K.S. Rangasamy College of Technology

(Autonomous Institution)

Curriculum & Syllabus

of

B.E. Computer Science and Engineering

(For the batch admitted in 2017-21)

R 2014

Courses Accredited by NBA, Accredited by NAAC with 'B++' Grade, Approved by AICTE, Affiliated to Anna University, Chennai.

KSRKalvi Nagar, Tiruchengode – 637 215.

Namakkal District, Tamil Nadu, India.

Vision

To produce competent software professionals, academicians and researchers through Quality Education.

Mission

- To produce competent software developers, system designers and network programmers.
- To keep abreast of the latest developments and technological transformations in computer science and engineering for social benefits.

The Programme Educational Objectives of the department are:

I. Graduates of the programme will identify, formulate, analyze complex problems and provide effective solutions by applying the concepts of science, mathematics, engineering fundamentals and computing.

II. Graduates of the programme will be professionally competent and successful in their chosen career through life-long learning.

III. Graduates of the programme will contribute individually or as member of a team in handling projects and exhibit social responsibility and professional ethics

Programme Outcomes (POs)

(a) Apply the knowledge of mathematics, science, engineering fundamentals to the solution of complexproblems in Computer Science and Engineering

(b) Identify, formulate, research literatureand analysecomplex Computer Science and Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

(c) Design solutions for complex Computer Science and Engineering problems and design system components or processes that meet thespecified needs with appropriate consideration for the public health andsafety, and the cultural, societal, and environmental considerations

(d) Use research-based knowledge and research methods including design of experiments, analysis andinterpretation of data, and synthesis of the information to provide valid conclusions related to Computer Science and Engineering

(e) Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelingto complex Computer Science and Engineering activities with an understanding of the limitations

(f) Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

(g) Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

(h) Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

(i) Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

(j) Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

(k) Demonstrate knowledge andunderstanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

(l) Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

K.S.Rangasamy College of Technology, Tiruchengode – 637 215	
Regulation	R 2014
Department	Department of Computer Science and Engineering
Programme Code & Name	CS : B.E. Computer Science and Engineering

Curriculum for the Programmes under Autonomous Scheme

Semester I

Course Code	Course Name	Hours / Week			Credit
		L	T	P	C
	THEORY				
40 EN 001	English	3	0	0	3
40 MA 001	Ordinary and Partial Differential Equations	3	1	0	4
40 PH 002	Physics of Materials	3	0	0	3
41 CH 007	Environmental Science and Engineering	3	0	0	3
40 ME 001	Basics of Mechanical Engineering	3	0	0	3
40 IT 001	Fundamentals of Information Technology	3	0	0	3
	PRACTICAL				
40 PH 0P1	Physics Laboratory	0	0	3	2
40 ME 0P2	Engineering Practices Laboratory	0	0	3	2
Total		18	01	06	23

Semester II

Course Code	Course Name	Hours / Week			Credit
		L	T	P	C
	THEORY				
40 EN 002	Communication Skills	3	0	0	3
40 MA 002	Laplace Transform and Complex Variables	3	1	0	4
40 CH 001	Engineering Chemistry	3	0	0	3
40 CE 001	Basics of Civil Engineering and Mechanics	3	1	0	4
41 EE 001	Basics of Electrical Engineering	3	0	0	3
40 CS 002	Computer Programming	3	1	0	4
	PRACTICAL				
40 CH 0P1	Chemistry Laboratory	0	0	3	2
40 CS 0P2	Computer Programming Laboratory	0	0	3	2
40 ME 0P1	Engineering Graphics Laboratory	0	0	3	2
Total		18	03	09	27

Semester III

	THEORY				
40 MA 004	Boundary Value Problems and Transform Methods	3	1	0	4
40 CS 003	Data Structures	3	0	0	3
40 CS 004	Object Oriented Programming	3	0	0	3
40 EC 003	Digital Principles and System Design	3	1	0	4
40 EC 004	Electronic Devices and Circuits	3	0	0	3
40 CS 301	Software Engineering	3	0	0	3
	PRACTICAL				
40 CS 0P3	Data Structures Laboratory	0	0	3	2
41 CS 0P4	Object Oriented Programming Laboratory	0	0	3	2
40 EC 0P1	Analog and Digital Circuits Lab	0	0	3	2
40 TP 0P1	Career Competency Development I	0	0	2	0
Total		18	2	11	26

