# **R2016 CURRICULUM & SYLLABI**

for

## **B.Tech. Degree – Information Technology Programme**

# FOR THE STUDENTS ADMITTED FROM THE

# ACADEMIC YEAR 2016-2017 ONWARDS



## SRI VENKATESWARA COLLEGE OF ENGINEERING

(Autonomous – Affiliated to Anna University) Sriperumbudur TK, Kanchipuram DT, Tamilnadu, India – 602117.

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#### SRI VENKATESWARA COLLEGE OF ENGINEERING (An Autonomous Institution, Affiliated to Anna University, Chennai) SRIPERUMBUDUR TK. - 602 117 REGULATION – 2016 B.TECH. INFORMATION TECHNOLOGY CURRICULUM AND SYLLABUS SEMESTER I

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	HS16151	Technical English – I	3	1	0	4
2	MA16151	Mathematics – I	3	1	0	4
3	PH16151	Engineering Physics – I	3	0	0	3
4	CY16151	Engineering Chemistry – I	3	0	0	3
5	GE16151	Computer Programming	3	0	0	3
6	GE16152	Engineering Graphics	2	0	3	4
<b>PR</b> A	ACTICALS					
7	GE16161	Computer Practices Laboratory	0	0	3	2
8	GE16162	Engineering Practices Laboratory	0	0	3	2
9	GE16163	Physics and Chemistry Laboratory - I	0	0	2	1
TO	TOTAL 1					26

#### **SEMESTER II**

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	HS16251	Technical English – II	3	1	0	4
2	MA16251	Mathematics – II	3	1	0	4
3	PH16251	Engineering Physics – II	3	0	0	3
4	CY16251	Engineering Chemistry – II	3	0	0	3
5	CS16201	Digital Principles and System Design	3	0	0	3
6	CS16202	Programming and Data Structures I	3	0	0	3
PRA	CTICALS					
7	GE16262	Physics and Chemistry Laboratory - II	0	0	2	1
8	CS16211	Digital Laboratory	0	0	3	2
9	CS16212	Programming and Data Structures Laboratory –I	0	0	3	2
TO	ΓAL		18	2	8	25

#### **SEMESTER III**

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	MA16351	Mathematics - III (Common to all branches)	3	1	0	4
2	CS16301	Programming and Data Structures II (Common to CS &IT)	3	0	0	3
3	CS16302	Operating Systems (Common to CS, EE, EC & IT)	3	0	0	3
4	IT16301	Computer Organization and Architecture	3	0	0	3
5	EC16351	Analog and Digital Communication (Common to CS & IT)	3	0	0	3
6	GE16451	Environmental Science and Engineering (Common to all branches)	3	0	0	3
<b>PR</b> A	ACTICALS					
7	CS16311	Programming and Data Structures Laboratory II (Common to CS& IT)	0	0	3	2
8	CS16312	Operating Systems Laboratory (Common to CS & IT)	0	0	3	2
9	EC16361	Analog and Digital Communication Laboratory	0	0	3	2
TO	ΓAL	·	18	1	9	25
					2	

#### SEMESTER IV

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	MA16453	Probability and Queuing Theory (Common to CS & IT)	3	1	0	4
2	EC16504	Microprocessors and Microcontrollers (Common to EC,CS & IT)	3	0	0	3
3	IT16401	Paradigms of Algorithm Design	3	0	0	3
4	CS16402	Database Management Systems (Common to CS & IT)	3	0	0	3
5	IT16402	Software Engineering Methodologies	3	0	0	3
6	IT16403	IT Essentials	3	0	0	3
PRA	ACTICALS					
7	EC16512	Microprocessors and Microcontrollers Laboratory (Common to EC, CS & IT)	0	0	3	2
8	CS16412	Database Management Systems Laboratory (Common to CS & IT)	0	0	3	2
9	IT16411	Mini Project	0	0	3	2
TO	ΓAL		18	1	9	25

#### **SEMESTER V**

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	CS16401	Computer Networks (Common to CS, EE, EC & IT)	3	0	0	3
2	IT16501	Graphics and Multimedia	3	0	0	3
3	CS16502	Object Oriented Analysis and Design (Common to CS & IT)	3	0	0	3
4	EC16651	Digital Signal Processing (Common to CS & IT)	3	1	0	4
5	IT16502	Web Programming	3	0	0	3
6	IT16503	Computational Intelligence	3	1	0	4
PR	ACTICAL	S				
7	CS16411	Networks Laboratory (Common to CS & IT)	0	0	3	2
8	IT16511	Web Programming Laboratory	0	0	3	2
9	IT16512	Case Tools Laboratory	0	0	3	2
ΤΟ	ΓAL		18	2	9	26

#### SEMESTER VI

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	IT16601	Information and Coding Theory	3	0	0	3
2	IT16602	Mobile Computing (Common to CS & IT)	3	0	0	3
3	IT16603	Software Testing And Quality Assurance (Common to CS & IT)	3	0	0	3
4	IT16604	Automata and Compiler Design	3	1	0	4
5	IT16605	Service Oriented Architecture	3	0	0	3
6		Elective - I	3	0	0	3
PR	ACTICALS	5				
7	IT16611	Mobile Application Development Laboratory (Common to CS & IT)	0	0	3	2
8	IT16612	Automata and Compiler Laboratory	0	0	3	2
9	GE16661	Interview and Career Skills Laboratory (Common to all branches)	0	0	4	2
TOT	ΓAL		18	1	10	25

#### **SEMESTER VII**

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	IT16701	Internet of Things (Common to CS, EE, EC& IT)	3	0	0	3
2	IT16702	Information Security	3	0	0	3
3	IT16703	Big Data Analytics	3	0	0	3
4	IT16704	Cloud Computing	3	0	0	3
5		Elective - II	3	0	0	3
PR	ACTICAL	S				
6	IT16711	IoT Laboratory	0	0	3	2
7	IT16712	Information Security Laboratory	0	0	3	2
8	IT16713	Cloud Computing and Big Data Laboratory	0	0	3	2
9	IT16714	Project Work Phase I	0	0	3	2
TO	ΓAL		15	0	12	23

#### SEMESTER VIII

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1		Elective III	3	0	0	3
2		Elective IV	3	0	0	3
3		Elective V	3	0	0	3
PR	ACTICAL	5				
4	IT16811	Project Work Phase II	0	0	12	6
TO	ГAL		9	0	12	15

Total Credit : 190

#### **ELECTIVE I**

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	IT16001	Free and Open Source Software	3	0	0	3
2	IT16002	Data Science using Python	3	0	0	3
3	IT16003	Functional Programming using SCALA	3	0	0	3
4	IT16004	Statistical Analysis using R- Programming	3	0	0	3
5	IT16005	Digital Image Processing (Common to CS, EE, EC & IT)	3	0	0	3
6	CS16016	User Interface Technologies (Common to CS & IT)	3	0	0	3

#### **ELECTIVE II**

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	IT16006	Multimedia Compression Techniques	3	0	0	3
2	EC16703	Embedded and Real Time Systems (Common to EC & IT)	3	0	0	3
3	EC16017	Ad hoc and Sensor Networks (Common to CS, EC & IT)	3	0	0	3
4	IT16007	Cognitive Radio Networks	3	0	0	3
5	EC16801	Wireless Networks (Common to CS, EC & IT)	3	0	0	3

#### ELECTIVE III

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	CS16009	Bio Informatics (Common to CS & IT)	3	0	0	3
2	CS16003	Business Intelligence (Common to CS & IT)	3	0	0	3
3	IT16008	Deep Learning	3	0	0	3
4	IT16009	Grid Computing	3	0	0	3
5	IT16010	Computer Vision	3	0	0	3
6	IT16011	Next Generation Cloud	3	0	0	3

#### ELECTIVE IV

SL.	COURSE	COURSE TITLE	L	Т	Р	С
No	CODE					
1	IT16012	Security Principles and Techniques	3	0	0	3
2	IT16013	Cyber Forensics	3	0	0	3
3	IT16014	Information System Security Engineering and Management	3	0	0	3
4	IT16015	Ethical Hacking (Common to CS & IT)	3	0	0	3
5	IT16016	Digital Forensic Tools and Techniques (Common to CS & IT)	3	0	0	3

SL.	COURSE	COURSE TITLE	L	Т	Р	С	
No	CODE						
1	GE16701	Total Quality Management (Common to all branches except CE & BT)	3	0	0	3	
2	GE16001	Professional Ethics (Common to all branches except CE & BT)	3	0	0	3	
3	CS16704	Resource Management Techniques (Common to CS & IT)	3	0	0	3	
4	MG16851	Principles of Management (Common to AE, CS, EE, EC, IT and ME)	3	0	0	3	
5	IT16017	Software Project Management (Common to EC & IT)	3	0	0	3	

## ELECTIVE V

#### **OBJECTIVES**:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

#### UNIT I

Listening – Introducing learners to GIE – Types of listening – Listening to audio (verbal & sounds); Speaking – Speaking about one's place, important festivals etc. – Introducing oneself, one's family / friend; Reading – Skimming a reading passage – Scanning for specific information – Note-making; Writing – Free writing on any given topic (My favourite place / Hobbies / School life, etc.) – Sentence completion – Autobiographical writing (writing about one's leisure time activities, hometown, etc.); Grammar – Prepositions – Reference words – Wh-questions – Tenses (Simple); Vocabulary – Word formation – Word expansion (root words / etymology); E-materials – Interactive exercises for Grammar & Vocabulary – Reading comprehension exercises – Listening to audio files and answering questions.

#### UNIT II

Listening – Listening and responding to video lectures / talks; Speaking – Describing a simple process (filling a form, etc.) – Asking and answering questions – Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing – Biographical writing (place, people) – Process descriptions (general/specific) – Definitions – Recommendations – Instructions; Grammar – Use of imperatives - Subject-verb agreement; Vocabulary – Compound words – Word Association (connotation); E-materials – Interactive exercises for Grammar and Vocabulary – Listening exercises with sample telephone conversations / lectures – Picture-based activities.

#### UNIT III

Listening – Listening to specific task – focused audio tracks; Speaking – Role-play – Simulation – Group interaction – Speaking in formal situations (teachers, officials, foreigners); Reading – Reading and interpreting visual material; Writing – Jumbled sentences – Coherence and cohesion in writing – Channel conversion (flowchart into process) – Types of paragraph (cause and effect / compare and contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary – Different forms and uses of words, Cause and effect words; E-materials – Interactive exercises for Grammar and Vocabulary – Excerpts from films related to the theme and follow up exercises – Pictures of flow charts and tables for interpretations.

#### UNIT IV

Listening – Watching videos / documentaries and responding to questions based on them; Speaking – Responding to questions – Different forms of interviews – Speaking at different types of interviews; Reading – Making inference from the reading passage – Predicting the content of a reading passage; Writing – Interpreting visual materials (line graphs, pie charts etc.) – Essay writing – Different types

#### 9+3

9 + 3

#### 9 + 3

#### 9 + 3

of essays; Grammar – Adverbs – Tenses – future time reference; Vocabulary – Single word substitutes – Use of abbreviations and acronyms; E-materials – Interactive exercises for Grammar and Vocabulary – Sample interviews – film scenes -dialogue writing.

#### UNIT V

#### 9+3

Listening – Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast and telecast from Radio and TV; Speaking – Giving impromptu talks, Making presentations on given topics; Reading – Email communication – Reading the attachment files having a poem/joke/proverb – Sending their responses through email; Writing – Creative writing, Poster making; Grammar – Direct and indirect speech; Vocabulary – Lexical items (fixed / semi fixed expressions); E-materials – Interactive exercises for Grammar and Vocabulary – Sending emails with attachment – Audio / video excerpts of different accents – Interpreting posters.

#### **TOTAL (L:45 + T:15) : 60 PERIODS**

#### **OUTCOMES:**

CO1	Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
CO2	Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
CO3	Read different genres of texts adopting various reading strategies.
CO4	Listen/view and comprehend different spoken discourses/excerpts in different accents.

#### **REFERENCES:**

- 1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012
- Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011
- 3. Goodale, Malcolm, Professional Presentations Video Pack: A Video Based Course Cambridge University Press; Pap/Vhs edition 1998)
- 4. Downes, Colm, Cambridge English for Job-hunting, Cambridge University Press, New Delhi. 2008
- 5. Murphy, Raymond, Intermediate English Grammar with Answers, Cambridge University Press, 2000.
- 6. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
- 7. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005.
- 8. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001.
- 9. Thomson, A.J. Practical English Grammar 1&2 Oxford 1986.

#### **EXTENSIVE Reading (Not for Examination)**

Kalam, Abdul. Wings of Fire. Universities Press, Hyderabad. 1999.

#### **WEBSITES:**

- 1. <u>http://www.usingenglish.com</u>
- 2. <u>http://www.uefap.com</u>

#### **TEACHING METHODS:**

- Lectures
- Activities conducted individually, in pairs and in groups like self introduction, peer introduction, group poster making, grammar and vocabulary games, etc.
- Discussions
- Role play activities
- Short presentations
- Listening and viewing activities with follow up activities like discussion, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc.

#### **EVALUATION PATTERN:**

3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Reviews
- Creative writing
- Poster making, etc.

All the four skills are to be tested with equal weightage given to each.

- ✓ Speaking assessment: Individual speaking activities, Pair work activities like role play, Interview, Group discussions
- ✓ Reading assessment: Reading passages with comprehension questions graded from simple to complex, from direct to inferential
- ✓ Writing assessment: Writing paragraphs, essays etc. Writing should include grammar and vocabulary.
- ✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content.

#### MA16151

#### **OBJECTIVES**:

• To develop the use of matrix algebra techniques this is needed by engineers for practical applications.

**MATHEMATICS - I** 

- To make the student knowledgeable in the area of infinite series and their convergence so that he/she will be familiar with the limitations of using infinite series approximations for solutions arising in mathematical modelling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concept of improper integrals of Gamma, Beta and error functions which are needed in engineering applications
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

#### UNIT I MATRICES

Eigen values and Eigen vectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigen vectors – Statement and Applications of Cayley-Hamilton Theorem – Diagonalization of matrices– Reduction of a quadratic form to canonical form by orthogonal transformation-Nature of quadratic forms.

#### UNIT II SEQUENCEANDSERIES

Sequences: Definition and examples - Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz' test – Series of positive and negative terms – Absolute and conditional convergence.

## UNIT IIIAPPLICATION OF DIFFERENTIAL CALCULUS9+3

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Evolute as envelope of normals.

#### UNIT IV DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES 9+3

Limits and Continuity - Partial derivatives – Total derivatives – Differentiation of implicit functions – Jacobians and properties– Taylor's series for functions of two variables – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.

#### UNIT V MULTIPLE INTEGRALS

Double integrals in Cartesian and polar coordinates – Change of order of integration – Area enclosed by plane curves - Change of variables in double integrals – Area of a curved surface - Triple integrals – Volume of solids.

#### TOTAL: (L: 45+T:15): 60 PERIODS

9+3

9+3

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9+3

CO1	Acquire matrix algebra techniques needed by engineers.
CO2	Express proficiency in handling the concepts of convergence and divergence of sequences and series.
CO3	Apply the concepts of differential calculus to find the evolutes and envelopes of curves
CO4	Explore functions of several variables and to find the maxima and minima of functions of two or more variables
CO5	Apply the concepts of multiple integrals to find the area of surfaces and volume of solids.

#### **TEXT BOOKS:**

- 1. Erwin Kreyszig, Advanced engineering mathematics, 8<sup>th</sup> Edition, John Wiley, 1999.
- 2. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd., (2011).
- 3. Grewal. B.S, "Higher Engineering Mathematics", 41<sup>st</sup>Edition, Khanna Publications, Delhi, (2011).

- 1. Dass, H.K., and Er.Rajnish Verma, "Higher Engineering Mathematics", S.Chand Private Ltd.,(2011).
- 2. Glyn James, "Advanced Modern Engineering Mathematics", 3<sup>rd</sup> Edition, Pearson Education, (2012).
- 3. Peter V.O'Neil, "Advanced Engineering Mathematics", 7<sup>th</sup> Edition, Cengage learning, (2012).
- 4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company New Delhi, (2008).
- 5. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, Pearson Publishing, 2011.

#### PH16151

#### **OBJECTIVES**:

To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

#### UNIT I CRYSTAL PHYSICS

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)- Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques(qualitative)

#### UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS

Elasticity- Hooke's law - Relationship between three moduli of elasticity (qualitative) – stress - strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young's modulus by uniform bending- I-shaped girders Modes of heat transfer-thermal conductivity- Newton's law of cooling - Linear heat flow – Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel)

#### UNIT III QUANTUM PHYSICS

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton Effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment -Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

#### UNIT IV ACOUSTICS AND ULTRASONICS

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications – Sonogram.

#### UNIT V PHOTONICS AND FIBRE OPTICS

Spontaneous and stimulated emission- Population inversion -Einstein's A and B coefficients - derivation. Types of lasers – Nd: YAG, CO2, Semiconductor lasers (homojunction & heterojunction)- Industrial and Medical Applications. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

#### **TOTAL: 45 PERIODS**

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CO1	Develop an understanding in fundamental physics and basic engineering properties to include advanced knowledge in one or more engineering disciplines
CO2	Learn to formulate, conduct, analyse and interpret experiments in engineering physics
CO3	Analyse the concepts in quantum Physics and learn to solve the problems
CO4	Classify and demonstrate the usage of modern engineering physics techniques and tools
CO5	Exhibit the ability to enhance knowledge about Photonics and optical fiber communication system

#### **TEXT BOOKS:**

- 1. Gaur R.K. and Gupta S.L. Engineering Physics. Dhanpat Rai publishers, 2009
- 2. Arumugam M. Engineering Physics. Anuradha publishers, 2010.

- 1. Searls and Zemansky. University Physics, 2009.
- 2. Gasiorowicz, Stephen, Quantum Physics, John Wiley & Sons, 2000.
- 3. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009.
- 4. Palanisamy P.K. Engineering Physics. SCITECH Publications, 2011.
- 5. Pandey B.K., Chaturvedi.S. Engineering Physics, Cengage Learning India Pvt.Ltd, 2012.

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#### **ENGINEERING CHEMISTRY – I**

#### L T P C 3 0 0 3

#### **OBJECTIVES**:

CY16151

- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- To acquaint the students with the basics of nano materials, their properties and application

## UNIT I POLYMER CHEMISTRY

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types and mechanism of polymerization: Addition (Free Radical, cationic and anionic); condensation and copolymerization. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon 6,6, and Epoxy resin.

## UNIT II CHEMICAL THERMODYNAMICS

Terminology of thermodynamics - Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions (problems); Criteria of spontaneity; Gibbs-Helmholtz equation (problems); Clausius-Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore (problems).

## UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY

**Photochemistry:** Laws of photochemistry - Grothus–Draper law, Stark–Einstein law and Lambert-Beer Law. Quantum efficiency – determination- Photo processes - Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photosensitization.

**Spectroscopy:** Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only).

## UNIT IV PHASE RULE AND ALLOYS

**Phase rule:** Introduction, definition of terms with examples, One Component System- water system -Reduced phase rule - Two Component Systems- classification – lead-silver system, zinc-magnesium system.

**Alloys:** Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel; Non-ferrous alloys – brass and bronze.

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#### UNIT V NANOCHEMISTRY

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Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and applications.

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Classify the polymers and relate their properties.
CO2	Describe the classical thermodynamics, thermodynamic properties and phase equilibrium.
CO3	Interpret the photochemical reactions and spectroscopic techniques.
CO4	Apply the phase rule to the study of alloys.
CO5	Compare the Nano and bulk materials in terms of change in properties and its applications.

#### **TEXT BOOKS:**

- 1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.
- 2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009.

- 1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010.
- 2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
- 3. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,), Chennai, 2006.
- 4. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

## **COMPUTER PROGRAMMING**

## **OBJECTIVES**:

GE16151

#### The students should be made to:

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

#### UNIT I **INTRODUCTION**

Generation and Classification of Computers- Basic Organization of a Computer -Number System -Binary - Decimal - Conversion - Problems. Need for logical analysis and thinking - Algorithm -Pseudo code - Flow Chart.

#### **UNIT II C PROGRAMMING BASICS**

Problem formulation - Problem Solving - Introduction to 'C' programming -fundamentals structure of a 'C' program – compilation and linking processes – Constants, Variables – Data Types - Expressions using operators in 'C' - Managing Input and Output operations - Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

#### UNIT III **ARRAYS AND STRINGS**

Arrays - Initialization - Declaration - One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

#### **UNIT IV** FUNCTIONS AND POINTERS

Function - definition of function - Declaration of function - Pass by value - Pass by reference -Recursion - Pointers - Definition - Initialization - Pointers arithmetic - Pointers and arrays-Example Problems.

#### UNIT V STRUCTURES AND UNIONS

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions - Storage classes, Pre-processor directives.

#### **TOTAL: 45 PERIODS**

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CO1	Apply simple algorithms for arithmetic and logical problems
CO2	Apply & implement conditional branching, iteration, and recursion to solve problems
CO3	Apply appropriate constructs based on algorithms. Also, to test and execute the programs and to fix logical and syntax errors.
CO4	Examine the problem for its decomposition into functions
CO5	Design and develop solutions to real-world problems using C.

#### **TEXT BOOKS:**

- 1. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
- 2. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
- 3. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

- 1. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
- 2. Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.
- 3. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2006.

1

5+9

5+9

#### **OBJECTIVES**:

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose them to existing national standards related to technical drawings.

#### **CONCEPTS AND CONVENTIONS (Not for Examination)**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

#### UNIT I PLANE CURVES AND FREE HAND SKETCHING

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves, Scales: Construction of Diagonal and Vernier scales.

**Visualization concepts and Free Hand sketching:** Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects.

#### UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 5+9

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

#### UNIT III PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

#### UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT 5+9 OF SURFACES

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

#### UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

#### **COMPUTER AIDED DRAFTING (Demonstration Only)**

Introduction to drafting packages and demonstration of their use.

3

6+9

TOTAL: 75 PERIODS

CO1	Students will construct conic sections and curves and perform free hand sketching of simple components
CO2	Students will sketch the orthographic views of lines and planes using the principles of orthographic projection.
CO3	Students will apply the concepts of orthographic projection and sketch different views of simple solid blocks in different positions.
CO4	Students will sketch the cut section and develop the surfaces of simple solids.
CO5	Students will sketch the pictorial projection of simple solids and understand computer aided drafting using AutoCAD

#### **TEXT BOOKS:**

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

#### **REFERENCES:**

- 1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
- 2. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
- 3. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.
- 4. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
- 5. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
- 6. BasantAgarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

#### Publication of Bureau of Indian Standards:

- 1. IS 10711 2001: Technical products Documentation Size and lay out of drawing sheets.
- 2. IS 9609 (Parts 0 & 1) 2001: Technical products Documentation Lettering.
- 3. IS 10714 (Part 20) 2001 & SP 46 2003: Lines for technical drawings.
- 4. IS 11669 1986 & SP 46 2003: Dimensioning of Technical Drawings.
- 5. IS 15021 (Parts 1 to 4) 2001: Technical drawings Projection Methods.

#### **Special points applicable to University Examinations on Engineering Graphics:**

- 1. There will be five questions, each of either or type covering all units of the syllabus.
- 2. All questions will carry equal marks of 20 each making a total of 100.
- 3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

The examination will be conducted in appropriate sessions on the same day

#### **COMPUTER PRACTICES LABORATORY**

#### **OBJECTIVES**:

GE16161

#### The student should be made to:

- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

#### LIST OF EXPERIMENTS:

- Search, generate, manipulate data using MS office/ Open Office 1.
- 2. Presentation and Visualization – graphs, charts, 2D, 3D
- 3. Problem formulation, Problem Solving and Flowcharts
- 4. C Programming using Simple statements and expressions
- 5. Scientific problem solving using decision making and looping.
- Simple programming for one dimensional and two dimensional arrays. 6.
- 7. Solving problems using String functions
- 8. Programs with user defined functions - Includes Parameter Passing
- 9. Program using Recursive Function and conversion from given program to flow chart.
- 10. Program using structures and unions.

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Use appropriate tools in office package for documentation, presentation and visualization charts
CO2	Sketch the flow chart for simple problems using problem solving skills
CO3	Utilize decision making and looping statements for problem solving
CO4	Apply the concept of array and string manipulation to implement sorting and searching
CO5	Develop simple applications using structure and union

#### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Stand alone desktops with C compiler 30 Nos.

(or)

Server with C compiler supporting 30 terminals or more.

#### GE16162 ENGINEERING PRACTICES LABORATORY L T P C

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13

#### **OBJECTIVES**:

• To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

#### **GROUP A (CIVIL & MECHANICAL)**

#### I CIVIL ENGINEERING PRACTICE Buildings:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

#### **Plumbing Works:**

- a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- b) Study of pipe connections requirements for pumps and turbines.
- c) Preparation of plumbing line sketches for water supply and sewage works.
- d) Hands-on-exercise:
  Basic pipe connections Mixed pipe material connection Pipe connections with different joining components.
- e) Demonstration of plumbing requirements of high-rise buildings.

#### **Carpentry using Power Tools only:**

- a) Study of the joints in roofs, doors, windows and furniture.
- b) Hands-on-exercise: Wood work, joints by sawing, planning and cutting.

#### II MECHANICAL ENGINEERING PRACTICE

#### Welding:

- a) Preparation of arc welding of butt joints, lap joints and tee joints.
- b) Gas welding practice

#### **Basic Machining:**

- a) Simple Turning and Taper turning
- b) Drilling Practice

#### **Sheet Metal Work:**

- a) Forming & Bending:
- b) Model making Trays, funnels, etc.
- c) Different type of joints.

