5 | Analyze the various storage management principles and protocols. | [AN] |

Course Contents:

PC components - Processor Specifications- Processor features - Processor manufacturing - BIOS Basics - UEFI Technology- RAM types and Performance- Memory modules- Memory Banks- Solid State Drive (SSD), Comparison of SSD and HDD.(Technical quiz) Motherboard Connectors System Bus types, Functions and Features- Resolving resource conflicts - input/output devices- **Network architecture overview**- Hardware elements of network- Putting network together- Internet connectivity: Trends- Broadband Internet access types- Internetworking components – IP addressing – subnet mask- server configuration-Router configuration –**Introduction to storage system management**-Storage system environment– Direct attached storage: Types of DAS-Benefits and limitations-Disk drive interfaces-Storage area Network: Evolution-Components-types-Network attached storage :General purpose servers Vs NAS Device-NAS File I/O-components of NAS - Data protection: software RAID –Hardware RAID- components-RAID levels.

Total Hours: 45

Text Books:

- 1 Scott Mueller "Upgrading and Repairing PCs", 22 nd Edition, QUE, Pearson Education, New Delhi, 2015.
- 2 G Somasundaram, Alok Shrivastava,"Information Storage and Management", EMC Education services,Wiley India, 2009 .
- 3 Mike Meyers, Scott Jernigan, "A+ Guide to Managing and Troubleshooting PCs", Tata McGraw Hill, 2010.

Reference Books:

- 1 Gary B.Shelly, Misty E.Vermaat, "Discovering Computers", Cengage Learning, 2012
- 2 Ron Gilster, "PC Hardware – a beginner's guide" – Tata McGraw Hill, 2002

- 3 Govindaraju B. "IBM PC and Clones: Hardware, Trouble Shooting and Maintenance", 2nd Edition, Tata McGraw Hill Pub. Co., New Delhi, 2002

Web References:

- 1 http://www.brainbell.com/tutors/A+/Hardware/Preventive_Maintenance.htm
- 2 <http://www.technologystudent.com/elec1/dig1.htm>

Online Resources:

- 1 <http://www.worldwidelearn.com/online-training/pc-hardware-courses.htm>
- 2 <https://www.edx.org/course/clep-information-systems-computer-upvalenci-ax-sc101-2x>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Quiz		2
CO2	Understand	Quiz		3
CO3	Understand	Group Assignment		5
CO4	Apply	Problem solving		5
CO5	Analyse	Technical Presentation		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	40	30	30	30
Understand	60	50	40	40
Apply	-	20	20	20
Analyse	-	-	10	10
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :M (Practical application)

Co requisites :Basic drawing and Computer Knowledge

Course Objectives:

1. To know the method of constructing the conic curves used in Engineering Applications.
2. To develop an understanding of Isometric to Orthographic Views and vice versa.
3. To learn the basic projection of straight lines and plane surfaces.
4. To develop the imagination of solids inclined to one reference planes.
5. To know the sectioning of solids and development of surfaces used in various fields.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Recall the basic concepts of engineering drawing. | [R] |
| CO2 | Recall the basic syntax and commands of CAD software. | [R] |
| CO3 | Interpret the parameters of engineering drawing. | [U] |
| CO4 | Sketch the 2D geometries in the drafting software. | [AP] |
| CO5 | Examine the isometric projection and convert it into orthographic projection (Vice versa). | [A] |

Course Contents:

- | | | |
|-----|--|----|
| 1. | Construction of Conic Curves (Ellipse, Parabola and Hyperbola) | R |
| 2. | Construction of Special Curves (Cycloid and Involute) | R |
| 3. | Isometric to Orthographic projections – Manual sketches | U |
| 4. | Isometric to Orthographic projections – Software sketches | U |
| 5. | Projection of lines - Inclined to HP | Ap |
| 6. | Projection of lines - Inclined to VP | Ap |
| 7. | Projection of Plane surfaces (Hexagon, Pentagon and circle) – Inclined to both HP and VP | Ap |
| 8. | Projection of Solids (Prism and Pyramid) – Inclined to HP | Ap |
| 9. | Projection of Solids (Cone and Cylinder) – Inclined to VP | Ap |
| 10. | Sectioning of Solids (Prism and Pyramid) with Section plane Inclined to HP | Ap |
| 11. | Sectioning of Solids (Cone and Cylinder) with Section plane Inclined to VP | A |
| 12. | Development of Surfaces (Prism, Pyramid, Cone and Cylinder) | A |
| 13. | Introduction to Perspective projection | A |

Total Hours: 45

Reference Books:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2014.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2011.
3. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2013.

Web References:

1. <http://nptel.ac.in/courses/112102101/>

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment [60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	30	30
Understand	30	30
Apply	20	20
Analyse	20	20
Evaluate	0	0
Create	0	0

Nature of Course J(Problem analytical)

Course Objectives:

- 1 To study the concepts needed to test the logic of a program
- 2 To understand and identify different types of patterns on many levels in engineering fields
- 3 To learn the working of class of functions which transform a finite set into another finite set which relates to input and output functions in computer science
- 4 To know the fundamental concepts of Group theory

Course Outcomes :

Upon completion of the course, students shall have ability to

CO1	To recall the basic concepts of sets, groups and truth table	[R]
CO2	To find the validity of arguments	[U]
CO3	Use the concepts of Discrete Mathematics in software development and hardware design	[AP]
CO4	Demonstrate and understand the fundamental concepts of a mathematical function and all of its properties.	[AP]
CO5	Apply operator-algebraic techniques to reformulate and solve group theoretic problems.	[AP]

Propositional calculus- Propositions – Logical connectives – Compound propositions – Conditional and bi-conditional propositions – Truth tables – Tautologies and contradictions –Contrapositive – Logical equivalences and implications – Normal forms – Principal conjunctive and disjunctive normal forms– Rules of inference – Arguments - Validity of arguments -**Predicate calculus**- Predicates – Statement function – Variables – Free and bound variables – Quantifiers– Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – The rules of universal specification and generalization – Validity of arguments -**Set theory**- Basic concepts – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets–Types of relations and their properties– Relational matrix and the graph of a relation – Equivalence relations – Partial ordering – Poset – Hasse diagram- **Functions**- Definitions of functions – Classification of functions –Types of functions - Examples –Composition of functions–Inverse function–Binary and n-ary operations– Characteristic function of a set – Hashing functions – Recursive functions –Permutation functions-**Group theory**-Binary operation-Semi group-Monoid-Group-Subgroup-Abelian group-Group homomorphism and isomorphism-Normal subgroup-Quotient group-Lagrangian theorem-Hamming distance-Group coding and decoding

Total Hours 60

Text Books:

1. Tremblay J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011
2. Kenneth H.Rosen,"Discrete Mathematics and its Applications", Seventh Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2011
3. Veerarajan T, " Discrete Mathematics with Graph theory and Combinatorics", Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2010

Reference Books:

1. Ralph. P. Grimaldi,"Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education Asia, New Delhi, 2007

2. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", sixth edition, Pearson Education Pvt Ltd., New Delhi, 2010
3. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, 2008.

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://freevideolectures.com/Course/2267/Mathematics-I/22>

Online Resources:

- 1 www.edx.org/Probability
- 2 <https://ocw.mit.edu/courses/.../18-440-probability-and-random-variables-spring-2014/>
- 3 https://onlinecourses.nptel.ac.in/noc15_ec07/

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Class room or online Quiz		2
CO2& CO3	Understand Apply	Class presentation/Powerpoint Presentation		6
CO4	Apply	Group Activities		6
CO5	Apply	Group Assignment		6
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination
	CIA1	CIA2	Term End Assessment	
Remember	20	20	20	20
Understand	30	30	30	30
Apply	50	50	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : G (Theory analytical)

Course Objectives:

1. To understand the structure and functions of OS
2. To learn about Processes, Threads and Scheduling algorithms
3. To understand the principles of concurrency and Deadlocks
4. To learn various memory management schemes
5. To study I/O management and File systems

Course Outcomes

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

CO1	Identify and reproduce the basic concepts of Modern operating systems	[R]
CO2	Understand the various operating system mechanisms and operations.	[U]
CO3	Understand Process management concepts including scheduling, synchronization deadlocks and multithreading in real world problems	[U]
CO4	Apply concepts of memory management including virtualMemory and Page Replacement to the issues that occur in Real time applications	[AP]
CO5	Solve issues related to file system interface, implementation, disk management, protection and security mechanisms	[AP]

Course Contents

Introduction of basics of Modern Operating Systems: Multitasking, Multiuser, parallel, distributed & Real-time O.S, POST, GUI, Types of servers **Concurrency:** Managing multiple tasks and sharing resources: Processes and threads, context switching, synchronization, Scheduling and Deadlock. Memory Management; linking, dynamic memory allocation, dynamic address translation, virtual memory, Quantum base memory and demand paging. **File systems:** disk management and scheduling, directories, protection, and crash recovery Virtual machines and security in OS. Server OS, Network OS and Mobile OS.

Total Hours 45

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts" 9th Edition, John Wiley, 2013
2. D.M.Dhamdhare, "Operating systems- A Concept based Approach" 2nd Edition, Tata Mc – Graw Hill, 2010.

Reference Books:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education/PHI 2014.
2. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
3. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2004.
4. Tanenbaum, "Modern Operating Systems," 3/e, Pearson Edition, 2007.

Web References:

1. nptel.ac.in/courses/Webcourse.../Operating%20Systems
2. <http://geeksforgeeks.org/Operating Systems/>

Online Resources

1. <https://www.coursera.org/learn/embedded-operating-system>

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative assessment based on Capstone Model (Max. Marks:20)			
Course Outcome	Bloom's Level	Assessment Component	Marks
C01	Remember	Quiz	5
C02	Understand	Writing Skills	5
C03	Understand	Class Presentation	4
C04	Apply	Group Assignment	3
C05	Apply	Surprise Test	3
Summative assessment based on Continuous and End Semester Examination			

Bloom's Category	Continuous Assessment Tests			Semester End Examination [60 Marks]
	CIA1 [6 Marks]	CIA2 [6 Marks]	Term Examination [8 Marks]	
Remember	20	20	20	20
Understand	40	20	20	20
Apply	40	60	60	60
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

Nature of Course :K (Problem Programming)

Pre requisites :Advanced C programming

Course Objectives:

- 1 To stress the importance of Algorithms and Data structures in becoming a more productive programmer.
- 2 To understand the Algorithms and Data structures used for solving a problem are much more important than knowing the exact code for it in some programming language.
- 3 To provide an insight into the intrinsic nature of the problem as well as possible solution techniques, independent of programming language, programming paradigms, computer hardware or any other implementation technique.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Remember the concepts of arrays, pointers, and structures | [R] |
| CO2 | Apply the linear data structures to solve various problems | [AP] |
| CO3 | Implement the complex data structures such as trees | [AP] |
| CO4 | Able to compare, implement and know when to apply sorting and searching algorithm | [AN] |
| CO5 | Understand and apply the concepts of graphs in different scenarios | [AP] |
| CO6 | Develop efficient algorithms for different applications | [C] |

Course Contents:

FUNDAMENTALS OF DATA STRUCTURES: Importance of Algorithms and Data Structures, Classification of Data Structures, Introduction to Time and Space Complexity , Asymptotic Notations, Introduction to Array and Pointer implementation, Structures, Recursion. **LISTS, STACKS AND QUEUES:** Abstract Data Type (ADT), The List ADT-Singly, Doubly, Circular Linked List, Stack ADT- Stack operations and its applications, Queue ADT-Queue, Circular Queue, Priority Queue, Applications. **TREES AND HASHING:** Binary Trees, Expression Trees, Tree Traversals, Binary Search Trees, AVL Trees, Hashing, Binary Heap. **SORTING AND SEARCHING:** Sorting-Selection, Insertion, Bubble, Quick, Merge sort, Searching-Linear, Binary. **GRAPHS:** Graph Traversal, Topological Sort, Shortest Path Algorithms: Dijkstra's Algorithm, Minimum Spanning Tree: Prim's and Kruskal's Algorithm, Applications of graph, Bi-Connectivity.

Total Hours: 75

Lab Component

1. Arrays, Pointers and Structures
2. List ADT
3. Stack ADT
4. Queue ADT
5. Binary Search tree
6. Tree traversal
7. Searching
8. Sorting
9. Minimum Spanning Tree
10. Dijkstra's Algorithm

Text Books:

- 1 Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein,"Introduction to Algorithms" , Paper Back 2010, Third edition, MIT Press, 2010(Reprint)

- 2 M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia, 2007

Reference Books:

- 1 V. Aho, J.E. Hopcroft and J. D. Ullman," Data Structures and Algorithms", Pearson India, 1st Edition, 2002.
- 2 Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009.
- 3 Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 2004.
- 4 J. Tremblay, P. Soresan, "An introduction to data structures with Applications", McGraw-Hill, 2nd edition, 2007.

Web References:

- 1 http://www.amazon.in/Data-Structures-Algorithms-Made-Easy/dp/0615459811/ref=sr_1_1?ie=UTF8&qid=1474906913&sr=8-1&keywords=karumanchi-C++edition
- 2 http://www.amazon.in/Data-Structures-Algorithms-Made-Easy/dp/1466304162/ref=sr_1_2?ie=UTF8&qid=1474906913&sr=8-2&keywords=karumanchi-java edition
- 3 <http://nptel.ac.in/courses//106103069/>
- 4 <http://web.stanford.edu/class/cs97si/>

Online Resources:

- 1 <https://www.coursera.org/learn/data-structures>
- 2 <https://www.coursera.org/specializations/data-structures- algorithms>
- 3 <http://nptel.ac.in/courses//data-structures>

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory			Practical	
	CIA1 [6 marks]	CIA2 [6 marks]	Term End Assessment [8 marks]	Rubric based CIA [40 Marks]	
Remember	30	20	20	-	10
Understand	20	0	10	20	10
Apply	50	40	40	20	40
Analyse	0	40	30	30	40
Evaluate	0	0	0	-	0
Create	0	0	0	30	0

17CS205

DIGITAL PRINCIPLES AND SYSTEMS DESIGN

3/0/2/4

Nature of Course: G (Theory analytical)

Pre Requisites: 17PH102 - Engineering Physics

Course Objectives:

1. To introduce the principles of digital logic and minimize the logic expression
2. To enable the students to understand the operation of various combinational logic circuits
3. To enable the students to understand the principles of flip flops and to realise one flip flop from another
4. To prepare the students to apply flip flop concepts in designing registers and counters
5. To allow students to design synchronous and asynchronous sequential circuits

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Examine the structures for various number systems , their conversions and use of various logic gates with different input patterns. | [R] |
| CO2 | Understand the various methods to simplify Boolean Functions | [U] |
| CO3 | Explain the conceptual design of Programmable Logic Devices | [U] |
| CO4 | Demonstrate the functionality of various flip flops and the conversion between them | [AP] |
| CO5 | Use the flip flops to design and construct the various types of shift registers and Counters | [AP] |
| CO6 | Analyse and design different combinational logic circuits | [AN] |
| CO7 | Analyse and design different Sequential logic circuits | [AN] |
| CO8 | Construct and test simple logic circuits | [C] |

Course Contents:

Introduction: Number Systems- Binary codes – Binary Arithmetic - Boolean algebra - Boolean functions – K Maps **Logic Gates:** Synthesis of Logic Circuits using NAND/NOR gates (Two Level/Multilevel Implementation). **Combinational Logic:** Analysis and Design Procedures, Circuits for Arithmetic Operations, Multiplexer, Demultiplexer, Decoder, Encoders, and their use in logic synthesis, Hazards in combinational circuits. **Synchronous Sequential Logic:** Latches, Flip flops, Analysis and Synthesis of clocked sequential circuits, State table reduction. **Registers and Counters:** Registers, Shift Registers, Ripple Counters, Synchronous Counters, Special Counters. **Memory:** RAM-ROM -Memory Decoding. **Programmable Logic Devices:** Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic .

Total Hours: 75

Lab Component

1. Realization of Boolean Functions using Logic Gates
2. Analysis and Synthesis of Combinational Logic Circuits
 - a) Code Converter
 - b) Parity Generator and Checker
 - c) Two bit magnitude comparator
 - d) Arithmetic Circuits
 - e) Multiplexer
3. Analysis and Synthesis of Shift Register
4. Analysis and Synthesis of Asynchronous/ Synchronous Counter
5. Testing/Tracing Logic Circuits
6. Schematic Review of Logic Circuits
7. Mini Project

Text Books:

- 1 M. Morris Mano, Michael D.Ciletti., "Digital Design",5thEdition, Pearson education,2013
- 2 C. H. Roth Jr., Larry L. Kinney "Fundamentals of Logic Design", 7th Edition, Cengage Learning, 2014

Reference Books:

- 1 Donald D.Givone, "Digital Principles and Design", 7th Edition, McGraw-Hill, 2010.
- 2 Donald P leach, Albert Paul Malvino, GoutamSaha,"Digital Principles and Application", 8th Edition., McGraw Hill education (India) Private Limited, 2015

Web References:

- 1 <http://nptel.ac.in/course.php?disciplineId=117>

Online Resources:

- 1 <http://www.nesoacademy.org/electronics-engineering/digital-electronics/digital>
- 2 <http://www.digital.iitkgp.ernet.in/dec/index.php>

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory			Practical	
	CIA1 [6 marks]	CIA2 [6 marks]	Term End Assessment [8 marks]	Rubric based CIA [40 Marks]	
Remember	20	-	10	-	10
Understand	30	20	20	-	10
Apply	50	40	40	30	40
Analyse	-	40	30	20	40
Evaluate	-	-	-	20	-
Create	-	-	-	30	-

17CS206 **OBJECT ORIENTED PROGRAMMING USING JAVA** **3/0/0/3**
Nature of Course : F (Theory Programming)
Pre requisites : 17CS201- Problem Solving Techniques and C Programming

Course Objectives:

- 1 To understand Object Oriented programming concepts like Data Abstraction Encapsulation
- 2 To analyze different types of constructor, Inheritance and polymorphism
- 3 To understand and apply package, Interface and Applet concepts
- 4 To know the fundamental concepts of collection framework and multithreading in solving real world problems

Course Outcomes:

Upon completion of the course, students shall have ability to

CO1	Identify and reproduce the features of Object Oriented programming paradigm.	[R]
CO2	Interpret the fundamental concepts of collection framework algorithms and its uses.	[U]
CO3	Understand the basis of Package, multithreading, and interface concepts	[U]
CO4	Use I/O functionality to code basic file operations and experiment with exceptions handling.	[AP]
CO5	Apply the concepts of Applets, AWT and Event handling mechanism to solve a given problems.	[AP]
CO6	Analyze the usage of different kinds of inheritance and constructor in real world scenario	[AN]

Course Contents:

Introduction to Object Oriented Programming: Object oriented programming features - Merits and demerits of object oriented methodology – Overview of object oriented programming languages-C++**JAVA:** Introduction to java programming – Features of java-Classes and objects - Arrays -Methods-Constructor-Access Specifier - Nested Classes-Inner Classes -Command line arguments. **Inheritance, packages and Interface:** Inheritance types-Method overriding - Abstract Classes- Packages-Interfaces-Strings. **Exceptions and I/O handling:** Exception handling fundamentals-I/O basics – Reading console input – Writing console output-Files- **Applets, AWT and Event Handling:** Applet classes-AWT-event handling –multithreaded programming- Collection framework-JDBC Connectivity

Total Hours: 45

Text Books:

- 1 Herbert Schildt." The Complete Reference C++" , 5th Edition, MH, 2012.
- 2 Herbert Schildt, "Java : The Complete Reference", 9th edition, TMH, 2014.