Semester IV

	THEORY				
40 MA 011	Statistics and Queuing Theory	3	1	0	4
40 PH 008	Applied Physics	3	0	0	3
40 IT 002	Design and Analysis of Algorithms	3	1	0	4
40 EC 005	Microprocessors and Microcontrollers	3	0	0	3
40 CS 401	Java Programming	3	1	0	4
40 CS 402	Operating Systems	3	0	0	3
	PRACTICAL				
40 EC 0P2	Microprocessors and Microcontrollers Lab	0	0	3	2
41 CS 4P1	Java Programming Laboratory	0	0	3	2
40 CS 4P2	Operating Systems Lab	0	0	3	2
40 TP 0P2	Career Competency Development II	0	0	2	0
Total		18	3	11	27

K.S.Rangasamy College of Technology, Tiruchengode – 637 215	
Regulation	**R 2014**
Department	**Department of Computer Science and Engineering**
Programme Code & Name	CS : B.E. Computer Science and Engineering

Curriculum for the Programmes under Autonomous Scheme

Semester V

Course Code	Course Name	Hours/ Week			Credit
		L	T	P	C
	THEORY				
40 MA 014	Discrete Mathematics	3	1	0	4
40 CS 501	Database Management Systems	3	0	0	3
40CS 502	Computer Architecture	3	0	0	3
40 CS 503	Computer Networks	3	0	0	3
40 CS 504	Web Technology	3	0	0	3
40 CS 505	Theory of Computation	3	1	0	4
	PRACTICAL				
40 CS 5P1	Database Management Systems Laboratory	0	0	3	2
40 CS 5P2	Networking Laboratory	0	0	3	2
40 CS 5P3	Web Technology Laboratory	0	0	3	2
40 TP 0P3	Career Competency Development III	0	0	2	0
Total		18	2	11	26

Semester VI

Course Code	Course Name	Hours / Week			Credit
		L	T	P	C
	THEORY				
40 HS 003	TotalQuality Management	2	0	0	2
40 CS 601	System Software	3	1	0	4
40 CS 602	Cryptography and Network Security	3	1	0	4
40 CS 603	Graphics and Multimedia system	3	0	0	3
40 CS 604	Data Mining	3	0	0	3
40 CS E1*	Elective I	3	0	0	3
	PRACTICAL				
40 CS 6P1	System Software Laboratory	0	0	3	2
40 CS 6P2	Data Mining Laboratory	0	0	3	2
40 CS 6P3	Graphics and Multimedia system Laboratory	0	0	3	2
40 TP 0P4	Career Competency Development IV	0	0	2	0
Total		17	2	11	25

Semester VII

	THEORY				
40 HS 002	Engineering Economics and Financial Accounting	2	0	0	2
40 CS 702	Cloud Computing	3	0	0	3
40 CS 703	Big Data	3	0	0	3
40 CS 801	Software Testing	3	0	0	3
40 CS E2*	Elective II	3	0	0	3
40 CS E3*	Elective III	3	0	0	3
	PRACTICAL				
40 CS 7P1	Open Source System Laboratory	1	0	2	2
40 CS 7P4	Cloud Computing Laboratory	1	0	2	2
40 CS 7P3	Project Work – Phase I	0	0	3	2
40 TP 0P5	Career Competency Development V	0	0	2	0
Total		19	1	9	23

Semester VIII

	THEORY				
40 CS 701	Mobile Computing	3	0	0	3
40 CS E4*	Elective IV	3	0	0	3
40 CS E5*	Elective V	3	0	0	3
	PRACTICAL				
40 CS 8P1	Project Work – Phase II	0	0	16	8
Total		9	0	16	17