#### Machine assembly practice:

- a) Study of centrifugal pump
- b) Study of air conditioner

#### **Demonstration on:**

- a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
- b) Foundry operations like mould preparation for gear and step cone pulley.
- c) Fitting Exercises Preparation of square fitting and vee fitting models.

#### **GROUP B (ELECTRICAL & ELECTRONICS)**

#### III ELECTRICAL ENGINEERING PRACTICE

- 1. Residential house wiring using switches, fuse, indicator, lamp and energy meter
- 2. Fluorescent lamp wiring.
- 3. Stair case wiring
- 4. Measurement of electrical quantities voltage, current, power & power factor in RLC circuit.
- 5. Measurement of energy using single phase energy meter.
- 6. Measurement of resistance to earth of an electrical equipment.

#### IV ELECTRONICS ENGINEERING PRACTICE

- 1. Study of Electronic components and equipments Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
- 2. Study of logic gates AND, OR, EOR and NOT.
- 3. Generation of Clock Signal.
- 4. Soldering practice Components Devices and Circuits –Using general purpose PCB.
- 5. Measurement of ripple factor of HWR and FWR.

#### **TOTAL: 45 PERIODS**

10

13

OUTCOMES:			
CO1	Fabricate carpentry components and pipe connections including plumbing works.		
CO2	Use welding equipment to join the structures.		
CO3	Do wiring of basic electrical system and measurement of electrical parameters.		
CO4	Apply the concepts of implementation of basic electronic components, circuits and solar photovoltaic panel.		
CO5	Design a basic regulated power supply.		

#### **REFERENCES:**

- 1. Jeyachandran K., Natarajan S. & Balasubramanian S., "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
- 2. Jeyapoovan T., Saravanapandian M. &Pranitha S., "Engineering Practices Lab Manual", VikasPuplishing House Pvt.Ltd, 2006.
- 3. Bawa H.S., "Workshop Practice", Tata McGraw Hill Publishing Company Limited, 2007.
- 4. Rajendra Prasad A. & Sarma P.M.M.S., "Workshop Practice", SreeSai Publication, 2002.
- 5. Kannaiah P. & Narayana K.L., "Manual on Workshop Practice", Scitech Publications, 1999.

# LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets

21

2.	Carpentry vice (fitted to work bench)	15 Nos.
3.	Standard woodworking tools	15 Sets
4.	Models of industrial trusses, door joints, furniture joints	5 each
5.	Power Tools:	
	a) Rotary Hammer	2 Nos.
	b) Demolition Hammer	2 Nos.
	c) Circular Saw	2 Nos.
	d) Planer	2 Nos.
	e) Hand Drilling Machine	2 Nos.
	f) Jigsaw	2 Nos.

#### MECHANICAL

1.	Arc welding transformer with cables and holders	5 Nos.
2.	Welding booth with exhaust facility	5 Nos.
3.	Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4.	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5.	Centre lathe	2 Nos.
6.	Hearth furnace, anvil and smithy tools	2 Nos.
7.	Moulding table, foundry tools	2 Nos.
8.	Power Tool: Angle Grinder	2 Nos.
9.	Study-purpose items: centrifugal pump, air-conditioner	One each.

## ELECTRICAL

1.	Assorted electrical components for house wiring	15 Sets.
2.	Electrical measuring instruments	10 Sets.
3.	Study purpose items: Iron box, fan and regulator, emergency lamp 1 each	
	Megger (250V/500V)	1 No.
4.	Power Tools:	
	a) Range Finder	2 Nos.
	b) Digital Live-wire detector	2 Nos.
	ELECTRONICS	
1	Soldaring owns	$10 N_{ec}$

1.	Soldering guils	10 INOS.
2.	Assorted electronic components for making circuits	50 Nos.
3.	Small PCBs	10 Nos.
4.	Multimeters	10 Nos.
5.	Study purpose items: Telephone, FM radio, low-voltage power supply	

## PHYSICS LABORATORY – I

#### **OBJECTIVES**:

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

#### LIST OF EXPERIMENTS:

- 1. a) Determination of Wavelength, and particle size using Laser.
  - b) Determination of acceptance angle in an optical fiber.
- 2. Determination of velocity of sound and compressibility of liquid Ultrasonic Interferometer.
- 3. Determination of wavelength of mercury spectrum spectrometer grating.
- 4. Determination of thermal conductivity of a bad conductor Lee's Disc method.
- 5. Determination of Young's modulus by Non uniform bending method.
- 6. Determination of specific resistance of a given coil of wire Carey Foster's Bridge.

#### **OUTCOMES:**

The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

#### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

- 1. Diode laser, lycopodium powder, glass plate, optical fiber.
- 2. Ultrasonic interferometer
- 3. Spectrometer, mercury lamp, grating
- 4. Lee's Disc experimental set up
- 5. Traveling microscope, meter scale, knife edge, weights.
- 6. Carey foster's bridge set up (vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

#### **CHEMISTRY LABORATORY - I**

#### **OBJECTIVES**:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by viscometry.

#### LIST OF EXPERIMENTS: (Any FIVE Experiments)

- 1. Determination of DO content of water sample by Winkler's method.
- 2. Determination of chloride content of water sample by argentometric method
- 3. Determination of strength of given hydrochloric acid using pH meter
- 4. Determination of strength of acids in a mixture using conductivity meter.
- 5. Estimation of iron content of the water sample using spectrophotometer (phenanthroline / thiocyanate method).
- 6. Determination of molecular weight of polyvinylalcohol using Ostwald viscometer Conductometric titration of strong acid vs strong base.

#### **TOTAL: 30 PERIODS**

CO1	Analyze the physical principle involved in the various instruments, also relate the principle to new application. Analyze the water quality parameters such as Dissolved oxygen, pH, Chloride, Iron present in the given water sample.	
CO2	Comprehend the Experiments in the areas of optics, mechanics and thermal physics to nurture the concepts in all branches of Engineering. Determination of molecular weight of polymer	
CO3	Acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis. Apply the basic concepts of Physical Science to think innovatively and also improve the creative skills that are essential for engineering.	

- 1. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New York 2001.
- 2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogels Textbook of practical organic chemistry", LBS Singapore 1994.
- 3. Jeffery G.H., Bassett J., Mendham J.and Denny vogels R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
- 4. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980

#### **OBJECTIVES**:

- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

#### UNIT I

Listening - Listening to informal conversations and participating; Speaking - Opening a conversation(greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using 'emoticons' as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); Ematerials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

#### UNIT II

Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one's friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials – Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs – Language Lab - Dialogues (Fill up exercises), Recording students' dialogues.

#### UNIT III

Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning – Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading articles from journals - Format for journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses – Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. 'rock', 'train', 'ring'); E-materials - Interactive exercise on Grammar and vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials – Attending a meeting and writing minutes.

#### 9+3

9+3

#### 9+3

#### UNIT IV

Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic and video conferencing); Speaking - Role play practice in telephone skills - listening and responding, - asking questions, -note taking – passing on messages, Role play and mock interview for grasping interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - resume preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials – Interactive exercises on Grammar and Vocabulary - Different forms of resumes- Filling up a resume / cover letter; Language Lab - Telephonic interview – recording the responses - e-resume writing.

#### UNIT V

#### 9+3

9+3

Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading; Writing – Checklist - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; Ematerials- Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises; Language Lab - Different models of group discussion.

#### TOTAL(L:45+T:15): 60 PERIODS

#### **OUTCOMES:**

CO1	Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, and argue using appropriate communicative strategies.
CO2	Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing
CO3	Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for the method of presentation
CO4	Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.
CO5	Face Job Interviews with Confidence

- 1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012.
- 2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011.
- 3. Goodale, Malcolm, Professional Presentations Video Pack: A Video Based Course Cambridge University Press; Pap/Vhs edition 1998).
- 4. Downes, Colm, Cambridge English for Job-hunting, Cambridge University Press, New

Delhi. 2008.

- 5. Murphy,Raymond, Intermediate English Grammar with Answers, Cambridge University Press 2000.
- 6. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
- 7. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
- 8. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001
- 9. Thomson, A.J. Practical English Grammar 1&2 Oxford 1986.

#### **WEBSITES:**

- 1. http://www.usingenglish.com
- 2. http://www.uefap.com3.
- 3. https://owl.english.purdue.edu/owl/
- 4. www.learnenglishfeelgood.com/esl-printables-worksheets.html

#### **TEACHING METHODS:**

- Lectures
- Activities conducted individually, in pairs and in groups like individual writing and presentations, group discussions, interviews, reporting, etc
- Long presentations using visual aids
- Listening and viewing activities with follow up activities like discussions, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc
- Projects like group reports, mock interviews etc using a combination of two or more of the language skills

#### **EVALUATION PATTERN:**

3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Report
- Creative writing, etc.

All the four skills are to be tested with equal weightage given to each.

- ✓ Speaking assessment: Individual presentations, Group discussions.
- ✓ Reading assessment: Reading passages with comprehension questions graded following Bloom's taxonomy.
- ✓ Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
- ✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom's taxonomy.

#### MA16251

#### **OBJECTIVES**:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated

#### UNIT I VECTOR CALCULUS

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

#### UNIT II ORDINARY DIFFERENTIAL EQUATIONS

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

#### UNIT III LAPLACE TRANSFORM

Laplace transform – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform -Statement of Convolution theorem – Initial and final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

#### UNIT IV ANALYTIC FUNCTION

Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w = z+k, kz, 1/z, z2, ez and bilinear transformation.

#### UNIT V COMPLEX INTEGRATION

Complex integration –Statement and applications of Cauchy's integral theorem and Cauchy's integral formula –Taylor's and Laurent's series expansions – Singular points– Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

#### TOTAL(L:45+T:15):60 PERIODS

#### MATHEMATICS II

#### 9+3

9+3

#### 9+3

9 + 3

#### 9+3

CO1	Interpret the fundamentals of vector calculus and be fluent in the use of Stokes theorem and Gauss divergence theorem.
CO2	Express proficiency in handling higher order differential equations.
CO3	Determine the methods to solve differential equations using Laplace transforms and Inverse Laplace transforms.
CO4	Explain Analytic functions and Categorize transformations.
CO5	Solve complex integrals using Cauchy integral theorem and Cauchy's residue theorem.

#### **TEXT BOOKS:**

- 1. Erwin Kreyszig, Advanced engineering mathematics, 8th Edition, John Wiley, 1999.
- 2. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth edition, Laxmi Publications Pvt Ltd., (2011).
- 3. Grewal. B.S, "Higher Engineering Mathematics", 41stEdition, Khanna Publications, Delhi, (2011).

- 1. Dass, H.K., and Er.Rajnish Verma, "Higher Engineering Mathematics", S.Chand Private Ltd.,(2011).
- 2. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, (2012).
- 3. Peter V.O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning, (2012).
- 4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company New Delhi, (2008).
- 5. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, PEARSON Publishing, 2011.

### **OBJECTIVES**:

• To enrich the understanding of various types of materials and their applications in engineering and technology.

#### UNIT I CONDUCTING MATERIALS

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

#### UNIT II SEMICONDUCTING MATERIALS

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors - direct and indirect band gap- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

#### UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

#### UNIT IV DIELECTRIC MATERIALS

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – Ferro electricity and applications.

#### UNIT V ADVANCED ENGINEERING MATERIALS

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical Kerr effect – Classification of Biomaterials and its applications.

#### **TOTAL: 45 PERIODS**

9

9

9

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9

CO1	Comprehend the importance of free electrons in determining the properties of metals, semiconductors and understand the concept of Fermi energy.
CO2	Describe the basic magnetic, superconducting and Dielectric properties of materials
CO3	Relate the Utilization of nano technology in various disciplines and also applications of the new engineering materials

#### **TEXT BOOKS:**

- 1. Arumugam M., Materials Science. Anuradha publishers, 2010.
- 2. Pillai S.O., Solid State Physics. New Age International (P) Ltd., publishers, 2009.

- 1. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
- 2. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009.
- 3. Pandey B.K., Chaturvedi.S. Engineering Physics, Cengage Learning India Pvt.Ltd, 2012.
- 4. Kittel, Charles, Introduction to Solid State Physics, JOHN WILEY ,India,2010.
- 5. Dekker, Adrianus J. Electrical Engineering Materials, Prentice-Hall Of India; 2002.

#### CY16251

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#### **OBJECTIVES**:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

#### UNIT I WATER TECHNOLOGY

Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation -softening of hard water -external treatment zeolite and demineralization - internal treatment boiler compounds (phosphate, calgon, carbonate, colloidal) - caustic embrittlement -boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

#### UNIT II ELECTROCHEMISTRY AND CORROSION

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation potential- reduction potential, measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems). Corrosion- causes- factors- types-chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Paints- constituents and function. Electroplating of Copper and electroless plating of nickel.

#### UNIT III ENERGY SOURCES

Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusiondifferences between nuclear fission and fusion- nuclear chain reactions nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline batterylead storage battery nickel-cadmium battery- lithium battery- fuel cell H2 -O2 fuel cellapplications.

#### UNIT IV ENGINEERING MATERIALS

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement-properties and uses. Glass - manufacture, types, properties and uses.

#### UNIT V FUELS AND COMBUSTION

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coalanalysis of coal (proximate and ultimate)- carbonization manufacture of metallurgical coke (Otto Hoffmann method) – petroleum manufacture of synthetic petrol (Bergius process)- knockingoctane number - diesel oil- cetane number - natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG)- producer gas- water gas. Power alcohol and bio diesel. Combustion of fuels: introduction- theoretical calculation of calorific value- calculation of stoichiometry of fuel and air ratio- ignition temperature, explosive range - flue gas analysis (ORSAT Method).

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Estimate the hardness of water, discuss the boiler feed water requirements and related problems also identification of suitable water treatment methods.
CO2	Describe the electrochemical cells, measurement of EMF, corrosion mechanism, its types and methods of corrosion control.
CO3	Apply the knowledge on non-conventional energy sources to the analysis and design of advanced energy storage devices.
CO4	Explain the method of manufacture, basic chemical and physical properties and uses of various engineering materials in industries.

#### **TEXT BOOKS:**

- 1. Vairam S, Kalyani P and Suba Ramesh., "Engineering Chemistry"., Wiley India PvtLtd., New Delhi., 2011.
- 2. DaraS.S,UmareS.S."Engineering Chemistry", S. Chand & Company Ltd., New Delhi , 2010.

- 1. Kannan P. and Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009.
- 2. AshimaSrivastava and Janhavi N N., "Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi., 2010.
- 3. RenuBapna and Renu Gupta., "Engineering Chemistry", Macmillan India 27 Publisher Ltd., 2010.
- 4. Pahari A and Chauhan B., "Engineering Chemistry"., Firewall Media., New Delhi., 2010.

#### CS16201 DIGITAL PRINCIPLES AND SYSTEM DESIGN

#### **OBJECTIVES**:

#### The student should be made to:

- Learn the various number systems.
- Learn Boolean Algebra
- Understand the various logic gates.
- Be familiar with various combinational circuits.
- Be familiar with designing synchronous and asynchronous sequential circuits.
- Be exposed to designing using PLD

#### UNIT I BOOLEAN ALGEBRA AND LOGIC GATES

Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map and Tabulation Methods – Logic Gates – NAND and NOR Implementations.

#### UNIT II COMBINATIONAL LOGIC

Combinational Circuits – Analysis and Design Procedures – Circuits for Arithmetic Operations, Code Conversion – Decoders and Encoders – Multiplexers and Demultiplexers – Introduction to HDL – HDL Models of Combinational circuits.

#### UNIT III SYNCHRONOUS SEQUENTIAL LOGIC

Sequential Circuits – Latches and Flip Flops – Analysis and Design Procedures – State Reduction and State Assignment – Shift Registers – Counters – HDL for Sequential Logic Circuits.

#### UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

#### UNIT V MEMORY AND PROGRAMMABLE LOGIC

RAM and ROM – Memory Decoding – Error Detection and Correction – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices – Application Specific Integrated Circuits.

#### **TOTAL: 45 PERIODS**

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CO1	Perform Arithmetic Operations in any number system & to simplify the boolean expression using K-map and Tabulation techniques.
CO2	Use Boolean simplification techniques to design a combinational hardware circuit.
CO3	Design and Analysis of a given digital sequential hardware circuit.
CO4	Design and Analysis of a given digital circuit for asynchronous sequential circuit.
CO5	Design using PLD

#### **TEXT BOOKS:**

1. Morris Mano M. and Michael D. Ciletti, "Digital Design", IV Edition, Pearson Education, 2008.

- 1. John F. Wakerly, "Digital Design Principles and Practices", Fourth Edition, Pearson Education, 2007.
- 2. Charles H. Roth Jr, "Fundamentals of Logic Design", Fifth Edition Jaico Publishing House, Mumbai, 2003.
- 3. Donald D. Givone, "Digital Principles and Design", Tata Mcgraw Hill, 2003.
- 4. Kharate G. K., "Digital Electronics", Oxford University Press, 2010.

#### CS16202 PROGRAMMING AND DATA STRUCTURES I L

#### 3 0 0 3

T P C

#### **OBJECTIVES**:

#### The student should be made to:

- Be familiar with the basics of C programming language.
- Be exposed to the concepts of ADTs
- Learn linear data structures list, stack, and queue.
- Be exposed to sorting, searching, hashing algorithms

#### UNIT I C PROGRAMMING FUNDAMENTALS- A REVIEW 9

Conditional statements – Control statements – Functions – Arrays – Preprocessor - Pointers -Variation in pointer declarations – Function Pointers – Function with Variable number of arguments

#### UNIT II C PROGRAMMING ADVANCED FEATURES

Structures and Unions - File handling concepts – File read – write – binary and Stdio - File Manipulations.

#### UNIT III LINEAR DATA STRUCTURES – LIST

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operation (Insertion, Deletion, Merge, Traversal).

#### UNIT IV LINEAR DATA STRUCTURES – STACKS, QUEUES

Stack ADT – Evaluating arithmetic expressions- other applications- Queue ADT – circular queue implementation – Double ended Queues – applications of queues.

#### UNIT V SORTING, SEARCHING AND HASH TECHNIQUES

Sorting algorithms: Insertion sort - Selection sort - Shell sort - Bubble sort - Quick sort - Merge sort - Radix sort - Searching: Linear search –Binary Search Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

#### **TOTAL: 45 PERIODS**

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#### **OUTCOMES:**

CO1	Utilize the control structures, arrays, pointers and functions of C appropriately for problems.
CO2	Employ Structures, Unions and file handling mechanism appropriately for problems using C
CO3	Implement abstract data type for linear data structures and apply the different linear data structure to problem solutions
CO4	Apply the different linear data structures like stack and queue to problem solutions
CO5	Evaluate various sorting and searching algorithms

#### **TEXT BOOKS:**

- 1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson Education, 1988.
- 2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997.

- 1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
- 2. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011.
- 3. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
- 4. Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Ed.,

#### GE16262 PHYSICS AND CHEMISTRY LABORATORY – II L

### PHYSICS LABORATORY - II

#### **OBJECTIVES**:

• To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

### LIST OF EXPERIMENTS (Any FIVE Experiments):

- 1. Determination of Young's modulus by uniform bending method.
- 2. Determination of band gap of a semiconductor.
- 3. Determination of Coefficient of viscosity of a liquid –Poiseuille's method.
- 4. Determination of Dispersive power of a prism Spectrometer.
- 5. Determination of thickness of a thin wire Air wedge method.
- 6. Determination of Rigidity modulus Torsion pendulum.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

- 1. Traveling microscope, meter scale, Knife edge, weights.
- 2. Band gap experimental set up
- 3. Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance.
- 4. Spectrometer, prism, sodium vapour lamp.
- 5. Air-wedge experimental set up.
- 6. Torsion pendulum set up. (Vernier Caliper, Screw gauge, reading lens are required for most of the experiments).

### CHEMISTRY LABORATORY - II

### **OBJECTIVES**:

• To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

### LIST OF EXPERIMENTS:

- 1. Determination of alkalinity in water sample.
- 2. Determination of total, temporary & permanent hardness of water by EDTA method.
- 3. Estimation of copper content of the given solution by EDTA method.
- 4. Estimation of iron content of the given solution using potentiometer.
- 5. Estimation of sodium present in water using flame photometer.
- 6. Corrosion experiment weight loss method.
- 7. Conductometric precipitation titration using BaCl2 and Na2SO4.
- 8. Determination of CaO in Cement.

### **TOTAL: 30 PERIODS**

#### **REFERENCES:**

- 1. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New York, 2001.
- 2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry, LBS Singapore ,1994.
- 3. Jeffery G.H, Bassett J., Mendham J. and Denny R.C., "Vogel's Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
- 4. Kolthoff I.M. and Sandell E.B. et al. Quantitative chemical analysis, McMillan, Madras 1980.

Laboratory classes on alternate weeks for Physics and Chemistry.

#### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1.	Potentiometer	-	5 Nos
2.	Flame photo meter	-	5 Nos
3.	Weighing Balance	-	5 Nos
4.	Conductivity meter	-	5 Nos

Common Apparatus: Pipette, Burette, conical flask, percelain tile, dropper (30 Nos each)

#### **OUTCOMES:**

CO1	Analyze the physical principle involved in the various instruments, also relate the principle to new application. Analyze the water quality parameters such as Hardness, alkalinity, copper and iron present in the given water sample.
CO2	Comprehend the Experiments in the areas of optics, mechanics and thermal physics to nurture the concepts in all branches of Engineering. Acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
CO3	Apply the basic concepts of Physical Science to think innovatively and also improve the creative skills that are essential for engineering. Decide whether, the water is fit for domestic and industrial applications

#### **DIGITAL LABORATORY**

#### **OBJECTIVES**:

#### The student should be made to:

- Understand the various logic gates.
- Be familiar with various combinational circuits.
- Understand the various components used in the design of digital computers.
- Be exposed to sequential circuits
- Learn to use HDL

#### LIST OF EXPERIMENTS:

- 1. Verification of Boolean Theorems using basic gates.
- 2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
- 3. Design and implementation of combinational circuits using MSI devices:
  - 4 bit binary adder / subtractor
  - Parity generator / checker
  - Magnitude Comparator
  - Application using multiplexers
- 4. Design and implementation of sequential circuits:
  - Shift –registers
  - Synchronous and asynchronous counters
- 5. Coding combinational / sequential circuits using HDL.
- 6. Design and implementation of a simple digital system (Mini Project).

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Develop a combinational hardware circuit using Boolean simplification techniques
CO2	Design and implement combinational and sequential circuits.
CO3	Design a digital circuit – combinational and sequential
CO4	Identify different functional units in a digital computer system
CO5	Design and implement a simple digital system.

# LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:

- 1. Digital trainer kits 30
- 2. Digital ICs required for the experiments in sufficient numbers 96

### **SOFTWARE:**

1. HDL simulator.

#### CS16212 PROGRAMMING AND DATA STRUCTURES LABORATORY I L T P C

#### **OBJECTIVES**:

The students should be made to:

- Be familiar with c programming
- Be exposed to implementing abstract data types
- Learn to use files
- Learn to implement sorting and searching algorithms.

#### LIST OF EXPERIMENTS:

- 1. C Programs using Conditional and Control Statements
- 2. C Programs using Arrays, Strings and Pointers and Functions
- 3. Representation of records using Structures in C Creation of Linked List Manipulation of records in a Linked List
- 4. File Handling in C Sequential access Random Access
- 5. Operations on a Stack and Queue infix to postfix simple expression evaluation using stacks Linked Stack Implementation Linked Queue Implementation
- 6. Implementation of Sorting algorithms
- 7. Implementation of Linear search and Binary Search.

#### **TOTAL: 45 PERIODS**

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#### **OUTCOMES:**

CO1	Design and implement C programs for implementing stacks, queues, linked lists.
CO2	Apply good programming design methods for program development.
CO3	Apply the different data structures for implementing solutions to practical problems.
CO4	Develop sorting programs.
CO5	Develop of linear search and binary search programs

#### LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

Standalone desktops with C compiler 30 Nos.

or

Server with C compiler supporting 30 terminals or more.

## **OBJECTIVES**:

**MA16351** 

- To introduce Fourier series analysis that finds tremendous applications in engineering and • also to analyze boundary value problems.
- To acquaint the student with Fourier transform techniques used to tackle problems in communication and heat transfer.
- To introduce the effective mathematical tools for the solutions of partial differential • equations for linear and non-linear systems.
- To develop Z transform techniques for discrete time systems. •

#### PARTIAL DIFFERENTIAL EQUATIONS **UNIT I**

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

#### **UNIT II** FOURIER SERIES

Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine series -Half range cosine series – Parseval's identity – Harmonic analysis.

#### UNIT III **APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS** 12

Classification of PDE - Method of separation of variables - Solutions of one dimensional wave equation - One dimensional equation of heat conduction - Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

#### **UNIT IV** FOURIER TRANSFORMS

Statement of Fourier integral theorem - Fourier transform pair - Fourier sine and cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity. Finite Fourier transforms, finite Fourier sine and cosine transforms.

#### UNIT V **Z**-TRANSFORMS AND DIFFERENCE EQUATIONS

Z-transforms - Elementary properties - Inverse Z-transform (using partial fraction, long division method and residues) - Convolution theorem - Formation of difference equations - Solution of difference equations using Z-transform.