Reference Books:

- 1 Scott Mayers, Effective Modern C++ ", O'Reilly Media , 1st Edition ,2014
- 2 Paul Deitel, Harvey Deitel, "Java How To Program", 10th Edition, Prentice Hall Publications,2014.
- 3 Y. Daniel Liang , "Introduction to Java Programming", 9th Edition , Prentice Hall Publications ,2015

Web References:

- 1 <http://www.nptel.ac.in>
- 2 <http://www.javaworld.com>

Online Resources:

- 1 <https://www.coursera.org/learn/c-plus-plus-a>
- 2 <https://www.coursera.org/learn/c-plus-plus-b>
- 3 <https://www.coursera.org/learn/object-oriented-java>
- 4 <https://www.coursera.org/specializations/java-object-oriented>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component	Marks	
CO1	Remember	Online Quiz	2	
CO2	Understand	Online Quiz	3	
CO3	Understand	Technical presentation	3	
CO4	Apply	Group Assignment	4	
CO5	Apply	Problem Solving	4	
CO6	Analyze	Test	4	
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60]
	CIA1 [6]	CIA2 [6]	Term End Assessment [8]	
Remember	20	10	10	10
Understand	30	30	20	20
Apply	30	40	40	40
Analyse	20	20	30	30
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course: M (Practical Application)

Co Requisites : Operating Systems

Course Objectives:

1. To design, simulate and debug various functionalities of operating System such as system calls, Process Synchronization Process Scheduling
2. To apply and analyse Deadlock, Memory Management and Disk Scheduling Techniques for real world problems
3. To analyse behaviour of simulation models using GDB debugger

Course Outcomes

Upon completion of the course, students shall have ability to

CO1	Demonstrate the use of basic unix commands and shell programming	[AP]
CO2	Apply synchronization techniques to processes	[AP]
CO3	Write programs for disk scheduling, Memory management and File organization Techniques	[AP]
CO4	Practice simple applications using operating system functionalities and debug using GDB debugger.	[AP]
CO5	Analyse the efficiency of CPU Scheduling algorithms	[AN]
CO6	Analyse the efficiency of Deadlock Prevention and avoidance mechanisms.	[AN]

List of Experiments

1. Analysis and Synthesis of Basic Linux Commands
2. Programs using Shell Programming
3. Implementation of Unix System Calls
4. Simulation and Analysis of Non Pre-emptive and Pre-emptive CPU Scheduling Algorithms
5. i. Simulation of Producer – Consumer Problem using Semaphores
ii. Implementation of Dining Philosopher's Problem to demonstrate Process Synchronization
6. Simulation of Banker's Algorithm for Deadlock Avoidance
7. Analysis and Simulation of Memory Allocation and Management Techniques
8. Implementation of Page Replacement Techniques
9. Simulation of Disk Scheduling Algorithms
10. Implementation of File organization Techniques
11. Design an efficient Traffic Control System to avoid traffic congestion in Metro Cities. Use Process Synchronization, Scheduling, Deadlock and Memory Management concepts to implement the system. Use GDB tool to debug the system designed

Total Hours

30

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts" 9th Edition, John Wiley, 2013
2. D.M.Dhamdhere, "Operating systems- A Concept based Approach", 2nd Edition, Tata Mc – Graw Hill, 2010.

Reference Books:

1. Andrew S. Tanenbaum, "Modern Operating Systems", 4th Edition, Pearson Education/PHI 2014.
2. Gary Nutt, "Operating Systems", 3rd Edition, Pearson Education, 2004.
3. Harvey M. Deital, "Operating Systems", 3rd Edition, Pearson Education, 2004.

4. Tanenbaum, "Modern Operating Systems," , 3rd Edition, Pearson Edition, 2007.

Web References:

1. [nptel.ac.in/courses/Web course./Operating%20Systems](http://nptel.ac.in/courses/Web%20course/Operating%20Systems)
2. <http://geeksforgeeks.org/Operating Systems/>

Online Resources:

1. <https://www.udacity.com/course/introduction-to-operatingsystems>

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment[60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	-	-
Apply	70	60
Analyse	30	40
Evaluate	-	-
Create	-	-

Nature of Course: K (Problem Programming)

Co Requisites : Object Oriented Programming using JAVA

Course Objectives:

1. To Analyse different kinds of constructor, Inheritance and polymorphism
2. To know the fundamental concepts of Applet and Multithreading concepts.
3. To understand the database connectivity concepts using JDBC

Course Outcomes

Upon completion of the course, students shall have ability to

CO1	Understand the usage of Applet and event handling mechanism	[U]
CO2	Demonstrate the use of object oriented concepts in real world problems	[AP]
CO3	Apply the concepts of inheritance, constructor, exception handling	[AP]
CO4	Construct java programs to solve the given problems using basic programming Constructs	[C]
CO5	Develop and debug java programs using Package, multithreading, Exceptions and interface concepts	[C]

List Of Experiments

1. Implementation of Election Contest using class and object.
2. Implementation of Toll Booth using Constructors
3. Develop staff management system for demonstrating the concept of Hierarchical Inheritance.
4. Implementation of Single and Multilvel Inheritance for library management systems
5. Implementation of String Operations
6. Implementation of exception handling mechanism using try and catch block
7. Design Java Package for numbers. Develop two different classes that belongs to two package, one to check whether the given string is palindrome or not and the other to check whether the given number is odd or even and access these package using one main file
8. Develop Applet Programming for loading graphic components
9. Implementation of Action and Mouse events
10. Implementation of tourism information system using JDBC.
11. Implementation of Multi-threading for generation of Prime numbers and Fibonacci Series.

Total Hours 45

Reference Books:

1. Herbert Schildt, "Java : The Complete Reference", 9th edition, TMH, 2014
2. Paul Deitel, Harvey Deitel, "Java How To Program", 10th Edition, Prentice Hall Publications, 2014.
3. Y. Daniel Liang, "Introduction to Java Programming", 9th Edition, Prentice Hall Publications, 2015

Web References:

1. <http://www.nptel.ac.in>
2. <http://www.javaworld.com>

Online Resources:

1. <https://www.coursera.org/learn/object-oriented-java>
2. <https://www.coursera.org/specializations/java-object-oriented>

Assessment Methods & Levels (based on Bloom's Taxonomy)

Summative assessment based on Continuous and End Semester Examination

Bloom's Level	Rubric based Continuous Assessment[60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	20	20
Apply	50	50
Analyse	-	-
Evaluate	-	-
Create	30	30

Nature of Course: G (Theory analytical)

Pre Requisites: 17MA101 Linear Algebra and Differential Calculus
17MA104 Integral Calculus and Laplace Transform

Course Objectives:

1. To study the basic probability concepts.
2. To understand and have a well – founded knowledge of standard distributions which can describe real life phenomena.
3. To understand the skills in handling situations involving more than one random variable.
4. To learn the concept of testing of hypothesis

Course Outcomes

Upon completion of the course, students shall have ability to

CO1	Apply the probability concepts in solving engineering problems	[U],[AP]
CO2	Use distribution in cluster analysis of similar binary variables.	[U],[AP]
CO3	Use two dimensional random variables to model experiments with two simultaneous outcomes.	[R],[U],[AP]
CO4	Analyze standard score from a given set of data.	[U],[AP]
CO5	Use testing of hypothesis to derive the inference for engineering problems.	[U],[AP]

Course Contents with Course Outcomes/Blooms Taxonomy/Assessment Methods

Probability- Probability concepts-Addition and Multiplication law of probability – Conditional probability - Total probability theorem - Bayes theorem- **Random Variables-** One dimensional random variable - Probability mass function - Probability density function – Discrete and continuous random variables– **Standard distributions-**Discrete distributions - Binomial – Poisson – Geometric – Continuous distributions - Uniform – Exponential - Normal distributions – MGF- Simple problems-**Two dimensional random variables**-Joint distributions - Marginal and conditional distributions – Covariance – Correlation- Regression- Multiple correlation- **Testing of hypothesis-** Test statistics for small samples -t-test-F-test, χ^2 -test -z- Test statistics for large samples

Total Hours 60

Text Books:

1. Kreyszig. E, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, Singapore, 2014.
2. Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2014.

Reference Books:

1. Venkataraman. M.K, "Engineering Mathematics", Volume I & II Revised Enlarged 4th Edition", The National Pub. Co., Chennai, 2006.
2. Veerarajan. T, "Engineering Mathematics for first year", 5th edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2011.
3. Kandasamy.P ,Thilagavathy.K, Gunavathy.K, "Numerical Methods" , 3rd edition, S Chand & Company Pvt. Ltd, 2013

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://freevideolectures.com/Course/2267/Mathematics-I/22>

Online Resources:

1. www.edx.org/Probability
2. <https://ocw.mit.edu/courses/.../18-440-probability-and-random-variables-spring-2014/>
3. https://onlinecourses.nptel.ac.in/noc15_ec07/

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative assessment based on Capstone Model (Max. Marks:20)			
Course Outcome	Bloom's Level	Assessment Component	Marks
CO1	Remember	Class room or online Quiz	2
CO2& CO3	Understand Apply	Class presentation/Powerpoint Presentation	6
CO4	Apply	Group Activities	6
CO5	Apply	Group Assignment	6

Summative assessment based on Continuous and End Semester Examination

Bloom's Category	Continuous Assessment Tests			Semester End Examination
	CIA1	CIA2	Term Examination	
Remember	20	0	10	10
Understand	30	20	20	10
Apply	50	40	40	40
Analyse	0	40	30	40
Evaluate	0	0	0	0
Create	0	0	0	0

Nature of Course :G (Theory)

Pre requisites : -

Course Objectives:

- 1 To understand the key modules of digital communication systems with emphasis on digital modulation techniques.
- 2 To introduce the principles of basics of source and channel coding/decoding and Spread Spectrum Modulation
- 3 To enable the students to understand the mobile radio communication principles, types and to study the recent trends adopted in cellular and wireless systems and standards.

Course Outcomes:

Upon completion of the course, students shall have ability to

- Understand the knowledge of basic communication systems and its principles [U]
- Describe and analyze the digital communication system with spread spectrum modulation [U]
- Understand the knowledge of channel coding theorem and apply the error control codes like Linear Block codes, Hamming codes, Cyclic codes, Convolutional codes, Viterbi Decoder [AP]
- Assess the latest wireless technologies. [AP]
- Describe the cellular concept and analyze capacity improvement Techniques. [AN]

Course Contents:

Base band transmission-Basics of communication systems, Need for modulation, Sampling theorem, Pulse code modulation (PCM), Delta Modulation, Data transmission using analog carrier(BFSK,BPSK,QPSK) **Error control coding Channel** coding theorem – Linear Block codes – Hamming codes – Cyclic codes – Convolutional codes – Viterbi Decoder-**Introduction to Wireless Communication**, Cellular concept, System design fundamentals, Coverage and Capacity improvement in Cellular system. Technical Challenges -**Multiple access techniques**; FDMA, TDMA and CDMA. Spread spectrum. Power control. WCDMA.CDMA network design. OFDM .**Latest trends**:GSM.3G, 4G(LTE), NFC systems, WLAN technology, WLL, HiperLAN, Ad hoc networks. Bluetooth.

Text Books:

- 1 S. Haykin, "Digital Communications", John Wiley, 2014
- 2 J.G.Proakis, "Digital Communication" , Tata McGraw – Hill,(4/e),2014
T.S.Rappaport, Wireless Communication Principles (2/e), Pearson, 2008.
A.F.Molisch, Wireless Communications, Wiley, 2010

Reference Books:

- 1 P.MuthuChidambaraNathan, Wireless Communications, PHI, 2010
- 2 W.C.Y.Lee, Mobile Communication Engineering. (2/e), McGraw- Hill,1998.
- 3 A.Goldsmith, Wireless Communications, Cambridge University Press, 2005.
- 4 B.Sklar, "Digital Communications: Fundamentals & Applications", Pearson Education, (2/e), 2001
- 5 A.B.Carlson, " Communication Systems", McGraw Hill, 3/e,2009
- 6 3. R.E.Zimer&R.L.Peterson," Introduction to Digital Communication", PHI,3/e, 2001

Web References:

- 1 <http://nptel.ac.in/courses/117102059/>
- 2 <https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-36-communication-systems-engineering-spring-2009/lecture-notes/>

Online Resources:

- 1 <https://ce.uci.edu/areas/engineering/networks/>
- 2 <http://scpd.stanford.edu/search/publicCourseSearchDetails.do?method=load&courseId=12075>
- 3 <https://www.edx.org/course/system-view-communications-signals-hkustx-elec1200-1x-1>
- 4 <https://www.udemy.com/introduction-to-wireless-communications/>

Assessment Methods & Levels (based on Blooms' Taxonomy)
Formative assessment based on Capstone Model (Max. Marks:20)

Course Outcome	Bloom's Level	Assessment Component		Marks
	Understand	Quiz		4
	Understand	Writing skills		3
	Apply	Assignment		4
	Apply	Mini Project		5
	Analyse	Technical Presentation		4
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-			
Understand	80	50	40	30
Apply	20	50	40	50
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :G (Theory analytical)

Course Objectives:

- 1 To learn the fundamentals of data models to conceptualize and depict a database system using ER diagram.
- 2 To understand the relational database implementation using SQL with effective relational database design concepts.
- 3 To learn the database design procedure for large enterprise database design.
- 4 To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure
- 5 To understand the internal storage structures using different file and indexing techniques which will help in physical DB design along with Query optimization techniques.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit. | [U] |
| CO2 | Understand the basic issues of transaction processing and concurrency control. | [U] |
| CO3 | Demonstrate with understanding of SQL Programming language and normalization theory. | [AP] |
| CO4 | Practice the query evaluation techniques, query optimization and familiar with basic database storage structures and access techniques. | [AP] |
| CO5 | Analyze and derive an information model expressed in the form of an entity relation diagram and transform into a relational database schema. | [AN] |

Course Contents :

Introduction & Data Modelling: Introduction– Characteristics of databases –File systems vs Database systems- Evolution of DBMS – Users of database systems- Three level DBMS Architecture and Data Abstraction- Database system architecture –Designing an enterprise database system- Introductions to data models – Benefits of data model – Phases of data modelling- Entity–Relationship model – E-R Diagrams – Extended E-R Diagram – Evaluating data model quality - The relational Model – Schema – Keys- Relational Algebra – Domain Relational Calculus- Tuple Relational Calculus - Fundamental operations. **Relational Database Design And Querying:** Introduction – Undesirable Properties of Relations – Functional Dependency- Single Valued Dependency Single valued Normalization (1NF, 2NF 3NF & BCNF)- Desirable properties of Decompositions – De-normalization- Client Server database Implementation- SQL fundamentals – Views - Integrity – Procedures, Functions, Cursor and Triggers- Advanced SQL features –Embedded SQL – Dynamic SQL- Transaction Concepts – Transaction model – ACID Properties – Serializability –Transactions as SQL statements. **Storage Techniques And Query Processing:** Introduction – Overview of physical storage media- File structures – Index and Index types – B+ Tree- Hashing – Static Hashing – Dynamic Hashing- Introduction to Query Processing – Issues in query optimization – Steps in query processing - **Database Implementation And Latest Trends:** Distributed database Implementation- Concurrent transactions - Concurrency control – Lock based protocols-

Text Books:

- 1 Gupta G K, "Database Management Systems", Tata McGraw Hill Education Private Limited, New Delhi, 2011.
- 2 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th Edition, Tata McGraw Hill, 2011.

Reference Books:

- 1 Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson / Addison Wesley, 2007
- 2 Raghu Ramakrishnan, Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill, 2006
- 3 Peter rob, Carlos Coronel, "Database Systems – Design, Implementation and Management", 9th Edition, Thomson Learning, 2009.

Web References:

- 1 <http://nptel.ac.in/video.php?subjectId=106106093>
- 2 <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-830-database-systems-fall-2010/>
- 3 www.tutorialspoint.com/dbms/

Online Resources:

- 1 <https://www.udemy.com/database-management-system/>
 - 2 <http://www.nptelvideos.in/2012/11/database-management-system.html>
 - 3 https://lagunita.stanford.edu/courses/Engineering/db/2014_1/about
 - 4 <http://nptel.ac.in/courses/106106093/>
 - 5 <https://alison.com/courses/IT-Management-Software-and-Databases>
 - 6 https://mva.microsoft.com/en-us/training-courses/database-fundamentals-8243?l=TEBiexJy_5904984
 - 7 <http://www.sqlcourse.com/>
 - 8 <https://www.coursera.org/learn/database-management>
 - 9 <https://university.mongodb.com/>
 - 10 <https://www.edx.org/school/mongodbx>
 - 11 <http://www.edureka.co/mongodb>
 - 12 <http://www.joyofdata.de/blog/free-and-certified-mongodb-online-courses-mooc/>
 - 13 <https://www.lynda.com/NoSQL-training-tutorials/1473-0.html>
 - 14 <https://www.udemy.com/learn-nosql-database-design-from-scratch/>
 - 15 <https://www.class-central.com/tag/nosql>
-

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Online Quiz		3
CO2	Understand	Technical Presentation		3
CO3	Apply	Group Assignment		5
CO4	Apply	Group Assignment		5
CO5	Analyse	Surprise Test		4
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	80	40	40	40
Apply	20	60	40	40
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : C (Theory Concept)

Pre requisites : Computer Hardware, Networks & Storage Management

Course Objectives:

- 1 To study the concepts of the basic structure and operation of a digital computer.
- 2 To learn the working of different types of arithmetic operations.
- 3 To understand the different types of control and the concept of pipelining.
- 4 To learn the working of different types of memories.
- 5 To understand the different types of communication with I/O devices and standard I/O interfaces

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| C01 | Recognize the design of the various units of digital computers that store and process information via instructions. | [R] |
| C02 | Review the functionality of all components and connectivity to the Central Processing Unit. | [U] |
| C03 | Interpret the logic design of fixed-point add, subtract, multiply and divide hardware and instantiating the concepts of fast adders, high speed multiplier, booth multiplier and carry save addition techniques. | [U] |
| C04 | Distinguish the hazards of pipelining technique and use in high performance processors. | [U] |
| C05 | Illustrate various memory components and memory mapping techniques including Cache and virtual memory for increasing the memory bandwidth and high performance. | [AP] |
| C06 | Choose different ways of communication with I/O devices using various interconnection networks including bus structures. | [AP] |
| C07 | Infer the processor concepts by introducing multi-core, cluster, shared and distributed architecture concepts | [AN] |

Course Contents:

Course Contents with Course Outcomes/Blooms Taxonomy/Assessment Methods

Architecture: Functional units, Basic operational concepts, Bus structures, Memory locations and addresses, Instruction and instruction sequencing, Addressing modes and Assembly language

Arithmetic Unit: Addition and subtraction of signed numbers – Design of Fast adders – Multiplication of signed numbers, Fast multiplication, Integer division, Floating point numbers and operations.

Processing: Execution of a Complete Instruction, Hardwired Control and Micro Programmed Control. **Pipelining:** Basic Concepts, Data Hazards, Instruction Hazards, Influence On Instruction Sets, Data Path And Control Consideration and Superscalar Operation.

Intel Pentium Processor Architecture & Working, Sun Ultra Sparc, Sandiego Super Computer Center) **Memory:** Basic concepts, Semiconductor RAMs, ROMs, Cache memories, Performance consideration, Virtual memory and Memory Management requirements.