K.S.Rangasamy College of Technology, Tiruchengode – 637 215								
Curriculum for the Programmes under Autonomous Scheme								
Regulation	**R 2014**							
Department	**Department of Computer Science and Engineering**							
Programme Code & Name	CS : B.E. Computer Science and Engineering							
Elective I								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
	THEORY							
40 HS 001	Professional Ethics	2	0	0	2	50	50	100
40 CS E11	Foundation Skills in integrated Product Development	3	0	0	3	50	50	100
41 CS E12	User Interface Technologies	3	0	0	3	50	50	100
40 CS E13	Information Storage and Management	3	0	0	3	50	50	100
40 CS E14	Distributed Computing	3	0	0	3	50	50	100
Elective II								
40 CS E21	Pattern Recognition	3	0	0	3	50	50	100
40 CS E22	Artificial Intelligence	3	0	0	3	50	50	100
40 CS E23	XML and Web Services	3	0	0	3	50	50	100
40 CS E24	Embedded Systems and Programming	3	0	0	3	50	50	100
40 CS E25	Mobile Ad hoc Networks	3	0	0	3	50	50	100
Elective III								
40 CS E31	Network Setup and Administration	3	0	0	3	50	50	100
40 CS E32	Machine Learning	3	0	0	3	50	50	100
40 CS E33	Python Programming	3	0	0	3	50	50	100
40 CS E34	Text Mining	3	0	0	3	50	50	100
40 CS E35	C# and .NET Framework	3	0	0	3	50	50	100
Elective IV								
40 CS E41	Service Oriented Architecture	3	0	0	3	50	50	100
40 CS E42	Big Data Security	3	0	0	3	50	50	100
40 CS E43	Mobile Application Development	3	0	0	3	50	50	100
40 CS E44	Cyber Laws and Intellectual Property	3	0	0	3	50	50	100
40 CS E45	Software Forensics	3	0	0	3	50	50	100
Elective V								
40 CS E51	Python Programming for Data Analytics	3	0	0	3	50	50	100
40 CS E52	Semantic Web	3	0	0	3	50	50	100
40 CS E53	Social Network Analysis	3	0	0	3	50	50	100
40 CS E54	Angular JS	3	0	0	3	50	50	100
40 CS E55	Multimedia Computing	3	0	0	3	50	50	100

K.S.Rangasamy College of Technology - Autonomous								
40 EN 001 & English								
Common to All Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	50	50	100

Objectives	• To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts. • To help learners develop strategies that could be adopted while reading texts. • To help learners acquire the ability to speak effectively in English in real life and career related situations. • To train learners in organized academic and professional writing.
Course Outcomes	**At the end of the course, the students will be able to** 1. Comprehend the basic grammatical structures and generate new sentences in a given paradigm. 2. Explain and apply the enriched vocabulary in academic and professional contexts. 3. Identify the main idea and integrate it with supporting data to facilitate effective comprehension. 4. Infer, compare and summarize lexical & contextual meaning of various technical / general passages. 5. Recognize the basic phonetic units of language and execute it for better oral competency. 6. Recognize and interpret standard English Pronunciation & use it in diverse situations. 7. Find and classify different reading strategies and demonstrate better articulation / expression 8. Categorize words into different parts of speech and use them in different contexts. 9. Retrieve information from various sources and construct a well designed descriptive writing. 10. Indentify the key words of concepts and learn to write definitions.

Grammar and Vocabulary

Word formation with Prefixes and Suffixes Level -1 (50 words), Level -2 (100 words) – Synonyms and Antonyms (100 each)– Verbal Analogy- Finding the Odd man out- Alphabet Test- One word substitute- Sentence Patterns- Subject-Verb Agreement – Tenses – Active and Passive voice – Use of conditionals – Comparative Adjectives– Expanding Nominal Compounds (100) – Articles – Use of Prepositions (basic level – 25) Identifying Phrasal Verbs - Error Detection – Abbreviations and Acronyms (100 each).

Suggested Activities

Prefixes and suffixes– identifying the lexical and contextual meanings of words – correction of errors in the given sentences -providing a context for the use of tenses, sentence structures – using comparative forms of adjectives - Identifying phrasal verbs - 'if' clauses – the three main types, probable condition, improbable condition and impossible conditions.

Note: All examples should preferably be related to science and technology.