### **TOTAL (L: 45 + T: 15): 60 PERIODS**

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#### LTPC 3 1 0 4

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#### **OUTCOMES:**

CO1	Express proficiency in handling higher order Partial differential equations
CO2	Acquire the skill in examining a signal in another domain rather in the original domain by handling Full and Half Range Fourier Series.
CO3	Develop skills in the classification, formulation, solution, and interpretation of PDE models.
CO4	Develops the skill of conversion between time domain to frequency domain using the concept of Fourier Transforms
CO5	Apply the systematic method for finding the impulse response of LTI systems described by difference equations: partial fraction expansion.

#### **TEXT BOOKS:**

- 1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10<sup>th</sup> Edition, Wiley India, 2011.
- 2. Grewal. B.S., "Higher Engineering Mathematics", 42<sup>nd</sup> Edition, Khanna Publishers, Delhi, 2012.
- 3. Narayanan.S., Manicavachagom Pillay. T.K and Ramanaiah. G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt. Ltd.1998.

- 1. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7<sup>th</sup> Edition, Laxmi Publications Pvt Ltd, 2007.
- 2. Glyn James, "Advanced Modern Engineering Mathematics", 4<sup>th</sup> Edition, Pearson Education, 2011.
- 3. Veerarajan. T., "Transforms and Partial Differential Equation", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
- 4. Ray Wylie. C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.
- 5. Peter V.O' Neil, "Advanced Engineering Mathematics", Cengage Learning India pvt. Ltd. 7<sup>th</sup> Edition, New Delhi, 2012.

#### PROGRAMMING AND DATA STRUCTURES II (Common to CS & IT)

# **OBJECTIVES**:

**CS16301** 

# • Be familiar with the C++ concepts of abstraction, encapsulation, constructor, polymorphism, overloading and Inheritance.

- Be familiar to tree and heap data structures.
- Be exposed to graph algorithms.
- Learn to apply Tree and Graph structures.

### UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS 9

C++ Programming features - Data Abstraction - Encapsulation - Class -Object - Constructors – Static members – Constant members – Member functions – Pointers – References - Role of this pointer – Storage classes – Function as arguments - String Handling.

### UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS

Dynamic memory allocation - Nested classes - Polymorphism – Compile time and Run time polymorphisms – Function overloading – Operator overloading - Inheritance – Virtual Functions - Abstract class.

### UNIT III C++ PROGRAMMING ADVANCED FEATURES

Generic Programming - Function template - Class template - Exception handling - Standard template libraries – containers – iterators – function adaptors – allocators - File handling concepts.

### UNIT IV TREE AND ITS APPLICATIONS

Trees – Binary Tree – Binary Search Tree - AVL trees – B-Trees – Splay trees – Heaps - Binomial Heaps – File indexing using B+ tree – Threaded binary tree – Huffman coding - Disjoint Sets.

### UNIT V GRAPH AND ITS APPLICATIONS

Representation of Graphs – Breadth-first search – Depth-first search - Topological sort – Minimum Spanning Trees – Kruskal and Prim algorithm – Shortest path algorithm – Dijkstra's algorithm – Bellman-Ford algorithm – Floyd - Warshall algorithm - Euler circuit - Travelling salesman problem - Biconnectivity – Network flow problem.

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Design and implement C++ programs for manipulating stacks, queues, linked lists, trees, and graphs.
CO2	Develop modularized applications using OOPS concept
CO3	Develop solutions to practical problems using ADT
CO4	Develop recursive programs using trees and graphs.
CO5	Investigate the efficiency of different algorithms applied to real world problems

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#### **TEXT BOOKS:**

- 1. Bjarne Stroustrup, "The C++ Programming Language", 4<sup>th</sup> Edition, Addison-Wesley Professional, 2013.
- 2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 4th Edition, Pearson Education, 2014

- 1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.
- 2. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7 th Edition, Wiley Publishers, 2004.

#### **OPERATING SYSTEMS** (Common to CS, EE, EC & IT)

#### **OBJECTIVES**:

#### The student should be made to:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

### UNIT I OPERATING SYSTEMS OVERVIEW

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization-Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

#### UNIT II PROCESS MANAGEMENT

Processes-Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; Threads- Overview, Multicore Programming, Multithreading Models; Windows 7 - Thread and SMP Management. CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux

#### UNIT III PROCESS SCHEDULING AND SYNCHRONIZATION

Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – critical regions – Monitors. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock

#### UNIT IV STORAGE MANAGEMENT

Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32 and 64 bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

### UNIT V I/O SYSTEMS

Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory Structure, Allocation Methods, Free Space Management, I/O Systems. TOTAL (L:45): 45 PERIODS

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CO1	Enumerate the OS concepts and its functionalities
CO2	Demonstrate the various process scheduling and interprocess communication techniques
CO3	Perform process synchronization and deadlock methods
CO4	Identify various memory management schemes and make comparison between the schemes
CO5	Apply file system and storage structure

### **TEXT BOOKS:**

- 1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
- 2. William Stallings, "Operating Systems Internals and Design Principles", 7th Edition, Prentice Hall, 2011.

- 1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
- 2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.

#### IT16301 **COMPUTER ORGANISATION AND ARCHITECTURE**

#### Т Р С L 3 0 3 0

#### **OBJECTIVES:**

- To make students understand the basic structure and operation of digital computer
- To understand the hardware-software interface
- To familiarize the student with arithmetic and logic unit and implementation of • fixed point and floating point arithmetic operations.
- To expose the students to the concept of pipelining •
- To familiarize the students with hierarchical memory system including cache ٠ memory and virtual memory
- To expose the students with different ways of communicating with I/O devices and • standard I/O interfaces.

#### **UNIT I BASIC COMPUTER ORGANIZATION AND DESIGN**

Instruction codes, Computer registers, computer instructions, Timing and Instruction Memory-Reference Control. cvcle. Instructions. Inputoutput and interrupt, Complete description. Basic computer, computer Design of design of Accumulator Unit. Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Microoperations, Arithmatic Logic Shift.

#### **UNIT II** ALU AND CU

ALU - Addition and subtraction - Multiplication - Division - Floating Point operations - Subword parallelism. CPU- General Organization, Organization, Register Stack Instruction manipulation, Program format. Addressing Modes. data transfer and Control, Reduced Instruction Set Computer (RISC).

#### **UNIT III ALU AND CU**

Basic MIPS implementation - Building datapath - Control Implementation scheme - Pipelining -Pipelined datapath and control - Handling Data hazards & Control hazards - Exceptions, The ARM Cortex-A8 and Intel Core i7 Pipelines.

#### **MEMORY AND I/O SYSTEMS UNIT IV**

Memory hierarchy - Memory technologies - Cache basics - Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

#### UNIT V MULTICORES, MULTIPROCESSORS, AND CLUSTERS 9

Shared Memory Multiprocessors, Clusters and Other Message-Passing Multiprocessors Hardware Multithreading, SISD, MIMD, SIMD, SPMD, and Vector, Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers, and Other Message-Passing Multiprocessors.

### **TOTAL: 45 PERIODS**

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#### **OUTCOMES:**

CO1	Build the basic structure of computer, operations and instructions
CO2	Design arithmetic and logic unit
CO3	Discuss the pipelined execution and design control unit
CO4	Evaluate performance of memory systems
CO5	Construct the parallel processing architectures

#### **TEXT BOOKS:**

1. David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan kauffman / elsevier, Fifth edition, 2014.

- 1. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", VI edition, McGraw-Hill Inc, 2012.
- 2. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
- 3. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
- 4. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
- 5. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
- 6. http://nptel.ac.in/.

EC16351

#### (Common to CS & IT)

#### **OBJECTIVES**:

#### The student should be made to:

- Understand analog and digital communication techniques.
- Learn data and pulse communication techniques.
- Be familiarized with source and Error control coding.
- Gain knowledge on multi-user radio communication.

#### UNIT I ANALOG COMMUNICATION

Noise: Source of Noise - External Noise- Internal Noise-. Introduction to Communication Systems: Modulation – Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation – Comparison of various Analog Communication System (AM – FM – PM).

#### UNIT II DIGITAL COMMUNICATION

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) – PhaseShift Keying (PSK) – BPSK – QPSK – 8 PSK – 16 PSK - Quadrature Amplitude Modulation (QAM) – 8QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK–FSK–PSK–QAM).

#### UNIT III DATA AND PULSE COMMUNICATION

**Data Communication:** History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques - Data communication Hardware - serial and parallel interfaces.

**Pulse Communication:** Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM – PCM).

#### UNIT IV SOURCE AND ERROR CONTROL CODING

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm.

#### UNIT V MULTI-USER RADIO COMMUNICATION

Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) – Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Handover - Overview of Multiple Access Schemes - Satellite Communication – Bluetooth.

#### **TOTAL : 45 PERIODS**

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#### **OUTCOMES:**

CO1	Apply analog and digital communication techniques.
CO2	Learn data and pulse communication techniques.
CO3	Analyze Source and Error control coding
CO4	Utilize multi-user radio communication
CO5	Understand different Multiple access techniques

#### **TEXT BOOKS:**

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, Pearson Education, 2009.

- 1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004
- 2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007
- 3. H.Taub, D L Schilling and G Saha, "Principles of Communication", 3rd Edition, Pearson Education, 2007.
- 4. B. P.Lathi, "Modern Analog and Digital Communication Systems", 3rd Edition, Oxford University Press, 2007.
- 5. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
- 6. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India,2002.
- 7. B.Sklar, "Digital Communication Fundamentals and Applications" 2nd Edition Pearson Education 2007.

#### GE16451 ENVIRONMENTAL SCIENCE AND ENGINEERING L T

#### L T P C 3 0 0 3

#### **OBJECTIVES**:

- To study about the natural Eco systems and the facts about Environment.
- To find and implement the scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on human beings; envision the surrounding environment, its functions and its value.
- To study about the Biodiversity, Natural resources
- To study the impacts of social issues on Environment

#### UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 12

Definition, scope and importance of Risk and Hazards; Chemical Hazards, Physical Hazards, Biological Hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity: Definition, Types of Biodiversity: genetic, species and ecosystem diversity – Biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a Mega-diversity nation – Hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and Endemic species of India – conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Field study of common plants, insects, birds - Field study of simple ecosystems – pond, river, hill slopes, etc.

#### UNIT II ENVIRONMENTAL POLLUTION

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of SMOG, PAN, acid rain, oxygen and ozone chemistry - Mitigation procedures- Control of particulate and gaseous emission, Control of SO<sub>2</sub>, NO<sub>X</sub>, CO and HC. (b). Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - Soil Waste Management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

#### UNIT III NATURAL RESOURCES

**Forest resources:** Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – **Water resources:** Use and overutilization of surface and ground water, dams-benefits and problems – **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies

– Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins

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-Biochemical degradation of pollutants, Bioconversion of pollutants. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

### UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

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From unsustainable to sustainable development – urban problems related to energy – Water conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization **Environmental Ethics:** Issues and possible solutions – 12 Principles of Green chemistry- Nuclear accidents and Holocaust, case studies. – Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air act – Water act – Wildlife Protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules, 1998 and amendments - scheme of labeling of environmentally friendly products (Ecomark). Enforcement machinery involved in environmental legislation- Central and State Pollution Control Boards-**Disaster Management:** Floods, Earthquake, Cyclone and Landslides. Public awareness.

### UNIT V HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – population explosion – Family welfare programme – Environment and Human health – Human Rights – Value education – HIV / AIDS – Women and Child welfare –Environmental Impact Analysis (EIA) – GIS - remote sensing - Role of Information Technology in environment and human health – Case studies.

#### **TOTAL: 45 PERIODS**

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#### **OUTCOMES:**

CO1	Students will be able to describe the importance of ecosystems, biodiversity and its protection.
CO2	Students will be able to implement the knowledge which requires optimum use of various natural resources for the conservation of natural resources.
CO3	Students will be able to classify the different types of pollution, their effects and control measures. Also apply the knowledge gained for disaster management.
CO4	Students will be able to describe the sustainable development, social issues, role of NGO's and various laws available in the country for environmental protection.
CO5	Students will be able to recognize the importance of women and child welfare, prevention of HIV /AIDS and usage of technology for environmental management.

### **TEXT BOOKS:**

- 1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2<sup>nd</sup> edition, Pearson Education, 2004.
- 2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

- 1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010.
- 2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
- 3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
- 4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.

#### CS16311

### PROGRAMMING AND DATA STRUCTURES L T P C

#### LABORATORY II (Common to CS & IT)

#### 0 0 3 2

#### **OBJECTIVES**:

- Be familiarized with good programming design methods, particularly Top- Down design.
- Getting exposure in implementing the different data structures using C++.
- Appreciate recursive algorithms.

#### LIST OF EXPERIMENTS:

#### Implementation in the following topics:

- 1. Constructors and Destructor.
- 2. Friend Function and Friend Class.
- 3. Polymorphism and Function Overloading.
- 4. Overload Unary and Binary Operators Both as Member Function and Non Member Function.
- 5. Inheritance.
- 6. Virtual Functions.
- 7. Class Templates and Function Templates.
- 8. Exception Handling Mechanism.
- 9. Standard Template Library concept.
- 10. File Stream classes.
- 11. Binary Search Tree with Tree traversal Techniques Preoder, Postorder and Inorder.
- 12. AVL trees
- 13. Heaps
- 14. Breadth-first search and Depth-first search
- 15. Minimum Spanning Trees Kruskal and Prim algorithm

Shortest Path Algorithms - Dijkstra's algorithm, Floyd - Warshall algorithm.

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Develop applications using linear data structures.
CO2	Develop applications using non-linear data structures.
CO3	Develop solutions to practical problems using ADT
CO4	Develop recursive programs using trees and graphs.
CO5	Develop modularized applications using OOPS concept

#### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C++ complier 30 Nos.

(or)

Server with C++ compiler supporting 30 terminals or more.

#### **TEXT BOOKS:**

- 1. Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007.
- 2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd Edition, Pearson Education, 2005

- 1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.
- 2. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7 th Edition, Wiley Publishers, 2004.

#### CS16312

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#### **OBJECTIVES**:

#### The student should be made to:

- Learn shell programming and the use of filters in the UNIX environment.
- Be exposed to programming in C using system calls.
- Learn to use the file system related system calls.
- Be exposed to process creation and inter process communication.
- Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance

#### LIST OF EXPERIMENTS:

- 1. Basics of UNIX commands.
- 2. Shell Programming.
- 3. Implement the following CPU scheduling algorithms
  - a) Round Robin b) SJF c) FCFS d) Priority
- 4. Implement all file allocation strategies
  - a) Sequential b) Indexed c) Linked
- 5. Implement Semaphores
- 6. Implement all File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG
- 7. Implement Bankers Algorithm for Dead Lock Avoidance
- 8. Implement an Algorithm for Dead Lock Detection
- 9. Implement e all page replacement algorithms
  - a) FIFO b) LRU c) LFU
- 10. Implement Shared memory and IPC
- 11. Implement Paging Technique of memory management.
- 12. Implement Threading & Synchronization Applications

Development of a reasonably sized dynamically loadable kernel module for Linux kernel

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Students will practice UNIX commands and perform shell programs masterfully
CO2	Students will infer the CPU scheduling and demonstrate the scheduling algorithms
CO3	Students will understand and demonstrate the performance of the various page replacement algorithms
CO4	Students will be able to create process and implement inter process communication techniques to achieve employability
CO5	Students will examine the Deadlock avoidance and page replacement algorithms and illustrate expertly

#### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C / C++ / Java / Equivalent complier 30 Nos. (or)

Server with C / C++ / Java / Equivalent complier supporting 30 terminals

#### **OBJECTIVES**:

#### The student should be made to:

- Explore digital communications with a software radio to understand how each component works together.
- Know details about analog to digital conversion, modulation, pulse shaping, and noise analysis.

#### LIST OF EXPERIMENTS:

- 1. Signal Sampling and reconstruction
- 2. Pulse Position Modulation and Demodulation / Pulse Width Modulation and Demodulation
- 3. Amplitude modulation and demodulation
- 4. Frequency modulation and demodulation
- 5. Pulse code modulation and demodulation.
- 6. Delta & Adaptive Delta Modulation and Demodulation
- 7. Line Coding Schemes

8. BFSK modulation and Demodulation (Hardware (Kit based) & Simulation using MATLAB / SCILAB / Equivalent)

9. BPSK modulation and Demodulation (Hardware& Simulation using MATLAB/SCILAB/ Equivalent)

- 10. M-ary FSK, M-ary PSK and DPSK schemes (Simulation)
- 11. Error control coding schemes (Simulation)
- 12. Spread spectrum communication (Simulation)
- 13. Communication link simulation
- 14. TDM and FDM

#### **OUTCOMES:**

#### **TOTAL: 45 PERIODS**

CO1	Explore digital communications with a software radio to understand how each component works together.
CO2	Know details about analog to digital conversion, modulation, pulse shaping, and noise analysis
CO3	To develop necessary skill in designing of digital electronic circuits.
CO4	To develop necessary skill in analyzing and constructing digital electronic circuits.
CO5	Investigate different digital format data representation

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

- i) Kits for Signal Sampling, TDM, AM, FM, PCM, DM and Line Coding Schemes.
- ii) Software Defined Radio platform for link simulation studies
- iii) MATLAB / SCILAB for simulation experiments.
- iv) PCs 10 Nos.
- v) Signal generator / Function generators / Power Supply / CRO / Bread Board each -15 nos.
- vi) IC 555, Resistors, Capacitors, BC107.

#### MA16453

**PROBABILITY AND QUEUING THEORY** 

(Common to CS & IT)

#### **OBJECTIVES**:

• To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering

#### UNIT I **RANDOM VARIABLES**

Discrete and continuous random variables - Moments - Moment generating functions - Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

#### UNIT II **TWO - DIMENSIONAL RANDOM VARIABLES**

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

#### UNIT III **RANDOM PROCESSES**

Classification - Stationary process - Markov process - Poisson process - Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

#### **UNIT IV OUEUEING MODELS**

Markovian queues - Birth and Death processes - Single and multiple server queueing models -Little's formula - Queues with finite waiting rooms - Finite source models

#### **ADVANCED QUEUEING MODELS** UNIT V

M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/EK/1 as special cases – Series queues - Open Jackson networks.

#### **OUTCOMES:**

CO1	Describe commonly used univariate discrete and continuous probability distributions by formulating fundamental probability distribution and density functions, as well as functions of random variables
CO2	Develop skills in dealing with scenarios involving multiple random variables.
CO3	Express and characterize phenomenon which evolve with respect to time in a probabilistic manner
CO4	Acquire skills in analyzing queuing models
CO5	Develop skills in identifying best techniques to solve a specific problem.

#### **TEXT BOOKS:**

- 1. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint. 2007
- Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student edition, 2. 2004.

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#### 8 + 3

**TOTAL: 60 PERIODS** 

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- 1. Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation", Springer, 3rd Edition, 2006.
- 2. Taha H.A., "Operations Research", Pearson Education, Asia, 8th Edition, 2007.
- 3. Veerarajan. T, "Probability, statistics and random processes", McGraw Hill Publishers, 3rd edition, 2011.
- 4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.
- 5. Yates R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd., Bangalore, 2nd Edition, 2012.

# MICROPROCESSORS AND MICROCONTROLLERS

#### (Common to CS, EC & IT)

### **OBJECTIVES**:

EC16504

- Study the Architecture of 8086 microprocessor.
- Learn the design aspects of I/O and Memory Interfacing circuits.
- Study about communication and bus interfacing
- Study the Architecture of 8051 microcontroller.

### UNIT I THE 8086 MICROPROCESSOR

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation

### UNIT II 8086 SYSTEM BUS STRUCTURE

8086 signals – Basic configurations – System bus timing –System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure - Multiprocessor configurations – Introduction of Architecture, of Pentium Processor

### UNIT III I/O INTERFACING

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display.

### UNIT IV MICROCONTROLLER

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set – Addressing modes - Assembly language programming.

### UNIT V INTERFACING MICROCONTROLLER

Programming 8051 Timers - Serial Port Programming - Interrupts Programming - LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor.

### TOTAL (L:45): 45 PERIODS

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CO1	Develop programs in 8086 microprocessors by understanding its architecture, instruction set and interrupt process.
CO2	Sketch the system bus structure of 8086 and multiprocessor configurations.
CO3	Design I/O and Memory interfacing units.
CO4	Develop programs in 8051 microcontrollers by understanding its architecture and instruction set.
CO5	Design various interfacing units with 8051 microcontroller-based systems.

### **TEXT BOOKS:**

- 1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007.
- 2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson Education, 2011

### **REFERENCES:**

1. Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware:, TMH, 2012

### PARADIGMS OF ALGORITHM DESIGN

### **OBJECTIVES**:

- To provide foundation on designing algorithms, complexity analysis of algorithms, and computational complexity.
- To learn the basics of Parallel algorithm and genetic algorithm.

### UNIT I FUNDAMENTALS

Algorithms - The Importance of Developing Efficient Algorithms - Analysis of Algorithms Order - Computational Complexity-sorting , searching, hashing, selection problem.

### UNIT II ALGORITHM STRATEGY

Divide-and-Conquer - Sorting -Searching- Strassen's Matrix Multiplication Algorithm Arithmetic with Large Integers. Dynamic Programming - Binomial co-efficient - Floyd's Algorithm for Shortest Paths - Chained Matrix Multiplication - Dynamic Programming and Optimization Problems- Optimal Binary Search Trees - The Traveling Salesperson Problem.

#### UNIT III DESIGN TECHNIQUES

Greedy Approach - Minimum Spanning Trees-scheduling - The Greedy Approach versus Dynamic Programming: The Knapsack Problem – Backtracking - Using a Monte Carlo Algorithm - The Sum-of-Subsets Problem - Graph Coloring - The Hamiltonian Circuits Problem - Branch-and-Bound - Best-First Search.

### UNIT IV NP-COMPLETENESS

NP-completeness – Polynomial Time - Polynomial Time Verification - Reducibility - NPcompleteness proofs - Approximation Algorithms - Vertex-Cover problem – Travelling-Salesman problem.

### UNIT V PARALLEL ALGORITHMS AND GENETIC ALGORITHM 9

Parallel Architectures - The PRAM Model - Designing Algorithms for the CREW PRAM Model - Designing Algorithms for the CRCW PRAM Model - Genetic Algorithm - Travelling salesperson, Genetic Programming - Artificial ant and Financial trading application.

### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Develop simple and recursive algorithms to different problems
CO2	Investigate the complexity of simple and recursive algorithms to different problems
CO3	Solve computational problems using various algorithm design strategies
CO4	Appreciate the concept of NP completeness
CO5	Implement parallel architecture models and develop parallel algorithms to solve complex problems.

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#### **TEXT BOOKS:**

- 1. Foundations of Algorithms, Richard E Neapolitan, 5th Edition, Jones &Bartlett Learning, 2014.
- 2. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, "Introduction to Algorithms", PHI Learning Private Limited, 2012.

- 1. S.Sridhar, "Design and Analysis of Algorithms", Oxford University Press, First Edition, 2015.
- 2. Steven S Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2010.
- 3. Robert Sedgewick and Kevin Wayne, —Algorithms<sup>II</sup>, Fourth Edition, Pearson Education, 2011.

CS16402

67

#### **OBJECTIVES**:

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To learn about the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- To have an introductory knowledge about the Storage and Query processing Techniques

#### UNIT I RELATIONAL DATABASES

Purpose of Database System -- Views of data -- Data Models -- Database System Architecture --Introduction to relational databases - Relational Model - Keys -- Relational Algebra -- Relational Calculus - SQL fundamentals - Advanced SQL features -- Triggers-- Embedded SQL-- Dynamic SQL - Database connectivity.

#### UNIT II DATABASE DESIGN

Entity-Relationship Model – E-R Diagrams - Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

#### UNIT III TRANSACTION MANAGEMENT

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

#### UNIT IV IMPLEMENTATION TECHNIQUES

Overview of Physical Storage Media – RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Catalog Information for Cost Estimation - Query Optimization.

### UNIT V ADVANCED TOPICS

Introduction to Distributed databases - Cloud Databases - Data warehouse and Mining - Mobile Databases - XML Databases - Multimedia Databases.

#### **TOTAL: 45 PERIODS**

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#### **OUTCOMES:**

CO1	Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data to design Databases for applications and use the Relational model, ER diagrams
CO2	Ability to formulate queries using SQL commands
CO3	Apply concurrency control and recovery mechanisms for practical problems
CO4	Analyze internal storage structure based on the requirement
CO5	Analyze the types of databases and use for real world applications

#### **TEXT BOOKS:**

- 1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts<sup>II</sup>, Sixth Edition, Tata McGraw Hill, 2010.
- 2. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems<sup>II</sup>, Eighth Edition, Pearson Education, 2006 Book 2.

- 1. Ramez Elmasri, Shamkant B. Navathe, —Fundamentals of Database Systems<sup>II</sup>, Sixth Edition, Pearson Education, 2010.
- 2. Raghu Ramakrishnan, Johannes Gehrke —Database Management Systemsl, Fourth Edition, Tata Mc Graw Hill, 2010.
- 3. G.K.Gupta, —Database Management Systemsl, Tata McGraw Hill, 2011.
- 4. Carlos Coronel, Steven Morris, Peter Rob, —Database Systems: Design, Implementation and Managementl, Ninth Edition, Cengage Learning, 2011.