Multicore Architecture: Secondary storage Multicore Processors, Centralized and Distributed shared-memory architecture, Cluster computers, Accessing I/O devices, Interrupts, Direct Memory Access (HP Moonshot)

Total Hours: 45

Text Books:

- 1 Carl Hamachar, Zvonco Vranesic and Safwat Zaky, Computer Organization, McGraw-Hill, 6th Edition 2012.
- 2 John P. Hayes, Computer Architecture and Organization, McGraw-Hill 3rd edition, 2013

Reference Books:

- 1 David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Elsevier, 4th edition 2012.
- 2 Avi Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley Asia 2nd Edition
- 3 William Stallings, Operating Systems: Internals and Design Principles, Prentice Hall of India, 8th edition , 2012
- 4 John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann, 5th edition 2011
- 5 John Paul Shen and Mikko H. Lipasti, Modern Processor Design: Fundamentals of Superscalar Processors, Tata McGraw-Hill, 1st edition 2013
- 6 M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing House
- 7 Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill reprint 2011

Web References:

- 1 http://www.hp.com/hpinfo/newsroom/press_kits/2013/hpmoonshot2013/DS_Moonshot_System.pdf
- 2 <https://www.hpe.com/h20195/v2/getpdf.aspx/c04168328.pdf?ver=11>
- 3 http://documents.opto22.com/casestudies/2183_Case_Study_San_Diego_Supercomputer_Center.pdf

Online Resources:

- 1 <https://www.coursera.org/learn/making-architecture>
- 2 <https://www.coursera.org/learn/comparch>
- 3 <http://nptel.ac.in/video.php?subjectId=106102062>
- 4 <http://nptel.ac.in/courses/106102062/>

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative assessment based on Capstone Model (Max. Marks:20)			
Course Outcome	Bloom's Level	Assessment Component	Marks
C01	Remember	Online Quiz	2
C02	Understand	Online Quiz	2
C03	Understand	Problem Solving	3
C04	Understand	Class Presentation	3
C05	Apply	Group Assignment	3
C06	Apply	Case Study	4
C07	Analyse	Technical Writing	3
Summative assessment based on Continuous and End Semester Examination			

Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	20	10	10
Understand	80	40	40	40
Apply	-	40	30	30
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

17IT309

DESIGN AND ANALYSIS OF ALGORITHMS

3/0/0/3

Nature of Course

: G (Theory analytical)

Pre requisites

: Problem Solving Techniques and C Programming
Data Structures

Course Objectives:

- 1 To introduce general techniques for analyzing computer algorithms
- 2 To learn different algorithm design techniques
- 3 To understand the limitations of Algorithm power

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------|---|------|
| CO1: | Recognize general principles and good algorithm design techniques for developing efficient algorithms | [R] |
| CO2: | Estimate the time and space complexities of algorithms | [U] |
| CO3: | Apply mathematical preliminaries to the analysis and design stages of different types of algorithms | [AP] |
| CO4: | Write efficient algorithms | [AP] |
| CO5: | Compare the time and space complexities of different types of algorithms | [AN] |

Course Contents:

Algorithm Analysis: Importance - role of algorithms in computing - Algorithm efficiency - Mathematical analysis for Recursive and Non-recursive algorithms - Empirical analysis of algorithm. **Brute Force Approach:** Selection Sort - Bubble Sort - Sequential Search - String Matching. **Decrease And Conquer Technique:** Insertion sort - Topological sort. **Divide And Conquer Technique:** Merge sort - Quick sort - Binary search - Strassen's Matrix Multiplication. **Dynamic Programming:** Knapsack Problem and Memory functions - Optimal Binary Search Trees - Warshall's and Floyd's Algorithms. **Greedy Technique:** Prim's Algorithms - Kruskal's Algorithm - Dijkstra's Algorithm - Huffman Trees and Codes. **Solvability:** Lower-Bound Arguments - Decision Trees - P, NP and NP-Complete Problems. **Backtracking:** n - Queens Problem - Hamiltonian Circuit Problem - Subset Sum Problem. **Branch and Bound Technique:** Assignment Problem - Knapsack Problem - Travelling Salesman Problem. **Approximation Algorithms:** Vertex-cover problem - Travelling Salesman Problem

Total Hours: 45

Text Books:

- 1 Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Publications, 3rd Edition, 2012.
- 2 Thomas H. Cormen, Charles E. Leiserson, R.L. Rivest, "Introduction to Algorithms", Prentice Hall of India Publications, 3rd Edition, 2009.

Reference Books:

- 1 Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Publications, 3rd Edition, 2012.
- 2 Thomas H. Cormen, Charles E. Leiserson, R.L. Rivest, "Introduction to Algorithms", Prentice Hall of India Publications, 3rd Edition, 2009.
- 3 Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms," 2nd Edition, Galgotia Publications, 2008.

- 4 Sara Baase and Allen Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", Pearson Publications, 3rd Edition, 2008.

Web References:

- 1 <https://www.cs.usfca.edu/~galles/visualization/Algorithms.html>

Online Resources:

- 1 <https://www.coursera.org/learn/introduction-to-algorithms>
- 2 https://onlinecourses.nptel.ac.in/noc16_cs04/preview
- 3 <https://www.edx.org/course/algorithms-iitbombayx-cs213-3x>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Online Quiz		4
CO2	Understand	Technical presentation		4
CO3	Apply	Group Assignment		4
CO4	Apply	Group Assignment		4
CO5	Analyse	Surprise Test		4
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination
	CIA1	CIA2	Term End Assessment	
Remember	10	10	10	10
Understand	20	20	20	20
Apply	40	40	40	40
Analyse	30	30	30	30
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : M (Practical application)

Course Objectives:

- 1 To learn the fundamentals of data models to conceptualize and depict a database system using ER diagram.
- 2 To understand the relational database implantation using SQL with effective relational database design concepts
- 3 To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- 4 To understand the internal storage structures using different file and indexing techniques which will help in physical DB design along with Query optimization techniques

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | |
|---|------|
| CO1 Understand the basics of NoSQL Databases and cloud storage. | [U] |
| CO2 Sketch ER diagrams for real world applications. | [AP] |
| CO3 Apply concurrency control and recovery mechanisms for practical problems. | [AP] |
| CO4 Select suitable SQL commands to manage the database | [AN] |
| CO5 Design effective Databases for enterprise applications. | [C] |

Course Contents :

1. Conceptual Database design using E-R DIAGRAM
2. Implementation of SQL commands DDL, DML, DCL and TCL
3. Queries to demonstrate implementation of Integrity Constraints
4. Practice of Inbuilt functions
5. Implementation of Join and Nested Queries AND Set operators
6. Implementation of virtual tables using Views
7. Practice of Procedural extensions (Procedure, Function, Cursors, Triggers)
8. Application Development using front end tools
9. Document Database creation using MongoDB
10. Study of Cloud Storage

Total Hours: 45

Reference Books:

- 1 Gupta G K, "Database Management Systems", Tata McGraw Hill Education Private Limited, New Delhi, 2011.
- 2 Peter rob, Carlos Coronel, "Database Systems – Design, Implementation and Management", 9th Edition, Thomson Learning, 2009.
- 3 Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition , Pearson/ Addison wesley, 2007.

Web References:

- 1 <http://nptel.ac.in/video.php?subjectId=106106093>
- 2 <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-830-database-systems-fall-2010/>
- 3 www.tutorialspoint.com/dbms/

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment[60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	20	20
Apply	40	40
Analyse	20	20
Evaluate	-	-
Create	20	20

Nature of Course : L (Problem experimental)

Course Objectives:

- 1 To implement and analyze various design techniques of algorithms
- 2 To implement efficient algorithms

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Apply different problem solving techniques to find a solution to a problem | [AP] |
| CO2 | Analyze time and space complexities of algorithms | [AN] |
| CO3 | Compare the time and space complexities of different algorithms designed to solve a problem | [E] |
| CO4 | Propose an efficient algorithm for a problem | [C] |

Course Contents:

1. Implement recursive and non-recursive algorithms for an application and analyze the same
2. Implement and analyze Sorting, Searching and String matching algorithms using Brute Force approach
3. Design algorithms using Divide and Conquer technique for different real-world scenarios
4. Use different algorithms find the valuable set of items in a Knapsack. Analyze the same
5. Implement and analyze an algorithm to find the shortest path between every pair of cities using Dynamic Programming
6. Using different algorithms based on Greedy technique, implement and analyze a real world application as the one given below

Scenario:

For a large local area network with a lot of switches, implement an algorithm to find the minimum number of packets that need to be relayed across the network and avoid multiple copies of the same packet from arriving via different paths

7. Use suitable algorithms to deal with the following Scenario and analyze the same

Scenario:

A vendor car has capacity 'K' kg. There are some bundles having respective weights c_1, c_2, \dots, c_n kg which are to be transported by that vendor car. The problem is to pick up those bundles and load them in the car so that the car capacity is maximum utilized, if not fully.

8. Implement an algorithm for the Huffman-tree construction. Analyze the time efficiency class of the algorithm for constructing a Huffman tree as a function of the alphabet's size
9. Implement a suitable Backtracking algorithm to find a tour

Scenario:

A person has to travel from island 'A' to another island 'B' crossing 'n' bridges and return to 'A'. A person can plan a walk in such a way that he will cross each of these bridges once but not more than once.

10. Implement a suitable Branch and Bound algorithm to find the shortest tour

Scenario:

A robot is involved in cutting the metal surface with laser. The sequence of movements for the robot arm should be minimal.

11. Incorporating the problem solving techniques, develop a mini project

Total Hours:

45

Reference Books:

- 1 Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Publications, 3rd Edition, 2012.

- 2 Thomas H. Cormen, Charles E. Leiserson, R.L. Rivest, "Introduction to Algorithms", Prentice Hall of India Publications, 3rd Edition, 2009.
- 3 Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms," 2nd Edition, Galgotia Publications, 2008.
- 4 Sara Baase and Allen Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", Pearson Publications, 3rd Edition, 2008.
- 5 Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Publications, 3rd Edition, 2012.

Web References:

- 1 <https://www.cs.usfca.edu/~galles/visualization/Algorithms.html>

Online Resources:

- 1 <https://www.coursera.org/learn/introduction-to-algorithms>
- 2 https://onlinecourses.nptel.ac.in/noc16_cs04/preview
- 3 <https://www.edx.org/course/algorithms-iitbombayx-cs213-3x>

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment [60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	-	-
Apply	40	40
Analyse	30	30
Evaluate	20	20
Create	10	10

Nature of Course

J(Problem analytical)

Pre requisites17MA101-Linear Algebra and Differential Calculus
17MA104-Integral Calculus and Laplace Transform**Course Objectives:**

- 1 To study the concept of mathematical formulation of certain practical problems in terms of partial differential equations and solving them for physical interpretation
- 2 To understand the concept of Fourier series and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data
- 3 To understand the basics of Z – transform and its applicability to discretely varying functions
- 4 To study the concept of finding the roots of nonlinear (algebraic and transcendental) equations and solutions of large system of linear equations and Eigen values of the matrix
- 5 To find numerical solution to partial differential equations

Course Outcomes:**Upon completion of the course, students shall have ability to**

- | | | |
|-----|---|------|
| CO1 | Recall concepts of partial differential equations, properties of definite integrals and summation of series | [R] |
| CO2 | Formulate certain problems in terms of difference equations and solve them using Z-transform technique | [U] |
| CO3 | Find Fourier series solution to the engineering problems involving partial differential equations | [AP] |
| CO4 | Apply numerical methods to solve algebraic, transcendental and simultaneous equations | [AP] |
| CO5 | Use numerical methods to solve partial differential equations by finite difference method | [AP] |

Course Contents:

Partial Differential Equations - Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions- Lagrange's linear equations –Linear homogeneous partial differential equations of second and higher order with constant coefficients- **Fourier series** - Dirichlet's conditions- General Fourier Series – Odd and Even Functions- Half range sine series and cosine series –Parseval's Identity- Harmonic analysis - **Z- Transforms** - Definition - Z-transform of Standard functions-Properties (excluding proof) – **Inverse Z- transform**- Convolution theorem(Statement)- Formation of difference equations- Solution of difference equations using Z-transform Techniques- **Numerical solution to algebraic and transcendental equations**-Regula-Falsi method - Newton-Raphson method –Gauss Elimination method -Gauss Jordan method –Gauss Jacobi method - Gauss Seidel method – Inverse of a matrix by Gauss Jordan method –Eigen value of a matrix by power method-**Numerical solution to PDE**- Finite difference technique-Laplace Equation-Liebmann's Iteration Process-Parabolic Equation –Bender-Schmidt's Difference Equation-Crank-Nicolson's Difference Equation-Hyperbolic Equation

Total Hours:**75****Text Books:**

- 1 Kreyszig. E, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, Singapore, 2014.
- 2 Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2014.
- 3 Grewal B.S., Numerical methods in Engineering and Science. 10th edition, Khanna Publishers, 2014

Reference Books:

- 1 Veerarajan. T, "Transforms and Partial differential equations", 2rd edition, Tata McGraw-Hill Publishing Company Ltd., reprint, 2015
- 2 Glyn James, –Advanced Modern Engineering Mathematics, Pearson Education, 4th edition, 2012

- 3 Jain M.K. Iyengar, K & Jain R.K., Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd, Publishers 2013

Web References:

- 1 <http://nptel.ac.in/courses/122107036/>
- 2 <http://nptel.ac.in/video.php?subjectId=122107037>
- 3 <http://nptel.ac.in/video.php?subjectId=117102060>

Online Resources:

- 1 <https://www.coursera.org/learn/integration-calculus>
- 2 <https://alison.com/courses/Strand-5-Higher-Level-Functions-and-Calculus/reviews/649/>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Class room or online Quiz		2
CO2	Understand	Class presentation/Powerpoint Presentation		4
CO3	Apply	Group Activities		6
CO4& CO5	Apply	Group Assignment		8
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination
	CIA1	CIA2	Term End Assessment	
Remember	20	20	20	20
Understand	30	30	30	30
Apply	50	50	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : C (Theory Concept)

Pre requisites : Nil

Course Objectives:

- 1 To have an understanding of Computational languages.
- 2 To have a knowledge of regular languages and context free languages and its properties.
- 3 To know the relation between regular language, context free language and corresponding recognizers.
- 4 To study the concept of Turing machines.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------------|--|----------|
| CO1 | Understand the concepts of Finite Automata, Regular and Context free Languages | [U] |
| CO2 | Compare the Equivalence of Finite Automata, Regular Expressions and Context Free Languages | [AN] |
| CO3 | Design the Context free grammar and Push down automata for a context free language. | [U],[AP] |
| CO4 | Apply the pumping lemma properties to Regular and Context Free Languages | [U],[AP] |
| CO5 | Interpret the properties of Regular languages and Context free languages | [U] |
| CO6 | Design the Turing machine for a Language. | [U],[AP] |

Course Contents:

Course Contents with Course Outcomes/Blooms Taxonomy/Assessment Methods

Grammar, Languages and Regular Expressions: General concepts – Alphabets, Strings, Languages, Operators of Regular Expressions and its precedence, Building Regular Expressions, Algebraic Laws for Regular Expressions, Grammar introduction – Types of Grammar, Chomsky hierarchy of Languages. **Properties of Regular Language:** Pumping Lemma for Regular Languages, Applications of the Pumping Lemma, Closure Properties of Regular Languages and Decision Properties of Regular Languages. **Finite Automata:** General concepts of Automata Theory, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), DFA's to Regular Expressions, Equivalence of DFA and NFA, Finite Automata with ϵ -transitions, Equivalence and Minimization of Automata, Applications and Limitations of Finite Automata. **Context Free Grammar:** Construction of Context Free Grammar (CFG), Derivations, Parse Trees, Ambiguity in Grammar, Simplification of CFG, Applications of Context Free Grammar. **Properties of Context-Free Language:** Normal forms for CFGs: Chomsky Normal Form and Griebach Normal Form, Closure properties of CFL's, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFL's. **Push Down Automata:** Formal Definition of Push Down Automata (PDA), Instantaneous Description, Languages of a PDA- Acceptance by Final state, Acceptance by empty stack, Equivalence of PDA's and CFG's, Deterministic PDA. **Turing Machines & Undecidability:** Basic model, Definition and representations, Instantaneous Description, Language acceptance by Turing Machine (TM), Universal Turing machine, Programming techniques, Variants of TM, TM as Computer of Integer functions, Decidable and Undecidable problems.

Total Hours:

45

Text Books:

- 1 J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2011.
- 2 Micheal Sipser, "Theory and Computation", 7th Edition, Thomson Course Technology, 2008

Reference Books:

- 1 H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003

- 2 J.Martin, "Introduction to Languages and the Theory of Computation", fourth Edition, TMH, 2010.

Web References:

- 1 <http://web.cs.ucdavis.edu/~doty/papers/thesis.pdf>

Online Resources:

- 1 https://onlinecourses.nptel.ac.in/noc16_cs14/
 2 <http://www.aduni.org/courses/theory/index.php?view=cw>
 3 <http://web.cecs.pdx.edu/~harry/TheoryOfComp/index.html>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1-CO6	Analyze	Technical Quiz		5
CO3	Apply	Tutorial		5
CO4, CO5	Apply	Problem Solving		5
CO2	Understand	Group Assignment		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	20	10	10
Understand	80	40	40	40
Apply	-	40	30	30
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :G(Theory Concept)

Pre requisites : Digital Principles and System Design

Course Objectives:

1. To understand the architecture and Instruction set of 8086 and 8051
2. To develop the programming abilities to work on 8086 microprocessor and microcontrollers
3. To know about different peripheral devices and their interfacing to 8051 & ARM Processor
4. To understand the architecture and programming of ARM Processor
5. To apply and understand the principles and working of Arduino Processor.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Understand the operations of microprocessor architecture 8086 and write the assembly language programming | [U] |
| CO2 | Understand the concepts of microcontroller 8051 and apply the programming concepts in microcontroller. | [AP] |
| CO3 | Design 8051 microcontroller and to interface the controller with the external circuits. | [AP] |
| CO4 | Understand the concepts of ARM architecture and interfacing with external circuit. | [U] |
| CO5 | Apply the concepts in developing real time applications using Arduino processor | [AP] |

Course Contents:

Organization and architectural features of 8086 microprocessor: The instruction set, Addressing modes; Interrupts, Assembly language programming of 8086. **Microcontroller:** Architecture of 8051, Special Function Registers (SFRs), I/O Pins Ports and Circuits, Instruction set, Interrupts, Assembly language programming. **8051 interfacing** - LCD & Keyboard Interfacing, ADC, DAC & Sensor Interfacing, External Memory Interface, Stepper Motor and Waveform generation. **ARM Processor-** The ARM architecture, ARM Bus architecture, ARM7 Processor Fundamentals, ARM Instruction Set, Memory Mapping, The Thumb Instruction Set, Interfacing of sensors, transducers, actuators, A/D and D/A Converters with ARM. **IOT Processors-** Arduino platform Getting started with Arduino, basic programming LCD Display, Arduino Ethernet programming.

Total Hours: 45

Text Books:

1. A.K.Ray&K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", Third edition, TMH, 2012 Reprint.
2. Mohamed Ali Mazidi, Janice GillispieMazidi, "The 8051 microcontroller and embedded systems", Pearson Education, 2006
3. Andrew N.Sloss, Dominic Symes and Chris Wright " ARM System Developer"s Guide : Designing and Optimizing System Software" , First edition, Morgan Kaufmann Publishers, 2004.
4. Simon Monk "Programming Arduino getting started with sketches", The McGraw-Hill, 2012.
5. Douglas V Hall, "Microprocessor and Interfacing", MHI, 2005.

Reference Books:

1. Yu-cheng Liu, Glenn A.Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", PHI 2003
2. Steve Furber , "ARM System –On –Chip architecture", Addison Wesley, 2000.

Web References:

1. <https://www.coursera.org/learn/raspberry-pi-interface/home/welcome>
2. <http://nptel.ac.in/courses/108107029/>
3. <http://www.eeherald.com/section/design-guide/esmod.html>
4. <https://www.edx.org/course/embedded-systems-shape-world-utaustinx-ut-6-03x>
5. https://www.udemy.com/mcu_msp430/
6. <http://www.multisoftvirtualacademy.com/8051-microcontroller-online-training.php>

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Quiz		5
CO2	Apply	Tutorial		5
CO3	Understand	Mini Project		5
CO4	Apply	Coding- Tutorial		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	25	0	20	20
Understand	25	30	20	20
Apply	50	50	40	40
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	20	20	20

Nature of Course : C (Theory Concept)

Course Objectives:

- 1 To study the concepts of data communications and functions of different layers of ISO/OSI reference architecture
- 2 To understand the error detection and correction methods and types of LAN
- 3 To study the concepts of sub netting and routing mechanisms.
- 4 To understand the different types of protocols and network components.
- 5 To study the application protocols and network security

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Understand the fundamentals of data communications and functions of layered architecture. | [U] |
| CO2 | Practice the error detection and correction methods and understand the different network technologies | [AN] |
| CO3 | Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and routing technologies | [AN] |
| CO4 | Understand the transport layer principles and reliable data transfer | [U] |
| CO5 | Understand the application layer protocols and also the use of cryptography and network security | [U] |

Course Contents:

Data communications and physical layer: Introduction, history and development of computer networks, networks topologies, ISO/OSI model and protocols. Different types of transmission media, errors in transmission: attenuation, noise. Repeaters. Encoding (NRZ, NRZI, Manchester, 4B/5B). MAC Layer: Aloha, TDMA, CDMA, CSMA/CD, CSMA/CA. **Data Link Layer:** Error detection (Parity, CRC, Hamming code), Sliding Window, Stop and Wait protocols, LAN: Design, specifications of popular technologies, switching, Ethernet, Gigabit Ethernet, Token Ring, Token Bus, Bluetooth, Wi-Fi, Wi-Max, FDDI, PPP, bridging and SDN. **Network layer:** Internet Protocol, IPv6, ARP, DHCP, ICMP, Distance vector routing, Link state routing, Classless Inter-domain routing, RIP, OSPF, BGP, Subnetting, , Network Address Translation. **Transport layer:** UDP, TCP, Connection establishment and termination, sliding window revisited, flow and congestion control, timers, retransmission, TCP extensions, Design issues in protocols at different layers, Socket Programming. **Application Layers:** DNS, E-Mail -SMTP, MIME, POP3, IMAP, FTP, HTTP, WWW, symmetric and asymmetric key cryptography, Sharing of symmetric keys – Diffie-Hellman key Exchange, Public Key Infrastructure, Public Key Authentication Protocols, Firewalls.