Listening skill

Extensive listening – Listening for General Content – Listening to fill up Gapped Texts – Intensive Listening – Listening for Specific Information: Retrieval of Factual Information – Listening to Identify Topic, Context, Function, Speaker's Opinion, Attitude, etc. – Global Understanding Skills and Ability to infer, extract gist and understand main ideas – Note-Taking: Guided and Unguided

Suggested Activities

Taking a quick glance at the text to predict the content – reading to identify main content and giving feedback in response to the teacher's questions – making a thesis statement about the text – scanning for specific information – sequencing of jumbled sentences using linguistic clues (e.g. reference words and repetition) and semantic clues following propositional development –fast reading drills – comprehending a passage and answering questions of varied kinds relating to information, inference and prediction.

Speaking skill

Verbal and Non-Verbal communication – Speech Sounds – Syllables – Word Stress (structural and content words) – SentenceStress – Intonation – Pronunciation Drills, Tongue Twisters – Formal and Informal English – Oral Practice – Developing Confidence – Introducing Oneself – Asking for or Eliciting Information – Describing Objects – Expressing Opinions (agreement / disagreement) – Giving Instructions – (Road Maps)

Suggested Activities

Role play activities based on real life situations – discussing travel plan / industrial visits- giving oral instructions for performing tasks at home and at work (use of imperatives) -using appropriate expressions-defining / describing an object /device / instrument / machine – participating in a short discussion on a controversial topic – oral presentation

Reading skill

Exposure to different reading techniques – Reading for gist and global meaning – Predicting the content – Skimming the text – Identifying the topic sentence and its role in each paragraph – Scanning – Inferring / Identifying lexical and contextual meanings – Reading for structure and detail – Transfer of information / Guided Note-Making – Understanding Discourse Coherence.

Suggested Activities

Gap filling activity while listening to a text – listening intently to identify the missing words in a given text – listening to a brief conversation and answering questions – listening to a discourse and filling up gaps in a worksheet – taking notes during lecture – inferential comprehension and literal comprehension tasks based on listening to quizzes.

Note: The listening activities can be done using a worksheet in the Language Laboratory or in the class room using a tape recorder.

Writing skill

Introduction to the characteristics of technical style – Writing Definitions and Descriptions – Paragraph Writing (topic sentence and its role, unity, coherence and use of cohesive expressions) – Process Description (use of sequencing connectives) – Comparison and Contrast – Classifying the Data – Analyzing / Interpreting the data – Formal letter Writing (letter to the editor, letter for seeking practical training, and letter for undertaking project works in industries) – Editing (punctuation, spelling and grammar)

Suggested Activities

writing a paragraph based on information provided in a tree diagram / flow chart / bar chart / pie chart / tables – formal letters – writing to officials (leave letter, seeking permission for practical training , asking for certificates, testimonials) – letter to the editor – informal letters (persuading / dissuading, thanking and congratulating friends / relatives) – sending e- mail – editing a passage (correcting the mistakes in punctuation, spelling and grammar)

Text book :

1.	Ashraf M Rizvi, 'Effective Technical Communication', 1st Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2005.

Reference(s) :

1.	M.Balasubramanian and G.Anbalagan, 'Performance in English', Anuradha Publications, Kumbakonam, 2007.
2.	Sharon J. Gerson, Steven M. Gerson, 'Technical Writing – Process & Product',3rd Edition, Pearson Education (Singapore) (p) Ltd., New Delhi, 2004.
3.	Mitra K. Barun, 'Effective Technical Communication – A Guide for Scientists and Engineers', Oxford University Press, New Delhi, 2006.
4.	R.S. Aggarwal, 'A Modern Approach to Verbal & Non – Verbal Reasoning',S.Chand& Company Ltd., New Delhi, Revised Edition, 2012.
5.	NPTEL Video Courses on Spoken English.

K.S.Rangasamy College of Technology - Autonomous								
40 MA 001 Ordinary and Partial Differential Equations								
Common to All Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	50	50	100