#### IT16402 SOFTWARE ENGINEERING METHODOLOGIES L

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#### **OBJECTIVES**:

#### The student should be made to

- Understand the roles of software process
- Understand how an iterative, incremental development process leads to faster delivery of more useful software
- Understand the essence of agile development methods

### UNIT I SOFTWARE PROCESS AND SOFTWARE REQUIREMENT ANALYSIS 9 Generic process model, Process Assessment and Improvement, Perscriptive Process models, Specialized Process models, Personal and Team Process models. Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and

analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

#### UNIT II SOFTWARE DESIGN

System Modeling -Context models-Interaction models-Structural models-Behavioral models-Model driven engineering, Architectural Design - Architectural design decisions-Architectural views-Architectural patterns-Application architecture- User Interface Design: Interface analysis, Interface Design. Software Testing.

#### UNIT III AGILE SOFTWARE DEVELOPMENT

Agile methods - Agile development techniques - Agile project management - Scaling agile methods.

#### UNIT IV AGILE PRODUCT MANAGEMENT WITH SCRUM

Understanding product owner role - Envisioning the product - Working with product backlog - Planning the release.

#### UNIT V ADVANCED SOFTWARE ENGINEERING

Software Reuse - Component based Software Engineering - Distributed Software Engineering - Service - oriented Software Engineering - Systems Engineering - Systems of Systems

#### **TOTAL: 45 PERIODS**

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#### **OUTCOMES:**

CO1	Choose the appropriate process models for creating the software based on problem statements.
CO2	Identify various requirements for the development of software to satisfy the customer needs.
CO3	Apply Agile methodology for design and development of the software.
CO4	Evaluate various team roles involving in software development using Scrum framework.
CO5	Develop software using different software engineering methodologies with reusable modules.

#### **TEXT BOOKS:**

- 1. Roger S. Pressman, "Software Engineering A Practitioner's Approach", Seventh Edition, Mc Graw-Hill International Edition, 2010.
- 2. Ian Sommerville, "Software Engineering", 10th Edition, Pearson Education Asia, 2016.
- 3. Roman Pichler,"Agile Product Management with Scrum Creating Products that Customers Love",Pearson Education, 2012

- 1. Ken Schwaber ,"Agile Project Management with Scrum" , Microsoft Press, 2014"
- 2. Tilak Mitra ," Practical Software Architecture: Moving from System Context to Deployment", IBM press,2016
- 3. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.

# IT16403

#### **OBJECTIVES**:

- To know the difference between data and information
- To introduce the concept of Internet, Networks and its working principles.
- To know scripting languages.
- To understand various applications related to Information Technology.

#### UNIT I **INTRODUCTION**

Data and Information, Aquisition of Data - Text - Image - Audio - Video, Internet Application, E-commerce, Business Information Systems, Social Impact of Information Technology.

**IT ESSENTIALS** 

#### UNIT II WEB ESSENTIALS

Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools -Types of servers: Application Server - Web Server - Database Server.

#### UNIT III SCRIPTING ESSENTIALS

Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators - Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts.

#### UNIT IV NETWORKING ESSENTIALS

Fundamental computer network concepts - Types of computer networks - - Network layers -TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching -Network components.

#### UNIT V MOBILE COMMUNICATION ESSENTIALS

Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture -Voice calls & SMS.

#### **OUTCOMES:**

CO1	lustrate the ways how information systems and technology may improve an organization's performance.
CO2	Develop web-based application using suitable client side and server-side web technologies
CO3	Examine the requirements and build dynamic and interactive Web pages.
CO4	Characterize the general principles and technological components of Computer networks.
CO5	Interpret the characteristics and functioning of cellular networks and standards.

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**TOTAL: 45 PERIODS** 

#### **TEXT BOOKS:**

- 1. V. Rajaraman, "Introduction to Information Technology", PHI Learning , Second Edition, 2013
- 2. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
- 3. James F. Kurose, —Computer Networking: A Top-Down Approach<sup>II</sup>, Sixth Edition, Pearson, 2012.

- 1. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.
- 2. R. Kelly Rainer, Casey G. Cegielski, Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.
- 3. it-ebooks.org
S L T P C

### MICROPROCESSORS AND MICROCONTROLLERS

### LABORATORY

### (Common to EC, CS & IT) 0 0 3 2

### **OBJECTIVES**:

EC16512

The student should be made to:

- Introduce ALP concepts and features
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors
- Be familiar with MASM

### LIST OF EXPERIMENTS:

### 8086 Programs using kits and MASM

- 1. Basic arithmetic and Logical operations
- 2. Move a data block without overlap
- 3. Code conversion, decimal arithmetic and Matrix operations.
- 4. Floating point operations, string manipulations, sorting and searching
- 5. Password checking, Print RAM size and system date
- 6. Counters and Time Delay

### **Peripherals and Interfacing Experiments**

- 7. Traffic light control
- 8. Stepper motor control
- 9. Digital clock
- 10. Key board and Display
- 11. Printer status
- 12. Serial interface and Parallel interface
- 13. A/D and D/A interface and Waveform Generation

### 8051 Experiments using kits and MASM

- 14. Basic arithmetic and Logical operations
- 15. Square and Cube program, Find 2's complement of a number
- 16. Unpacked BCD to ASCII
- 17. Mini project using modern microcontrollers.

### **TOTAL: 45 PERIODS**

### **OUTCOMES:**

CO1	Apply the knowledge and skills to ALP Programmes for fixed and Floating-Point and Arithmetic
CO2	Explore different I/Os with processor
CO3	Demonstrate different waveforms using Microprocessors
CO4	Demonstrate and execute basic program for 8051
CO5	Evaluate the difference between simulator and Emulator

# LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: HARDWARE:

- 8086 development kits 30 nos
- Interfacing Units Each 10 nos
- Microcontroller 30 nos

### **SOFTWARE:**

- Intel Desktop Systems with MASM 30 nos
- 8086 Assembler
- 8051 Cross Assembler

# CS16412DATABASE MANAGEMENT SYSTEMS LABORATORYLTPC(Common to CS & IT)0032

### **OBJECTIVES**:

### The student should be made to:

- Learn to create and use a database
- Be familiarized with a query language
- Have hands on experience on DDL Commands
- Have a good understanding of DML Commands and DCL commands
- Familiarize advanced SQL queries.
- Be Exposed to different applications

### LIST OF EXPERIMENTS:

- 1. Creation of a database and writing SQL queries to retrieve information from the database.
- 2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
- 3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
- 4. Creating an Employee database to set various constraints.
- 5. Creating relationship between the databases.
- 6. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
- 7. Write a PL/SQL block that handles all types of exceptions.
- 8. Creation of Procedures.
- 9. Creation of database triggers and functions
- 10. Database Connectivity with Front End Tools
- 11. Mini project
  - a) Inventory Control System.
  - b) Material Requirement Processing.
  - c) Hospital Management System.
  - d) Railway Reservation System.
  - e) Personal Information System.
  - f) Web Based User Identification System.
  - g) Timetable Management System.
  - h) Hotel Management System

### **TOTAL: 45 PERIODS**

### **OUTCOMES:**

CO1	Design and implement a database schema for a given problem domain
CO2	Create and maintain tables using PL/SQL
CO3	Make use of queries using SQL DML/DDL/DCL commands.
CO4	Examine an information storage problem and derive an information model
CO5	Application development using PL/SQL and front-end tools

# LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

### HARDWARE:

Standalone desktops 30 Nos.

(or)

Server supporting 30 terminals or more.

### **SOFTWARE:**

Front end: VB/VC ++/JAVA or Equivalent Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent

### **MINI PROJECT**

### **OBJECTIVES**:

• The student should able to design and develop a working model using the concepts studied in Operating System, Software Engineering Methodologies and Database Management System courses.

### Sample Mini Projects:

Creating own operating system

Creating Virtual Machines

Migration in Virtual Machines

Applications using Parallel Processing

### **TOTAL: 45 PERIODS**

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# OUTCOMES:

CO1	Demonstrate a sound technical knowledge of their selected project topic.
CO2	Design engineering solutions to complex problems utilising a systems approach.
CO3	Plan and execute a project
CO4	Conform to a designated quality standard & Employ industry best practices and tools.
CO5	Compile relevant data, interpret & analyze it and test the model and create a logically coherent project report

CS16401

<b>COMPUTER NETWORKS</b>	L	Т	Р	С

(Common to CS, EE, EC & IT) 3 0 0 3

### **OBJECTIVES**:

### The student should be made to:

- Understand the concepts of network architecture and transmission medium.
- Perform and understand methods for error detection and correction of data.
- Be exposed to various addressing schemes and routing protocols.
- Learn the flow control and congestion control algorithms.
- Be familiar with real time applications of networks.

### UNIT I FUNDAMENTALS & SIGNAL TRANSMISSION 9

Fundamentals : Building a network – Requirements – Layering and protocols – OSI Model – Internet Architecture – Performance – Network Topology ; Physical Layer: Data and Signals – Digital Transmission – Analog Transmission – Multiplexing and Spread Spectrum - Transmission Media

### UNIT II MEDIA ACCESS & LOGICAL LINK CONTROL 9

Framing – Error Detection and Correction – Media access control – Ethernet (802.3) – Wireless LANs – 802.11 – Bluetooth – Switching and bridging – Flow control.

### UNIT III ROUTING & ADDRESSING SCHEMES 9

Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP) – Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, Ipv6), Multicast – addresses – multicast routing (DVMRP, PIM)

### UNIT IV END TO END COMMUNICATION 9

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

### UNIT V APPLICATION LAYER PROTOCOLS 9

Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS - SNMP - Multimedia applications

### **TOTAL: 45 PERIODS**

CO1	Students will be able to identify the components required to build different types of networks.
CO2	Students will be able to distinguish error detection and correction methods for the appropriate types of errors.
CO3	Students will be able to develop solution for each functionality of Network layer and analyze the different network layer level protocols that support IP.
CO4	Students will be able to implement UDP and TCP protocols that perform transport layer functions and trace the flow of information from one node to another node in the network.
CO5	Students will be able to categorize different application layer level protocols based on user's request.

### **TEXT BOOKS:**

- 1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.
- 2. Behrouz A. Forouzan, "Data Communications and Networking", Fourth Edition, McGrawHill, 2011.

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

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# **OBJECTIVES**

IT16501

- To explore the fundamental concepts in 2D and 3D computer graphic models.
- To understand 2D raster graphics techniques, 3D modeling, geometric transformations, 3D viewing and rendering.
- To learn about multimedia building blocks of text, images, sound, animation, and video.
- To develop an understanding of the process of developing multimedia.

# UNIT I INTRODUCTION

Overview of graphics systems – Raster scan, Random scans, Output primitives –2D concepts-Points and Lines, Line drawing algorithms, Circle and Ellipse generating algorithms.

## UNIT II TWO DIMENSIONAL TRANSFORMATION AND 9 VIEWING

Two dimensional geometric transformations – Matrix representations and Homogeneous Coordinates, Composite transformations; Two dimensional viewing – Viewing pipeline, Viewing coordinate reference frame; Window-to-Viewport coordinate transformation, Clipping operations- Point, Line, Polygon, Curve and Text clipping.

### UNIT III THREE DIMENSIONAL TRANSFORMATION AND 9 VIEWING

Three dimensional concepts; Three dimensional object representations – Polygon surfaces-Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects, Splines. Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations, Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping. Color Models – RGB, YIQ, CMY, HSV.

## UNIT IV MULTIMEDIA BASICS

Introduction: Definition, application, elements, Text, Image, Audio, Video –types, representations, standards, file formats.

# UNIT VMULTIMEDIA DEVELOPMENT9

Software Life cycle, Addie Model, Conceptualization, Content collection and processing, flow line, script, storyboard, implementation, Authoring metaphors, Testing and feedback, final delivery, Case Study: study of CBT on sound in multimedia.

# **TOTAL : 45 PERIODS**

### **OUTCOMES:**

CO1	Formulate and solve a wide range of graphic design problems.
CO2	Determine the geometric transformations and different algorithms for viewing and clipping in two-dimensional graphics related problems.
CO3	Choose projection techniques for display of 3D scenes on a 2D screen.
CO4	Investigate various multimedia building blocks like text, images, sound, animation, and video.
CO5	Develop multimedia applications.

### **TEXT BOOKS:**

1. Donald Hearn, M.Pauline Baker, "Computer Graphics", PHI, 2014.

2. Ranjan Parekh, "Principles of Multimedia", Second Edition, Mcgraw Hill, 2012.

- 1. F .S. Hill, "Computer Graphics using OPENGL", Second edition, Pearson Education 2014.
- 2. John F. Hughes , Andries van Dam, Morgan McGuire , David F. Sklar, James D. Foley , Steven K. Feiner , Kurt Akeley , "Computer Graphics: Principles and Practice", 3rd Edition, Addison Welsey Professional, 2013.
- 3. Prabhat K Andleigh, Kiran Thakrar, "Multimedia systems design", First Edition, PHI, 2015.
- 4. Ze-Nian Li and Mark S.Drew, "Fundamentals of Multimedia", First Edition, Pearson Education, 2007.

#### CS16502 **OBJECT ORIENTED ANALYSIS AND DESIGN** С L T Р (COMMON TO CS & IT) 3 0 0 3

### **OBJECTIVES:**

### The Student should be made to:

- Learn the basics of OO Analysis and Design skills.
- Learn the UML diagrams for Modeling.
- Learn Design Patterns.
- Learn Layered Architecture.
- Learn to map design to code.
- Learn OO testing techniques.

#### **INTRODUCTION & INCEPTION** UNIT I

Object-Oriented Analysis and Design - Iterative, Evolutionary, and Agile : Unified Process, Iterative and Evolutionary Development, Waterfall Lifecycle, How to do Iterative and Evolutionary Analysis and Design, Agile Methods and Attitudes, Agile Modeling, Agile UP, UP Phases, UP Disciplines - Case Studies : The NextGen POS System, The Monopoly Game System - Inception is Not the Requirements Phase - Evolutionary Requirements, - Use Cases - Relating Use Cases - Other Requirements

### **UNIT II ELABORATION - BASICS**

Domain Models - System Sequence Diagrams - Operation Contracts - Logical Architecture and UML Package Diagrams - UML Interaction Diagrams - UML Class Diagrams -Designing for Visibility - Refactoring.

### UNIT III ELABORATION - DESIGN PATTERNS

GRASP: Designing Objects with Responsibilities, Polymorphism, Pure Fabrication - Object Design Examples with GRASP : What is a Use Case Realization, Use Case Realizations for the NextGen Iteration - Applying GoF Design Patterns : Adapter, Factory, Singleton (GoF), Strategy (GoF), Composite (GoF), Facade (GoF), Observer/Publish-Subscribe/Delegation Event Model

#### **ELABORATION – DYNAMIC MODELING** UNIT IV

UML Activity Diagrams and Modeling - UML State Machine Diagrams and Modeling -Domain Model Refinement - Logical Architecture Refinement - Designing a Persistence Framework with Patterns - UML Deployment and Component Diagrams

### **UNIT V OBJECT ORIENTED TESTING**

Mapping design to code - Testing: Issues in OO Testing - Class Testing - OO Integration Testing – GUI Testing – OO System Testing.

### **TOTAL: 45 PERIODS**

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CO1	Identify various scenarios based on software requirement.
CO2	Employ the UML analysis and design diagram for developing the software application
CO3	Apply appropriate design patterns for UML based software design.
CO4	Construct code from design and inspect the code with OO testing techniques.
CO5	Develop real time projects using Object Oriented concepts.

## **TEXT BOOKS:**

- 1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.
- 2. Paul C. Jorgensen, "Software Testing:- A Craftsman's Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2008.

- 1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
- 2. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 1995.
- 3. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2003.

EC16651

### **OBJECTIVES:**

- To learn discrete Fourier transform and its properties.
- To know the characteristics of IIR and FIR filters learn the design of infinite and finite impulse response filters for filtering undesired signals.
- To understand Finite word length effects.
- To study the concept of Multirate and adaptive filters.

### UNIT I SIGNALS AND SYSTEMS

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – concept of aliasing-Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation.

### UNIT II FREQUENCY TRANSFORMATIONS

Introduction to DFT – Properties of DFT – relationship among z transform, DTFT and DFT-Circular Convolution - Filtering methods based on DFT –FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT.

### UNIT III IIR FILTER DESIGN

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation in analog domain.

### UNIT IV FIR FILTER DESIGN

Structures of FIR – Transversal, linear phase and polyphase realization- Linear phase FIR filter – Fourier Series - Filter design using windowing techniques, (Rectangular Window, Hamming Window), Frequency sampling techniques

## UNIT V FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS

Binary fixed point and floating point number representations – Comparison - Quantization noise -truncation and rounding – quantization noise power- input quantization error-coefficient quantization error – limit cycle oscillations-dead band- Overflow error- signal scaling-Scaling to prevent overflow.

### TOTAL (L:45+T:15): 60 PERIODS

### OUTCOMES:

CO1	Solve using Discrete Fourier Transform (DFT) for the analysis of digital signals and systems
CO2	Design Infinite Impulse Response (IIR) and Finite Impulse response (FIR) filters
CO3	Interpret the effects of finite word length on filters

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### **TEXT BOOKS:**

1. John G. Proakis and Dimitris G.Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Fourth Edition, Pearson Education, Prentice Hall, 2007.

- 1. Emmanuel C.Ifeachor, and Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education, Prentice Hall, 2002.
- 2. Sanjit K. Mitra, "Digital Signal Processing A Computer Based Approach", Third Edition, Tata Mc Graw Hill, 2007.
- 3. A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.
- 4. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006.

# WEB PROGRAMMING

### L T P C 3 0 0 3

# OBJECTIVES

IT16502

- To create simple web pages and to learn about client side validation.
- To create dynamic web pages using server side scripting.
- To understand MVC concept using Strut, Hibernate and Spring.

# UNIT I INTRODUCTION TO WORLD WIDE WEB

Introduction to WWW and WWW architecture, internet protocols, overview of HTTP, Generation of dynamic web pages, Java Fundamentals - Data types- Class - Object – I/O Streams - File handling concepts

# UNIT II FEATURES OF JAVA

Interfaces - Packages - Threads - Exception handling - Applets - Swing Framework - Reflection - JDBC

# UNIT III PROGRAMMING FOR USER INTERFACE

JavaScript Fundamentals - Evolution of AJAX - AJAX Framework - Web applications with AJAX - AJAX with PHP - AJAX with Databases – Angular JS.

# UNIT IV SERVER SIDE PROGRAMMING

Servlet Overview - Life cycle of a Servlet - Handling HTTP request and response – Using Cookies - Session tracking - JDBC - Java Beans - Advantages - Enterprise Java Beans - EJB Architecture- Type of Beans - EJB Transactions

# UNIT V APPLICATION DEVELOPMENT ENVIRONMENT

Overview of MVC architecture - Java Server Faces: Features - Components - Tags -Struts: Working principle of Struts - Building model components - View components -Controller components - Forms with Struts - Presentation tags - Developing Web applications - Hibernate: Configuration Settings - Mapping persistent classes - Working with persistent objects - Concurrency - Transactions - Caching - Queries for retrieval of objects -Spring: Framework- Controllers - Developing simple applications.

# TOTAL : 45 PERIODS

# OUTCOMES

CO1	Design an interactive web site(s) with regard to issues of usability, accessibility and internationalization.
CO2	Develop GUI based applications in java and implement the advanced features of Java.
CO3	Design a client-side internet application that accommodates specific requirements and constraints, based on analysis, modeling or requirements specification.
CO4	Create a server-side internet application that accommodates specific requirements, constraints based on analysis and modeling
CO5	Illustrate about various Strut, Hibernate and Spring MVC Framework(s) for designing web application(s)

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### **TEXT BOOKS:**

- 1. Deitel, Deitel, Goldberg. "Internet & World Wide Web How To Program". Fifth edition, Pearson Education, 2012.
- 2. Cay S. Horstmann, "Core Java Volume I—Fundamentals", 10th Edition, Prentice Hall, 2015.

- 1. Marty Hall and Larry Brown, "Core Servlets And Javaserver Pages", Second Edition, Pearson education.
- 2. Bryan Basham, Kathy Siegra, Bert Bates. "Head First Servlets & JSP", Second Edition, O'reily.
- 3. Uttam K Roy, 'Web Technologies", Oxford University Press, 2011.

### IT16503

### **COMPUTATIONAL INTELLIGENCE**

### **OBJECTIVES**

- To learn search strategies and to understand the concepts of game playing
- To represent and infer knowledge using predicate logic
- To understand basic concepts of data mining
- To introduce the concepts of Expert Systems
- To learn evolutionary computation, neural networks, fuzzy systems

### UNIT I **PROBLEM SOLVING METHODS**

Problems, Problem Spaces and Search - problem characteristics -production system characteristics-Heuristic Search Techniques - Generate and Test- Hill Climbing- Best First Search- Problem Reduction-Constraint Satisfaction Problems – Game Playing – Minimax procedure - Alpha-Beta Pruning.

### **KNOWLEDGE REPRESENTATION** UNIT II

Knowledge representation-Using Predicate logic- Representing Simple Facts- Representing Instance - Computable Functions and Predicates -Resolution, Knowledge Inference -Backward chaining, Forward chaining.

### **DATA MINING** UNIT III

Fundamentals - Data reduction - Classification - Decision tree Induction - Learning -Supervised Learning - Unsupervised Learning - Reinforcement Learning - Associations-Frequent Itemset Mining Methods, Clustering- Partitioning methods - Hierarchical methods-Data Mining Applications.

#### UNIT IV **EXPERT SYSTEMS**

Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition -Meta knowledge, Heuristics. , Expert systems shells- Typical expert systems -MYCIN, DART, XOON.

### UNIT V **ADVANCED TOPICS**

Evolutionary Computation- Genetic Algorithms – Crossover- Mutation, Genetic programming; Evolutionary Programming- Operators- Parameters- Implementations; Neural Networks -Multi layer Feed Forward Neural Network-Applications of Neural Networks- Fuzzy Systems-Fuzzy Sets - Fuzzy Logic and Reasoning - Creating a bot - Weather Monitoring bot.

### **TOTAL: 45 PERIODS**

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### **OUTCOMES:**

CO1	Investigate the problems and solve them using AI techniques
CO2	Infer knowledge for the problem represented in the language/framework using different AI methods
CO3	Solve real-world problems using data mining techniques
CO4	Design expert systems for various applications
CO5	Generate solutions to problems using advanced concepts of Computational Intelligence

### **TEXT BOOKS:**

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Third edition, McGraw Hill, 2008.

- 1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
- 2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2007.
- 3. Andries .P. Engelbrecht, "Computational Intelligence: An Introduction", Second Edition, John Wiley & Sons, 2012.
- 4. <u>https://en.wikipedia.org/wiki/Wikipedia:Creating\_a\_bot</u>.
- 5. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2014.

CS16411

### (Common to CS & IT)

0 0 3 2

### **OBJECTIVES**:

### The student should be made to:

- Learn socket programming.
- Be familiar with simulation tools.
- Have hands on experience on various networking protocols.

### LIST OF EXPERIMENTS:

- 1. Study of Socket Programming and Client Server model
- 2. Applications using TCP Sockets
  - 1. Date and Time server & client
  - 2. Echo server & client, etc
  - 3. Chat
- 3. Applications using UDP Sockets
  - 1. DNS
  - 2. DHCP
- 4. Simulation of Stop and Wait Protocol and Sliding Window Protocol.
- 5. Simulation of ARP /RARP protocols.
- 6. Simulation of PING and TRACEROUTE commands
- 7. Write a program to implement RPC (Remote Procedure Call)
- 8. Write a program to implement subnetting and find the subnet for a given ip.
- 9. Using Cisco Packet Tracer, do the following

a). Establish a Local Area Network (LAN) with 4 hosts and a switch/Hub

- b). Connect two LANs using multi-router topology with static routes
- 10. 10. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS
- 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 protocol
  - ii. Distance vector routing protocol

Configuration of proxy server

### **TOTAL: 45 PERIODS**

### **OUTCOMES:**

CO1	Students will be able to implement various client server applications
CO2	Students will be able to gain the knowledge to demonstrate various protocols.
CO3	Students will be able to analyse the performance of the protocols in different layers.
CO4	Students will be able to apply the knowledge of various routing algorithms in data.
CO5	Students will be able to understand the major software and hardware technologies used on computer networks.

## LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

### **SOFTWARE:**

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

### HARDWARE:

Standalone desktops 30 Nos

### **REFERENCES:**

1. UNIX® Network Programming Volume 1, Third Edition: The Sockets Networking API By W. Richard Stevens, Bill Fenner, Andrew M. Rudoff.

# IT16511WEB PROGRAMMING LABORATORYLTPC0032

### **OBJECTIVES**

- To create simple web sites.
- To create dynamic web pages using server side scripting and to perform client side validation
- To create modern java web applications using struts MVC framework.
- To build spring based applications
- To understand object/relational mapping (ORM) in Java applications using Hibernate.