Total Hours: 45

Text Books:

- 1 AS Tanenbaum, DJ Wetherall, "Computer Networks", 5th Edition, Prentice-Hall, 2010.
- 2 Behrouz A. Forouzan, "Data communication and Networking", 4th Edition, Tata McGraw-Hill, 2007.

Reference Books:

- 1 Peterson & Davie, "Computer Networks, A Systems Approach", 3rd Edition, Harcourt, 2013
- 2 William Stallings, "Data and Computer Communications", 8th Edition, PHI, 2006

- 3 Bertsekas and Gallagher "Data Networks, PHI, 2000
- 4 JF Kurose, KW Ross, "Computer Networking: A Top-Down Approach", 5th Edition, Addison-Wesley, 2009.
- 5 W Stallings, Cryptography and Network Security, Principles and Practice, 5th Ed., Prentice-Hall, 2010

Web References:

- 1 <https://www.udacity.com/course/computer-networking--ud436>
- 2 <http://www.learnerstv.com/Free-Computer-Science-Video-lectures-Itv578-Page1.htm>
- 3 <http://freevideolectures.com/Course/3162/Computer-Networking-Tutorial>

Online Resources:

- 1 <http://nptel.ac.in/courses/106105082/>
- 2 <https://www.free-online-training-courses.com/networking/>
- 3 <https://www.youtube.com/watch?v=1eGxPIInj4M>
- 4 <http://www.omnisecu.com/basic-networking/index.php>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Online Quiz		3
CO2	Understand, Analyse	Group Assignment		4
CO3	Analyse	Case Study		5
CO4	Understand	Class Presentation		4
CO5	Understand	Class Presentation		4
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	50	50	60	60
Apply	-	-	-	-
Analyse	50	50	40	40
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :G (Theory analytical)

Pre requisites : PROBABILITY & STATISTICS

Course Objectives:

- To introduce applications of machine learning and case studies
- To provide an insight to different supervised learning techniques, merits and demerits
- To enable the students to understand Graphical models and their applicability to real world problems
- To explore discovering clusters in the given data
- To study and evaluate dimensionality reduction for the given data

Course Outcomes

Upon completion of the course, students shall have ability to

- | | | |
|--------|--|------|
| C404.1 | Explore the acquired knowledge on recalling the applications of machine learning | [R] |
| C404.2 | Understand the concepts behind different types of learning and their appropriateness | [U] |
| C404.3 | Choose and apply appropriate learning technique for a given real world problem | [AP] |
| C404.4 | Analyse the observations for a given set of data | [AN] |
| C404.5 | Evaluate the effectiveness of different learning techniques for different kinds of data and applications | [E] |

Course Contents:

Introduction to Machine Learning: what and why?, Designing a learning system, Issues. Examples of Machine Learning Applications, Overview: Supervised Learning, Learning Associations, Classification, Regression, Unsupervised learning and Reinforcement Learning. **Supervised Learning:** Generative vs discriminative learning, Gaussian mixture models, Decision Tree learning, Neural Networks, Support vector machines, Instance based learning, Ensemble learning. **Graphical models:** Bayesian Learning, Markov random Fields, Hidden Markov model, conditional random fields. **Regression:** Linear regression, logistic regression, other types of regression, Overfitting, Model selection. **Unsupervised learning:** Discovering clusters, Discovering latent factors, Discovering graph structure, **Dimensionality reduction, Case Studies:** Classification, Regression, clustering and anomaly detection

Lab Component

- | | |
|------------------------------------|-----|
| 1. Gaussian mixture models | [E] |
| 2. Decision Tree classifier | [E] |
| 3. Neural Networks | [E] |
| 4. Support Vector Machines | [E] |
| 5. k- nearest neighbour classifier | [E] |
| 6. Regression algorithms | [E] |
| 7. Clustering algorithms | [E] |
| 8. Dimensionality reduction | [E] |
| 9. Mini Project | |

Total Hours: 75

Text Books:

- 1 Ethem Alpaydin, –Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014
- 2 Kevin P. Murphy, Machine Learning A probabilistic Perspective, MIT press, 2012

Reference Books:

- 1 Christopher Bishop. Pattern Recognition and Machine Learning., Springer, 2006.
- 2 Jason Bell, –Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
- 3 Stephen Marsland, –Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

Web References:

- 1 https://onlinecourses.nptel.ac.in/noc16_cs18/
<http://freevideolectures.com/Course/2257/Machine-Learning>
- 2

Online courses:

- 1 <https://www.coursera.org/learn/machine-learning>
- 2 <https://www.edx.org/course/machine-learning-data-science-analytics-columbia-ds102x-0#!>

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory		Term End Examination [8 marks]	Practical	
	CIA-I [6 marks]	CIA-II [6 marks]		Rubric based CIA [40 Marks]	
Remember	20	10	10	-	10
Understand	60	30	20	20	20
Apply	20	30	30	20	30
Analyse	-	30	40	20	40
Evaluate	-	-	-	20	-
Create	-	-	-	20	-

Nature of Course : L (Problem experimental)

Course Objectives:

- 1 To understand the basic programming of Microprocessors and Micro Controllers.
- 2 To solve various real time problems using Micro controllers and Micro – processors.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------------|---|------|
| CO1 | Write the assembly language programming using 8086 Microprocessor. | [AP] |
| CO2 | Able to program using 8051 microcontroller and Interface 8051 with other devices. | [AP] |
| CO3 | Program using ARM and to do interfacing with external circuit. | [AP] |
| CO4 | Solve real time problems using Arduino Processor. | [C] |

Course Contents:

1. Assembly Language programs using 8086.
2. Assembly Language programs using 8051.
3. Stepper motor control using 8086 Microprocessor.
4. Sensor Interfacing using 8051 Micro controller.
5. Interfacing 8051 with ADC.
6. Basic Programming with Arduino Kit
7. Design of a Traffic light controller with Arduino.
8. Design a Simple chat Server using Arduino.
9. Basic programming using ARM Processor.
10. Interfacing with seven segment display using ARM.

Total Hours: 45

Reference Books:

- 1 A.K.Ray&K.M.Bhurchandi, "Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing", Third edition, TMH, 2012 Reprint.
- 2 Mohamed Ali Mazidi, Janice GillispieMazidi, "The 8051 microcontroller and embedded systems", Pearson Education,2006.
- 3 Andrew N.Sloss, Dominic Symes and Chris Wright " ARM System Developer"s Guide : Designing and Optimizing System Software" , First edition, Morgan Kaufmann Publishers, 2004.
- 4 Simon Monk "Programming Arduino getting started with sketches", The McGraw-Hill, 2012.
- 5 Yu-cheng Liu, Glenn A.Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", PHI 2003
- 6 Steve Furber , "ARM System –On –Chip architecture", Addison Wesley, 2000.

Web References:

- 1 <https://www.coursera.org/learn/raspberry-pi-interface/home/welcome>

Online Resources:

- 1 <http://nptel.ac.in/courses/108107029/>

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment [60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	-	-
Apply	80	80
Analyse	-	-
Evaluate	-	-
Create	20	20

Nature of Course : L (Problem experimental)

Course Objectives:

- 1 To learn socket programming
- 2 To study and learn the network simulation tools
- 3 Hands-on Experience on various networking protocols and tools

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Implement various networking protocols using sockets | [AP] |
| CO2 | Analyse the performance of the protocols and algorithms in different layers | [AN] |
| CO3 | Ability to implement algorithms in simulation tools | [E] |
| CO4 | Analyse the network performance using tools and apply the solutions to the problems incurred | [AP] |

Course Contents:

- 1.Study of system administration and network administration
- 2.Study of socket programming and client server model using UDP and TCP
- 3.Implementation of Sliding window protocol and stop and wait protocol
- 4.Write a code simulating PING and TRACEROUTE commands
- 5.Applications using TCP Sockets like
 - a. File transfer
 - c. Remote command execution
 - d. Chat
 - e. Concurrent server
- 6.Create a socket for HTTP for webpage upload and download
- 7.Implementation of Subnetting
- 8.Applications
 - a. DNS
 - b. SNMP
- 9.Study of Network Simulator(NS)
- 10.Study of Wire Shark Tool for SDN and Hypervisor for Network Virtualization.
11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
 - i. Link State routing ii. Flooding iii. Distance vector

Total Hours: 45

Reference Books:

- 1 Craig Hunt, " TCP/IP Network Administration ", O'Reilly Media, 3rd Edition 2002
- 2 Kenneth L. Calvert, Michael J. Donahoo, "TCP/IP Sockets in Java: Practical Guide for Programmers" , Imprint: Morgan Kaufmann 2008
- 3 Elliotte Rusty Harold, "Java Network Programming, Developing Networked Applications", O'Reilly Media, 2013
- 4 Esmond Pitt, "Fundamental Networking in Java", Springer.
- 5 James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, 6th edition,2012

Web References:		
1	Spoken-tutorial.org	
Online Resources:		
1	https://www.coursera.org/learn/object-oriented-java	
2	http://nptel.iitm.ac.in	
Assessment Methods & Levels (based on Bloom’s Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom’s Level	Rubric based Continuous Assessment [60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	10	10
Apply	40	40
Analyse	30	30
Evaluate	20	20
Create	-	-

3/0/0/3

Course Objectives:

- 1 Understanding the fundamental characteristics of signals and systems
- 2 To implement Fourier Transformations- DFT & FFT.
- 3 To understand the structure and design of IIR & FIR filters.
- 4 To enable the students to understand the various applications of DSP.

Upon completion of the course, students shall have ability to

CO1	Analyze discrete-time systems in both time & transform domain	[U]
CO2	Analyze discrete-time signals and systems using DFT and FFT.	[U]
CO3	Design and implement digital finite impulse response (IIR) filters.	[AP]
CO4	Design and implement digital finite impulse response (FIR) filters.	[AP]
CO5	Understand and develop application of digital signal processing systems	[AN]

SIGNALS AND SYSTEMS-Basic elements of digital signal Processing-Classifications of Signals-Concept of frequency in continuous time and discrete time signals –Discrete time signals: Classifications of DTS, Manipulation of DTS-Discrete Time systems: Classifications of Discrete time System.**FAST FOURIER TRANSFORMS**-DFT, Relationship of DFT to other transforms-FFT algorithms– Radix-2 FFT algorithms – Decimation in Time, Decimation in Frequency algorithms –Application of FFT: Use of FFT algorithms in Linear Filtering and correlation. **IIR FILTER DESIGN**-Structure of IIR – System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance, Bilinear transformation – Design of Digital Butterworth filter. **FIR FILTER DESIGN**-Structure of FIR-Symmetric & Antisymmetric FIR filters – Design of Linear phase filter using Rectangular Window techniques — Design of Linear phase filter using Frequency sampling techniques.**APPLICATIONS OF DSP**-Role of DSP for 3G mobile Communication Systems-DSP function in GSM Mobile Station-DSP function in Base station – Image processing: Compression, Enhancement, JPEG Standard- DSP trends in wireless : Multiplexing, Echo Control, Power dissipation.

Total Hours: 45

1. John G Proakis and Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", 4th edition, PHI/Pearson Education, 2009.
2. Alan V Oppenheim, Ronald W Schafer and John R Buck, "Discrete Time Signal Processing", 3rd edition, PHI/Pearson Education, 2009.

- 1.SanjitK.Mitra, "Digital Signal Processing: A Computer – Based Approach", Second Edition, Tata McGraw- Hill, 2006.
- 2.JohnyR.Johnson, "Introduction to Digital Signal Processing", Prentice Hall of India/Pearson Education, 2002.

<http://researchtrend.net/ijet/5%20SHIVI.pdf>

1. <http://nptel.ac.in/courses/117102060/http://meseec.ce.rit.edu/eec722-fall2003/722-10-8-2003.pdf>

Online Resources:

1. <https://www.mooc-list.com/course/digital-signal-processing-coursera>
2. https://ce.uci.edu/areas/engineering/digital_signal/courses.aspx
3. <https://www.edx.org/course/discrete-time-signal-processing-mitx-6-341x-1>
4. <https://www.udemy.com/digital-signal-processing-with-matlab/>

Assessment Methods & Levels (based on Blooms'Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
	Understand	Quiz		4
	Understand	Writing skills		4
	Apply	Assignment		4
	Apply	Assignment		4
	Analyse	Technical Presentation		4
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-			
Understand	80	50	30	30
Apply	20	50	40	50
Analyse	-	-	30	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :G (Theory)

Pre requisites : 17CS206- Object Oriented Programming using Java

Course Objectives:

- 1 To discuss the essence of agile development methods.
- 2 Carry out all stages of an agile software process in a team, to produce working software.
- 3 Provide practical knowledge of how to manage a project using Scrum framework.
- 4 Use testdriven development to ensure software quality.
- 5 Should be able to demonstrate a more advanced capability to apply lean and agile development techniques to solve complex problems.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Understand the background and driving forces for taking an Agile approach to software development. | [U] |
| CO2 | Understand the business value of adopting Agile approaches. | [U] |
| CO3 | Understand the Agile development practices. | [U] |
| CO4 | Drive development with unit tests using Test Driven Development. | [AP] |
| CO5 | Apply design principles and refactoring to achieve Agility. | [AP] |
| CO6 | Deploy automated build tools, version control and continuous integration | [AP] |
| CO7 | Perform testing activities within an Agile project. | [U] |

Course Contents :

Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

Agile Scrum Framework: Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management

Agile Testing: The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

Agile Software Design and Development: Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

Industry Trends: Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.

Total Hours: 45

Text Books:

- 1 Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson Education.
- 2 Lisa Crispin, Janet Gregory, "Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley.

Reference Books:

- 1 Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices", Prentice Hall.
- 2 Alistair Cockburn, "Agile Software Development: The Cooperative Game", Addison Wesley
- 3 Mike Cohn, "User Stories Applied: For Agile Software", Addison Wesley

Web References:

- 1 www.it-ebooks.info/tag/agile
- 2 <http://martinfowler.com/agile.html> www.tutorialspoint.com/dbms/

Online Resources:

- 1 www.umsi.edu/~sauterv/analysis/Fall2013Papers/Buric/-5-references.html
- 2 [https://www.codeproject.com/Development/Lifecycle/Design and Architecture](https://www.codeproject.com/Development/Lifecycle/Design%20and%20Architecture)
- 3 <https://www.agilemethodology.org>
- 4 [https://www.versionone.com/Agile 101](https://www.versionone.com/Agile101)
- 5 <https://www.scrummethodology.com>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
C01	Understand	Online Quiz		3
C02	Understand	Technical Presentation		3
C03	Apply	Group Assignment		3
C04,C05	Apply	Group Assignment		4
C06	Apply	Case study		4
C07	Understand	Online Quiz		3
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	80	40	40	40
Apply	20	60	40	40
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : G (Theory analytical)

Course Objectives:

- To introduce different kinds and sources of Big data
- To provide an insight to different data analytics techniques
- To explore mining hidden structures in big data
- To study and evaluate dimensionality reduction for big data

Course Outcomes

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Explore kinds of big data and statistical analysis techniques on big data | [R] |
| CO2 | Understand the concepts behind data preparation and dimensionality reduction techniques | [U] |
| CO3 | Understand techniques for mining similar items, frequent itemsets and data streams | [U] |
| CO4 | Explore big data analytics frameworks such as Hadoop Ecosystem and Spark architecture and apply for few case studies | [AP] |

Course Contents:

Introduction to big Data: Sources of Big data, Characteristics, Challenges and applications and case studies. **Statistical analysis and modelling:** Mean, Covariance, Correlation, Sampling distributions, random variables and probabilities - Probability Theory – Bayes Theorem **Graphical models:** Bayesian Learning. **Data Preparation,** Dimensionality reduction techniques : Principal Component Analysis, Singular Value Decomposition. **Hadoop Ecosystem for Big Data** – Hadoop Architecture, HDFS -Algorithms using Map Reduce Framework – Hbase – Hive- MongoDB. Scalable Machine Learning, Mahout for Machine Learning, **Introduction to Spark Architecture-** Analyzing big data- Case studies. **Finding similar items:** distance measures, Locality sensitive hashing- applications. **Mining frequent itemsets:** Market –basket model, A-priori algorithm, Limited pass algorithms. **Mining data streams:** sampling, filtering, counting distinct elements, counting frequent items in a stream Case study: recommendation systems

Total Hours: 45

Text Books:

- 1 Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, Second Edition, 2014.
- 2 Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013

Reference Books:

1. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2014
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012

Online Courses

1. <https://www.edx.org/course/subject/data-analysis- statistics>
2. <https://www.coursera.org/browse/data-science/data- analysis?languages=en>
3. <http://online-learning.harvard.edu/course/big- data-analytics>

Web References

1. <https://bigdatauniversity.com/>
2. <http://www.statistics.com/data-analytics- courses>
3. www.ibm.com/Data Analytics/

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Quiz		5
CO2	Understand	Writing Skills		5
CO3	Understand	Class Presentation		5
CO4	Apply	Group Assignment		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	20	20	20
Understand	80	60	40	40
Apply	-	20	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : C(Theory Concept)

Course Objectives:

- 1 To understand the basic concepts of virtualization and cloud infrastructure.
- 2 To allow students to design and configure virtual data centre environment.
- 3 To identify the various cloud models, services and solutions.
- 4 To learn about procedure to implement virtual data centre environment.
- 5 To enable the knowledge of Next generation Data center technologies and Cloud API's .

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Describe the characteristics of virtualization and cloud infrastructure. | [R] |
| CO2 | Classify and explain the functions of virtual data centers and cloud computing. | [U] |
| CO3 | Design cloud infrastructure management services and security policies. | [AP] |
| CO4 | Apply configuration procedure to implement virtual data centre environment. | [AP] |
| CO5 | Integrate the Next generation Data center technologies and Cloud API's . | [AN] |

Course Contents:

Journey to the Cloud: Drivers for cloud computing, cloud definition and characteristics, building cloud infrastructure –a phased approach from Classic data center to virtual data center to Cloud, virtualization and its benefits. **Introduction to Data Centers:** Key elements of data center - application, DBMS, compute, storage and network, server clustering, RAID technology, intelligent storage system. **Virtualized Data Center (VDC) – Compute:** Compute virtualization benefits, hypervisor types, virtual machine (VM) and its resources, VM resource management, physical to virtual conversion – process, benefits and considerations. **Virtualized Data Center – Storage:** Storage virtualization benefits, storage for VMs, block and file level storage virtualization, virtual provisioning – benefits and best practices, storage tiering. **Virtualized Data Center – Networking:** Network virtualization benefits, VDC network infrastructure components, VLANs, and Network traffic management techniques. **Virtualized Data Center – Desktop and Application:** Desktop, application, and user state virtualization – benefits, tools, and deployment methods. **Cloud Computing Primer:** Cloud computing characteristics, cloud deployment models – private, public, hybrid and community cloud, cloud services – SaaS, PaaS, and IaaS, cloud economics and challenges. **Public Cloud Services:** Amazon Web Services (AWS): cloud computing with AWS, Amazon Elastic Compute Cloud (Amazon EC2), Amazon Simple Storage Service (Amazon S3), big data on AWS; Google's cloud solutions. **Advance Topics in Cloud Computing:** Introduction to big data analytics, using MapReduce/Hadoop for analyzing unstructured data, Hadoop ecosystem of tools.