Objectives	• This course creates the ability to model, solve and interpret any physical or engineering problems. • Development of mathematical skills to solve the ordinary and partial differential equations. • To understand the concepts of vectors in two-dimension and three dimension spaces.
Course Outcomes	**At the end of the course, the students will be able to** 1. (i) Understand the types of matrix and find eigen values, eigen vectors and inverse of the matrix. (ii) Solve the system of linear equations. 2. Apply transformation techniques to reduce quadratic form into canonical form. 3. Solve linear differential equations with constant and variable coefficients. 4. (i) Find the solution of differential equations by the method of variation of parameters. (ii) Solve simultaneous differential equations. 5. Understand the concepts of curvature and evolutes. 6. (i) Analyze the maxima and minima of a function (ii) Expand the function of two variables as Taylor's series and find the Jacobians. 7. Construct partial differential equations and find the solutions of non-linear partial differential equations of first order. 8. Apply the appropriate method to solve Lagrange's linear equations and solve linear partial differential equations with constant coefficients. 9. Know about gradient, directional derivative, solenoidal and irrotational of a vector function. 10. Apply the notions of vector calculus to verify Green's, Gauss divergence and Stoke's theorems.

Matrices

Basic concepts – Addition and multiplication of matrices – Orthogonal matrices – Conjugate of a matrix – Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors – Cayley-Hamilton theorem (without proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation – System of linear equations.

Ordinary Differential Equations

Introduction – Differential equations of first-order and first degree – Exact differential equations – Linear differential equations of second and higher order with constant co-efficient when the R.H.S is $e^{\alpha x}$, sin α x or cos α x ,x^n n>0, $e^{\alpha x} x^n$, $e^{\alpha x}$ sinβx, and $e^{\alpha x}$ cosβx – Differential equations with variable co-efficients reducible to differential equations with constant co-efficients (Cauchy's form and Legendre's linear equation) – Method of variation of parameters – Simultaneous first-order linear equations with constant co-efficients.

Differential Calculus and Functions of Several Variables

Curvature – Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Involutes and evolutes – Taylor's series for a function of two variables – Maxima and minima of function of two variables – Constrained maxima and minima (Lagrange's method of undetermined multipliers) – Jacobians(Problems only).

Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Non-linear partial differential equations of first order (Type I – IV) – Solution of partial differential equations of first order – Lagrange's linear equations – Linear partial differential equations with constant coefficients.

Vector Calculus

Introduction – Gradient of a scalar point function – Directional derivative – Angle of intersection of two surfaces – Divergence and curl(excluding identities) – Solenoidal and irrotational vectors – Green's theorem in the plane –Gauss divergence theorem – Stoke's theorem(without proof) – Verification of the above theorems and evaluation of integrals using them.

Text book:

1	Kreyszig E, "Advanced Engineering Mathematics", 9th Edition, John Wiley and Sons (Asia) Limited, New Delhi, Reprint 2012.

Reference(s):

1	GrewalB.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, Delhi, 2013.
2	Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", 9th Edition, Lakshmi Publications Pvt Ltd, New Delhi, 2014.

K.S.Rangasamy College of Technology – Autonomous								
40 PH 002 Physics of Materials								
Common to CSE, IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	4	0	0	45	3	50	50	100
Objectives	• To impart fundamental knowledge about conducting, superconducting, semiconducting, magnetic, advanced materials &devices and IC fabrication technology. • To correlate the theoretical principles with application oriented studies.							
Course outcomes	**At the end of the course, the students will be able to** 1. Recognize the electrical and thermal conductivity to analyze the properties of electrons in metals. 2. Recall superconductivity to understand the properties, the classification and the applications of superconducting devices. 3. Recall the fundamental concept of semiconductors and classify them based on structural arrangements, deduce the semiconductor parameters 4. Recognize Hall effect and employ Hall experiment to discriminate the semiconductor types 5. Classify magnetic materials based on their properties 6. Employ magnetic materials to act as data storage devices 7. Understand and apply the properties of metallic glasses, SMA, MEMS for research and industrial applications 8. Understand the properties and prepration ofnanomaterials and its impact in research and industrial applications. 9. Recognize IC terminologies and classify different Ics 10. Analyze the advantages and disadvantages of Ics and apply fabrication techniques of IC components for research and industrial applications.							