### List of Experiments

- 1. Creation of HTML Files
- 2. Working with Client Side Scripting

3. Creating Applications using java core features, applets, Swing framework, Method Invocation using reflection, Threads

- 4. Implementation of servlets
- 5. Creating application using JDBC and JSP
- 6. Developing application using java bean and EJB
- 7. Developing Web enabled application using struts framework
- 8. Implement simple hibernate applications
- 9. Implement RMI using Spring framework

### **TOTAL: 45 PERIODS**

### **OUTCOMES:**

CO1	Create websites with HTML and CSS.
CO2	Create dynamic web applications using client-side scripting languages.
CO3	Implement advanced java features to develop GUI based applications.
CO4	Create web applications using server-side scripting languages.
CO5	Use modern MVC frameworks to develop web based applications.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

### **SOFTWARE:**

Java, MySQL or Equivalent, Apache Server

HARDWARE:

Standalone desktops

### IT16512

### **OBJECTIVES**

- Learn the basics of Object Oriented analysis and design skills.
- Be exposed to UML design diagrams.
- Learn to map design to code.
- Be familiar with the various testing techniques

### List of Experiments

### To develop a web based application using the 12 concepts listed below.

- 1. To develop a problem statement.
- 2. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
- 3. Identify Use Cases and develop the Use Case model.
- 4. Identify the business activities and develop an UML Activity diagram.
- 5. Identity the conceptual classes and develop a domain model with UML Class diagram.
- 6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
- 7. Draw the State Chart diagram.
- 8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
- 9. Implement and test the technical services layer.
- 10. Implement and test the domain objects layer.
- 11. Implement and test the user Interface layer.
- 12. Draw Component and Deployment diagrams.

### **Suggested domains:**

- 1. Passport automation system.
- 2. Book bank
- 3. Exam Registration
- 4. Stock maintenance system.
- 5. Online course reservation system
- 6. E-ticketing
- 7. Software personnel management system
- 8. Credit card processing
- 9. e-book management system
- 10. Recruitment system
- 11. Conference Management System

**TOTAL: 45 PERIODS** 

### **OUTCOMES:**

CO1	Develop Problem statement and its SRS document.
CO2	Develop Risk Management and project plan.
CO3	Draw UML design diagrams.
CO4	Map Design to code.
CO5	Implement various testing techniques.

# LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: SUGGESTED SOFTWARETOOLS:

Rational Suite (or) Argo UML (or) equivalent, Eclipse IDE and Junit

IT16601

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### **OBJECTIVES**

- Be familiar with the methods for generation of codes and their decoding techniques.
- Understand error–control coding.
- Be aware of compression and decompression techniques.
- Be familiar with coding for secure communication

### UNIT I INFORMATION THEORY

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding -Joint and conditional entropies, Mutual information -Discrete memory less channels – BSC, BEC – Channel capacity, Shannon limit.

### UNIT II SOURCE CODING

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MPEG Audio Layers I,II,III, Dolby AC, Atmos - Speech: Channel Vocoder, Linear Predictive Coding, Image Compression.

### UNIT III CHANNEL AND NOISY CODING

Discrete memory less channel - Classification of channels & channel capacity - Calculation of channel capacity - Decoding schemes - Fano's inequality -Shannon's fundamental theorem - Capacity of a band limited Gaussian channel. Implication of the information capacity theorem - Information capacity of colored noise channel - Rate distortion theory - Data compression.

### UNIT IV ERROR CONTROL CODING

Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome, Convolutional codes, turbo codes, viterbi algorithm.

### UNIT V CODING FOR SECURE COMMUNICATION

Introduction to cryptography-Overview of Encryption Techniques – operations used – Symmetric Cryptography – DES - IDEA – RC Ciphers – Asymmetric Algorithms – RSA Algorithm – PGP- One-way Hashing - Elliptic Curve Cryptography-Diffie-Hellman Key Agreement Protocol-Chaos Functions – Quantum Cryptography – Biometric encryption-Cryptanalyis.

### **TOTAL : 45 PERIODS**

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CO1	Calculate Entropy, mutual information, and channel capacity for various channels
CO2	Adapt different types of error-correcting codes
CO3	explore digital communication system by selecting an appropriate error correcting codes
CO4	Investigate various methods of generating and detecting different types of error correcting codes
CO5	Compare the performance of digital communication system by evaluating the probability

### **TEXT BOOKS:**

Simon Haykin, "Communication Systems", Fourth Edition, John Wiley and Sons, 2001.
R Bose, "Information Theory, Coding and Cryptography", Fifth Edition, Tata Mcgraw Hill, 2009.

### **REFERENCES:**

1. Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002.

2. Khalid Sayood, "Introduction to Data Compression", Fifth Edition, Elsevier, 2017.

### MOBILE COMPUTING (Common to CS & IT)

# IT16602

- **OBJECTIVES** 
  - To understand the fundamentals of mobile computing
  - To infer knowledge about the various technologies used in mobile communication
  - To learn about development environment used in Mobile devices

# UNIT I INTRODUCTION

Mobility of bits and bytes, Beginning of wireless, Mobile computing, Dialogue control, Networks, Middleware and gateway, Application and services, Developing mobile computing application, Security in mobile computing, Standards, Mobile computing architecture, Mobile computing through telephony.

# UNIT II WIRELESS TECHNOLOGIES

Bluetooth, RFID, WIMAX, Mobile IP, GSM, GPRS, CDMA, 3G, 4G and 5G networks.

# UNIT III WIRELESS LAN AND INTELLIGENT NETWORKS

Introduction-Advantages, IEEE 802.11 standards, Architecture, Mobility, Deploying wireless LAN, Mobile Ad hoc and Sensor network, Security, Wireless access in vehicular environment, Wireless local loop, Hyper LAN, Wi-Fi versus 3G, Wireless Application Protocol, Fundamentals of call Processing, Intelligence in networks, SS#7 signaling, IN conceptual model, soft switch, programmable networks, Technologies and interfaces for IN,SS7 security, MAPsec, Virtual Private Network.

# UNIT IV COMPUTING IN MOBILE ENVIRONMENT

Client Programming, Programming for palm OS, Wireless device with Symbian OS,J2ME,Wireless device with Windows CE, Wireless device with Android OS.

# UNIT V APPLICATIONS

Voice over Internet and Convergence, SMS, CODEC, Networked Multimedia Applications, Issues in Multimedia delivery over the internet, Multimedia Networking Protocols, Security issues in mobile computing, Next generation networks, **APP DEVELOPMENT :** Native, Hybrid, Android Application development - SDK, Features of SDK, Android Application Components, software stack structure. **TOTAL : 45 PERIODS** 

## **OUTCOMES:**

CO1	Interpret the working characteristics and limitations of mobile hardware devices including their user-interface modalities
CO2	Choose the suitable technologies for appropriate mobile communication
CO3	Summarize the various wireless LAN technologies.
CO4	Assess the development environment used in mobile devices
CO5	Develop applications that are mobile-device specific.

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### **TEXT BOOKS:**

- 1. Asoke Talukder, Hasan Ahmed and Roopa R yavagal "Mobile computing Technology, Application and service creation", Second edition, McGraw Hill, 2010.
- 2. Jochen Schiller, "Mobile Communications", Second Edition, Pearson, 2004.

- 1. "Beginning for Android 4 Application Development ", Wei Meng Lee, Wiley –India Edition, 2012.
- 2. Zigurd Mednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, "Programming Android", O"Reilly, 2011.

### IT16603 SOFTWARE TESTING & QUALITY ASSURANCE L T P C (Common to CS & IT) 3 0 0 3

### **OBJECTIVES**

- To understand mathematical foundations of software testing.
- To comprehend the phases of software testing
- To know the managerial aspects of software testing
- To understand software quality management process and quality management models
- To learn software quality metrics, assurance and various software standards

## UNIT I INTRODUCTION TO SOFTWARE TESTING

Software testing lifecycle, software specifications, program correctness and verification, Failures, errors and faults, testing taxonomy.

## UNIT II TEST DATA GENERATION

Test generation concepts, Functional and structural criteria, Test Oracle design, Test Driver design, Test outcome analysis.

### UNIT III MANAGEMENT OF SOFTWARE TESTING

Metrics for software testing, tools – Scripting tools, record-and-replay tools, performance testing tools, oracle design tools, exception discovery, collaborative tools.

## UNIT IV SOFTWARE QUALITY

Defining Software Quality, Software Quality factors, Components of software quality assurance system, pre project software quality components- Contract Review - Development and Quality Plans, integrating quality activities in project life cycle.

### UNIT V STANDARDS, CERTIFICATION AND ASSESSMENT

Need for standards, SQA Standards – ISO9001 Certification, bootstrap methodology, SPICE project and process assessment, Organizing for Quality Assurance -Management and its Role in Quality Assurance - SQA Unit & other actors, introduction to Six Sigma.

### **TOTAL : 45 PERIODS**

### **OUTCOMES:**

CO1	Apply the knowledge of mathematics in software testing and test data generation techniques.
CO2	Select appropriate procedures, Tools, and test data generation techniques
CO3	Choose and use suitable Software Testing Tools
CO4	Examine the benefits of the software quality management process
CO5	Create and apply a software quality assurance plan for software projects

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### **TEXT BOOKS:**

- 1. Ali Mili, Fairouz Tchier, "Software Testing: Concepts and Operations", John wiley & sons, 2015.
- 2. Daniel Galin, "Software Quality Assurance: From Theory to Implementation", Pearson Addison-Wesley, Second Edition, 2012.

- 1. Jeff Tian, "Software Quality Engineering: Testing, Quality Assurance, and Quantifiable", Wiley, 2006.
- 2. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing Principles and Practices", Pearson Education, 2006.
- 3. Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.

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### **OBJECTIVES**

- To learn the design principles and tools of the compiler.
- To learn the various analysis techniques
- To learn how to obtain specific object code from source language
- To learn how to optimize the code

### UNIT I INTRODUCTION TO FINITE AUTOMATA

Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with  $\notin$ - moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without  $\notin$ -moves – Equivalence of finite Automaton and regular expressions – Minimization of DFA.

### UNIT II LEXICAL AND SYNTAX ANALYSIS

**Lexical Analysis**-Translators -The Phases of Compiler-Errors Encountered in Different Phases-compiler Construction Tools, Role of Lexical Analyzer-Specification and Recognition of Tokens-Thompson Construction –LEX.

**Syntax Analysis**-Role of the Parser- Top Down Parsing - Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-SLR Parser, YACC.

### UNIT III SYNTAX DIRECTED TRANSLATION

Syntax Directed Definitions--Intermediate Code Generation-Representation and Implementation -Types And Declarations –-Type Checking –Control Flow Statements-Back Patching –Procedures.

UNIT IVCODE OPTIMIZATION AND RUN TIME ENVIRONMENT9Code Optimization -Principal Sources of Optimization-DAG- Optimization of Basic Blocks-<br/>Global Data Flow Analysis.9

**Run-time Environment-** Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation

### UNIT V CODE GENERATION

Issues -Design of Code Generator -Addresses in the Target Code -Basic Blocks in Flow Graph -Simple Code Generator -Peephole Optimization -Machine Independent Optimization

### TOTAL (L:45): 45 PERIODS

### **OUTCOMES:**

CO1	Examine the various deterministic and non-deterministic machines for a language processing system.
CO2	Formulate the analysis phase of the compiler.
CO3	Choose compiler construction tools for analysis and synthesis phase.
CO4	Examine the various optimization techniques.
CO5	Design code generators for the specified machine.

### **Text Books:**

1. John. E. Hopcroft, Rajiv Motwani and Jeffrey D Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson Education, 2014.

2. Alfred Aho, Ravi Sethi and Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Second Edition, Pearson Education, 2013.

### **References:**

- 1. Alexander Meduna, Petr Zemek," Regulated Grammars and Automata", Springer, 2014.
- 2. Torben Mogensen, "Basics of Compiler Design", Springer, 2010.

# SERVICE ORIENTED ARCHITECTURE

# **OBJECTIVES**

IT16605

- To learn XML fundamentals and to build applications based on XML.
- To know the basic principles of Service Oriented Architecture, its components and techniques.
- Be familiar with the web service standards and elements for realizing SOA.
- To acquire knowledge on mapping of SOA and Cloud Computing.

# UNIT I INTRODUCTION TO XML

XML document structure- Well formed and valid documents- Namespaces- DTD- XML Schema- X-Files- Parsing XML- XML Transformation and XSL.

# UNIT II SOA BASICS

Roots of SOA – Characteristics of SOA – Comparing SOA to client-server and distributed Internet architectures – Anatomy of SOA- How components in an SOA interrelate – Principles of service orientation.

# UNIT III WEB SERVICES AND SOA

Web services Architecture– Service descriptions – WSDL- Messaging with SOAP –Message exchange Patterns - Coordination –Atomic Transactions – Business activities – Orchestration – Choreography – Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer.

# UNIT IV ENTERPRISE PLATFORMS AND SOA

Service Oriented Analysis- Service Oriented Design- Service Modeling- SOA platform basics-SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) , RESTful web services, Web Services Interoperability Technologies (WSIT), SOA support in .NET – ASP.NET web services.

# UNIT V RECENT TRENDS IN SOA

SOA business process design- WS-BPEL Language basics- WS-Policy, WS-Security- WS-coordination- Mapping of SOA and Cloud computing, Case Study: Travel Insurance

# TOTAL (L:45): 45 PERIODS

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### **OUTCOMES:**

CO1	Generate applications based on XML
CO2	Examine the basic principles of Service Oriented Architecture, its components and techniques
CO3	Group web service standards and elements for realizing SOA
CO4	Solve enterprise problems using SOA
CO5	Develop knowledge on mapping of SOA and Cloud Computing

### **TEXT BOOKS:**

- 1. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2002.
- 2. Thomas Erl, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2016.

- 1. David S.Linthicum, "Cloud Computing and SOA Convergence in Your Enterprise", Pearson Addison-Wesley Information Technology Series, 2010.
- 2. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
- 3. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
- 4. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
- 5. James McGovern, Sameer Tyagi, Michael E. Stevens, Sunil Mathew, "Java Web Services Architecture", Morgan Kaufmann Publishers, 2011.

### IT16611

### MOBILE APPLICATION DEVELOPMENT LABORATORY (COMMON TO CS & IT)

С L T Р 0 0 3 2

### **OBJECTIVES**

- To learn the basics of mobile application development
- To get accustomed to Android platform
- To develop skills in developing basic Android applications

### **List of Experiments**

- 1. Install the Android SDK and developer tools and build a test project to confirm that those tools are properly installed and configured.
- 2. Develop an application that uses GUI components, Font and Colours
- 3. Develop an application that uses Layout Managers and event listeners.
- 4. Develop a native calculator application.
- 5. Write an application that draws basic graphical primitives on the screen.
- 6. Develop an application that makes use of database.
- 7. Implement an application that implements Multi threading.
- 8. Develop a native application that uses GPS location information.
- 9. Implement an application that writes data to the SD card.
- 10. Implement an application that creates an alert upon receiving a message.
- 11. Mini Project

## **Suggested list of Projects:**

- 1. Secure Digi Locker Application
- 2. Android Campus Recruitment System
- 3. Automated Canteen Ordering System using Android
- 4. Android Customer Relationship Management System
- 5. Android Employee Tracker
- 6. Android Graphical Information System
- 7. Smart Health Consulting Android System
- 8. Android Based Universal Ticketing Project
- 9. Android Civil Administration Reporting Project
- 10. Student Faculty Document Sharing Android Project
- 11. Android Patient Tracker

**TOTAL: 45 PERIODS** 

### **OUTCOMES:**

CO1	Relate the various components of mobile application development frameworks for Android based mobile.
CO2	Design and Develop user interfaces for the Android platform.
CO3	Demonstrate their ability to develop software with reasonable complexity on mobile platforms.
CO4	Develop mobile applications for the Android operating system that use basic and advanced phone features.
CO5	Demonstrate their ability to debug programs running on mobile devices.

# LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE REQUIREMENTS

Android SDK.

### IT16612 AUTOMATA AND COMPILER LABORATORY L T P C

### **OBJECTIVES**

- To learn tools for compiler design
- To design the specification of language constructs
- To understand code generation

### List of Experiments

- 1. Input acceptance using DFA, NFA, Basic Regular Expression
- 2. Conversion of NFA to DFA.
- 3. Design a Lexical Analyzer.
- 4. Implement various parsers.
- 5. Generation of machine code from abstract syntax tree.
- 6. Exercises using Lexical Analyzer generating tools.

### **TOTAL: 45 PERIODS**

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### **OUTCOMES:**

CO1	Implement deterministic and non-deterministic machines.
CO2	Formulate the analysis phase of the compiler
CO3	Use the different compiler construction tools like LEX and YACC
CO4	Generate the intermediate code from the abstract syntax tree.
CO5	Develop the machine code from the optimized ICG.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

### SOFTWARE REQUIREMENTS

Lex, Yacc.

GE 16661

(Common to All Branches)

L T P C 0 0 4 2

### **OBJECTIVES**

- To enable learners to build confidence and enhance their language proficiency.
- To expose learners to the use of professional English.
- To equip them with employability skills.
- To expose learners to build entrepreneurship skills

## UNIT I LISTENING AND SPEAKING SKILLS 12

Conversation Skills – Types - Small Talk, Face-to-Face and Telephonic, Formal and Informal Conversations – Skills in presenting ideas and collating information during Conference Calls (one –to-one and technical group / team) – Academic and Workplace Situations – Conversing with Faculty /Guests/Officials/Employers and Employees – Group Discussion – Etiquette and Dos and Don'ts, Turn-taking –Presentation Skills – Seminars and Projects using Digital Tools; Mock Interview – Etiquette and Dos and Don'ts – Audio-Visual interface for enhancement of Listening and Speaking Skills

### UNIT II READING / SPEED READING, CRITICAL THINKING 12 AND WRITING SKILLS

Reading Comprehension – General and Scientific Texts/Articles/Case Studies from different or relevant fields of study for analysis and critical thinking; Employability Skills – Writing Job Applications – Cover Letter accompanying Résumé – Types of Business Letters and Email Writing and Etiquette; Writing Reports – Statement of Purpose – Writing Articles for Publication Style and Format – Creating Blogs or Company Profiles – Speed Reading of Voluminous Reports / Documents and Exacting Necessary Information and Abstract Preparation including Dissemination

### UNIT III ENGLISH FOR PROFESSIONAL EXAMINATIONS

Sentences, Paragraphs and Reading Comprehension – Vocabulary Building – General and Technical Terms – Contextual Meaning – Spelling – Subject-Specific Words – Usage and User-Specific Terminology

### UNIT IV SOFT SKILLS

Analysis – Personality Grooming; Crisis Management – Problem Solving and Finding Solutions; Negotiation Skills – Persuading and Convincing, Briefing; Stress Management – Case Studies.

### UNIT V ENTREPRENEURSHIP SKILLS

Developing Leadership Qualities and Team Work; Goal Setting and Real-Life Scenarios; Fundamentals of Entrepreneurial Skills – Marketing Strategies - Microcosmic and Macrocosmic Levels of Product Sales and Survey – Sector / Industry Appraisal and Appreciation (Review and Understanding State of the Nation / Economy / Environment / Sector Reports Published) -Interaction & Understanding Role of Multi-Lateral Financial / Institutional / Industrial Agencies such as World Bank, ADB, UNDP, CII etc. – Understanding Role of Governmental & Para / Quasi-Governmental Organizations such as Trade & Commerce, MSME (Micro Small & Med Scale Enterprises), Energy Development Authorities - Opportunities available w/ institutions to secure Capital / Loans for pursuing entrepreneurial efforts – Interaction with Incubation Centers in higher learning institutes like IIT – Madras / Bombay etc.

### **TOTAL : 60 PERIODS**

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### **Teaching Methods:**

- 1. To be totally learner-centric with minimum teacher intervention as the course revolves around practice.
- 2. Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.
- 3. Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.
- 4. GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.
- 5. Learners are to be assigned to read/write/listen/view materials outside the classroom as well for gaining proficiency and better participation in the class.
- 6. Learners to form team(s), select a module of external Industrial / Institutional interaction and prepare a short-thesis/project proposal.

### OUTCOMES

CO1	Take international examination such as IELTS and TOEL.
CO2	Make presentations and Participate in Group Discussions.
CO3	Successfully answer questions in interviews
CO4	To expose learners to build entrepreneur skills

LAB INFRASTRUCTURE		
S.No	Description of Equipment (minimum configuration)	Qty Required
	Server	
	PIV System	
1	• 1 GB RAM / 40 GB HDD	1 No
1	• OS: Win 2000 server	1 NO
	Audio card with headphones	
	• JRE 1.3	
	Client Systems	
	PIII or above	
2	• 256 or 512 MB RAM / 40 GB HDD	60 No's
2	• OS: Win 2000	00 100 5
	Audio card with headphones	
	• JRE 1.3	
3	Handicam	1 No
4	CC TV + Microphone	2 No Nos
5	Television 46"	1 No
6	Collar mike	1 No
7	Cordless mike	1 No
8	Audio Mixer	1 No

9	DVD recorder/player	1 No
10	LCD Projector with MP3/CD/DVD provision for	1 No
	Audio/video facility	

### Evaluation: Internal: 20 marks

Record maintenance: Students should write a. a Cover letter and a Resume or SoP, b. Project Proposal.

### External: 80 marks

Online Test (IELTS, TOEFL, MCQs

	-	35 marks
Interview	-	15 marks
Presentation	-	15 marks
Group Discussion	-	15 marks

### Note on Internal and External Evaluation:

1. Interview – mock interview can be conducted on one-on-one basis.

- a. Speaking on a topic extempore or predetermined, role play: convincing a customer to buy his product.
- b. Telephonic conversation- fixing an official appointment / placing an order / enquiring and so on.
- 3. Presentation should be extempore on simple topics.
- 4. Discussion topics of different kinds; general topics, and case studies.

### **REFERENCES**:

- 1. Business English Certificate Materials, Cambridge University Press.
- 2. Graded Examinations in Spoken English and Spoken English for Work downloadable materials from Trinity College, London.
- 3. International English Language Testing System Practice Tests, Cambridge University Press.
- 4. Interactive Multimedia Programs on Managing Time and Stress.
- 5. Personality Development (CD-ROM), Times Multimedia, Mumbai.
- 6. Robert M Sherfield and et al. "Developing Soft Skills" 4th ed , New Delhi: Pearson Education, 2009.

### Web Sources:

http://www.slideshare.net/rohitjsh/presentation-on-group-discussion http://www.washington.edu/doit/TeamN/present\_tips.html http://www.oxforddictionaries.com/words/writing-job-applications http://www.kent.ac.uk/careers/cv/coveringletters.htm http://www.mindtools.com/pages/article/newCDV\_34.html

TED Talks

INTERNET OF THINGS

(Common to CS, EC, EE & IT)

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### **OBJECTIVES**

IT16701

- To understand the state of the art Internet of Things architecture.
- To learn about IoT protocols.
- To understand the integration of IoT and Cloud.
- To apply the concept of Internet of Things in the real world scenario.

### UNIT I INTRODUCTION & CONCEPTS

Introduction and evolution of IoT from internet, IOT Physical Devices & Endpoints - Basic building blocks and Exemplary IOT Device: Raspberry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces - Serial, SPI, I2C, Programming Raspberry Pi with Python - Controlling LED with Raspberry Pi, Interfacing an LED and Switch with Raspberry Pi, Interfacing a Light Sensor (LDR) with Raspberry Pi, Other IoT Devices - Arduino with embedded C, Intel Galileo, pcDuino, BeagleBone Black, Cubieboard.

### UNIT II I IOT PROTOCOLS

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT-Software Defined Networking, Network Function Virtualization, IoT Protocol Stack, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee, 6LowPAN.

### UNIT III IoT PLATFORMS DESIGN METHODOLOGY

IoT Design Methodology- Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level specification, Functional View Specification, Operational View Specification, Device & Component Integration, Application Development, Case Study on IoT System for Weather Monitoring.

### UNIT IV IoT PHYSICAL SERVERS & CLOUD OFFERINGS

Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework – Django - Django Architecture, Starting Development with Django, Designing a RESTful Web API, Amazon Web Services for IoT - Amazon EC2, Amazon AutoScaling, Amazon S3, Amazon RDS, Amazon DynamoDB, Amazon Kinesis, Amazon SQS, Amazon EMR, SkyNet IoT Messaging Platform.

### UNIT V IoT TOOLS

Introduction, Chef - Setting up Chef, Chef Case Studies - Multi-tier Application Deployment, Hadoop Cluster, Storm Cluster, Puppet, Puppet Case Study - Multi-tier Deployment, NETCONF-YANG Case Studies - Steps for IoT device Management with NETCONF-YANG, Managing Smart Irrigation IoT System with NETCONF-YANG, Managing Home Intrusion Detection IoT System with NETCONF-YANG.

### **TOTAL : 45 PERIODS**

CO1	Interpret the purpose of IoT from a global context.
CO2	Select various protocols to be used in IoT
CO3	Conclude the Market perspective of IoT.
CO4	Identify the suitable technologies and devices for stated IoT challenge
CO5	Choose the state-of-the-art Methodologies to develop IoT applications.
CO6	Illustrate the application of IoT and identify Real World Design Constraint

### **TEXT BOOKS:**

- 1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things : A hands on approach", First Edition, Universities Press, 2015.
- 2. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.

### **REFERENCES:**

1. Dieter Uckelmann Mark Harrison; Florian Michahelles, "Architecting the Internet of Things", Springer, 2011.

## **INFORMATION SECURITY**

## **OBJECTIVES**

IT16702

- To give an insight into the key principles of information security.
- To learn about various threats facing organizations
- To understand key laws that shape the field of information security

### UNIT I **INTRODUCTION**

Introduction to Information security, CNSS security model, -Introduction to Data and Network Security - Critical characteristics of information -Components of an information system -Balancing information security and access - The SDLC and Security SDLC- NIST -Need for Security.

### **UNIT II CRYPTOGRAPHY**

Foundations- Cipher methods - Cryptographic Algorithms-symmetric and asymmetric encryption – Cryptographic tools – Digital Signature, Digital certificates, Hybrid cryptographic systems, steganography, protocols for secure communication.