Total Hours: 45

Text Books:

- 1 Cloud Infrastructure and Services Participant Guide Volume 1 & 2 (EMC Education

Services, Oct 2011)

- 2 M. Haines, S. Kaplan, D. Epping and B. Lin, "Cloud Computing with VMware vCloud Director" (Short Topics in System Administration) (Kindle eBook, 2011, ISBN 978-1-931971-83-6)
- 3 S.R. Smoot and N. K. Tan, "Private Cloud Computing: Consolidation, Virtualization, and Service-Oriented Infrastructure" (Elsevier, 2012, ISBN: 978-0-12-384919-9)
- 4 Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, "Mastering in Cloud", MHI, 2013

Reference Books:

- 1 J. Rhoton, R. Haukioja, "Cloud Computing Architected: Solution Design Handbook" (Recursive Press, 2011, ISBN 978-0-9563556-1-4)
- 2 T. Petrocelli, "Data Protection and Information Lifecycle Management" (Prentice Hall, 2006, ISBN 0131927574)

Web References:

- 1 http://www.brainbell.com/tutors/A+/Hardware/Preventive_Maintenance.htm
- 2 <http://www.technologystudent.com/elec1/dig1.htm>

Online Resources:

- 1 <https://www.edx.org/course/introduction-cloud-infrastructure-linuxfoundationx-lfs151-x>
- 2 <https://www.edx.org/course/clep-information-systems-computer-upvalenciadx-sc101-2x>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Quiz		2
CO2	Understand	Quiz		3
CO3	Understand	Group Assignment		5
CO4	Apply	Problem solving		5
CO5	Analyse	Technical Presentation		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	40	30	30	30
Understand	60	50	40	40
Apply	-	20	20	20
Analyse	-	-	10	10
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of : L (Problem experimental)

Course

Co requisites : Data Mining techniques and numerical methods

Course Objectives:

- 1 To familiarize big data concepts and how it is applied for business
- 2 To deploy modern tools for big data analysis

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------------|--|--------|
| CO1 | To provide an overview of knowledge used in manipulating, storing, and analyzing big data. | [AP,E] |
| CO2 | Analyse the fundamentals and operating mechanisms of Hadoop | [AN] |
| CO3 | To apply the learning specific problems in various domains | [AP] |

Course Contents:

1. Deploy the Hadoop tool and use its function for analysing data
2. Deploy Oracle NoSQL database and process unstructured data
3. Demonstrate the functions of HIVE tool
4. Process a market based sample data set using HBase
5. Implement Simple consumer functions using R programming
6. Make Intelligent Business Decisions using Association Rule mining using R programming
7. Forecast the consumer behaviour using Simple linear regression with Hadoop
8. Cluster the customers based on buying behaviour using HIVE/Hadoop
9. Case Studies of web click stream data
eg. how many times the particular link in particular site has been referred
10. Case Studies on student selecting higher education
eg. how many students in engineering or opting for higher studies
11. Case studies on tweets classification in social media
eg. the nature of tweets positive, negative or neutral based on pattern of words

Total Hours:

30

Softwares Required:

Oracle NoSQL database, R for windows/Linux, Hadoop, Oracle Big data Connectors, R Studio, Oracle R Enterprise

Reference Books:

- 1 Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging

Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiley CIO Series, 2013..

- 2 Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
- 3 Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.
- 4 Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012

Web References:

- 1 <http://www.coreservlets.com/hadoop-tutorial/>
- 2 <http://www.javatpoint.com/hive>
- 3 <https://www.tutorialspoint.com/hbase/>
- 4 <http://www.javatpoint.com/nosql-databases>

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment [60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	-	-
Apply	40	40
Analyse	30	30
Evaluate	20	20
Create	10	10

17IT321

CASE TOOLS LABORATORY

0/0/3/2

Nature of Course : M (Practical application)

Course Objectives:

- 1 To understand and apply the principles of agile software development
- 2 To use CASE tools for software development
- 3 To model a system using different diagram
- 4 To test any application

Course Outcomes:

Upon completion of the course, students shall have ability to

- CO1** Understand the Agile development practices. [AP]
CO2 Deploy automated build tools, version control and continuous integration. [C]
CO3 Perform testing activities within an Agile project. [AN]
CO4 Drive development with unit tests using Test Driven Development. [AP]

Course Contents :

1. Understand a given business scenario and identify product backlog, user stories and sprint tasks
2. Define user stories for a given feature
3. Fill user stories, sprint schedule and sprint tasks in an Agile tool such as AgileFant
4. Write unit tests aligned to xUnit framework for TDD
5. Refactor a given design for next sprint requirements
6. Execute continuous integration using a tool such as Jenkins

Total Hours: 45

Reference Books:

- 1 **Agile Software Development with Scrum** By Ken Schawber, Mike Beedle
Publisher: Pearson
- 2 **Agile Testing: A Practical Guide for Testers and Agile Teams** By Lisa Crispin, Janet Gregory
Publisher: Addison Wesley

Web References:

- 1 www.it-ebooks.info/tag/agile
- 2 <http://martinfowler.com/agile.html>
- 3 www.tutorialspoint.com/dbms/

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment[60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	20	20
Apply	40	40
Analyse	20	20

Evaluate	-	-
Create	20	20

17IT322

Virtualization and Cloud Lab

0/0/4/2

Nature of Course: M (Practical application)

Co Requisites: - Computer Networks

Course Objectives:

To understand the concepts of VM installation, cloud configuration and storage Management applications.

Course Outcomes

Upon completion of the course, students shall have ability to

CO.1 set up virtual machines and virtual storage management applications.

CO 2. Configure and Implement Virtual datcenter

CO3. Configure virtual internetworking components.

CO4.develop cloud application in AWS/Azure environment.

Course Contents

Installation of hosted hypervisor –Bare metal hypervisor- Implementation of VMs- Implementation of virtual datacenter (Vshere 6)- configuration of virtual internetworking components- Deployment of VMs in AWS/Azure-Integration of IoT components in AWS/Azure – mini project

Total Hours 30

Reference Books:

1. Kenneth Hess,Amy Newman: Practical Virtualization Solutions: Virtualization from the Trenches Prentice Hall 2010
2. Anthony T. Velte, Toby J. Velte, Robe t Elsenpeter - Cloud Computing: A Practical Approach, TMH, 2010

Web References:

1. <https://labs.hol.vmware.com/>
- 2.

Online Resources:

1. https://www.vmware.com/pdf/esx2_admin.pdf

Blooms Taxonomy based Assessment Pattern:

Bloom's Category	Continuous Assessment Tests		Semester End Examination
	Mid Sem Review	Term Review	
Remember	30	30	30
Understand	30	30	30
Apply	30	30	30
Analyse	10	10	10
Evaluate	0	0	0
Create	0	0	0

Nature of Course : D (Theory Application)

Pre requisites : Microprocessors & Microcontrollers

Course Objectives:

- 1 To understand the fundamentals of Internet of Things.
- 2 To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- 3 To apply the concept of Internet of Things in the real world scenario

Course Outcomes:

Upon completion of the course, students shall have ability to

CO1	Attain the fundamental knowledge of Internet of Things	[U]
CO2	To build IoT systems using Raspberry Pi, Arduino, Galileo	[AP]
CO3	To design and develop a real world IoT systems	[AP]

Course Contents:

FUNDAMENTALS OF IOT - Introduction – Characteristics - Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M. **IOT DESIGN METHODOLOGY** - IoT systems management – IoT Design Methodology – Specifications Integration and Application Development - **BUILDING IOT WITH RASPBERRY PI** - Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services - **BUILDING IOT WITH GALILEO/ARDUINO** - Intel Galileo Gen2 with Arduino - Interfaces - Arduino IDE – Programming APIs and Hacks Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT **CASE STUDIES and ADVANCED TOPICS** - Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT.

Total Hours: 45

References:

1. Arshdeep Bahga, Vijay Madiseti, "Internet of Things – A hands - on approach", Universities Press, 2015.
2. Cuno Pfister, "Getting started with Internet of Things", Maker Media, 1st edition, 2011.
3. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
4. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.
5. A Bahaga, V. Madiseti, "Internet of Things- Hands on approach", VPT publisher, 2014.
6. A. McEwen, H. Cassimally, "Designing the Internet of Things", Wiley, 2013.

Web References:

- 1 www.ptc.com > Internet of Things (IoT)
- 2 <http://wwwusers.di.uniroma1.it/~spenza/files/labIoT2015/Lab-IoT-1.pdf>

Online Resources:

- 1 <http://www.iotlab.eu/>
- 2 http://www.libelium.com/resources/top_50_iot_sensor_applications_ranking/

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Online Quiz		3
CO2	Apply	Group Assignment		2
CO3	Apply	Mini Project		15
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	50	40	40	40
Apply	50	60	60	60
Analyse				-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :K (Problem Programming)

Pre requisites :OOPS & JAVA Programming

Course Objectives:

1. To provide an overview of working principles of internet, web related functionalities
2. To understand and apply the fundamentals core java, packages, database connectivity for computing
3. To enhance the knowledge to server side programming
4. To provide knowledge on advanced features like Swing, JavaBeans, Sockets.

Course Outcomes:

Upon completion of the course, students shall have ability to

CO1	Able to understand the internet standards and recent web technologies like Conferencing, newsgroup etc.	[U]
CO2	Able to implement, compile, test and run Java program,	[AP]
CO3	Able to make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API	[AP]
CO4	Able to understand the components and patterns that constitute a suitable architecture for a web	[U]
CO5	Able to create Web pages	[C]

Course Contents:

JAVAFUNDAMENTAL :Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Packages and Interfaces – Exception Handling.**PACKAGES** :AWT package – Layouts – Containers – Event Package – Event Model – Painting – Garbage Collection – Multithreading – Language Packages.**ADVANCED JAVA PROGRAMMING** Utility Packages – Input Output Packages – Inner Classes – Java Database Connectivity - Servlets -RMI – Swing Fundamentals - Swing Classes. **JAVABEANS AND NETWORKING** :Java Beans – Application Builder Tools - Using the Bean Developer Kit-Jar Files-Introspection- BDKUsingBeanInfo Interface – Persistence- Java Beans API – Using Bean Builder - Networking Basics - Java and the Net – InetAddress – TCP/IP Client Sockets – URL –URL Connection – TCP/IP Server Sockets – A Caching Proxy HTTP Server – Datagrams. **INTERNET APPLICATIONS** Domain Name System - Exchanging E-mail – Sending and Receiving Files - Fighting Spam, Sorting Mail and avoiding e-mail viruses – Chatting and Conferencing on the Internet – Online Chatting - Messaging – Usenet Newsgroup – Voice and Video Conferencing – Web Security, Privacy, and siteblocking – FTP. **INTRODUCTION TO AJAX and WEB SERVICES** **AJAX**: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; **Web Services**: Introduction- Java web services Basics – Creating, Publishing ,Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

Total Hours:

45

Text Books:

1. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall, 5th Edition, 2011.
2. Herbert Schildt, "Java-The Complete Reference", Eighth Edition, Mc Graw Hill Professional, 2011

Reference Books:

1. Stephen Wynkoop and John Burke "Running a Perfect Website", QUE, 2nd Edition, 1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
5. Paul Dietel and Harvey Deitel, "Java How to Program", , 8th Edition Prentice Hall of India.
6. Mahesh P. Matha, "Core Java A Comprehensive Study", Prentice Hall of India, 2011.
7. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.

Web References:

- 1 <https://www.w3schools.com/>
- 2 <http://www.webreference.com/programming/java.html>
- 3 <http://dl.acm.org/citation.cfm?id=600071>

Online Resources:

- 1 <https://www.coursera.org/learn/learn-to-program>
- 2 <https://www.coursera.org/learn/web-app>
- 3 <https://www.coursera.org/learn/duke-programming-web>

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [40 marks]
	Theory			Practical	
	CIA1 [6 marks]	CIA2 [6 marks]	Term End Assessment [8 marks]	Rubric based CIA [40 Marks]	
Remember	10	10	10	-	-
Understand	20	20	20	-	-
Apply	50	40	40	20	20
Analyse	-	30	30	30	30
Evaluate	-	-	-	20	20
Create	-	-	-	30	30

Nature of Course : L (Problem Experimental)

Course Objectives

1. To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
2. To apply the concept of Internet of Things in the real world scenario

Course Outcomes

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

- | | | |
|-----|---|------|
| CO1 | Attain the fundamental knowledge of Internet of Things | [AP] |
| CO2 | To build IoT systems using raspberry pi/arduino/Galileo | [C] |
| CO3 | To design and develop a real world IoT systems | [C] |

COURSE CONTENTS:

1. Design and development of CO₂ Emission identification
2. Design and development of Automatic Irrigation system
3. Design and Development of Theft Identification alert system
4. Design and Development of health abnormal alert system

Reference Books:

1. Arshdeep Bahga, Vijay Madiseti, "Internet of Things – A hands - on approach", Universities Press, 2015.
2. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
3. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.
4. A Bahaga, V. Madiseti, "Internet of Things- Hands on approach", VPT publisher, 2014.
5. Cuno Pfister, "Getting started with Internet of Things", Maker Media, 1st edition, 2011.
6. A. McEwen, H. Cassimally, "Designing the Internet of Things", Wiley, 2013.

Web References:

1. <https://learn.sparkfun.com/tutorials/iot-hobby-kit-experiment-guide>
2. <https://www.iot-experiments.com>

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment [60 marks] (in %)	End Semester Examination [40 marks] (in %)
Remember	-	-
Understand	-	-
Apply	40	40
Analyse	-	-
Evaluate	-	-
Create	60	60

Nature of :L (Programming)

Course

Course Objectives:

- 1 Familiarise students with Internet structure and with basic protocols
- 2 Provide knowledge of and proficiency in basic techniques for the development of web-based applications,
- 3 Provide basic knowledge of construction techniques related to client-server applications

Course Outcomes:

Upon completion of the course, students shall have ability to

- 1 Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's. [AP]
- 2 Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services. [AP]
- 3 Get introduced in the area of Online programming. [AP]

Course Contents:

1. Programs in java using servlets
2. Write programs in Java to create three-tier applications using JSP and Databases
 - i) for conducting on-line examination.
 - ii) for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
3. Write programs in Java using Servlets:
 - i) To invoke servlets from HTML forms
 - ii) To invoke servlets from Applets
4. Create a web page with the following using HTML
 - i) To embed an image map in a web page
 - ii) To fix the hot spots
 - iii) Show all the related information when the hot spots are clicked.
5. Create a web page with all types of Cascading style sheets
6. Client Side Scripts for Validating Web Form Controls using DHTML
7. Write programs in Java to create applets incorporating the following features:
Create a color palette with matrix of buttonsSet background and foreground of the control text area by selecting a color from color palette.In order to select Foreground or background use check box control as radio buttonsTo set background images
8. Programs using XML – Schema – XSLT/XSL
9. Programs using AJAX
10. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Data base.

Total Hours: 45

Reference Books:

1. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.

2. Paul Dietel and Harvey Deitel, "Java How to Program", , 8th Edition Prentice Hall of India.
3. Mahesh P. Matha, "Core Java A Comprehensive Study", Prentice Hall of India, 2011.

Web References:

- 1 <https://www.w3schools.com/>
- 2 <http://www.webreference.com/programming/java.html>

Assessment Methods & Levels (based on Bloom's Taxonomy)		
Summative assessment based on Continuous and End Semester Examination		
Bloom's Level	Rubric based Continuous Assessment[40 marks] (in %)	End Semester Examination [60 marks] (in %)
Remember	-	-
Understand	20	20
Apply	80	80
Analyse	-	-
Evaluate	-	-
Create	-	-

Elective Stream 1

17IT401

WIRELESS NETWORKS

3/0/0 /3

Nature of Course :C (Theory Concept)

Course Objectives:

1. To study about Wireless networks, protocol stack and standards.
2. To study about fundamentals of 3G Services, its protocols and applications.
3. To study about evolution of 4G Networks, its architecture and applications

Course Outcomes:

Upon completion of the course, students shall have ability to

CO1	Categorize the latest 3G / 4G and WiMax networks and its architecture.	[U]
CO2	Implement wireless network environment for any application using latest wireless protocols and standards.	[AP]
CO3	Implement different type of applications for smart phones and mobile devices with latest network strategies.	[AP]

Course Contents:

WIRELESS LAN-Introduction,WLAN technologies: Infrared, UHF narrowband, spread spectrum, IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security , IEEE802.16,WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX. **MOBILE NETWORK LAYER**-Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6,Network layer in the internet, Mobile IP session initiation protocol , mobile ad,hoc network: Routing, Destination Sequence distance vector, Dynamic source routing. **MOBILE TRANSPORT LAYER** -TCP enhancements for wireless protocols , Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility , Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP , TCP over 3G wireless networks. **WIRELESS WIDE AREA NETWORK**-Overview of UTMS Terrestrial Radio access network,UMTS Core network Architecture: 3G,MSC, 3G,SGSN, 3G,GGSN, SMS,GMSC/SMS,IWMSC, Firewall, DNS/DHCP,High speed Downlink packet access (HSDPA), LTE network architecture and protocol. **4G NETWORKS** -4G vision – 4G features and challenges , Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM,MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

Total Hours: 45

Text Books:

- 1 Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.
- 2 Vijay Garg , "Wireless Communications and networking", First Edition, Elsevier 2007.

Reference Books:

- 1 Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
- 2 Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
- 3 Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition,Pearson Education, 2013

Web References:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=117999903>
2. <http://nptel.ac.in/courses/106105081/23>

Online Resources:

1. https://www.tutorialspoint.com/wireless_communication

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Quiz		5
CO2	Understand	Case Study		5
CO3	Understand	Class Preparation		10
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : C (Theory Concept)
Pre requisites : 16IT313– Computer Networks

Course Objectives:

- 1 To understand the different types of modern cryptographic techniques.
- 2 To study the concepts of public key encryption and number theory.
- 3 To learn authentication standards and applications.
- 4 To learn the network security and applications.
- 5 To study the concept of main security threats and techniques to diminish these threats in Communication networks.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------------|---|------|
| C01 | Identify computer and network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks | [AP] |
| C02 | Encrypt and decrypt messages using block ciphers, sign and verify messages using well known signature generation and verification algorithms | [R] |
| C03 | illustrate the number theory & generate the public key | [U] |
| C04 | Analyze existing authentication and key agreement protocols, identify the weaknesses of these protocols. | [A] |
| C05 | Download and install an e-mail and file security software, PGP, and efficiently use the code to encrypt and sign messages. | [AP] |
| C06 | Develop SSL or Firewall based solutions against security threats, employ access control techniques to the existing computer platforms | [AP] |

Course Contents:

Course Contents with Course Outcomes/Blooms Taxonomy/Assessment Methods

Encryption techniques: Security goals-OSI Security Architecture(attacks,Services,Mechanisms)-
Symmetric ciphers: Classical Encryption techniques- Block Cipher Principles - Data Encryption Standard-Triple DES- Advanced Encryption Standard- Block cipher modes of operations
Asymmetric ciphers: Fermat's theorem-Testing of primality- Chinese remainder theorem- Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography-public-key cryptography and RSA
Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions,MD5 message Digest algorithm - Secure Hash Algorithm (SHA)-RIPEMD – HMAC- Digital Signatures standards
Key Management and distribution: Symmetric key distribution-Public key distribution-X.509 Certificates-Public key Infrastructure
Electronic Mail Security: PGP – S/MIME
IP Security: Architecture-Authentication header-Encapsulating security payloads
Web Security: SSL,TLS,SET
System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls

Total Hours: 45

Text Books:

- 1 William Stallings, "Cryptography and Network Security – Principles and Practices", 5th edition,Prentice Hall of India,2011.
- 2 Behrouz A.Forouzon,"Cryptography and network security", 2nd edition, Tata McGraw-Hill, 2010.

Reference Books:

- 1 AtulKahate, "Cryptography and Network Security", 2nd edition, Tata McGraw-Hill, 2009.
- 2 Bruce Schneier, "Applied Cryptography", 2nd edition, John Wiley & Sons Inc, 2007.
- 3 Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 4th Edition, Pearson Education, 2007.