Conducting, Superconducting Materials and Devices

Introduction-Classical Free electron theory-verification of Ohm's law –Electrical Conductivity- Expression for electrical conductivity-Thermal conductivity-Expression for thermal Conductivity-Widemann Franz Law-Lorentz number - Advantages and drawbacks of classical free electron theory- superconductivity-Properties of Superconductors-Factors affecting superconducting phenomena – DC and AC Josephson effect –BCS theory- Type-I and Type-II superconductors-High T_C Superconductors-Applications: SQUID, Cryotron, Magnetic Levitation

Semiconducting Materials and Devices

Introduction-properties-Elemental and Compound Semiconductors-Intrinsic and Extrinsic Semiconductors-Properties-Carrier Concentration in intrinsic and Extrinsic semiconductors- electrical conductivity of a semiconductor- determination of band gap-Relation between electrical conductivity and mobility- Variation of Fermi level with Temperature and impurities-Hall effect- Hall Coefficient-Experimental Determination of Hall Coefficient-applications-Semiconductor devices :LDR, Solar Cells

Magnetic Materials and Devices

Introduction-Classification of Magnetic materials-properties-Domain theory of ferromagnetism-Hystersis-Hard and Soft magnetic materials-Ferrites: Structure, preparation and applications-Applications: Charge coupled devices(CCD) -Optical and magnetic data storage

Advanced Materials

Metallic glasses: preparation, properties and applications – Shape memory alloys (SMA):Characteristics, properties of NiTi alloy, application: MEMS – Nanomaterials- Properties- Top-down process: Ball Milling method – Bottom-up process: Vapour Phase Deposition method- Carbon Nano Tube(CNT): Properties, Electric arc method, Applications

IC Fabrication

Introduction-Advantages and Drawbacks of Ics-Scale of Integration- Classification between different Ics-Linear Integrated Circuit-Digital Integrated Circuit- IC Terminologies-Monolithic IC fabrication – Fabrication of IC components-Applications of Ics

Text Books

1	Rajendran V, "Engineering Physics", TataMcGraw Hill, New Delhi, 2011
2	William D.Callister, "Material Science and Engineering," Wiley India, 2006

Reference Books

1	B.L.Theraja, "Basic Electronics", S. Chand publications, New Dehli-2007
2	R.S.Sedha, "Applied Electronics" S. Chand Publications, New Dehli-2010
3	V.K.Metha, RohitMetha "Principles of Electronics", S,Chand& company Ltd, New Delhi, 2010

K.S. Rangasamy College of Technology - Autonomous								
41 CH 007 - Environmental Science and Engineering								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
I	3	0	0		3	50	50	100

Objectives	• To help the learners to analyze the importance of ecosystem and biodiversity. • To familiarize the learners with the impacts of pollution, control and legislation. • To enlighten the learners about waste and disaster management. • To endow with an overview of food resources and human health. • To enlighten awareness and recognize the social responsibility in environmental issues.
Course Outcomes	**At the end of the course, the students will be able to** 1. Recognize the concepts and issues related to environment and ecosystem. 2. Assess the importance of biodiversity 3. Analyze the source, effects, and control measures of pollution. 4. Imbibe the applications of Laws of environmental protection. 5. Appraise the methods of solid waste management. 6. Increase the awareness of disaster management and preparedness. 7. Instill the awareness on the impacts of food resources and its related problems. 8. Evaluate the problems related to population explosion and its related health issues. 9. Analyze the value of sustainable development. 10. Identify the issues related to environmental issues and civic responsibilities.

Environmental Studies, Ecosystem and Biodiversity

Environment- Segment - Environmental studies - Scope and multidisciplinary nature - Need for public awareness - Environmental ethics- Ecosystem - Structure and function - Ecological succession. Biodiversity - Values of biodiversity - Endangered and endemic species - Hot spots - India a mega biodiversity nation - Threats - Impact of biodiversity loss - Conservation - In-situ and ex-situ - Case studies.

Environmental Pollution and Legislation

Pollution - Sources, effects and control measures - Air, water, soil, noise, thermal, nuclear and marine - Major polluting industries of India - Land degradation - Impacts of mining. Environmental legislation in India- Environment protection act - Air pollution, water pollution, wildlife protection and forest conservation - Case studies.

Waste and Disaster Management

Waste - Solid waste - Sources, effects and control measures - Management techniques - e-waste - Effluent water treatment - Radioactive waste and disposal methods. Disaster management - Earth quakes - Landslides - Floods - Cyclones - Tsunami - Disaster preparedness - Response and recovery from a disaster - Disaster management in India - Case studies.