### **UNIT III** SECURITY TECHNOLOGY

Introduction- Access control- firewall, protecting remote connections- Intrusion Detection and Prevention system -Honey pots, Honey Nets and Padded cell systems, scanning and analysis tools, Digital forensics.

### **UNIT IV LEGAL ETHICAL & PROFESSIONAL ISSUES**

Law and Ethics in Information Security- International law and legal bodies, Ethical differences across cultures, ethics and education, deterring unethical and illegal behavior- codes of ethics at professional organization.

### UNIT V **IMPLEMENTATION OF INFORMATION SECURITY**

Information Security project management, Technical and Non technical aspects of implementation, IS standards and certifications- ISO 27001, NIST Models, NSTISS, VISA International Security Model, Maintenance Models.

## **OUTCOMES:**

CO1	Examine the basics of Information security, different security model and the need for security
CO2	Apply cryptographic algorithms and tools and develop protocols for Secure communication
CO3	Examine various security systems like Access control systems, IDPS, Digital Signatures, Honey pots.
CO4	Interpret and use different laws and ethics in information security
CO5	Develop information security standards & certifications to ensure organization's information security

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**TOTAL: 45 PERIODS** 

### **TEXT BOOKS:**

- 1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, fifth edition, Cengage learning, 2015.
- 2. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Prentice Hall, 2007.

- 1. Mark Rhodes- Ousley ,"Information Security: The complete Reference", Second Edition Mcgraw Hill, 2013.
- 2. William Stallings, "Cryptography and Network Security: Principles and Practices", Seventh Edition, Pearson Education, 2017.
- 3. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison-Wesley Professional, 2003.

### **BIG DATA ANALYTICS**

### **OBJECTIVES**

IT16703

- To understand the concept of big data.
- To learn about various practical data analytics with R and Hadoop.
- To learn about big data frameworks.

### UNIT I INTRODUCTION TO BIG DATA

Introduction to Big Data Analytics – Challenges and limitations of big data analytics-Conventional Systems - Nature of Data, Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools -Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

### UNIT II MINING DATA STREAMS

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

### UNIT III INTRODUCTION TO BIG DATA ANALYTICS & R 9 PROGRAMMING

Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Introduction to R and RStudio, Basic analysis in R, Intermediate R, Intermediate analysis in R, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis.

### UNIT IV HADOOP

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop, Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

### UNIT V FRAMEWORKS

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.

### **TOTAL : 45 PERIODS**

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CO1	Identify the characteristics of datasets and compare the trivial data and big data for various applications.
CO2	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
CO3	Apply scaling up machine learning techniques and associated computing techniques and technologies
CO4	Integrate machine learning libraries and mathematical and statistical tools with modern technologies like Hadoop and map reduce
CO5	Investigate how Big Data is managed

### **TEXT BOOKS:**

- 1. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", Packt Publishing, 2014.
- 2. Stephan Kudyba, "Big Data, Mining, and Analytics: Components of Strategic Decision Making", First Edition, CRC Press, 2014.

- 1. Michael Minelli, Michele Chambers, Ambiga Dhiraj,"Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
- 2. Dr. Mark Gardener, "Beginning R: The Statistical Programming Language" (Wrox), 2013
- 3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
- 4. Bill Franks,"Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
- 5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
- 6. Zikopoulos, Paul, Chris Eaton, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", Tata McGraw Hill Publications, 2011.
- 7. Tom White," Hadoop: The Definitive Guide", Third Edition, O'reilly Media, 2012.
- 8. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.

### **CLOUD COMPUTING**

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### **OBJECTIVES**

IT16704

- To provide comprehensive knowledge of fundamental concepts of cloud computing
- To understand service models, deployment models and virtualization
- To learn programming and software environments of Cloud
- To shed light on the security issues in Cloud

## UNIT I INTRODUCTION

Introduction – Scalable Computing over the Internet-System Models for Distributed and Cloud Computing – Design Principles of Computer Clusters-Cluster Job and Resource Management-Cloud Computing Architecture – The Cloud Reference Model – Cloud Characteristics – Cloud Deployment Models: Public, Private, Community, Hybrid Clouds - Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing.

## UNIT II VIRTUALIZATION

Introduction, Virtualized Environment characteristics, Server Virtualization Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – Virtualization for data center automation - Virtualization Management- Storage Virtualization – Network Virtualization.

## UNIT III CLOUD COMPUTING MECHANISM

Cloud Infrastructure Mechanism: Cloud Storage, Cloud Usage Monitor, Resource Replication – Specialized Cloud Mechanism: Load Balancer, SLA Monitor, Pay-per-use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi Device Broker, State Management Database – Cloud Management Mechanism: Remote Administration System, Resource Management System, SLA Management System, Billing Management System.

## UNIT IV PROGRAMMING MODEL AND SECURITY

Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write. Security: Data Security and Storage - Cloud Infrastructure security: network, host and application level – Cloud Security Mechanisms (Encryption, PKI, SSO, IAM).

## UNIT V CASE STUDIES & TOOLS

Case Studies of Top Supercomputer Systems – Virtualization : Xen, VMWare, Microsoft Hyper-V – Examples of Cloud Service Providers(SaaS,PaaS,IaaS)-Emerging Cloud software Environments: Open Source Eucalyptus and Nimbus - Open Nebula, Sector/Sphere and Open Stack.

## TOTAL : 45 PERIODS

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CO1	Examine the various cloud service and deployment models
CO2	Evaluate the programming models for virtualization
CO3	Inspect the cloud infrastructure mechanism
CO4	Appraise Big data scenarios using HDFS and examine security issues in cloud
CO5	Develop Cloud applications using open-source tools

### **TEXT BOOKS:**

- 1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.
- 2. Thomas Erl , Ricardo Puttini, Zaigham Mahmood," Cloud Computing: Concepts, Technology & Architecture", First Edition, Prentice Hall,2013.

- 1. Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications in the Cloud", A Press, 2009
- 2. Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009.
- 3. Tim Master, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O' Reily Media, Sep 2009.

### **OBJECTIVES**

To build a simple IoT application and to perform the predictive analysis on gathered data.

## LIST OF EXPERIMENTS

## Raspberry Pi exercises

1. Peripheral interfacing with IoT kit

Working with LED,SWITCH and BUZZER

Movement Detection with PIR

Simulation of Traffic Light

Controlling LED intensity using pwm signal

Working with servo motor

2. I2C Communication and SPI Communication for displaying atmospheric temperature and pressure

3. Controlling pheripheral device with Mobile devices

Controlling LED using Bluetooth

Sending sensor data to user through SMS and Email

- 4. Designing GUI for capturing and analysing sensor data from IoT kit
- 5. Developing Video Surviellence application using IoT

### Machine Learning

6. Exercises to understand the data collected from sensors.

### **Predictive Analysis**

- 7. Exercises to perform predictive analysis.
- 8. A project to be implemented covering all IoT phases using Raspberry Pi / Arduino.

### **TOTAL: 45 PERIODS**

CO1	Apply the knowledge and skills acquired to build and test a complete, working IoT system involving prototyping, programming and data analysis
CO2	Examine the working of IoT components, systems and protocols.
CO3	Choose the most appropriate IoT Devices and Sensors to build real time applications Using IoT
CO4	Develop IoT solutions and demonstrate the relationship between IoT, cloud computing, big data and data analytics.
CO5	Simulate the working of real time applications
CO6	Evaluate the appropriate protocol for communication between IoT systems.

# LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

IoT Kit

- 15 Nos.

Cloud Infrastructure like Azure, AWS, etc.,

# IT16712 INFORMATION SECURITY LABORATORY LABORATORY

### **OBJECTIVES**

- To learn about secure coding practices.
- To implement security controls.
- To learn techniques specific to mitigating the occurrence of common software vulnerabilities.

### LIST OF EXPERIMENTS

### Exercises to perform

i) Input Validation for an application on a trusted system.

ii) Output encoding

iii) Authentication and password management.

iv) Session Management.

v) Access Control.

### Implementation

- i) Cryptographic techniques.
- ii) Error handling and logging.
- iii) Data Protection.

Implement encryption for transmission of all sensitive information. Secure File Management.

### ule File Mallagement.

### **TOTAL: 45 PERIODS**

### **OUTCOMES:**

CO1	Interpret the basic concepts of Cryptography techniques and Security tools
CO2	Apply cryptographic techniques to implement classical encryption techniques
CO3	Implement Encryption for transmission of all sensitive information using the Kleopatra tool.
CO4	Implement Intrusion detection using the SNORT Tool.
CO5	Use security tools to implement secure coding practices.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Java, C, C++ or any Open Source tool

### **REFERENCES:**

1. OWASP SCP Quick Reference guide V 2

**CLOUD COMPUTING AND BIG DATA** LABORATORY

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### **OBJECTIVES**

IT16713

- Be exposed to tool kits for cloud environment.
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop.

### LIST OF EXPERIMENTS

Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.

2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.

3. Install a C compiler in the virtual machine and execute a sample program.

4. Show the virtual machine migration based on the certain condition from one node to the other.

- 5. Find procedure to install storage controller and interact with it.
- 6. Find procedure to set up the one node Hadoop cluster.
- 7. Mount the one node Hadoop cluster using FUSE.
- 8. Write a program to use the API's of Hadoop to interact with it.
- 9. Programs to demonstrate the use of Hadoop Map Reduce, Pig and Hive.
- 10. Programs to demonstrate the use of SPARK for near-real time processing.
- 11. Analyze large data sets using various algorithms in Mahout.

### **TOTAL: 45 PERIODS**

### **OUTCOMES:**

CO1	Use Cloud open-source Tools for managing cloud resources.
CO2	Create virtual Machines using Eucalyptus
CO3	Demonstrate storage controller using virtual machines
CO4	Interpret Hadoop MapReduce algorithms and develop sample Web applications
CO5	Demonstrate different types of Hadoop frameworks for large datasets.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

### **SOFTWARE**

Eucalyptus or Open Nebula or equivalent SPARK, Pig, Hive, Hadoop

### **HARDWARE**

Standalone desktops 30 Nos IT16001

### FREE AND OPEN SOURCE SOFTWARE

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### **OBJECTIVES**

- To be exposed to the context and operation of free and open source software (FOSS) communities and associated software projects.
- To be familiar with participating in a FOSS project
- To learn scripting languages like Python or Perl
- To learn some important FOSS tools and techniques

### UNIT I INTRODUCTION

Introduction to Open sources – Need of Open Sources, Advantages of Open Sources–FOSS usage, Free Software Movement, Certification courses issues -Global and Indian, Application of Open Sources, Commercial aspects of open source movement, Introduction to Open Source Hardware.

### UNIT II SHELL SCRIPTING

Introduction to Linux Operating System -Kernel Mode- User Mode, Development with Linux: GNU products- Development tools, Kernel Operations, Processes: Basic Concepts- Basic System Calls- Scheduling – Personalities – Cloning, Signals: Sending Signals-signal Handling-Complementary System Calls.

### UNIT III PYTHON

Python Basics- Python Objects – Numbers, Sequences: Strings, Lists and Tuples, Mapping and Set Types, Conditionals and loops. Files: Input and Output.

### UNIT IV PERL

Perl backgrounder – Perl overview, Perl parsing rules – Variables and Data, Statements and Control structures – Subroutines, Packages, **CASE STUDY**: Government Policy toward Open Source (E- Governance).

### UNIT V JSON

JSON Overview - Datatypes, Arrays, Objects, Schemas, Parsing, Stringify, JSONP, JSON with MongoDB

### **TOTAL : 45 PERIODS**

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### **OUTCOMES:**

CO1	Utilize free and open source software to create applications
CO2	Examine the functionalities of Linux operating system and its development tools
CO3	Build real-time applications using Python
CO4	Develop web applications using PERL Scripting
CO5	Design data interchange applications using JSON.

### **TEXT BOOKS:**

- 1. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003.
- 2. Wesley J. Chun, "Core Python Programming", Second Edition, Pearson Education, 2007.

- 1. Alicia Gibb, "Building Open Source Hardware", Addison Wesley, 2015.
- 2. w3schools.org
- 3. Martin C. Brown, "Perl: The Complete Reference", Second Edition, McGrawHill, Indian Reprint 2009.

## DATA SCIENCE USING PYTHON

## **OBJECTIVES**

- To understand the fundamentals of data science.
- To explore data and to produce visualizations.
- To form and test hypotheses about data.
- To learn different ways of getting data into Python and into the right formats.
- To use existing data to develop prediction models for new data.

## UNIT I INTRODUCTION

Data Science-Python -the basics- visualizing data-matplotlib, bar charts, line charts, scatterplots, linear algebra- Vectors, Matrices.

## UNIT II STATISTICS AND PROBABILITY

Statistics- describing a single set of data, correlation, Simpson's Paradox, Correlation and causation, Probability –Dependence and Independence, Conditional Probability, Bayes theorem, random variables, continuous distributions, normal distribution, Central Limit Theorem, Hypothesis & Inference- statistical hypothesis testing, flipping a coin example, p-values, confidence intervals, p-hacking, running an A/B test example, Bayesian Inference, Gradient Descent-idea, estimation, stochastic.

## UNIT III WORKING WITH DATA

Reading files, Scraping the web, using APIs, using twitter API example, Exploring Data – cleaning and munging, manipulating data, rescaling, dimensionality reduction.

## UNIT IV MACHINE LEARNING

Over fitting and under fitting, Feature Extraction and Selection, K- Nearest Neighbors, Naïve Bayes, Simple Linear, Multiple and Logistic Regression.

## UNIT V ADVANCED TOPICS

Decision Trees, Neural Networks, Clustering, Natural Language Processing, Recommender Systems, MapReduce.

## **TOTAL : 45 PERIODS**

## **OUTCOMES:**

CO1	Demonstrate the need for data science and a detailed technical understanding of the key advanced tools and methods used.
CO2	Investigate, explore and preprocess data using python.
CO3	Apply quantitative modeling and data analysis techniques, communicate findings, and effectively present results using data visualization techniques.
CO4	Evaluate machine learning models to devise solutions to data science tasks using python.
CO5	Interpret data science analysis outcomes from the machine learning models.

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

Demonstrate the need for data science and a detailed technical understanding of the key advanced tools and methods used.

Investigate, explore and preprocess data using python.

Apply quantitative modeling and data analysis techniques ,communicate findings, and effectively present results using data visualization techniques.

Evaluate machine learning models to devise solutions to data science tasks using python.

Interpret data science analysis outcomes from the machine learning models.

### **TEXT BOOKS:**

- 1. Joel Grus, "Data Science from Scratch- First Principles with Python", O'reily, First edition, 2015.
- 2. Wes mckinney, "Python for data analysis", O'reily 2012.

- 1. Alexandre Devert, "Matplotlib Plotting Cook book", Packt Publishing, 2014.
- 2. Cathy O'Neil, Rachel Schutt, "Doing Data Science -Straight Talk from the Frontline", O'Reilly Media, 2013.

### IT16003 FUNCTIONAL PROGRAMMING USING SCALA L T P

### **OBJECTIVES**

- To understand the principles of functional programming.
- To write purely functional programs using pattern matching and higher-order functions.
- To combine functional programming with objects and classes.
- To design immutable data structures.
- To understand generic types for functional programs.

### UNIT I INTRODUCTION

Introduction to functional programming – Need for scala – Scala interpreter - Defining variables and functions - Writing scripts – Loops – Arrays – tuples- sets – maps – arrays – File manipulations – Case studies.

### UNIT II CLASSES

Classes and Objects – Basic types and Operators –Wrappers – Functional objects – constructors – method overloading – implicit conversions - Case studies.

### UNIT III INHERITANCE

Built-in Control Structures - Functions and Closures- Control Abstraction - Composition and Inheritance – Abstract classes – Overriding methods and fields – polymorphism and dynamic binding - Case studies.

### UNIT IV HIERARCHY OF SCALA

Primitives – Bottom types – Traits- Thin vs rich interfaces – Packages and Imports- Putting code in packages - Access modifiers – Package imports - Assertions and Unit Testing - Case studies.

### UNIT V PATTERN MATCHING

Pattern Matching – pattern guards – pattern overlaps - Sealed classes - Working with Lists – types, operations and pattern –Parallel programming: Collections – sequence and maps – mutable and immutable collections - Stateful Objects - Case studies.

### **TOTAL: 45 PERIODS**

# Examine the principles of functional programming

**OUTCOMES:** 

COI	
CO2	Design purely functional programs using pattern matching and higher-order functions
CO3	Develop functional programs with objects and classes
CO4	Design immutable data structures

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### **TEXT BOOKS:**

1 .Martin Odersky, Lex Spoon and Bill Venners, "Programming in Scala, A comprehensive step-by-step guide", Third Edition, Artima press, 2010.

- 1. Dean Wampler, Alex Payne , "Programming Scala, Scalability = Functional Programming + Objects", 2nd Edition ,O'Reilly Media, 2014.
- 2. Paul Chiusano and Runar Bjarnason, "Functional Programming in Scala", Manning, 2014.

STATISTICAL ANALYSIS USING R

PROGRAMMING

### **OBJECTIVES**

**IT16004** 

- To learn data structures such as matrices, lists, factors, and data frames.
- To create a variety of graphic displays.
- To understand the concepts of probability and statistics.
- To build statistical models.

### UNIT I INTRODUCTION

Introduction to R-Basic Syntax-data Types-variables-Operators-Decision Making-Loops-Functions-Strings-Vectors-Lists-Matrices-Arrays-Factors-Data Frames-Packages-Data Reshaping.

### UNIT II DATASET AND GRAPHICS

Input and Output-Entering Data from the Keyboard-CSV file-Excel File-Binary File-XML file-JSON file-Web Data-Database-Graphics-Pie Charts-Bar Charts-Box Plots-Dot plots-Histograms-Line Graphs- Scatter plots-Kernel density plots-Writing plot to a file-Changing graphical parameters.

### UNIT III PROBABILITY

Introduction-Sample Space -Events-Counting Methods-Conditional probability -Independent Events-Bayes Rule-Random Variables-Probability distribution-Discrete and continuous Distribution-Multivariate Distribution.

### UNIT IV STATISTICS

Regression-Linear-Multiple-Logistic-Poisson-Analysis of Covariance-Time Series Analysis-Nonlinear Least Square-Decision Tree-Random Forest-Survival Analysis-t-Test-Chi Square Test,ANOVA.

### UNIT V ADVANCED METHODS

Advanced methods for missing data-Steps in dealing with missing data-Identifying missing values-Exploring missing value patterns-Understanding the sources and impact of missing data-rational Approaches for dealing with incomplete data-Lit wise deletion-Multiple Imputation-Advanced Graphics-Lattice Package-ggPlot2 Package-Interactive graphs.

### **TOTAL : 45 PERIODS**

### **OUTCOMES:**

CO1	Experiment with the various data structures such as matrices, lists, factors, and data frames.
CO2	Infer knowledge on various file formats and create various graphic displays
CO3	Formulate and Solve the problems in probability distributions
CO4	Choose statistical models for analysing the data.

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### **TEXT BOOKS:**

1. Paul Teetor, "R Cookbook", O'reily, 2011.

- 1. Robert I Kabacoff, "R in Action: Data Analysis and Graphics with R", Manning Publications, 2015.
- 2. G. Jay Kerns,"Introduction to Probability and Statistics Using R", First Edition, 2010.

### **DIGITAL IMAGE PROCESSING** (Common to CS, EE, EC & IT)

### **OBJECTIVES**

IT16005

- To get exposed to different image enhancement techniques •
- To learn about image transformation and color image analysis
- To learn about image classification
- To study various applications of image processing •

### **INTRODUCTION** UNIT I

Introduction-Origins, Examples of Fields, fundamental steps, Components, Fundamentals-Elements of Visual Perception, Image Sensing & Acquisition, Sampling and Quantization, Relationship between Pixels, Mathematical Tools – Spatial, Vector and Matrix operations.

### **IMAGE ENHANCEMENT UNIT II**

Histogram Processing, Fundamentals of Spatial Filtering- Smoothing, Sharpening, Frequency domain- Smoothing and Sharpening, Filters – Homo-morphic Filtering, Noise Models, Inverse filtering, Wiener filtering, Geometric Mean Filter.

### UNIT III **IMAGE TRANSFORMATION**

Transforms: Matrix-based - correlation, Fourier related, Walsh- Hadamard, Slant, Haar, Wavelet, Color: Models, Transformations, Image smoothing and sharpening, Noise in color images.

### **MIDDLE & HIGH LEVEL IMAGE PROCESSING** UNIT IV

Basic Morphological algorithms: Hole filling, Convex hull, Pruning, Edge Detection-Basic, Thresholding-Foundation and Segmentation - Region Growing and Region Splitting & Merging, Active contours- image segmentation using Snakes, Feature Extraction-Preprocessing, Feature descriptors - Boundary, Region and Principal components, Pattern classification: Statistical classifiers -Bayes classifier, Neural Networks and Deep learning: Multilayer Feedforward Neural Networks, Deep Convolutional Neural Networks.

### UNIT V **APPLICATIONS**

Face Recognition, Finger print Recognition, Gait Recognition, Location of dark contaminants in cereals, recent developments in In-Vehicle Vision systems.

### **TOTAL: 45 PERIODS**

CO1	Interpret missing data and infer knowledge on advanced graphics
CO2	Implement the various image enhancement techniques
CO3	Interpret image transformation and its algorithms
CO4	Identify the image classification techniques
CO5	Relate the various applications of image processing.

### **OUTCOMES:**

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### **TEXT BOOKS:**

1. Rafael C.Gonzalez and Richard E.Woods, —Digital Image Processing, Fourth Edition, Pearson Education, 2017.

2. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012.

- 1. S.Sridhar, "Digital Image Processing", Oxford University Press, 2011.
- 2. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2011.

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### CS16016

### **USER INTERFACE TECHNOLOGIES** (COMMON TO CS & IT)

### **OBJECTIVES:**

- To Understand the Concepts and Architecture of the World Wide Web.
- To Understand and Practice Markup Language.
- To Understand and Practice Embedded Dynamic Scripting on Client-Side Internet Programming.
- To Understand and Practice Web Development Techniques on Client-Side.

### UNIT I **INTRODUCTION TO WWW**

Introduction to computer networks - Internet Standards - Introduction to WWW -WWW architecture - SMTP - POP3 - File Transfer Protocol - Overview of HTTP, HTTP request response – Generation of dynamic web pages.

### UNIT II UI DESIGN

HTML5: What is HTML5 - Features of HTML5 - Semantic Tags - New Input Elements and tags - Media tags(audio and video tags) - Designing Graphics using Canvas API - Drag and Drop features - Geolocation API - Web Storage (Session and local Storage).

CSS3: What is CSS3 - Features of CSS3 - Implementation of border radius ,box shadow, Image border, custom web font, backgrounds - Advanced text effects(shadow) - 2D and 3D Transformations - Transition to elements - Animations to text and elements

### UNIT III RESPONSIVE WEB DESIGN (RWD)

Responsive Design: What is RWD - Introduction to RWD Techniques - Fluid Layout, Fluid Images and Media queries - Introduction to RWD Framework - Twitter Bootstrap -Bootstrap background and Features - Getting Started with Bootstrap - Demystifying Grids -OffCanvas - Bootstrap Components - JS Plugins - Customization

### UNIT IV INTRODUCTION TO JAVASCRIPT

Introduction - Core features - Datatypes and Variables - Operators, Expressions and Statements - Functions & Scope - Objects - Array, Date and Math related Objects -Document Object Model - Event Handling - Browser Object Model - Windows and Documents - Form Handling and Validations.

Object-Oriented Techniques in JavaScript - Classes - Constructors and Prototyping (Sub Classes and Super Classes) - JSON - Introduction to AJAX

### UNIT V INTRODUCTION TO JQUERY

Introduction - jQuery Selectors - jQuery HTML - Animations - Effects - Event Handling -DOM – jQuery DOM Traversing, DOM Manipulation – jQuery AJAX

### **TOTAL :45 PERIODS**

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CO1	Practice NoSQL Database CRUD operations
CO2	Design the website using functionalities of Client-side and Server-side JS frameworks.
CO3	Design the website using Server-side JS framework to make Database Connectivity.
CO4	Explore Angular features and create component-based web pages using them
CO5	Design Front-end web pages and connect to the Back-end Databases

### **TEXT BOOKS:**

- 1. Harvey & Paul Deitel& Association, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web How to Program", Fifth Edition, Pearson Education, 2011
- 2. Achyut S Godbole and Atul Kahate, "Web Technologies", Second Edition, Tata McGraw Hill, 2012.

- 1. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition Tata McGraw Hill, 2013
- David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
- 3. Bear Bibeault and Yehuda Katz, "jQuery in Action", January 2008
- 4. Web link for Responsive Web Design https://bradfrost.github.io/this-is-responsive/
- 5. Ebook link for JavaScript https://github.com/jasonzhuang/tech\_books/tree/master/js

MULTIMEDIA COMPRESSION TECHNIQUES

### **OBJECTIVES**

**IT16006** 

To provide in-depth knowledge about

- Data Compression
- Text Compression and Audio Compression
- Image and Video Compression

### UNIT I INTRODUCTION

Introduction to Compression Techniques – Lossless Compression, Lossy Compression, Measure of Performance, Mathematical preliminaries for lossless compression- Models-Physical model, Probability model, Markov model, Composite source model.