Web References:

- 1 <http://www.iitg.ac.in/icdcn2006/isg.pdf>
- 2 <http://www.tutorialspoint.com/cryptography/>
- 3 <http://www1.se.cuhk.edu.hk/~eclt5740/>

Online Resources:

- 1 <http://nptel.ac.in/courses/106105031/>
- 2 <http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html>
- 3 <http://freevideolectures.com/Course/3027/Cryptography-and-Network-Security>
- 4 <https://www.coursera.org/learn/crypto>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Apply	Assignment		4
CO2	Remember	Problem Solving		4
CO3	Understand	Problem Solving		4
CO4	Analyse	Technical presentation		4
CO5	Apply	Case study		2
CO6	Apply	Technical Writing		2
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	20	10	10
Understand	80	40	40	40
Apply	-	40	30	30
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Course Objectives:

- To understand the basics of networking and the protocols used in distributed environment.
- To evaluate the impact of memory on parallel/distributed algorithm formulations and validate their performance.
- To gain knowledge of how to design and implement distributed algorithms

Course Outcomes

Upon completion of the course, students shall have ability to

CO1	Analyse various issues in the design and implementation of distributed computing systems	[A]
CO2	Categorize the various system models, communication between client and server	[U]
CO3	Apply the knowledge of deadlock methods and its algorithms	[AP]
CO4	Understand the significance of distributed file system with real time applications	[U]

Course Contents

Introduction Distributed Computing Models, Software Concepts, Hardware Concepts, The Client-Server model, Issues in design of a distributed operating system. **Communication** Introduction to Message Passing, Advantages and features of message passing, Message format, Message Buffering, Remote Procedure Call, Extended RPC Models, Remote Object Invocation, Message Oriented Communication. **Processes And Synchronization** Threads, code migration, clock synchronization, logical clocks, global state, Election algorithms, mutual exclusion, Distributed transaction. **Distributed Deadlock Detection** System model, Resources vs. communication deadlocks, deadlock prevention, avoidance, detection and resolution, Centralized deadlock detection, distributed deadlock detection, path pushing and edge chasing algorithm **Distributed Shared Memory** Introduction, General architecture of distributed shared memory, Design and implementation, Issues of DSM, Granularity, structure of shared memory space, consistency models, thrashing, advantages of DSM **Distributed File System** Introduction, Desirable features of good distributed file system, file models, file accessing, sharing, caching methods, file replication, fault tolerance, Case Study: CORBA(CORBA RMI and Services)

TotalHours 45

Text Books:

1. Andrew Tanenbaum, Maarten Van Steen, "Distributed System- Principals Paradigm", Maarten van Steen Publication, 2016
2. Singhal and Shivratri, "Advanced Concept in Operating Systems", McGraw Hill, 2015

Reference Books:

1. Sunita Mahajan, Seema Shah, " Distributed Computing", Oxford, second edition, 2013
2. Pradeep K. Sinha "Distributed Operating Systems", Prentice Hall of India Private, 2012

Web References:

1. <http://www.nptel.ac.in/courses/106106107/>

Online Resources:

1. <https://www.wiziq.com/tutorials/distributed-computing>

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
C01	Analyse	Case Study		5
C02	Understand	Technical Presentation		5
C03	Apply	Group Assignment		5
C04	Understand	Online Quiz		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination
	CIA1	CIA2	Term End Assessment	
Remember	10	25	40	40
Understand	30	15	40	40
Apply	0	10	10	10
Analyse	10	0	10	10
Evaluate	0	0	0	0
Create	0	0	0	0

Nature of Course : Programming

Pre requisites : 16IT206- Object Oriented Programming using Java

Course Objectives:

1. Understand system requirements for mobile applications.
2. Generate suitable design using specific mobile development frameworks.
3. Implement the design using specific mobile development frameworks.
4. Deploy the mobile applications in marketplace for distribution.

Course Outcomes:

Upon completion of the course, students shall have ability to

C105.1	Demonstrate knowledge on basics of mobile application.	[R]
C105.2	Understand the framework of mobile application and design simple interfaces.	[U]
C105.3	Create an application using multimedia components.	[AP]
C105.4	Develop and deploy application with server side connectivity.	[AP]

Course Contents:

Introduction: Introduction to mobile application - Market values for mobile applications-System requirements for mobile application – Mobile application development architecture. **Designing Applications using Android:** Developing user interfaces -Layout -Input Controls and Events- Menus - Dialogs, Notifications and Toasts**Multimedia&Services:**Lifecycle of a Service - Managing Services – GPS – location API – Playing audio, video.**Technology I Android**-Introduction –Establishing the development environment –Android architecture –Activities and views –Interacting with UI – Persisting data using SQLite –Packaging and deployment .**Technology II–IOS**-Introduction to Objective C –IOS features –UI implementation–Touch frameworks –Data persistence using Core Data and SQLite.

Total Hours: 45

Text Books:

- 1 Jeff McWhorter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.
- 2 David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development: Exploring the iOS SDK", Apress, 2013.

Reference Books:

- 1 James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
- 2 Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012.

Web References:

- 1 <http://developer.android.com/develop/index.htm>
- 2 <https://www.tutorialspoint.com/android/>

Online Resources:

- 1 <http://www.androidhive.info/>
 - 2 <https://www.codeschool.com/learn/ios>
-

Assessment Methods & Levels (based on Bloom'sTaxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level		Assessment Component	Marks
C105.1	Remember		Quiz	5
C105.2	Understand		Assignment	5
C105.3	Apply		Coding	5
C105.4	Apply		Mini Project	5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course: G (Theory analytical)

Pre-Requisites: 16IT206-Microprocessors and Microcontrollers

Course Objectives:

1. To study the fundamentals of embedded systems.
2. To understand the process of embedded computing and ARM Processor.
3. To learn the concepts of Real Time Operating Systems
4. To develop embedded applications.

Course Outcomes

At the end of the course the students should be able to:

CO1.Understand the basics concepts in embedded systems	R,U
CO2. understand the knowledge on hardware & software components and developing tools in embedded systems.	U
CO3 Understand the working of arm processor and learn to write programs in arm processor.	U
CO4 Understand the basic concepts of real time operating systems.	U
CO5 Develop embedded applications	AP,C

Course Content:

Introduction to Embedded Systems – The build process for embedded systems- Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging- **Embedded Computing**-CPU bus- Memory devices- I/O devices- Component interfacing- Designing with Microprocessors-development and Debugging- Design patterns- Dataflow graphs- Assembly and Linking- Basic compilation techniques- Analysis and Optimization-**Embedded Product Development**-Life Cycle- objectives, different phases of EDLC, Modeling of EDLC- **Introduction to basic concepts of RTOS**- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication, shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, Real time Operating systems- **ARM Embedded Systems** – The ARM architecture -- ARM7 Processor Fundamentals – ARM Instruction Set – The Thumb Instruction Set- – ARM Development tools **Embedded System Application Development**- Case Study of Washing Machine- Automotive Application- Smart card System Application.

TOTAL: 45 HOURS

TEXT BOOKS:

1. Rajkamal, 'Embedded System-Architecture, Programming, Design', Mc Graw Hill, 2013.
2. Peckol, "Embedded system Design", John Wiley & Sons, 2010
3. Lyla B Das, "Embedded Systems-An Integrated Approach", Pearson, 2013

REFERENCES:

1. Shibu. K.V, "Introduction to Embedded Systems", Tata Mcgraw Hill, 2009.
2. Elicia White, "Making Embedded Systems", O' Reilly Series, SPD, 2011.
3. Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2006.
4. Han-Way Huang, "Embedded system Design Using C8051", Cengage Learning, 2009.
5. Rajib Mall "Real-Time systems Theory and Practice" Pearson Education, 2007.

Assessment Methods & Levels (based on Blooms' Taxonomy)			
Formative assessment based on Capstone Model (Max. Marks:20)			
Course Outcome	Bloom's Level	Assessment Component	Marks
CO1	Remember, Understand	Class room or online Quiz	2
CO2& CO3	Understand	Class presentation/Powerpoint Presentation	4
CO4	Understand	Group Activities	4
CO5	Apply, Create	Mini Project	10

Summative assessment based on Continuous and End Semester Examination

Bloom's Category	Continuous Assessment Tests			Semester End Examination
	CIA1	CIA2	Term Examination	
Remember	30	20	10	20
Understand	50	40	50	40
Apply	20	40	40	40
Analyse	0	0	0	0
Evaluate	0	0	0	0
Create	0	0	0	0

Nature of Course :G (Theory analytical)

Course Objectives:

- 1 Understand the building blocks of a quantum computer.
- 2 Understand the principles, quantum information and limitation of quantum operations formalizing.
- 3 Gain knowledge about the quantum error and its correction.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|--|------|
| CO1 | Explain the basic concepts of quantum computing. | [U] |
| CO2 | Explain the quantum model of computation and how it relates to quantum mechanics | [U] |
| CO3 | Explore the quantum computing algorithms and operations. | [U] |
| CO4 | Describe the quantum computational complexity and physical realization | [AP] |

Course Contents :

FOUNDATION: Overview of traditional computing - Church-Turing thesis - circuit model of computation- reversible computation - quantum physics - quantum physics and computation – Dirac notation and Hilbert Spaces - dual vectors - operators - the spectral theorem - functions of operators - tensor products - Schmidt decomposition theorem.**QUBITS AND QUANTUM MODEL OF COMPUTATION:** State of a quantum system - time evolution of a closed system - composite systems - measurement - mixed states and general quantum operations - quantum circuit model -quantum gates - universal sets of quantum gates - unitary transformations – quantumcircuits.**QUANTUM ALGORITHMS-I:**Superdense coding - quantum teleportation - applications of teleportation - probabilisticversus quantum algorithms - phase kick-back - the Deutsch algorithm - the Deutsch- Jozsa algorithm - Simon's algorithm - Quantum phase estimation and quantum Fourier Transform - eigenvalue estimation. **QUANTUM ALGORITHMS-II:**Order-finding problem - eigenvalue estimation approach to order finding - Shor's algorithm for order finding - finding discrete logarithms - hidden subgroups - Grover's quantum search algorithm - amplitude amplification - quantum amplitude estimation - quantum counting - searching without knowing the success probability. **QUANTUM COMPUTATIONAL COMPLEXITY AND ERROR CORRECTION:**Computational complexity - black-box model - lower bounds for searching - general black-box lower bounds - polynomial method - block sensitivity - adversary methods - classical error correction - classical three-bit code - fault tolerance- quantum error correction - three- and nine-qubit quantum codes - fault-tolerant quantum computation-Physical realization of quantum computers.

Total Hours: 45

Text Books:

- 1 1. P. Kaye, R. Laflamme, and M. Mosca, "An introduction to Quantum Computing", Oxford University Press, 1999.

Reference Books:

- 1 V. Sahni, "Quantum Computing", Tata McGraw-Hill Publishing Company, 2007.
- 2 M. A. Nielsen & I.Chuang, "Quantum Computation and Quantum Information",Cambridge University Press (2000).

Web References:

- 1 <http://nptel.ac.in/courses/115101092/>
- 2 <https://ocw.mit.edu/courses/mathematics/18-435j-quantum-computation-fall-2003/>
- 3 <https://www.edx.org/course/quantum-mechanics-quantum-computation-uc-berkeleyx-cs-191x>

Online Resources:

- 1 <https://www.udemy.com/a-gentle-introduction-to-quantum-mechanics/>
- 2 www.nptelvideos.com/physics/quantum_physics.php <https://quantum.class.stanford.edu/>
- 3 <https://quantum.class.stanford.edu/>
- 4 <https://courses.cs.washington.edu/courses/cse599d/06wi/> <https://uwaterloo.ca/institute-for-quantum-computing/programs/.../current-courses>
- 5 <https://www.findamasters.com/search/courses.aspx?Keywords=quantum+computing>
- 6 [https://www.coursetalk.com/providers/coursera/courses/quantum-mechanics-and-](https://www.coursetalk.com/providers/coursera/courses/quantum-mechanics-and-quantum-computation)
- 7 [quantum-computation](https://www.coursetalk.com/providers/coursera/courses/quantum-mechanics-and-quantum-computation)
- 8 [quantum-computation](https://www.coursetalk.com/providers/coursera/courses/quantum-mechanics-and-quantum-computation)

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Online Quiz		5
CO2	Understand	Technical Essay Writing		5
CO3	Understand	Group Assignment		5
CO4	Apply	Group Assignment		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	80	40	60	60
Apply	20	60	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Elective Stream II

17IT407	ADVANCED JAVA PROGRAMMING		3/0/0/3
Nature of Course		: K (Problem Programming)	
Course Objectives:			
1	To understand the basic concepts of core principles of the Java Language		
2	To gain knowledge to develop standalone applications.		
3	To discuss basic principles of HTML, Java Script and XML		
4	To gain knowledge to develop dynamic Web applications like servlet.jsp.		
5	To introduce tools, technologies and framework hence Hibernate and Spring are introduced to enhance web development skills.		
Course Outcomes:			
Upon completion of the course, students shall have ability to			
CO1	Gain the basic knowledge on Object Oriented concepts		[R]
CO2	Ability to develop the application based on the java concepts		[AP]
CO3	Ability to solve the real world problems using concepts like swings, JDBC		[AP]
CO4	Analyze and design web-based information systems to meet certain business needs using HTML5, CSS, JavaScript		[AP]
CO5	Able to Design and develop interactive, client-side, server-side executable web applications using eclipse.		[A]
CO6	Explore the features of various platforms and frameworks like hibernate, Spring ,struts used in web applications development		[A]
Course Contents:			
Core Java - Overview of Java - Java modifiers-Wrapper classes-Argument passing in class & object- Returning a value- Objects as arguments-Returning objects- Passing an array-constructors – this keyword- Inheritance- Use of super in calling parent class constructor- java.lang.Object and its methods – Passing arguments in super(): super(int), super(String) - super(String,String)-Packages-User defined exception-Collections-Swings-Event Handling-JDBC-JDBC Drivers-JDBC configuration(connection) - Statement – Callable Statement-prepared statements- Scrollable and updatable result sets - Query execution- HTML5, XML, Java Script - HTML common tags – List – Tables – Images – Forms – Frames -HTML5- Form design-CSS- Introduction to Java Scripts-storing data (data types) - Objects- Properties-Events-Decision making-Looping-Functions-Array-Conversions-Processing HTML forms and validation using JavaScript- XML- DTD, XSD-XSLT-Well-formed XML, valid XML-Creating XML using XSD- DOM and SAX - Servlets and JSP - Overview of servlet-Servlet configuration-Servlet Architecture- Servlet life cycle-Servlet Request and Response- Generic Servlet ,Http Servlet- web.xml and its need -Servlet configuration- Session Tracking-servlet CRUD- Introduction to JSP – Problem with servlet -Life cycle of JSP- scripting Elements (Expression tag, scriptlets tag and declarations tag)-JSP Directive Elements-page directive - JSP objects- Action Elements – Sharing data Between JSP pages Application Development using eclipse- Hibernate, Spring and struts - Hibernate Introduction-features-Architecture-Mapping and Configuration Files in Hibernate - Hibernate O/R Mappings –Hibernate query language-Simple examples using hibernate- Spring Introduction- Architecture-IOC container- Dependency Injection Bean – Getting started with Spring MVC framework- Simple examples using Spring-STRUTS – Introduction, Struts framework core components – Installing and setting up struts – Getting started with struts.			
Total Hours:			45

Text Books:	
1	Herbert Schildt, "Java The Complete Reference", 8th Edition, McGraw-Hill Osborne Media, 2015.
2	Kathy Sierra, "SCJP/ OCJP Sun Certified Programmer for Java 6 Study Guide", Dreamtech press, Kogent Learning Solutions Inc. 2011.
3	Bryan Basham, Kathy Sierra, Bert Bates, "Head First Servlets and JSP", O' Reilly Media, 2011
4	Paul Deitel, "Internet & World Wide Web: How to Program", Prentice Hall, 5th Edition, 2011.
5	Gavin King, Christian Bauer, "Java Persistence with Hibernate", Dreamtech press, Kogent Learning Solutions Inc. 2008.
6	Craig Walls, "Spring in Action", Manning, Dreamtech press, 2014
Reference Books:	
1	Cay S. Horstmann and Gary Cornell, "Core Java™, Volume I – Fundamentals" 9th Edition, Prentice Hall, 2012.
2	Cay S. Horstmann and Gary Cornell, "Core Java, Vol. 2: Advanced Features", 9th Edition, Prentice Hall, 2013.
3	Robert W. Sebesta, "Programming the World Wide Web", Addison-Wesley, 7th Edition, 2012.
4	Uttam K. Roy, "Web Technologies", Oxford University Press, 1st Edition, 2011.
5	Jon Duckett, "Beginning HTML, XHTML, CSS & JavaScript", Wiley India Pvt. Ltd 2010
Web References:	
1	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092-introduction-to-programming-in-java-january-iap-2010/lecture-notes/
2	https://www.udemy.com/java-tutorial/
3	http://www.studytonight.com/servlet/introduction-to-web.php
4	http://www.javatpoint.com/hibernate-tutorial
5	http://www.java4s.com/hibernate/
6	http://www.oracle.com/technetwork/java/javaee/jsp/index.html
7	http://www.oracle.com/technetwork/java/javaee/ejb/index.html
8	http://www.javatpoint.com/servlet-tutorial

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level		Assessment Component	Marks
CO1	Remember		Quiz	3
CO2	Apply		Coding	3
CO3	Apply		Class Presentation	2
CO4	Apply		Group Presentation	2
CO5	Analyze		Group Project	5
CO6	Analyze		Group Project	5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination (Theory) [40 marks]
	Theory			
Remember	CIA1 [6 marks]	CIA2 [6 marks]	Term End Assessment [8 marks]	-S
Understand	20	30	-	-
Apply	80	70	80	60
Analyse			20	-
Evaluate	-	-	-	-
Create	-	-	-	40

Nature of Course :C (Theory Concept)

Pre requisites : Data Warehousing and Mining

Course Objectives:

1. To understand the basics in R programming in terms of constructs, control statements, string functions
2. To learn to apply R programming for Text processing
3. To understand the use of R Big Data analytics
4. To able to appreciate and apply the R programming from a statistical perspective

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------|---|------|
| CO.1 | Create artful graphs to visualize complex data sets and functions | [AP] |
| CO.2 | Write more efficient code using parallel R and vectorization | [A] |
| CO.3 | Interface R with C/C++ and Python for increased speed or functionality | [AP] |
| CO.4 | Find new packages for text analysis, image manipulation, and perform statistical analysis of the same | [A] |

Course Contents:

Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorised if-then else – Vector Equality – Vector Element names
Matrices, Arrays And Lists Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists.
Data Frames Creating Data Frames – Matrix-like operations in frames – Merging Data Frames – Applying functions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Other factors and table related functions - Control statements – Arithmetic and Boolean operators and values – Default values for arguments - Returning Boolean values – functions are objects – Environment and Scope issues – Writing Upstairs - Recursion – Replacement functions – Tools for composing function code – Math and Simulations in R Creating Graphs – Customizing Graphs – Saving graphs to files – Creating three-dimensional plots
Interfacing Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear models – Time Series and Auto-correlation - Clustering

Total Hours: 45

Text Books:

1. Norman Matloff , "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press, 2011.
2. Jared P. Lander, "R for Everyone: Advanced Analytics and Graphics", Addison-Wesley Data & Analytics Series, 2013.
3. Mark Gardener, " Beginning R – The Statistical Programming Language", Wiley, 2013
4. Robert Knell, "Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R", Amazon Digital South Asia Services Inc, 2013.

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO.1	Apply	Writing Skills		5
CO.2	Analyze	Seminar and Assignment		5
CO.3	Apply	Class Presentation		5
CO.4	Analyze	Mini Project		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	-	-	-	-
Apply	20	40	20	20
Analyse	80	60	40	40
Evaluate	-	-	20	20
Create	-	-	20	20

Nature of Course : C (Theory Concept)

Course Objectives:

1. To study the Graphics Techniques and Algorithms
2. To understand Computational Development of Graphics with Mathematics
3. To provide in depth knowledge of Display Systems, Image Synthesis, Shape Modelling of 3D Application
4. To study and understand the basic concepts related to Multimedia including Data Standard, Algorithms and Technologies

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | |
|---|------|
| CO1 Understand the importance of computer graphics API programming | [U] |
| CO2 To draw the basic primitives of an object and their algorithms | [R] |
| CO3 To understand and perform 2D and 3D transformations | [AP] |
| CO4 To gain knowledge of using interactive animation using multimedia tools | [A] |
| CO5 Gain the knowledge of different media streams in multimedia transmissions | [A] |

Course Contents:

Introduction to Computer Graphics and scan conversion: Overview of computer graphics-Computer Display Technologies, Graphics Software, Output Primitives: - Points & lines, Line drawing algorithms, Circle generation algorithm, Ellipse generating algorithm. **2D & 3D Transformation:** Basic transformations. 3D Transformation, Clipping operations. **Object Modelling & Surface Determination:** 3D Object Representations, 3D viewing, Projections, Visible Surface Identification Methods. Introduction to OpenGL programming and Animations. **Multimedia System Design:** -Introduction to Multimedia-Multimedia Applications-Multimedia Architecture-Technologies for Multimedia Data- File Format Standards-Multimedia Input Output Technologies-Multimedia Storage and Retrieval Technologies. **Compression Techniques and Authoring Systems:** Lossless and Lossy Compression- Inter-Frame and Intra-Frame Compression Text Compression, Image Compression, Video Compression. Multimedia Authoring Systems and User Interfaces.