Food Resources, Human Population and Health

World food problems - Over grazing and desertification - Effects of modern agriculture - Fertilizer – Pesticide - Problems, water logging and salinity. Population - Population growth and explosion - Population variation among nations. Human rights - Value education - Women and child welfare - HIV/AIDS - Role of IT in environment and human health - Case studies.

Social Issues and the Environment

Unsustainable to sustainable development - Use of alternate energy sources - Energy Conversion processes - Biogas - Anaerobic digestion - Production and uses - Water conservation - Rain water harvesting - Water shed management - Resettlement and rehabilitation of people - Deforestation - Green house effect - Global warming - Climate change - Acid rain - Ozone layer depletion - Waste land reclamation. Consumerism and

Text book(s):

1	Tyler miller. G, “Environmental Science”, 13th Edition Cengage Publications, Delhi, 2013.

Reference books:

1.	Gilbert M.Masters and Wendell P. Ela,”Environmental Engineering and Science”, Phi learning private limited, New Delhi, 3rd Edition, 2013. Learning private limited, New Delhi, 3rd Edition, 2013.
2.	Rajagopalan. R, “Environmental Studies” Oxford University Press, New Delhi, 2nd Edition, 2012.
3.	Deeksha Dave and Katewa. S.S, “Environmental Studies” 2nd Edition, Cengage Publications, Delhi, 2013.

K.S.Rangasamy College of Technology – Autonomous

40 ME 001 Basics of Mechanical Engineering

Common to ECE, CSE, IT, &NST

Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	50	50	100

Objectives	• To impart knowledge on power plants, thermodynamics, heat transfer, IC engines, refrigeration and air-conditioning
Course Outcomes	**At the end of the course, the student will be able to:** 1. Discuss on types of Fossil fuels and their use for power generation. 2. Discuss on renewable sources of energy and their application for power generation. 3. State the laws of thermodynamics and applied to open thermodynamic system. 4. Apply the second law of thermodynamics to heat engines and heat pumps. 5. Explain the modes of heat transfer. 6. Apply the principles of conduction in solving heat transfer problems 7. Explain the operation of Internal Combustion engine. 8. Describe fuel supply and injection system in an internal combustion engine. 9. Explain the components of refrigeration systems and its operation. 10. Demonstrate the principle of operation of air-conditioning systems.

Sources of Energy and Power Plants

Introduction – Energy- Classification of Energy Sources - Conventional Energy Sources: Working principle of Thermal, Gas, Diesel, Hydro-electric and Nuclear power plants. Non - Conventional Energy Sources: working principle of Solar, Wind, Tidal and Geothermal power plants.

Thermodynamics – Laws and Entropy

Basic concepts – Thermodynamic systems – Laws of Thermodynamics: Zeroth law of Thermodynamics, First law of thermodynamics - Steady Flow Energy Equation – Application of SFEE to nozzle, boiler, turbine and compressor (simple problems). Second law of Thermodynamics – cyclic heat engine, heat pump, Carnot cycle (simple problems), Entropy.

Heat Transfer

Introduction – Modes of Heat Transfer: Conduction, Convection and Radiation – Laws of Conduction - Types of Convection – Laws of Radiation – Radiation Shields - Fourier law of heat conduction in simple and composite wall geometrics, types of boundary and initial conditions – Fins: types – fin efficiency (simple problems).

Internal Combustion Engines

Introduction - working principle of petrol and diesel engines - two and four stroke cycle engines – Comparison of two and four stroke engine – Fuel supply system – Ignition system – Calculation of Mechanical and Brake thermal efficiency - Layout of Automobile Vehicle.

Refrigeration

Introduction – Terminology of Refrigeration and Air conditioning systems – working principle of vapour compression and absorption system – Layout of typical domestic refrigerator,

Air-Conditioning

Introduction – Types of Air conditioner: Window, Split and Central air conditioners – Calculation of CoP (simple problems).