### UNIT II DATA COMPRESSION

Huffman coding- Minimum Variance Huffman codes, Extended Huffman codes, Non binary Huffman Codes, Applications of Huffman coding, Context Based Compression- prediction with partial match, burrows-Wheeler Transform, Associative Coder of Buyanovsky.

### UNIT III AUDIO COMPRESSION

Digital audio - audio compression techniques -  $\mu$  Lawand A Law companding, ADPCM. Speech compression- waveform codecs-source codecs- hybrid codecs-Shorten compressor MPEG-1 audio layers.

### UNIT IV IMAGE COMPRESSION

Image Transforms – orthogonal transforms- DCT, JPEG, progressive image compression-JBIG, JBIG2 standards, Vector quantization, Differential lossless compression –DPCM Wavelet based compression- Filter banks, DWT, Multiresolution decomposition, SPIHT and EZW Coders, JPEG 2000 standard.

### UNIT V VIDEO COMPRESSION

Motion Compensation, Video Signal Representation – MPEG Video Coding– H.261, H.263, H.264 Standards, Compression issues in ATM Networks, Compression algorithm for Packet Video.

### **TOTAL: 45 PERIODS**

### **OUTCOMES:**

CO1	Investigate various mathematical models that support Compression schemes.
CO2	Examine different types of Huffman coding techniques for text based applications.
CO3	Illustrate different Audio Compression methods and Speech compression techniques.
CO4	Categorize different Image Compression standards for Differential lossless compression techniques.
CO5	Interpret the concepts of different video coding standards, Video Compression techniques for analyzing ATM compression issues.

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### **TEXT BOOKS:**

- 1. Khalid Sayood, "Introduction to Data Compression", Fifth Edition, Elsevier, 2017
- 2. David Salomon, "Data Compression The Complete Reference" Fifth Edition, Springer Verlag New York Inc., 2010.

- 1. Yun Q. SHI, Huifang Sun, "Image and Video cOMPRESSSION FOR Multimedia Engineering Fundamentals, Algorithms and standards", CRC Press, Second Edition, 2008.
- 2. John. W. Woods, "Multidimensional Signal, Image and Video Processing and Coding", Academic Press, 2011.

### EC16703 **EMBEDDED AND REAL TIME SYSTEMS**

### **OBJECTIVES**

The student should be made to:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis
- Be exposed to the basic concepts and overview of real time Operating system.
- Learn the system design techniques and networks for embedded systems to industrial applications

### **INTRODUCTION TO EMBEDDED COMPUTING AND ARM 9** UNIT I PROCESSORS

Complex systems and micro processors- Embedded system design process - Overview on formalisms for system design -Design example: Model train controller- Instruction sets preliminaries - ARM Processor - CPU: programming input and output- supervisor mode, exceptions and traps - Co-processors- Memory system mechanisms - CPU performance-CPU power consumption-Introduction to Embedded Industrial CPUs for rugged environment

### **UNIT II EMBEDDED COMPUTING PLATFORM DESIGN**

The CPU Bus–Memory devices and systems–Designing with computing platforms – consumer electronics architecture - platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading - compilation techniques-Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization - Analysis and optimization of program size-Program validation and testing.

### UNIT III **PROCESSES AND OPERATING SYSTEMS**

Introduction - Kernel, Threads - Multiple tasks and multiple processes - Multirate systems-Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance– power optimization strategies for processes - GPOS versus RTOS- Classification of RTOS- Example Real time operating systems-POSIX-Windows CE.

UNIT IV SYSTEM DESIGN TECHNIQUES AND NETWORKS

Design methodologies- Design flows - Requirement Analysis - Specifications-System analysis and architecture design - Quality Assurance techniques- Distributed embedded systems -Multiprocessors-CPUs, accelerators, MPSoCs- Overview on Internet of (robotic) Things–Ubiquitous computing.

### **CASE STUDY** UNIT V

Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera -Telephone answering machine–Engine control unit – Video accelerator–Embedded systems in industrial applications- challenges and trends.

### **OUTCOMES:**

CO1	Understand the basic concepts of embedded computing, ARM processors and Co Processors
CO2	Analyze the embedded computing platform, design in program and operating system level.
CO3	Apply the system design techniques and networks for embedded systems and apply embedded system concept in consumer and industrial applications.

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**TOTAL : 45 PERIODS** 

### **TEXT BOOKS:**

1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

### **REFERENCES:**

1. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012.

2. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.

3. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.

4. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, Mc Graw Hill 1997

5. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.

6. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.



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### **OBJECTIVES:**

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- Learn the architecture and protocols of wireless sensor networks.

### UNIT I INTRODUCTION

Background of Sensor Network Technology. Mobile adhoc networks and wireless sensor networks. Difference between mobile ad-hoc and sensor networks. Applications of mobile adhoc networks and sensor networks- Design challenges in adhoc and wireless sensor networks, Enabling technologies for wireless sensor networks.

### UNIT II MAC PROTOCOLS FOR ADHOC WIRELESS NETWORKS

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

### UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN ADHOC 9 WIRELESS NETWORKS

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

### UNIT IV WIRELESS SENSOR NETWORK AND MAC PROTOCOLS 9

Single node architecture - Hardware Components, Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Gateway Concepts. MAC Protocols for WSN, Issues in designing MAC Protocol for WSNs, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, IEEE 802.15.4

### UNIT V WSN ROUTING, LOCALIZATION & QOS

Issues in designing routing protocols for WSN, Classification of Routing Protocols, Unicast, Broadcast and Multicast. Localization – properties, approaches, single hop localization and positioning in multihop environment. Transport layer and QoS in WSN, Optimization Goals and Figures of Merit

### **TOTAL:45 PERIODS**

CO1	Understand the basics of adhoc sensor networks and MAC protocols
CO2	Understand routing protocols and transport layer in adhoc wireless networks.
CO3	Describe the architecture and hardware components of wireless sensor networks
CO4	Classify the routing protocols and implements its design issues.

### **TEXT BOOKS:**

- 1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.
- 2. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

- 1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
- 2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication 2002.
- 3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
- 4. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

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### **OBJECTIVES**

- To enable the student to understand the evolving paradigm of cognitive radio communication and the enabling technologies for its implementation.
- To enable the student to understand the essential functionalities and requirements in designing software defined radios and their usage for cognitive communication.
- To expose the student to the evolving next generation wireless networks and their associated challenges.

### UNIT I SOFTWARE DEFINED RADIO AND ITS ARCHITECTURE 9

Definitions and potential benefits, software radio architecture evolution, technology tradeoffs and architecture implications. Essential functions of the software radio, basic SDR, hardware architecture, Computational processing resources, software architecture, top level component interfaces, interface topologies among plug and play modules.

### UNIT II COGNITIVE RADIOS AND ITS ARCHITECTURE 9

Marking radio self-aware, cognitive techniques –position awareness, environment awareness in cognitive radios, optimization of radio resources, Artificial Intelligence Techniques, Cognitive Radio –functions, components and design rules, Cognition cycle –orient, plan, decide and act phases, Inference Hierarchy, Architecture maps, Building the Cognitive Radio Architecture on Software defined Radio Architecture.

### UNIT III SPECTRUM SENSING AND IDENTIFICATION

Primary Signal Detection: Energy Detector, Cyclostationary Feature Detector, Matched Filter ,Cooperative Sensing , Definition and Implications of Spectrum Opportunity, Spectrum Opportunity Detection , Fundamental Trade-offs: Performance versus Constraint , MAC Layer Performance Measures, Global Interference Model, Local Interference Model, Fundamental Trade-offs: Sensing Accuracy versus Sensing Overhead.

### UNIT IVUSER COOPERATIVE COMMUNICATIONS9

User Cooperation and Cognitive Systems, Relay Channels: General Three -Node Relay Channel, Wireless Relay Channel, User Cooperation in Wireless Networks: Two-User Cooperative Network, Cooperative Wireless Network, Multihop Relay Channel.

### UNIT V INFORMATION THEORETICAL LIMITS ON CR 9 NETWORKS

Types of Cognitive Behavior, Interference-Avoiding Behavior: Spectrum Interweave, Interference-Controlled Behavior: Spectrum Underlay, Underlay in Small Networks: Achievable Rates, Underlay in Large Networks: Scaling Laws, Interference-Mitigating Behavior: Spectrum Overlay, Opportunistic Interference Cancellation, Asymmetrically Cooperating Cognitive Radio Channels.

### **TOTAL : 45 PERIODS**

CO1	Understand the hardware and software architecture of software defined radio
CO2	Design the wireless networks based on the cognitive radios.
CO3	Describe the cognitive radio architecture and components
CO4	Classify the cognitive techniques and its design issues

### **TEXT BOOKS:**

- 1. Alexander M. Wyglinski, Maziar Nekovee, And Y. Thomas Hou, "Cognitive Radio Communications And Networks -Principles And Practice", Elsevier Inc., 2010.
- 2. Bruce Fette, "Cognitive Radio Technology", Elsevier, Second edition, 2009.

- 1. Kwang-Cheng Chen and Ramjee Prasad, "Cognitive Radio Networks", John Wiley & Sons Ltd, 2009.
- 2. Khattab, Ahmed, Perkins, Dmitri, Bayoumi, Magdy, "Cognitive Radio Networks -From Theory to Practice", Springer Series: Analog Circuits and Signal Processing, 2009.
- 3. J. Mitola, "Cognitive Radio: An Integrated Agent Architecture for software defined radio", Doctor of Technology thesis, Royal Inst. Technology, Sweden 2000.
- 4. Simon Haykin, "Cognitive Radio: Brain –empowered wireless Communications", IEEE Journal on selected areas in communications, Feb 2005.
- 5. Ian F. Akyildiz, Won –Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, "NeXt generation / dynamic spectrum access / cognitive radio wireless networks: A Survey Elsevier Computer Networks, May 2006.

EC16801

WIRELESS NETWORKS (Common To CS,EC & IT)

### **OBJECTIVES:**

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

### UNIT I WIRELESS LAN

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayer-MAC Management Sublayer- Wireless ATM - HIPERLAN- BRAN- Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security WiMax.

### UNIT II 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.

### UNIT III INTERWORKING BETWEEN WLANS AND 3G WWANS

Interworking objectives and requirements, Schemes to connect WLANs and 3G Networks, Session Mobility, Interworking Architectures for WLAN and GPRS, System Description, Local Multipoint Distribution Service, Multi-channel Multi-point Distribution system.

### UNIT IV ADHOC & SENSOR NETWORKS

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

### UNIT V 4G & BEYOND

4G features and challenges, Technology path, IMS Architecture, Convergent Devices, 4G technologies, Advanced Broadband Wireless Access and Services, Multimedia, MVNO.

### **TOTAL:45 PERIODS**

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CO1	Categorize different types of wireless LAN
CO2	Infer various WWAN technologies
CO3	Distinguish various architectures for Interworking between WLANs and 3G WWANs
CO4	Identify suitable routing protocols used for adhoc and sensor networks
CO5	Interrelate advanced wireless networking technologies, their features and services for 4G

# n completion of the course, students will be able to TEXT BOOKS:

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

- 1. Clint Smith. P.E., and Daniel Collins, "3G Wireless Networks", 2<sup>nd</sup> Edition, Tata McGraw Hill, 2007.
- 2. Kaveth Pahlavan, K. Prashanth Krishnamuorthy, "Principles of Wireless Networks", Prentice Hall of India, 2006.
- William Stallings, "Wireless Communications and Networks" Prentice Hall of India, 2<sup>nd</sup> Ed., 2007.
- Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2<sup>nd</sup> Ed., 2007.
- 5. Gary. S. Rogers & John Edwards, "An Introduction to Wireless Technology", Pearson Education, 2007.
- 6. Sumit Kasera and Nishit Narang,"3G Networks– Architecture, Protocols and Procedures", Tata McGraw Hill, 2007.
**BIO INFORMATICS** (Common To CS & IT)

#### **OBJECTIVES:**

#### The Student should be made to:

- Exposed to the need for Bioinformatics technologies
- Learn the applications of data mining and warehousing techniques
- Be familiar with Pattern Matching and Visualization
- Learn microarray analysis

#### UNIT I INTRODUCTION

Bioinformatics technologies – Needs for Bioinformatics - Overview of Bioinformatics technologies Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

#### UNIT II DATAWAREHOUSING & DATAMINING IN BIOINFORMATICS 9

Bioinformatics data – Introduction to Data warehousing- data warehousing architecture – Importance of Data warehousing- data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.

#### UNIT III MODELING FOR BIOINFORMATICS

Hidden Markov modeling for biological data analysis – Sequence identification –Sequence classification – multiple alignment generation – Comparative modeling –Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling.

#### UNIT IV PATTERN MATCHING AND VISUALIZATION

Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.

#### UNIT V MICROARRAY ANALYSIS

Microarray technology for genome expression study – image analysis for data extraction – pre-processing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark – Tradeoffs.

#### **TOTAL: 45 PERIODS**

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CO1	Tell the basic concepts of bioinformatics technologies
CO2	Extend the knowledge on data warehouse and data mining in bioinformatics
CO3	Choose and Make use of suitable model for biological data analysis
CO4	Name suitable pattern matching techniques to bioinformatics data
CO5	Utilize micro array technology for genomic expression study

#### **TEXT BOOKS:**

1. Yi-Ping Phoebe Chen (Ed), "BioInformatics Technologies", First Indian Reprint, Springer Verlag, 2007.

- 1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
- 2. Arthur M Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005

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#### **OBJECTIVES**

- Be exposed with the basic rudiments of business intelligence system
- Understand the modeling aspects behind Business Intelligence
- Understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques
- Apply the business intelligence in different domain.

#### UNIT I BUSINESS INTELLIGENCE

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Definition, concept and need for Business Intelligence, Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

#### UNIT II KNOWLEDGE DELIVERY

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports, automated reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message

#### UNIT III BUSINESS INTELLIGENCE IN KNOWLEDGE STORAGE 9 AND RETRIEVAL

Querying data from data servers using SQL -Restructuring transactional files - Recoding alphanumeric and date variables -Date transformation into time periods -Data Import and Transformation - Linear Regression - Regression Output - Regression Transformation - Logistic Regression Output.

#### UNIT IV BUSINESS INTELLIGENCE APPLICATIONS

Marketing models – Logistic and Production models – Application of business intelligence in neural networks-application of business intelligence in artificial intelligence -Case study

#### UNIT V FUTURE OF BUSINESS INTELLIGENCE

Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.

#### **TOTAL : 45 PERIODS**

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CO1	Students will be able to apply the ETL concepts, tools and techniques to perform Extraction, Transformation and Loading of data.
CO2	Students will be able to summarize the usable data by using various reporting concepts, techniques/tools, and use charts, tables for reporting in BI.
CO3	Students will be able to use Analytics concepts like data mining, Exploratory and statistical techniques for predictive analysis in Business Intelligence.
CO4	Students will be able to demonstrate application of concepts in BI.
CO5	Students will be able to analyze and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

#### Upon completion of the course, students will be able to

#### **TEXT BOOKS:**

- 1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.
- 2. GalitShmueli, Nitin R. Patel and Peter C. Bruce, —Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner, Wiley, 2007.

- 1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
- 2. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.
- 3. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill, 2007.
- 4. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

## **DEEP LEARNING**

#### IT16008 OBJECTIVES

**OUTCOMES:** 

- To learn feed forward deep networks
- To understand convolutional networks and sequence modeling
- To study probabilistic models and auto encoders
- To expose the students to various deep generative models
- To study the various applications of deep learning

## UNIT I APPLIED MATH AND MACHINE LEARNING BASICS

Linear Algebra - Norms, Singular Value Decomposition, the Moore-Penrose Pseudoinverse, Probability and Information Theory, Machine Learning Basics

### UNIT II INTRODUCTION TO DEEP NETWORKS: MODERN PRACTICES

Deep Feedforward Networks, Regularization for Deep Learning, optimization for Training Deep Models

## UNIT III MODERN PRACTICES

Convolutional Networks, SequenceModeling,: recurrent and recursive Nets, Practical methodology, Linear Factor Models, Autoencoders, Representation Learning, Monte Carlo methods, Confronting the partition function.

## UNIT IV INTRODUCTION TO DEEP GENERATIVE MODELS

Approximate Inference, Deep Generative Models - Boltzmann Machines, Restricted Boltzmann Machines, Deep Belief Networks, Deep Boltzmann Machines, Convolutional Boltzmann Machines, Back-Propagation through Random Operations, Directed Generative Nets, Generative Stochastic Networks, Evaluating Generative Models.

## UNIT V DEEP LEARNING FRAMEWORK AND APPLICATIONS

Introduction to TensorFlow, MXNET, TORCH, Applications of Deep Learning – TEXT, IMAGE, SPEECH.

CO1	Explore the basics for linear algebra for deep learning
CO2	Interpret machine learning algorithms for various applications
CO3	Identify programming models for deep networks
CO4	Examine deep learning frameworks using different applications
CO5	Develop text and image-based applications using deep generative models.

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**TOTAL: 45 PERIODS** 

#### **TEXT BOOKS:**

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville,"Deep Learning", MIT Press, 2016.

- 1. Li Deng, Dong Yu, "Deep Learning: Methods and Applications", Now publishers, 2014.
- 2. Special Issue on deep learning for speech and language processing, IEEE Transaction on Audio, Speech and Language Processing, vol. 20, iss. 1, pp. 7 54, 2012.

## **GRID COMPUTING**

## **OBJECTIVES**

IT16009

- To understand Grid Architecture.
- To understand different types of grids.
- To know Grid standards.
- To acquire the knowledge of Grid computing in various areas.

#### **UNIT I INTRODUCTION**

Parallel and Distributed Computing - Cluster Computing - Grid Computing Anatomy and Physiology of Grid - Web and Grid Services. Q

#### UNIT II **FRAMEWORK**

Architecture - Implementation of Grid Architecture - Grid Services OGSI, OGSA, WSRF -Grid Resource and Service Management -Resource Management Framework - Service Negotiation and Acquisition Protocol - Layers of Grid Computing - Building Reliable Services - Grid Monitoring - Sensors and Sensor Management - Grid Security - WS Security - GSI. 9

#### DATA AND KNOWLEDGE GRID **UNIT III**

DATA Source - Collective Data Services - Data Management - Collective Data Management - Federation Services - Representing Knowledge - Processing Knowledge - Knowledge Oriented Grid. 9

#### **UNIT IV GRID MIDDLEWARE**

List of Globally Available Toolkits - GT3 - Architecture Details - Grid Service Container -OGSI Implementation - Security Infrastructure - System Level Services - Hosting Environments Programming Model.

#### **APPLICATIONS** UNIT V

Scientific - Medical - Bioinformatics - Federated Computing - ERM - Multiplayer Games -Collaborative Science – Grid Computing for SAS, Case Study.

## **TOTAL : 45 PERIODS**

## **OUTCOMES:**

CO1	Practice the various computing technologies
CO2	Interpret the concepts of resource management and security for effective utilization of grid
CO3	Determine the performance and scalability of data oriented and knowledge grids
CO4	Evaluate the Globus Toolkit and the programming
CO5	Develop grid based applications for solving real life problems

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#### **TEXT BOOKS:**

Ian Foster, Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure", Elsevier Series, Second edition, 2006.

- 1. Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya, "Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience", Wiley Press, New York, USA, 2008.
- 2. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making the Global Infrastructure a Reality", Wiley, 2003. 4. Maozhen Li, Mark Baker, "The Grid: Core Technologies", Wiley, 2005.
- 3. SAS Documentation, Grid Computing in SAS 9.3 second edition, 2012.

## **COMPUTER VISION**

#### **OBJECTIVES**

- To understand the concepts of low level and intermediate level vision •
- To understand Hough Transform and its applications. •
- To understand three-dimensional image analysis techniques.
- To understand motion analysis. •
- To study some applications of computer vision. •

#### LOW LEVEL VISION UNIT I

Nature of Vision, Basic Imaging operations- gray scale image, binary image, convolutional and point spread function, sequential vs. parallel operations, Thresholding - Adaptive Thresholding. 9

#### **UNIT II INTERMEDIATE LEVEL VISION**

Texture analysis - Binary Shape analysis, connectedness, object labeling and counting, size filtering, distance functions, skeletons and thinning, boundary tracking procedures, Hough Transform – generalized, spatial Matched Filtering, Hough Transform (HT) for line detection, GHT for ellipse detection.

#### UNIT III **3D VISION**

Methods for 3D vision - projection schemes - shape from shading - photometric stereo shape from texture - shape from focus - active range finding - surface representations - pointbased representation – volumetric representations – 3D object recognition – 3D reconstruction

#### **UNIT IV MOTION**

Introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion.

#### **APPLICATIONS UNIT V**

Application: Photo album - Face detection - Face recognition - Eigen faces - Active appearance and 3D shape models of faces Application: Surveillance - foreground-background separation - particle filters - Chamfer matching, tracking, and occlusion - combining views from multiple cameras - human gait analysis Application: In-vehicle vision system: locating roadway - road markings - identifying road signs - locating pedestrians

#### **TOTAL: 45 PERIODS**

#### **OUTCOMES:**

CO1	Explore the concepts of low level and intermediate level vision
CO2	Develop applications based on Hough Transform
CO3	Employ three-dimensional image analysis techniques in real time applications
CO4	Simulate human motion analysis.
CO5	Design computer vision based socially relevant applications

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#### **TEXT BOOKS:**

1. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012.

#### **REFERENCES:**

1. R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 2011.

2. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.

3. Mark Nixon and Alberto S. Aquado, "Feature Extraction & Image Processing for Computer Vision", Third Edition, Academic Press, 2012.

4. D. L. Baggio et al., "Mastering OpenCV with Practical Computer Vision Projects", Packt Publishing, 2012.

5. Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012.

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#### **OBJECTIVES**

- To learn specialized cloud architectures
- To understand Unikernels
- To study the basics of containers

#### UNIT I SPECIALIZED CLOUD ARCHITECTURES

Direct I/O Access Architecture , Direct LUN Access Architecture, Dynamic Data Normalization Architecture , Elastic Network Capacity Architecture , Cross-Storage Device Vertical Tiering Architecture , Intra-Storage Device Vertical Data Tiering Architecture , Load Balanced Virtual Switches Architecture , Multipath Resource Access Architecture , Persistent Virtual Network Configuration Architecture , Redundant Physical Connection for Virtual Servers Architecture , Storage Maintenance Window Architecture .

#### UNIT II UNIKERNELS

Dockerized containers, Unikernel application stack, MirageOS, HaLVM, LING, ClickOS, Rumprun,OSv, IncludeOS, Ecosystem elements, Limitations.

#### UNIT III CONTAINERS

Containers Vs VMs, Docker and Containers, Docker Fundamentals, Docker Architecture, Connecting Containers to the World, Linking Containers, Managing Data with Volumes and Data Containers, Common Docker Commands.

#### UNIT IV MICROSERVICES

Autonomous Services ,Small Services, Benefits- Independent Deployments, Continuous Innovation, Improved Scale and Resource Utilization, Technology Diversity, Small Focused Teams, Fault Isolation, Challenges, Encapsulation, DevOps Principles and Culture, Automation, Monitoring, Fault Tolerance.

#### UNIT V CONTAINERS ON AZURE - BASICS

VMs, Containers, and Processes, Containers on Azure, Creating an Azure VM with Docker, Service Orchestration and Connectivity- Orchestration, Provisioning, Scheduling and Cluster Management - Docker Swarm, Kubernetes, Apache Mesos, Using Apache Mesos to Run Diverse Workloads, Service Discovery - Service Registration, Service Lookup, Service Registry, Technologies, Application/API Gateway, Overlay Networking.

#### TOTAL (L:45): 45 PERIODS

#### **OUTCOMES:**

CO1	Examine the specialized cloud architectures
CO2	Interpret the functionality of various UniKernels
CO3	Demonstrate the concepts of containers
CO4	Investigate the automation and fault tolerance managed by MicroServices
CO5	Interpret the functionality of various UniKernels.

#### **TEXT BOOKS:**

- 1. Zaigham Mahmood, Thomas Erl, Ricardo Puttini, "Cloud Computing: Concepts, Technology & Architecture", Prentice Hall, 2013.
- 2. Russell Pavlicek,"UnikernelsBeyond Containers to theNext Generation of Cloud", O'Reilly Media, 2017.

- 1. Adrian Mouat, "Using Docker, Developing and Deploying Software with Containers", O'Reilly Media, 2015.
- 2. Daniel Fernandez, Trent Swanson, Boris Scholl, "Microservices with Docker on Microsoft Azure", Addison-Wesley Professional, June 2016.

#### IT16012 SECURITY PRINCIPLES AND TECHNIQUES L T

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#### **OBJECTIVES**

- To understand the fundamentals of computer security.
- To explore the principles of software security.
- To learn about OS & Database security.
- To learn the principles of mobile and cloud computing security.

### UNIT I COMPUTER SECURITY TECHNOLOGY AND PRINCIPLES

Computer Security Concepts - Threats, Attacks, and Assets - Security Functional Requirements - Fundamental Security Design Principles - Attack Surfaces and Attack Trees -

Computer Security Strategy, Cryptographic Tools - Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers Case study: Encryption of Stored Data.

#### UNIT II AUTHENTICATION AND ACCESS CONTROL

Electronic User Authentication Principles, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, Remote User Authentication, Security Issues for User Authentication, Access Control Principles, Discretionary Access Control, Role-Based Access Control, Attribute-Based Access Control, Case study - Security Problems for ATM Systems, RBAC System for a Bank.