Total Hours: 45

Text Books:

1. Donald Hearn and M.Pauline Baker, "Computer Graphics in C version", 2nd Edition, Pearson education, 1996
2. Multimedia Systems Design-prabhat K. Andleigh, Kiran Thakrar-PHI edition, 2003
3. Z. Xiang, R. Plastrock – "Schaum's outlines Computer Graphics (2nd Edition.)" – TMH, 2000
4. Donald D.Hearn, M.Pauline Baker-Computer graphics with openGL, Pearson (3rd Edition), 2010

Reference Books:

- 1 Foley, Vandam, Feiner, Hughes – "Computer Graphics principles (2nd Edition.) – Pearson Education, 2013
- 2 Elsom Cook – "Principles of Interactive Multimedia" – McGraw Hill, 2001
- 3 W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" Tata Mc Graw Hill, 1979

Web References:

- 1 http://en.wikipedia.org/wiki/Computer_graphics
 - 2 <http://nptel.ac.in/video.php?subjectId=106106090>
 - 3 http://graphics.ucsd.edu/courses/cse167_f06/CSE167_05.ppt
-

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Class Presentation		5
CO2	Reasoning	Online Quiz		5
CO3	Apply	Assignment		5
CO4,CO5	Analyse	Problem Solving		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	20	10	10
Understand	80	60	40	40
Apply	-		40	40
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

17IT410

Image and Vision Computing

3/0/0/3

Nature of Course : E (Theory Skill Based)

Pre requisites : 16IT409 – Computer Graphics and Multimedia

Course Objectives

- 1 To understand the basic concept of image processing.
- 2 To understand the concept of Edge Detection
- 3 To apply video processing.
- 4 To understand the concept of object recognition.
- 5 To understand the concept of shape recognition.

Course Outcomes

Upon completion of the course, students shall have ability to

- | | | |
|------------|--|------|
| C01 | To work with the image Processing | [R] |
| C02 | To work and apply the various Edge Detection mechanisms. | [U] |
| C03 | To work and apply the video Processing. | [U] |
| C04 | To process the Object Recognition. | [AP] |
| C05 | To manipulate the Shape Recognition. | [AN] |

Course Contents

Introduction to Image Processing - Image Acquisition and Display- Color Image Processing- Image Transforms (DFT,DCT,Wavelet,...)- Enhancement (Spatial/Frequency Domain)- Image Restoration- Image Segmentation- Edge detection- Shape Recognition- Image Registration and Matching- Image and Video Compression-. Image Watermarking-3D Shapes- Video Processing- Image/Video Communication- Applications (Medical Image Processing)-**Computer Vision** -Introduction Image Processing -2D Visual Geometry-3D Visual Geometry-. Dynamic Vision- Motion-2D Object Tracking-3D Object Tracking- Object Recognition- Object Modeling- Model-based Object Recognition- Scene and Object Discrimination-4 Shape Recognition- Applications (Handwritten Character & Face Recognition)

Total Hours: 45

Text Books

- 1 Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited 2011.
- 2 Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003.

Reference Books

- 1 Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
- 2 K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990.

Web References

- 1 <http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=34>.
- 2 <http://link.springer.com/journal/11263>.

Online Resources

- 1 <https://www.udacity.com/course/introduction-to-computer-vision--ud810>
- 2 <https://www.coursera.org/learn/digital>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
C01	Remember	Quiz		2
C02	Understand	Quiz		3
C03	Understand	Group Assignment		5
C04	Apply	Problem solving		5
C05	Analyse	Technical Presentation		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	40	30	30	30
Understand	60	50	40	40
Apply	-	20	20	20
Analyse	-	-	10	10
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :C (Theory Concept)

Pre requisites : Operating System

Course Objectives:

- 1 A good understanding of the principles and goals of FOSS
- 2 Familiarity, through case studies, with the characteristics and the design concepts on which current open source is based
- 3 Ability to use certain open source tools

Course Outcomes:

Upon completion of the course, students shall have ability to

CO.1	To understand the basic concepts of FOSS	[U]
CO.2	To identify the existing performance open Source tools	[A]
CO.3	To allow students to configure and install open source OS and tools	[U]
CO.4	To understand the importance of open source	[AP]
CO.5	To enable the knowledge of FOSS	[A]

Course Contents:

INTRODUCTION - Introduction to Open sources – Need of Open Sources –Advantages of Open Sources– FOSS – FOSS usage - Free Software Movement, Commercial aspects of Open Source movement - Certification courses issues - global and Indian. Application of Open Sources.**LINUX** – Introduction – General Overview – Kernel mode and User mode process-Scheduling - Time Accounting – Personalities – Cloning and Backup your Linux System – Linux Signals – Development with Linux **OPEN SOURCE DATABASE: MySQL:** Introduction - Setting up account - Starting, Terminating and Writing your own SQL Programs - Record Selection Technology - Working with Strings - Date and Time - Sorting Query Results - Generating Summary - Working with Metadata - Using Sequences - MySQL and Web **PHP:** Introduction - Programming in Web Environment - Variables - Constants - Data Types - Operators - Statements - Functions - Arrays - OOP - String Manipulation and Regular Expression - File Handling and Data Storage - PHP and MySQL Database Connectivity - PHP and LDAP - Sending and Receiving E-mails **PYTHON:** Syntax and Style - Python Objects - Numbers - Sequences - Strings - Lists and Tuples - Dictionaries - Conditionals and Loops - Files - Input and Output - Errors and Exceptions - Functions - Modules - Classes and OOP - Execution Environment

Total Hours: 45

TEXT BOOKS

- 1 Understanding Open Source Software Development, Joseph Feller & Brian Fitzgerald, Pearson Education Limited 2001
- 2 Introduction to Linux - A Hands on Guide, Author: MachteltGarrels , UNIX Academic publications 2007 <http://www.tldp.org/LDP/intro-linux/intro-linux.pdf>
- 3 Beginning PHP and MySQL: From Novice to Professional, Fourth Edition: W. J. Gilmore : APress 2010
- 4 Learning Python : Mark Lutz : O'Reilly Publications, 2007

REFERENCES

- 1 Introduction to Linux : Installation and Programming. Dr.N.B.Venkateswarlu. 2011. NRCFOSS Series
- 2 PHP: A Beginner's Guide : VikramVaswani: McGraw Hill , 2008
- 3 MySQL: The Complete Reference, VikramVaswani : McGraw Hill 2003
- 4 Linux Cookbook, First Edition, Carla Schroder, O'Reilly Cookbooks Series, November 2004,ISBN: 0-596-00640-3.
- 5 Open Sources: Voices from the Open Source Revolution, First Edition, January 1999, ISBN: 1-56592-582-3.
URL:<http://www.oreilly.com/catalog/opensources/book/toc.html>
- 6 Python Tutorial, Guido van Rossum, Fred L. Drake, Jr., Editor

Assessment Methods & Levels (based on Bloom'sTaxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO.1	Understand	Writing Skills		5
CO.2	Analyze	Seminar and Assignment		5
CO.3	Understand	Class Presentation		5
CO.4	Apply	Group Assignment		5
CO.5	Apply	FOSS Tool Practices		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	20	20
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : C (Theory Concept)

Pre requisites : Software Development

Course Objectives:

- 1 A good understanding of the principles and goals of Software Engineering design, including relevant algorithms.
- 2 Familiarity, through case studies, with the characteristics and the design concepts on which current testing is based.
- 3 Ability to apply some of the principles and concepts of testing

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------|---|------|
| CO.1 | To understand the basic concepts of performance testing | [U] |
| CO.2 | To identify the existing performance testing tools | [A] |
| CO.3 | To allow students to configure and install testing tools | [U] |
| CO.4 | To understand the importance of performance testing | [AP] |
| CO.5 | To enable the knowledge of free performance testing tools | [A] |

Course Contents:

The Art of Application Performance Testing: Why Performance Test: - What Is Performance? The End-User Perspective, Bad Performance: Why It's So Common, Choosing an Appropriate Performance Testing Tool- Performance Testing Tool Architecture, Choosing a Performance Testing Tool, Performance Testing Toolset: Proof of Concept, The Fundamentals of Effective Application Performance Testing- Making Sure Your Application Is Ready, Allocating Enough Time to Performance Test, Obtaining a Code Freeze, Designing a Performance Test Environment, The Process of Performance Testing, Interpreting Results: Effective Root-Cause Analysis, Performance Testing and the Mobile Client, End-User Experience Monitoring and Performance, Integrating External Monitoring and Performance Testing. Introduction to Automation Testing – Types of Automation Testing – Introduction to Performance Testing – Load Testing- Stress Testing – Spike Testing – Endurance – Scalability Testing – Volume Testing - Performance Testing Process. Apache Jmeter- Installation -Principles – Plugins - Rational Performance Tester – Features – Benefits – LoadUI NG Pro- Features -Resources – Cloud Based Load Tests – Parallel Load Testing – End Point Load Testing

Total Hours: 45

TEXT BOOKS

- 1 "The Art of Application Performance Testing" Second Edition by Ian Molyneaux- O'Reilly Publications
- 2 Roger S.Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill International edition, Seventh edition, 2009.
- 3 Ian Sommerville, Software Engineering, 8th Edition, Pearson Education, 2008.

REFERENCES LINKS

- 1 <http://www.softwaretestinghelp.com/what-is-performance-testing-load-testing-stress-testing>
- 2 <http://www.softwaretestingclass.com/what-is-performance-testing/>
- 3 <https://saas.hpe.com/en-us/software/loadrunner>
- 4 <http://www.methodsandtools.com/tools/tools.php?jmeter>
- 5 <http://www.automation-consultants.com/index.php/products/ibm-products/rational-performance-tester>

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO.1	Understand	Writing Skills		5
CO.2	Analyze	Seminar and Assignment		5
CO.3	Understand	Class Presentation		5
CO.4	Apply	Group Assignment		5
CO.5	Apply	Coding Practices		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	20	20
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Elective Stream III

17IT413

DATA WAREHOUSING AND MINING

3/0/0/3

Nature of Course :G (Theory analytical)

Course Objectives:

- 1 To learn the fundamentals of data warehouse and OLAP
- 2 To acquire knowledge in data pre-processing and association rule mining
- 3 To perform data classification and clustering
- 4 To gain knowledge about the emerging trends in data mining

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Design a data warehouse | [U] |
| CO2 | Perform data pre-processing | [U] |
| CO3 | Evaluate association, classification and clustering methods | [A] |
| CO4 | Apply data mining techniques for real world problems | [AP] |

Course Contents :

DATA WAREHOUSING - Basic Concepts – Architecture – Data warehouse modeling – Data cube and OLAP – Data warehouse design and usage – Framework for data warehouse design – Data warehouse design process - Data warehouse implementation – Efficient data cube computation – Indexing OLAP data – Efficient processing of OLAP queries – OLAP server architectures. **DATA MINING** - Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data transformation and discretization – Mining frequent patterns, associations and correlations – Basic concepts - Frequent Item set mining methods – Pattern evaluation methods – Pattern mining in multilevel, multidimensional space - Constraint-based frequent pattern mining. **CLASSIFICATION** - Classification - Basic concepts - Decision Tree Induction – Bayesian Classification – Rule Based Classification – Model evaluation and selection – Techniques to improve classification accuracy – Bayesian belief networks - Classification by Back propagation – Support Vector Machines – Classification using frequent patterns – Lazy Learners – Other classification methods – Genetic algorithms – Rough set approach – fuzzy set approach. **CLUSTER ANALYSIS** - Overview of basic clustering methods - Partitioning Methods – k-Means – k-Medoids- Hierarchical methods – Density-Based Methods – DBSCAN – OPTICS – DENCLUE - Grid-Based Methods – STING – CLIQUE – Evaluation of clustering – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis – Outlier detection methods – Statistical, proximity and clustering based approaches. **CURRENT TRENDS** - Graph mining – Temporal data mining – Spatial data mining – Distributed data mining – Privacy, security and legal aspects of data mining – Data mining applications – Financial data analysis – Telecommunication industry – Retail industry – Health care and biomedical research.

Total Hours: 45

Text Books:

- 1 Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques", 3rd Edition, Elsevier, 2012.
- 2 M. Kantardzic, "Data Mining: Concepts, Models, Methods, and Algorithms", 2nd edition, Wiley-IEEE Press, 2011.

Reference Books:

- 1 Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", McGraw Hill, 2012.
- 2 Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2012.

Web References:

- 1 www.cs.purdue.edu/homes/clifton/cs490d/
- 2 www.tutorialspoint.com/data_mining/dm_cluster_analysis.htm
- 3 www.cs.waikato.ac.nz/ml/weka/

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Online Quiz		5
CO2	Understand	Technical Presentation		5
CO3	Apply	Group Assignment		5
CO4	Analyse	Surprise Test		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	80	40	40	40
Apply	20	60	40	40
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :K (Problem Programming)

Course Objectives:

- 1 To remember and understand the importance of design patterns
- 2 To demonstrate and analyse the different aspects of how the objects interact with each other and with physical components of the design solutions.
- 3 To provide an insight into design thinking with graphical interfaces to provide dynamism in transformations of a design product or a solution.

Course Outcomes:

Upon completion of the course, students shall have ability to

CO 1	Understand the various design patterns and its purpose	[U]
CO 2	Analyse the various behavioural aspects of design pattern to be solved.	[AN]
CO 3	Study the importance of dynamic responsibility in evaluating the standard design patterns by invoking object oriented concepts.	[E]
CO 4	Evaluate the different pattern interactions between various physical components and the user, managing a design solution through visual representations and simulation models.	[E]
CO 5	Unresolve different transformations of a product or a service through brainstorming and incremental approach, etc.	[AP]

Course Contents:

Course Contents with Course Outcomes/Blooms Taxonomy/Assessment Methods

Introduction to Design patterns: Describing design pattern, Design problems, Design problems solved by design patterns, Selection of a design pattern, Usage of design patterns. **The catalog of design pattern:** Creational pattern, Structural pattern, Behavioural pattern, Class & object communication. **Case Study:** Designing a document editor. **Design Thinking:** Defining design thinking, needs, requirements. **Stages in design thinking:** Immersion: Preliminary immersion, In-depth immersion. Analysis and Synthesis: Insight, Affinity diagram, Conceptual Map, Guiding criteria, Empathy map. Ideation: Brainstorming, Co-creation workshop, Idea menu, Decision matrix. Prototyping: Paper prototyping, Volumetric model, Staging, Storyboard, Service prototyping. **Case Study:** Andorinha project.

Total Hours : 45

Text Books:

1. Enrich Gamma, Richard Helm, Ralph Johnson and John Vissides, "Design Patterns: Elements of reusable object oriented software", Pearson education, Oct 1994.
2. Maurício Vianna, Ysmar Vianna, Brenda Lucena and Beatriz Russo, "Design thinking : Business innovation", MJV Technologies and innovation press, 2011.

Reference Books:

1. Alan Shalloway and James R. Trott, "Design Pattern Explained: A new perspective on object oriented design", Addison Wesley publication, 2011.
2. Tim Brown, "Change by Design: Design Thinking Transforms organizations and inspires innovations", Harper Collins publication, 2009
3. Design Patterns : Elements of Reusable Object-Oriented Software (1995)
4. The Design Patterns Smalltalk Companion (1998) Alpert, Brown & Woolf

E-Books

1. https://sourcemaking.com/design_patterns
2. <https://www.goodreads.com/book/show/8013346-design-thinking>
3. <https://dschool.stanford.edu/sandbox/groups/designresources>
4. http://courses.washington.edu/art166sp/documents/Spring2012/readings/week_3/design_thinking.pdf

Web References:

1. <http://www.centrodeinnovacionbbva.com/en/ebook/ebook-design-thinking>
2. https://www.tutorialspoint.com/design_pattern/design_pattern_overview.htm
3. <http://www.oodeesign.com/>
4. <https://code.tutsplus.com/articles/a-beginners-guide-to-design-patterns--net-12752>
5. <https://dzone.com/refcardz/design-patterns>
6. <http://dschool.stanford.edu/dgift/>
7. <https://hbr.org/2008/06/design-thinking>
8. <http://www.creativityatwork.com/design-thinking-strategy-for-innovation/>
9. <http://www.designthinkingforeducators.com/design-thinking/>

Assessment Methods & Levels (based on Blooms' Taxonomy)					
Formative assessment based on Capstone Model (Max. Marks:20)					
Course Outcome	Bloom's Level		Assessment Component		Marks
CO1	Understand		Quiz		5
CO2	Analyse		Presentation		5
CO3	Evaluate		Problem solving		5
CO4	Evaluate				
CO5	Apply		Case Study		5
Summative assessment based on Continuous and End Semester Examination					
Bloom's Level	Continuous Assessment				End Semester Examination (Theory) [60 marks]
	Theory			Practical	
	CIA1 [6 marks]	CIA2 [6 marks]	Term End Assessment [8 marks]	Rubric based CIA [40 Marks]	
Remember	-	-	-	-	-
Understand	20	20	20	-	20
Apply	20	20	20	-	20
Analyse	30	30	30	-	30
Evaluate	30	30	30	-	30
Create	-	-	-	-	-

Nature of Course: F (Theory Programming)

Course Objectives:

1. To introduce the basic of visualization design and evaluation principles.
2. To enable the students to understand the operation of various types of data.
3. To enable the students to understand the principles of interactive data visualization.
4. To prepare the students to handle the network, temporal, text based, geospatial, hierarchical and graph based data.
counters
5. To allow the students to learn and make use of R.

Course Outcomes:

Upon completion of the course, students shall have ability to

CO1	Describe the necessity of interactive web pages.	[R]
CO2	Discuss the efficiency of data representation.	[U]
CO3	Understand the concepts of visualization perspectives.	[U]
CO4	Apply the functionalities and usage of scripting languages	[AP]
CO5	Write programs using R.	[AP]

Course Contents

Introduction: HTML – Introduction-Elements-Attributes-Paragraphs-Formatting-Links-Images-CSS-Java Script.**Text Representation:** Basic Charts and Plots- Principles of perception-Text data visualization-temporal data visualization. **Visualization And Statistical Perspectives:** Geospatial data visualization – redesign principles – hierarchical data-network data visualization.**Visualization Design:** The Power of Representation – Data Ink and Graphical Redesign – Chart-Junk. **R:** Overview of R- Control Structures-functions-Looping-Simulation.

Total Hours: 45

Text Books:

- 1 "Storytelling with Data – A Data Visualization guide for Business Professionals", Wiley Publishers, 2015.
- 2 Richard Cotton , "Learning R: A Step by Step Function Guide to Data Analysis", 1st Edition, , O Reilly Publishers.

Reference Books:

- 1 The Visual Display of Quantitative Information, By Edward R. Tufte, Graphic Press.
- 2 Handle on Programming with R: Write your own Functions and Simulations By Garrett Golemund, O Reilly Publishers.