#### UNIT III SOFTWARE SECURITY

Malicious Software - Types of Malicious Software , Advanced Persistent Threat , Propagation – Infected Content - Viruses- Vulnerability Exploit - Worms- Social Engineering – SPAM E-Mail, Trojans – System Corruption – Attack Agent – Zombie, Bots – Information Theft – Keyloggers, Phishing, Spyware – Stealthing – Backdoors, Rootkits, Countermeasures, Writing safe code - Buffer Overflow - Stack Overflows - Defending Against Buffer Overflows , Software security issues - Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs.

#### UNIT IV OS AND DATABASE SECURITY

The Need for Database Security - SQL Injection Attacks ,Database Access Control, Inference,

Database Encryption, Introduction to Operating System Security - System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/UNIX Security, Windows Security, Virtualization Security.

#### UNIT V MOBILE AND CLOUD COMPUTING SECURITY

Cloud Security Risks and Countermeasures, Data Protection in the Cloud, Cloud Security as a Service. GSM and UMTS-Security architecture & Attacks, Vulnerabilities in Cellular Services, Cellular Jamming, Attacks & Mitigation, Security in Cellular VoIP Services, Mobile application security.

#### **TOTAL : 45 PERIODS**

CO1	Explore the approaches, trade-offs in security design principles.
CO2	Design a secure operating system
CO3	Design a secure database application
CO4	Simulate the various platform security models in a mobile environment
CO5	Identify the risks and Countermeasures in Cloud Security

#### **TEXT BOOKS:**

- 1. William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", 3rdEdition Pearson, 2015.
- 2. S. Kami Makki, Peter Reiher, Kia Makki, Niki Pissinou, Shamila Makki, "Mobile and Wireless Network Security and Privacy", Springer, 2007.

- 1. Noureddine Boudriga, "Security of Mobile Communications", CRC Press, 2010.
- 2. Mark Stamp, "Information Security: Principles and Practice", Second Edition, Wiley, 2011.
- 3. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Prentice Hall, 2007.
- 4. Sean Smith, John Marchesini, "The Craft of System Security", Addison-Wesley Professional, 2008.

IT16013	CYBER FORENSICS	L	Т	Р	С
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OBJECTIV	/ES				
• ] I	Fo understand the fundamentals of Computer Forensics and compunity nvestigations.	ting			
• ]	Fo recognize the legal underpinnings and critical laws affecting for	rensi	CS		
• ]	Γο apply the tools and methods to uncover hidden information in d	igita	l sys	tems	3.
• ]	Fo learn about current licensing and certification requirements to b	uild	the c	caree	r in
	ligital forensic.				_
UNIT I	INTRODUCTION				9
The Scope	of Computer Forensics - Windows Operating and File Sys	tems	з —Н	Iand	ling
Computer H	lardware – Anatomy of Digital Investigation.				
UNIT II	INVESTIGATIVE SMART PRACTICES				9
Forensics In	vestigative Smart Practices – Time and Forensics – Incident closure	2.			
IINIT III	LAWS AND PRIVACY CONCERNS				0
	LAWS AND I RIVACT CONCERNS	: . 1	- 4 - 1	Dula	,
Laws Affec	ting Forensic Investigations – Search warrants and Subpoends–La	egisi	ated	Priv	acy
LINIT IV	DATA ACOUSTION AND REPORT WRITING	,ator.	•		0
Data Acqui	sition _Finding Lost Files _Document Analysis _Case Manager	ment	and		nort
WritingRi	ilding a Forensics Workstation	nem	anc	i Ke	pon
UNIT V	TOOLS AND CASE STUDIES				9
Tools of the	Digital Investigator-Licensing and Certification –Case Studies: E	-mai	l Foi	rensi	cs -
Web Forens	ics –Searching the Network –Excavating a Cloud –Mobile device	Fore	nsic	S.	•••
	TOTAL (L:45	5): 4	5 PE		DDS
OUTCOM	ES:	,			

CO1	Relate the fundamentals of computer forensics, laws, report writing and tools in digital investigations.
CO2	Assess the investigative smart practices and applicability of concerned laws & investigative tools
CO3	Examine the acquired data, recover the deleted data and manage a case.
CO4	Choose the correct method to handle the digital evidence and acquire appropriate certification to build the career in digital forensics.
CO5	Create a method for gathering, assessing and applying new and existing legislation specific to the practice of digital forensics.

#### **TEXT BOOKS:**

- 1. Michael Graves, —Digital Archaeology: The Art and Science of Digital Forensics, Addison-Wesley Professional, 2014.
- 2. Darren R. Hayes, —Practical Guide to Computer Forensics Investigation, Pearson, 2015.

- 1. Albert J. Marcella and Frede ric Guillossou, —Cyber Forensics: From Data to Digital Evidence, Wiley, 2015.
- 2. Bill Nelson, Amelia Phillips and Christopher Steuart, —Guide to Computer Forensics and Investigations, Fourth Edition, Cengage, 2013.

**INFORMATION SYSTEM SECURITY** L

ENGINEERING AND MANAGEMENT

### **OBJECTIVES**

- To provide fundamental knowledge, skills, techniques, and tools required by IT security professionals
- To understand access control, physical security, cryptography, application security, and operations security.
- To facilitate the up-to-date understanding required to stay one step ahead of evolving • threats, standards, and regulations.

#### **INTRODUCTION** UNIT I

Security Engineering, Protocols, Access control, Cryptography- the vingere, one-time pad, Block cipher, one way functions, asymmetric primitives, Random oracle model, symmetric crypto primitives, modes of operation, hash functions, asymmetric crypto primitives, Multilevel and multi lateral security. 9

#### MANAGEMENT OF INFORMATION SECURITY UNIT II

Principles of Information Security Management - Applying Project Management to Security -Project Management Tools - Planning for Security: The Role of Planning - Precursors to Planning - Strategic Planning - Information Security Governance - Information Security Policy, Standards, and Practices – Planning for Information Security Implementation.

#### **UNIT III** MANAGEMENT IN ORGANIZATION

Developing the Security Program: Organizing for Security – Placing Information Security within an Organization - Components of the Security Program - Information Security Roles and Titles - Implementing Security Education, Training and Awareness Program - Security Management Models: Blueprints, Frameworks, and Security Models – Access Control Models - Security Architecture Models - Security Management Models - Security Management Practices: - Benchmarking - Performance Measures in Information Security Management. -Personnel and Security: Staffing the Security Function - Information Security Professional Credentials - Security Considerations for Non employees - Employment Policies and Practices.

#### **UNIT IV** SECURITY MANAGEMENT CONCEPTS AND PRINCIPLES

Measuring ROI on security- Security patch management- Purposes of Information Security management- The building blocks of information security- Human side of information security-Security management- Securing new information technology. 9

#### UNIT V MANAGING THE DEVELOPMENT OF SECURE SYSTEMS

security project, Methodology, Security requirement engineering, Managing Risk management, Managing the team, System Evaluation and Assurance.

## **TOTAL: 45 PERIODS**

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CO1	Explore techniques, and tools required to provide IT security
CO2	Plan for Information Security Implementation.
CO3	Implement access control, physical security, cryptography, application security, and operations security
CO4	Appraise the evolving threats, standards, and regulations.
CO5	Formulate Information Security Policy and Standards

#### Upon completion of the course, students will be able to

#### **TEXT BOOKS:**

- 1. Micki Krause, Harold F.Tripton, "Information Security Management Handbook", Auerbach Publications, 2012.
- 2. Ross J. Anderson, "Security Engineering: A Guide to Building Dependable Distributed Systems", 2nd Edition, Wiley publications, 2008.

- 1. Michael Whitman and Herbert Mattord, "Principles of Information Security", Fifth Edition, Cengage Learning, 2015.
- 2. Thomas R. Peltier, "Information Security Policies and Procedures", 2nd Edition, Auerbach Publications, 2004.

IT16015

#### ETHICAL HACKING (Common to CS & IT)

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#### **OBJECTIVES**

- To understand numerous methods of real-world information intelligence
- To learn about vulnerability scanners
- To understand techniques used to sniff traffic across a network
- To familiarize with the methodologies that can be used to hack into a target
- To appreciate the wide variety of attacks that can be performed against a wireless network

#### UNIT I INTRODUCTION TO HACKING

Terminologies, Categories of Penetration Test, Writing Reports, Structure of a Penetration Testing Report, Vulnerability Assessment Summary, Risk Assessment, Methodology, Linu Basics: File Structure, Cron Job, Users, Common Applications, BackTrack, Services.

#### UNIT II INFORMATION GATHERING, TARGET ENUMERATION AND PORT SCANNING TECHNIQUES

Active, Passive and Sources of information gathering, Copying Websites Locally, NeoTrace Cheops-ng, Intercepting a Response, WhatWeb, Netcraft, Basic Parameters, Xcode Exploi Scanner, Interacting with DNS Servers, Fierce, Zone Transfer with Host Command an Automation, DNS Cache Snooping- Attack Scenario, Automating Attacks, SNMP - Problem Sniffing Passwords, SolarWinds Toolset, sweep, Brute Force and Dictionary- Tools, Attack Enumeration, Intelligence Gathering Using Shodan, Target enumeration and Port Scannin Techniques.

#### UNIT III VULNERABILITY ASSESSMENT & NETWORK SNIFFING

Introduction to Vulnerability Assessment - Pros and Cons, NMap, Updation of database Testing SCADA Environments with Nmap, Nessus, **Sniffing:** Types, Hubs versus Switches Modes, MITM Attacks, ARP Protocol Basics- working, Attacks, DoS Attacks, Dsniff too Using ARP Spoof to Perform MITM Attacks, Sniffing the Traffic with Dsniff, Sniffing Picture with Drifnet, Urlsnarf and Webspy, Sniffing with Wireshark, Ettercap- ARP Poisoning Hijacking Session with MITM Attack, ARP Poisoning with Cain and Abel, Sniffing Sessio Cookies with Wireshark, Hijacking the Session, SSL Strip: Stripping HTTPS Traffic Requirements, Automating Man in the Middle Attacks, DNS Spoofing, DHCP Spoofing.

#### UNIT IV BASICS OF EXPLOITATION

**Remote Exploitation** : Understanding Network Protocols, Attacking Network Remot Services, Common Target Protocols, tools for cracking network remote services, Attackin SMTP, Attacking SQL Servers, Client Side Exploitation Methods: E-Mails Leading t Malicious Attachments & Malicious Links, Compromising Client Side Update, Malwar Loaded on USB Sticks, **Postexploitation:** Acquiring Situation Awareness, Privilege Escalatior Maintaining Access, Data Mining, Identifying and Exploiting Further Targets, Window Exploit Development Basics.

#### UNIT V WIRELESS & WEB HACKING

**Wireless Hacking :** Requirements , Aircracking , Hidden SSIDs , Monitor Mode , Monitorin Tool- Beacon Frames on Wireshark ,Airodump-ng , Wireless Adapter in Monitor Mode Determining the Target , Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng Capturing Packets and Four-Way Handshake , **Web Hacking :** Attacking the Authentication Brute Force and Dictionary Attacks , Types of Authentication , Crawling Restricted Links Testing for the Vulnerability , Authentication Bypass with Insecure Cookie Handling , SQI injection, XSS – DOM based,BeEF,CSRF, Bypassing CSRF and BeEF with XSS, Vulnerabilit

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CO1	Interpret the core concepts related to malware, hardware and software vulnerabilities and their causes
CO2	Relate ethics behind hacking and vulnerability disclosure
CO3	Judge the vulnerabilities related to computer system and networks using state of the art tools and technologies
CO4	Assess the strengths and weaknesses of general cybersecurity models
CO5	Assess the possible consequences of misaligning enterprise strategy, security policy, and security plans

#### **TEXT BOOKS:**

1. Rafay Baloch ,"Ethical Hacking and Penetration Testing Guide", CRC Press, 2015.

- 1. Patrick Engebretson, "The Basics of Hacking and Penetration Testing : Ethical Hacking and Penetration Testing Made Easy", Syngress Media, Second Revised Edition, 2013.
- 2. Michael T. Simpson, Kent Backman, James E. Corley, "Hands On Ethical Hacking and Network Defense", Cengage Learning, 2012.

DIGITAL FORENSIC TOOLS AND TECHNIQUES L

(Common to CS & IT)

#### **OBJECTIVES**

IT16016

- To understand evidence-handling procedures
- To comprehend the general rules of evidence
- To know the fundamental computer and mobile forensics concepts
- Locate forensic artifacts in various operating systems
- Analyze extracted evidence and properly report findings

#### UNIT I BASICS OF DIGITAL FORENSICS

The Role of Digital Forensics - the history and purpose, criminal investigations and cybercrime, civil investigations and the nature of e-discovery, The role and challenges of digital forensic practitioners, case studies, Digital Forensics Environment – Nature of digital information, Operating systems, Describing and locating evidence in file systems, password security, encryption, and hidden files, linking the evidence to the user.

#### UNIT II INTRODUCTION TO DIGITAL EVIDENCE

Digital evidence – Usage, Characteristics, technical complexities, determining the value and admissibility of digital evidence, Recovering and Preserving Digital Evidence - chain of custody, physical acquisition and safe keeping, Recovery - forensic imaging process, live recovery process.

#### UNIT III TOOLS

Forensic Tools - Standards, Need, forensic imaging tools, Enhanced forensic tools - The Event Analysis tool ,The Cloud Analysis tool ,The Lead Analysis tool, Analyzing e-mail datasets ,Detecting scanned images ,Volume Shadow Copy analysis tools ,Timelines and other analysis tools, Case study : Interrogating large datasets , Selecting and Analyzing Digital Evidence- Structured processes to locate and select digital evidence ,Locating digital evidence, Selecting digital evidence , Case study : recovery of deleted evidence held in volume shadows.

#### UNIT IV EVIDENCE SOURCE AND EXAMINATION

Sources of Evidence -The Windows Registry and system files and logs as resources of digital evidence, Apple and other operating system structures, Remote access and malware threats ,Case study – corroborating evidence using Windows Registry, Examining Evidence - Locating evidence from Internet browsing ,Messaging systems, E-mail analysis and the processing of large e-mail databases, evidence recovery from mobile phones and handheld devices Case study – mobile phone evidence in a bomb hoax.

#### UNIT V VALIDATING THE EVIDENCE

The nature and problem of unsound digital evidence, Impartiality in selecting evidence, The structured and balanced analysis of digital evidence, Formalizing the validation of digital evidence, The presentation of digital evidence, Ethical issues confronting digital forensics practitioners, Case study – presumed unauthorized use of intellectual property Solutions to the challenges posed by new hardware and software, Challenges posed by communication media and the cloud, Mobile phone evidence recovery, The cloud - convenient for users but problematic for practitioners, The need for effective evidence processing and validation, Contingency planning.

#### **TOTAL : 45 PERIODS**

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CO1	Interpret and appropriately apply the laws and procedures associated with identifying ,acquiring, examining and presenting digital evidence.
CO2	Interpret and appropriately apply the laws and procedures associated with identifying ,acquiring, examining and presenting digital evidence.
CO3	Formulate a method for gathering, assessing and applying new and existing legislation and industry trends specific to the practice of digital forensics.
CO4	Employ fundamental computer theory in the context of computer forensics practices.
CO5	Identify forensic artifacts in various operating systems
CO6	Investigate extracted evidence and properly report findings.

#### **TEXT BOOKS:**

1. Richard Boddington, "Practical Digital Forensics", Packt Publishing, 2016.

- 1. Cory Altheide and Harlan Carvey, "Digital Forensics with Open Source Tools", Syngress, 2011.
- 2. Harlan Carvey, "Windows Forensic Analysis Toolkit: Advanced Analysis Techniques for Windows 7", Syngress Publishing, 2012.

# GE16701TOTAL QUALITY MANAGEMENTLTPC(Common To All Branches Except CE & BT)3003

#### **OBJECTIVES:**

• To facilitate the understanding of Quality Management principles and process

#### UNIT I INTRODUCTION

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

#### UNIT II TQM PRINCIPLES

Leadership - Strategic quality planning, Quality Councils - Employee involvement -Motivation,Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal- Continuous process improvement - PDCA cycle, 5S, Kaizen -Supplier partnership - Partnering, Supplier selection, Supplier Rating by Analytical Hierarchical Processing(AHP)

#### UNIT III TQM TOOLS AND TECHNIQUES I

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Industrial case studies on DFMEA and PFMEA

#### UNIT IV TQM TOOLS AND TECHNIQUES II

Control Charts - Process Capability - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

#### UNIT V QUALITY SYSTEMS

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing -QS 9000/TS16949 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

**TOTAL:45 PERIODS** 

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CO1	The students will be able to understand the concepts of TQM (Total Quality Management), quality and its need, evolution of TQM.
CO2	The students will be able to understand the quality statements and importance of customers to the organization
CO3	The students will be able to understand the various principles of TQM and able to apply them to the need in various sectors of a firm
CO4	The students will be able to understand & apply the various tools and techniques used in TQM and apply them in the processes
CO5	The students will be able to understand the various quality systems and able to implement in manufacturing and service sectors

#### **TEXT BOOKS:**

1. Dale H. Besterfiled, et at., "Total quality Management", Pearson Education Asia, Third Edition, Indian Reprint 2006.

- 1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
- 2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
- 3. Janakiraman. B and Gopal .R.K., "Total Quality Management Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

#### **OBJECTIVES:**

**GE16001** 

• To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

#### UNIT I HUMAN VALUES

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Stress and emotional management

#### UNIT II ENGINEERING ETHICS

Senses of "Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

## UNITENGINEERING AS SOCIAL EXPERIMENTATION9III

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

#### UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

#### UNIT V GLOBAL ISSUES

Multinational Corporations – Environmental Ethics – Global warming – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

#### **TOTAL:45 PERIODS**

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CO1	To know and understand human values.
CO2	To discuss the ethical issues related to engineering.
CO3	Implementation of ethical aspects in practicing.
CO4	To realize the responsibilities and rights in society.
CO5	The student should apply corporate, computer and environment ethics to address the global issues.

#### **TEXT BOOKS:**

- 1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
- 2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

#### **REFERENCES:**

- 1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
- 2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics Concepts and Cases", Cengage Learning, 2009
- 3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
- 4. Edmund G Seebauer and Robert L Barry, "Fundametals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001
- 5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi 2013.
- 6. World Community Service Centre, " Value Education", Vethathiri publications, Erode, 2011

#### Web sources:

- 1. www.onlineethics.org
- 2. www.nspe.org
- 3. www.globalethics.org
- 4. www.ethics.org

# CS16704RESOURCE MANAGEMENT TECHNIQUESLTP(Common To CS & IT)300

## **OBJECTIVES**

- The student should be familiar with the basic resource management techniques
- The student should learn to solve problems in linear programming and Integer programming and be exposed to CPM and PERT
- The student should be familiar to use the queuing model

## UNIT I LINEAR PROGRAMMING MODELS

Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques- Variants of Simplex method.

## UNIT II INTEGER PROGRAMMING MODELS

Formulation – Gomory's IPP method – Gomory's mixed integer method – Branch and bound technique.

## UNIT III TRANSPORTATION AND ASSIGNMENT MODELS

Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem

## UNIT IV SCHEDULING BY PERT AND CPM

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling

## UNIT V QUEUING MODELS

Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / 8 /8), (M / M / 1) : (FIFO / N / 8), (M / M / C) : (FIFO / 8 / 8), (M / M / C) : (FIFO / N / 8) models.

## **TOTAL : 45 PERIODS**

## **OUTCOMES:**

CO1	Students will be able to formulate linear programming (LP) models and solve the problems using appropriate methods.
CO2	Students will be able to construct a linear integer programming model and discuss the methods to solve it.
CO3	Students will be able to produce optimized solutions for transportation and assignment models.
CO4	Students will be able to apply CPM and PERT techniques constructively to make effective business decisions and resource mapping.
CO5	Students will be able to develop mathematical skills to solve queuing models arising from a wide range of applications.

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#### **TEXT BOOKS:**

1. Taha H.A., "Operations Research : An Introduction " 7th Edition, Pearson Education, 2004.

- 1. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
- 2. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3rd Edition, 2003.

## MG16851PRINCIPLES OF MANAGEMENTLTP(COMMON TO AE,CS,EE,EC,IT & ME)300

#### **OBJECTIVES:**

• To enable the students to study the evolution of Management, functions and principles of management and to learn the application of management principles in an organization.

#### UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management –Nature of Management-Management as Science or Art-Management and Administration-Evolution of Management-Contribution of Taylor and Fayol-– Manager Vs Entrepreneur - types of managers - managerial roles and skills-Types of Business Organisation-Organization Culture and Environment.

#### UNIT II PLANNING

Nature and purpose of planning – Steps Involved in planning process – Types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques-Forecasting – Decision making steps and process.

#### UNIT III ORGANISING

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization by different strategies – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection process, Training and Development, Performance Management , Career planning and management.

#### UNIT IV DIRECTING

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication

#### UNIT V CONTROLLING

System and process of controlling – Requirements for effective control - budgetary and nonbudgetary control techniques – use of computers and IT in handling the information – Productivity problems and management – control of overall performance – direct and preventive control – reporting.

#### **TOTAL:45 PERIODS**

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CO1	Students will be able to practice various managerial roles in the enterprise, apply various managerial approaches to handle complex situations, identify various business organizations and design planning process to reach the decided organizational objectives.
CO2	Students will be able to formulate strategies for the betterment of the organization as demanded by the environment and the current scenario existing in the organization, group activities, and able to effectively execute various human resource planning activities as required by the organization
CO3	Students can able to execute the appropriate motivational and leadership techniques as demanded by the situation
CO4	Students will be able to apply various control techniques to solve the productivity problems and effectively utilize various communication methods in the organization

#### **TEXT BOOKS:**

- 1. Stephen P. Robbins & Mary Coulter, "Management", 10th Edition, Prentice Hall (India) Pvt. Ltd., 2009.
- 2. M. Govindarajan and S. Natarajan, "Principles of Management", BPB Publications, New Delhi,2009.
- 3. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.

- 1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 7<sup>th</sup> Edition, Pearson Education, 2011.
- 2. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.
- 3. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999.
- 4. Harold Koontz & Heinz Weihrich "Essentials of management" Tata Mc Graw Hill, 1998.

SOFTWARE PROJECT MANAGEMENT

(Common to EC & IT)

#### **OBJECTIVES**

**IT16017** 

- To understand the roles of the project manager
- To understand the threats and opportunities in project management •
- To gain expertise in size, effort and cost estimation techniques •
- To understand how to approach non-technical problems •
- To appreciate management issues like team structure, group dynamics

#### **INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT UNIT I**

Project Definition . Contract Management ,Activities Covered by Software Project Management, Plan, Methods and Methodologies, Ways of Categorizing Software Projects, Problems with Software Projects, Setting Objectives, Stakeholders, Management Control, Overview of Project Planning - Stepwise Project Planning.

#### **PROJECT EVALUATION UNIT II**

Programme Management, Managing the Allocation of Resources, Strategic Programme Management, Creating a Programme, Aids to Programme Management, Benefits Management, Evaluation of Individual Projects, Technical Assessment - Cost Benefit Analysis - Cost Benefit Evaluation Techniques – Risk Evaluation – Cash Flow Forecasting – Software Effort Estimation. 9

#### **ACTIVITY PLANNING** UNIT III

Objectives of Activity Planning - Project Schedule - Project and Activities - Sequencing and Scheduling Activities – Network Planning Models – Formulating a Network Model – Adding the Time Dimension -Forward Pass – Backward Pass –Identifying Critical Path - Activity Float - Shortening Project Duration - Identifying Critical Activities - Activity on Arrow Networks -Risk Management - Categories - Risk - Framework - Identification - Assessment - Planning -Management - Evaluating Risk to the Schedule - PERT Technique - Monte Carlo Simulation -Resource Allocation – Nature Of Resources – Identifying Resource Requirements – Scheduling Resources – Creating Critical Paths – Counting the Cost - Publishing the Resource Schedule. 9

#### MONITORING AND CONTROL **UNIT IV**

Framework - Collecting the Data -Visualizing Progress - Cost Monitoring - Earned Value Analysis - Prioritizing Monitoring - Getting Project Back to Target - Change Control -Managing Contracts – Introduction – The ISO 12207 Approach – Supply process – Types of Contract - Stages in Contract Placement - Typical Terms Of a Contract - Contract Management – Acceptance. 9

#### **UNIT V** MANAGING PEOPLE AND ORGANIZING TEAMS

Introduction – Understanding Behavior – Organizational Behavior - Selecting the Right Person for the Job - Instruction in the Best Methods - Motivation - The Oldham -Hackmann Job Characteristics Model - Working in Groups - Becoming a Team -Decision Making -Leadership - Organizational Structures - Stress - Health and Safety - Process Group view, Tools - web-based project management tool, Scrum-based task management board.

**TOTAL: 45 PERIODS** 

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CO1	Select the software project management plan and it's activities
CO2	Appraise the individual project through cost, effort and risk
CO3	Judge the various project activity plan through available resources
CO4	Recognize project progress and its control
CO5	Assess the ethics followed in handling a project team

#### **TEXT BOOKS:**

1. Bob Hughes, Mike Cotterell, —Software Project Management, Fifth Edition, Tata McGraw Hill, 2011.

- 1. http://projectmanagementacademy.net/articles/five-traditional-process-groups/
- 2. Karen Brown, Nancy Lea Hyer, "Managing Projects: A Team-Based Approach", first edition, Tata Mcgraw Hill, 2013.
- 3. Andrew Stellman, Jennifer Greene Head First PMP, 3rd Edition O'Reilly Media 2013.