Web References:

- 1 <http://www.creativebloq.com/design-tools/data-visualization-712402>

Online Resources:

- 1 <http://www.instantatlas.com/>
- 2 <http://dygraphs.com/>

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Quiz		5
CO2	Understand	Quiz		5
CO3	Understand	Technical Presentation		5
CO4	Apply	Group Assignment		3
CO5	Apply	Group Assignment		2
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination
	CIA1	CIA2	Term End Assessment	

Remember	20	0	10	10
Understand	30	20	20	10
Apply	50	40	40	40
Analyse	0	40	30	40
Evaluate	0	0	0	0
Create	0	0	0	0

Nature of Course : C (Theory Concept)

Course Objectives:

- 1 To understand user experience design principles & end users of the product
- 2 To understand various methodologies used in user experience research activity
- 3 To apply tools for testing user experience

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|-----|---|------|
| CO1 | Understand user experience design principles | [U] |
| CO2 | Choose a right method for conducting user experience research activity | [U] |
| CO3 | Analyze user experience & interpret the results of user experience research | [A] |
| CO4 | To test user experience design using Morae tool | [AP] |

Course Contents:

Introduction to user experience: What is user experience, user-centered design, principles, life cycle, design thinking, variety of requirements, getting stakeholder buy-in for your activity, Learning about product users, Existing research, Learning about product, Special populations, Ethical & legal considerations.

User experience research activity: Methods, Diary studies, Interviews, Surveys, Card sort, Focus groups, Field studies, Evaluation methods, Differences among the methods, Choosing the right method.

Diary studies: Diary study formats, Sampling frequency, Preparing and conducting a diary study, data analysis & interpretation.

Interviews: Preparing & conducting an interview, Data analysis & interpretation.

Surveys: Need, Survey awareness, Creating & distributing survey, Data analysis & interpretation.

Focus groups: Preparing & conducting focus group, Modifications, Data analysis & interpretation.

Case Study: Morae software for usability testing

Total Hours: 45

Text Books:

- 1 Kathy Baxter, Catherine Courage & Kelly Caine, "Understanding your users - A practical guide to user research methods", 2nd Edition, Morgan Kaufmann Publishers, Elsevier Inc., 2015.
- 2 Preece, Rogers & Sharp, "Interaction Design beyond human-computer interaction", 4th Edition, John Wiley & Sons Ltd., 2015.

Reference Books:

- 1 Gavin Allanwood, Peter Beare, "User Experience Design – Creating designs users really love", 1st Edition, Bloomsbury Publishers, 2014.
- 2 Patrick J. Lynch & Sarah Horton, "Web Style Guide – Foundations of User Experience Design", 4th Edition, Yale University Press, 2016.

Web References:

- 1 https://www.cmu.edu/dietrich/english/classroom_and_beyond/user-experience-lab/morae-documentation.pdf
- 2 http://download.techsmith.com/morae/docs/whitepapers/morae_overview_whit

Online Resources:

- 1 <http://www.ieee.org/about/webteam/resources/uxlab.html>
- 2 <http://usabilitygeek.com>
- 3 <http://www.allaboutux.org>

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand	Quiz		5
CO2	Understand	Assignment		5
CO3	Analyze	Case study		5
CO4	Apply	Quiz		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :C (Theory Concept)

Prerequisite : Basic knowledge of RDBMS (relational database management system) concepts with hands-on exposure (includes design & implementation of table structures).

Course Objectives:

4. To learn the fundamentals of business intelligence
5. To acquire knowledge in data integration
6. To perform multi-dimensional data modelling
7. To explore enterprise reporting

Course Outcomes:

Upon completion of the course, students shall have ability to

CO1	Describe the need for Business Intelligence	R
CO2	Understand the technology and processes associated with Business Intelligence framework	U
CO3	Demonstrate understanding of Data Warehouse implementation methodology and project life cycle	U
CO4	Identify the metrics, indicators and make recommendations to achieve the business goal	AP
CO5	Design an enterprise dashboard that depicts the key performance indicators which helps in decision making	AP

Course Contents:

Introduction to Business Intelligence : Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities. **Basics of Data Integration (Extraction Transformation Loading)**: Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications. **Introduction to Multi-Dimensional Data Modeling** : Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using SSAS. **Basics of Enterprise Reporting** : Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS.

Total Hours: 45

Text Books:

- 1 David Loshin, Business Intelligence, Morgan Kaufmann, 2nd Edition, 2012.
- 2 Mike Biere, Business intelligence for the enterprise, Prentice Hall Professional, 2003.

Reference Books:

- 1 Larissa Terpeluk Moss, Shaku Atre, Business intelligence roadmap, Addison-Wesley Professional, 2003.
- 2 Cindi Howson, Successful Business Intelligence: Secrets to making Killer BI Applications, McGraw Hill Professional, 2007
- 3 Brain Larson, Delivering business intelligence with Microsoft SQL server 2008, McGraw Hill Professional, 2009
- 4 Lynn Langit, Foundations of SQL Server 2005 Business Intelligence, Apress, 2007
- 5 Stephen Few, Information dashboard design, O'Reilly, 2006

Web References:

3. www.wipro.com/documents/resource-center/library/bidw_bilogistics.pdf
4. https://en.wikipedia.org/wiki/Business_intelligence

Online Resources:

2. <https://www.coursera.org/learn/business-intelligence-tools>
3. <https://www.coursera.org/courses?query=business%20intelligence>

Assessment Methods & Levels (based on Bloom'sTaxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
C01 & C02	Understand	Quiz		5
C03	Understand	Case Study		5
C04 & C05	Apply	Class Presentation		10
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course

:C (Theory Concept)

Course Objectives:

1. To provide an analytical skills into increasingly complex conflicts
2. To introduce logic and strategic decision making involved in the theory of games.
3. To enable the students to be aware of rational behaviour in strategically interdependent situations.
4. To introduce Theorize possible and probable strategies where information is incomplete.

Course Outcomes:**Upon completion of the course, students shall have ability**

- | | | |
|-----|--|------|
| CO1 | Demonstrate the basic knowledge of a "game" into a wide range of conflicts from the standpoint of rationality | [R] |
| CO2 | Understand the strategic games between two and more agents in non cooperative scenario. | [U] |
| CO3 | Understand and Evaluate Game Theory principles in workplace settings. | [U] |
| CO4 | Apply the Nash equilibrium, dominant strategy, equilibrium, Subgame perfect equilibrium for achieving various applications | [AP] |

Course Contents:

Introduction to Game Theory: Nash Equilibrium, Strategic games, the Prisoner's Dilemma, the Stag Hunt, Matching Pennies, Best response functions, Dominated actions, Equilibrium in a single population: symmetric games and symmetric equilibria, Cournot's model of oligopoly, Bertrand's model of oligopoly, Electoral competition, The War of Attrition, Accident law **Mixed Strategy Equilibrium:** Strategic games in which players may randomize, Mixed strategy Nash equilibrium, Dominated actions, Equilibrium in a single population, **Extensive games with perfect information:** Strategies and outcomes, Subgame perfect equilibrium, backward induction, Extensive Games with Perfect Information: The ultimatum game, the holdup game, and agenda control, Stackelberg's model of duopoly, **Coalitional Games and the Core:** Games with Imperfect Information, Bayesian Games, Variants and Extensions, Strictly Competitive Games and Maximization, **Applications:** Bayesian Games, Auctions and Voting.

Total Hours: 45**Text Books:**

1. Matsumoto, Akio and Szidarovszky, Ferenc, 'Game Theory and Its Applications', McGraw Hill Education (India) Private Ltd., 2016
2. Martin Osborne, 'An Introduction to Game Theory (2003)', published by Oxford University Press.

Reference Books:

1. Avinash Dixit and Susan Skeath 'Games of Strategy', 2nd Ed. McGraw Hill Education India Private Ltd., 2013.
2. Leyton-Brown, K., Shoham, Y., Essentials of Game Theory: A Concise, Multidisciplinary Introduction, Morgan & Claypool Publishers. 2008.

Web References:

1. www.economics.utoronto.ca
2. www.cs.stanford.edu
3. www.utsystem.edu

Online Resources:

- 1 <http://www.economics.utoronto.ca/osborne/igt>

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Remember	Quiz		5
CO2	Understand	Writing Skills		5
CO3	Understand	Class Presentation		5
CO4	Apply	Group Assignment		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Open Electives

17IT501

Mobile Applications Development using Android

3/0/0/3

Nature of Course : Programming**Pre requisites** :16IT204 - Object Oriented Programming using Java**Course Objectives:**

1. To understand the system requirements for mobile applications.
2. To generate suitable design using Android studio.
3. To Create and deploy an application in marketplace for distribution.

Course Outcomes:**Upon completion of the course, students shall have ability to**

- | | | |
|--------|--|------|
| C105.1 | Demonstrate knowledge on basics of mobile application and java for mobile applications | [R] |
| C105.2 | Understand the framework of android application and design simple user interfaces. | [U] |
| C105.3 | Create an android application using multimedia components. | [AP] |
| C105.4 | Develop and deploy application with server side connectivity. | [AP] |

Course Contents:

Introduction: Introduction to mobile application-System requirements for mobile application – Mobile application development architecture-Anatomy of Android Project. **Java for Android-** Classes and Objects-Access specifiers and modifiers-Interfaces-Exception Handling-**Activities, Intent and User Interfaces**–Activity- Life Cycle of an Activity - Creating an Activity - Developing user interfaces -Notifications and Toasts**Multimedia&Services:**Lifecycle of a Service - GPS – Android location API- WIFI– Playing audio, video- Messaging and Telephony services.**Persistent Data Storage and APK publishing-** Introduction to SQLite -Android Database API- Connection and Operations -APK Conversion Process-App Publishing Guidance.

Total Hours: 45**Text Books:**

- 1 Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.
- 2 Reto Meie, Professional Android 4 Application Development (Wrox Professional Guides)

Reference Books:

- 1 Paul Deitel, Harvey Deitel, "Java How To Program", 10th Edition, Prentice Hall Publications 2014.
- 2 Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012.

Web References:

- 1 <http://developer.android.com/develop/index.htm>
- 2 <https://www.tutorialspoint.com/android/>

Online Resources:1 <http://www.androidhive.info/>

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level		Assessment Component	Marks
C105.1	Remember		Quiz	5
C105.2	Understand		Assignment	5
C105.3	Apply		Coding	5
C105.4	Apply		Mini Project	5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : Theory

Course Objectives:

1. To understand the fundamental concepts of cyber Security
2. To learn various hacking techniques and attacks.
3. To know how to protect data assets against attacks from the Internet.
4. To assess and measure threats to information assets.
5. To understand the benefits of strategic planning process.
6. To evaluate where information networks are most vulnerable.
7. To enable students to understand issues in the Internet

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|--------|---|------|
| C105.1 | Defend hacking attacks and protect data assets. | [R] |
| C105.2 | Defend a computer against a variety of different types of security attacks using a number of hands on techniques. | [AP] |
| C105.3 | Defend a LAN against a variety of different types of security attacks using a number of hands on techniques. | [AP] |
| C105.4 | Practice and use safe techniques on the World Wide Web | [AP] |

Course Contents:

FUNDAMENTALS Network and security concepts: Information assurance - Basic cryptography - DNS - Firewalls - Virtualization, Microsoft windows security principles, creating a managed network, defining the boundaries of trust, Implementing the network security function- attacker techniques- physical security. **System Hacking** Hacking Windows: Overview - Unauthenticated attacks - Authenticated attacks - Windows security features – Spoofing – Case study. Hacking UNIX: Overview - Quest for root - Remote Access - Local Access - Types – Hacking root - Sniffers - Case study. **Infrastructure Hacking** Remote Connectivity & VOIP Hacking - Preparing to dial up - VPN Hacking - Network Devices - Discovery, Autonomous system lookup - Public News groups - Network Vulnerability. Wireless Hacking: Wireless Foot Printing - Wireless Scanning and Enumeration - Hacking 802.11 – WEP Hacking Hardware: Hacking Devices - Analysis default configurations-Reverse Engineering Hardware. **Application and Data Hiding** Hacking Code - Common Exploit Techniques - Common Counter Measures. WEP Hacking: Web Server Hacking - Web Application Hacking - Vulnerabilities - Hacking the Internet user - Client Hacking - Malware - Spyware - Adware - Spam - Phishing - Case Study **Remote Control Insecurities** Discovering Remote Control Software - Session Hijacking - Backdoors - Trojans - Subverting the system Environment - Social Engineering - Weakness VNC - Case Study.

Total Hours: 45

Text Books:

- 1 Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", Tata Mcgrawhill Publishers, 2010.
- 2 Michael T Simpson "Ethical Hacking and Network Defense", cengage learning, 2010.

Reference Books:

- 1 Ben smith, and Brian Komer, "Microsoft Windows Security Resource Kit" Prentice Hall of India, 2010.
- 2 Ankit Fadia, "Unofficial guide to ethical hacking", Macmillan India Limited, 2001
- 3 Ankit fadia, Manu zacharia "Intrusion alert : An Ethical Hacking Guide to Intrusion

Detection", 2009.

Web References:

- 1 https://www.youtube.com/results?search_query=nptel+user+interface+design
- 2 <https://www.youtube.com/watch?v=gCZbWQd4NIO>

Online Resources:

- 1 https://books.google.co.in/books?id=mVKiVojF96YC&pg=PA15&dq=web+user+interface&hl=en&sa=X&ved=0CCMQ6AEwAWoVChMIImJfIgo_eyAIVgSumCh1qCg5b#v=onepage&q=web%20user%20interface&f=false

Assessment Methods & Levels (based on Bloom's Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
C105.1	Remember	Quiz		5
C105.2	Understand	Assignment		5
C105.3	Apply	Coding		5
C105.4	Apply	Mini Project		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	40	40
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course : C (Theory Concept)

Pre requisites : **Basic Programming, Data structures and Algorithms**

Course Objectives:

- 1 To impart the knowledge of basic data Base Management Systems and models
- 2 To understand the traditional relational database systems implementation using SQL.
- 3 To study the normalization theory concepts
- 4 To understand the internal storage structures using different file and indexing techniques
- 5 To get familiarized with query processing, optimization and transactions

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------------|--|-----------|
| CO1 | Understand the fundamentals of data models and depict a database system using ER diagram and transform into relational database design | [U], [AN] |
| CO2 | Demonstrate with understanding of SQL Programming and normalization theory | [AP] |
| CO3 | Understand the basic database storage structures and access techniques | [U] |
| CO4 | Practice the query evaluation and query optimization techniques. | [AP] |
| CO5 | Understand the basic issues of transaction processing and concurrency control | [U] |

Course Contents:

Data modelling: Purpose of Database System, Views of data, Data Models, Database Languages- Database System Architecture, Database users and Administrator, Entity Relationship model (E-R model) – E-R Diagrams, Introduction to relational databases. Relational Algebra: Basic Operators, Additional Operators, composition of operators, Extended relational algebra, Relational calculus, Entity-Relationship Diagram, **SQL fundamentals:** Creation and Basic Query Structure, Basic Operations, Aggregate and Grouping, Nested Subqueries and Sets, Updates and Joins, Views ,Triggers and security, Advanced SQL features, Embedded SQL, Dynamic SQL, Introduction to Distributed Databases and Client/Server Databases. Database Normalization: Functional Dependencies, 1NF, 2NF, 3NF and BCNF, **Storage techniques:** Overview of physical storage media- File structures, Indexing: Basics, Hashing, B-tree and B+-tree, **Query Processing and optimization:** Selection, Sorting, Basic Nested Loop Join, Block and Indexed Nested Loop Joins, Merge and Hash Joins, Query Optimization: Equivalent Expressions and simple equivalent rules, Estimating Sizes, **Database Transaction concepts:** Introduction, Features of Transactions, ACID Properties, Types of Recovery Systems, Log-based Schemes, Transaction Schedules: Conflicts and Abort, Serializability, Recoverability, Concurrency Control: Locks, Two-phase Locking Protocols, Timestamp Ordering Protocol, Validation-based protocol, Multiple Granularity Locks, Deadlock Prevention and detection and Deadlock recovery and update operations.

Total Hours: 45

Text Books:

- 1 Silberschatz, A., Korth, H. F., Sudharshan, S., "Database System, Concepts", Sixth Edition, Tata McGraw Hill, 2011.
- 2 Date, C. J., Kannan, A., Swamynathan, S., "An Introduction to Database Systems", Eighth Edition, Pearson Education ,2006

Reference Books:

- 1 Gupta G K, "Database Management Systems", Tata McGraw Hill Education Private Limited, New Delhi, 2011.
- 2 Elmasri, R. and Navathe, S. B., "Fundamentals of Database Systems", Fourth Edition, Pearson / Addison Wesley, 2007.
- 3 Bhattacharya, P. and Majumdar, A., "Introduction to Database Management Systems", Tata McGraw Hill, 2001
- 4 Desai, B. C., "Introduction to Database Systems" West Group, 11th Ed, 1990

Web References:

- 1 <http://nptel.ac.in/video.php?subjectId=106106093>
- 2 <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-830-database-systems-fall-2010/>

Online Resources:

- 1 <http://www.nptelvideos.in/2012/11/database-management-system.html>
- 2 <http://www.sqlcourse.com/>
- 3 https://mva.microsoft.com/en-us/training-courses/database-fundamentals-8243?l=TEBiexJy_5904984
- 4 https://lagunita.stanford.edu/courses/Engineering/db/2014_1/about

Assessment Methods & Levels (based on Blooms' Taxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO1	Understand, Analyse	Class Presentation		4
CO2	Apply	Group Assignment		5
CO3	Understand	Online Quiz		3
CO4	Apply	Group Assignment		5
CO5	Understand	Online Quiz		3
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	-	-	-	-
Understand	70	50	40	40
Apply	-	50	40	40
Analyse	30	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

Nature of Course :C (Theory Concept)

Pre requisites : 16IT304 - Data Structures

Course Objectives:

- 1 To make students know the basic concept and framework of virtual reality.
- 2 To teach students the principles and multidisciplinary features of virtual reality.
- 3 To teach students the technology for multimodal user interaction and perception in VR, in particular the visual, audial and haptic interface and behavior.
- 4 To teach students the technology for managing large scale VR environment in real time.
- 5 To provide students with an introduction to the VR system framework and development tools.

Course Outcomes:

Upon completion of the course, students shall have ability to

- | | | |
|------|--|------|
| CO.1 | An ability to apply knowledge of computing and mathematics to solve complex computing problems in computer science discipline. | [U] |
| CO.2 | An ability to use current techniques, skills, and tools necessary for computing practice with an understanding of the limitations. | [A] |
| CO.3 | Ability to develop 3D virtual environments and to develop 3D interaction techniques. | [U] |
| CO.4 | Ability to develop immersive virtual reality applications. | [AP] |

Course Contents:

Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality. **Multiple Modals of Input and Output Interface in Virtual Reality:** Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3D Scanner etc. Output -- Visual / Auditory / Haptic Devices. **Visual Computation in Virtual Reality:** Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. **Advanced Techniques in CG:** Management of Large Scale Environments & Real Time Rendering. **Environment Modelling in Virtual Reality:** Geometric Modelling, Behaviour Simulation, Physically Based Simulation. **Interactive Techniques in Virtual Reality:** Body Track, Hand Gesture, 3D Manus, Object Grasp. **Introduction of Augmented Reality (AR):** System Structure of Augmented Reality. Key Technology in AR. **Development Tools and Frameworks in Virtual Reality:** Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools. **Application of VR in Digital Entertainment:** VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.

Total Hours: 45

Text Books:

- 1 Burdea G. C., Coiffet P., "Virtual Reality Technology", J. Wiley & Sons, Second Ed., 2003.
- 2 William R. Sherman and Alan Craig, "Understanding Virtual Reality: Interface, Application, and Design" Morgan Kaufmann Publishers.
- 3 Rikk Carey and Gavin Bell, "The Annotated VRML 2.0 Reference Manual", Addison-Wesley.
- 4 John Vince, "Virtual Reality Systems", Pearson Education.

Assessment Methods & Levels (based on Bloom'sTaxonomy)				
Formative assessment based on Capstone Model (Max. Marks:20)				
Course Outcome	Bloom's Level	Assessment Component		Marks
CO.1	Understand	Writing Skills		5
CO.2	Analyze	Seminar and Assignment		5
CO.3	Understand	Class Presentation		5
CO.4	Apply	Group Assignment		5
Summative assessment based on Continuous and End Semester Examination				
Bloom's Level	Continuous Assessment			End Semester Examination [60 marks]
	CIA-I [6 marks]	CIA-II [6 marks]	Term End Examination [8 marks]	
Remember	20	40	20	20
Understand	80	60	40	40
Apply	-	-	20	20
Analyse	-	-	20	20
Evaluate	-	-	-	-
Create	-	-	-	-