Text Book(s):

1	Pravin Kumar, "Basic Mechanical Engineering", 1st Edition, Pearson India Education Services Pvt. Ltd, Chennai, 2014.

Reference(s):

1	Arora, S. C., Domkundwar.S., "A Course in Power Plant Engineering", Dhanpatrai& Co., New Delhi, 2014.
2	Cengel, YA and Boles, M.A, "Thermodynamics: An Engineering Approach", McGraw-Hill; 4th edition ,2002.
3	YunusA.Cengel, " Heat Transfer: A Practical Approach", Mcgraw-Hill, 2nd edition, 2002.
4	V.Ganesan ,"Internal Combustion Engines", Tata McGraw-Hill Education, 2002.
5	Arora.C.P., "Refrigeration and Airconditioning", 3rd Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2008.

K.S.Rangasamy College of Technology - Autonomous

40 IT 001 Fundamentals of Information Technology

Common to CSE& IT

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	50	50	100

Objectives	• To enable students to learn basic concepts of Information Technology and its applications. • To explain technological outlook in social, economic, and political context. • To introduce cutting-edge technologies and trends in the areas of wireless multimedia, digital audio and computer networking.
Course Outcomes	**At the end of the course, the students will be able to** 1. Outline the basics of Information Technology and digital domain. 2. Explain mathematical techniques to manipulate number systems. 3. Explore the fundamental components of computer and its storage technologies. 4. Describe the stages of software development process and programming paradigms. 5. Select the digital audio technologies for creating, digitizing and compressing the sound waves. 6. Identify the technical processes of producing digital images and videos. 7. Classify the types of networks. 8. Examine the Internet Architecture and articulate unique economic and social issues that accompanied the Internet evolutions. 9. Realize the traditional telephone systems architecture, VoIP and Wireless multimedia systems. 10. Infer the multimedia access devices and identify the transform of information access.

Introduction to Information Technology

Information Technology Introduction - The Information Era - Defining Information Technology –Information Technology in Society-The State of IT Careers- Emergence of the Digital Age-The Difference between Analog and Digital Representations of Information-Manipulating Bits-Advantages of Digital Technology – The Binary Numbering System –Alternative Numbering Systems – Representing Text and other Characters in Binary.

Fundamentals of Computers

Introduction - A brief History of Computer - Digital Logic-Fundamental Components of a Computer- Factors That Affect Computer Performance-Inside a Typical Computer-Types of Computers and Their Applications-Storage Technologies - Software – Programming Languages – Types of Software – The Software Development Process – Open Source Software.

Digital Multimedia

Introduction – Background-Digitizing Sound – Digital Audio Compression – Imaging Technologies – Digitizing Images and Video – Digital Image and Video Formats – Display Technologies.

Computer Networking

Introduction- Defining LANs – LAN Design Characteristics – The Evolution of LAN Types - WAN Background - WAN Alternatives – WAN Access Alternatives – Network Management Systems – Internet History – Internet Architectural Components – Internet Applications – Internet Administration - Internet Open Issues – Case Project.

Internet and Wireless Multimedia

Introduction—Historical Background – Public Switched Telephone Network – Telecommunications Principles – Future of the Telephone System– VolP Protocols – Implementation Options – Internet Telephony Benefits – Internet Telephony Challenges – Public Policy Issues - Wireless Multimedia Devices-The Bluetooth Standard-Cellular Technology-Wi-Fi, WiMAX, and Cellular Integration.

Text book(s):

1	PelinAksoy , Laura Denardis,"Information Technology in Theory", Cengage Learning India Private Limited, Reprint 2012.

Reference(s):

1	Turban,Rainer,Potter, "Introduction to Information Technology", WSE Wiley, Reprint 2014.

K.S.Rangasamy College of Technology – Autonomous								
40 PH 0P1 Physics Laboratory								
Common for ME,MC,CE,TT,BT,NST								
Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	3	45	2	50	50	100

Objectives	• To give exposure for understanding the various physical phenomena in mechanics, optics, materials science and properties of matter. • To correlate the theoretical principles with application oriented studies.
Course Outcomes	**At the end of the course students will be able to** 1. Know the concept of parameters, such as stress, strain and elastic limit needed to achieve a given amount of deformation in the given material. 2. Grasp the knowledge of dependency of viscosity of a liquid on its density and velocity of liquid motion 3. Imbibe the property of surface tension and capillarity action in fluid dynamics, which are due to the pressure of cohesion and adhesion that causes the liquid to work against gravity 4. Understand the phenomenon of interference of light between the two reflected lights from a flat (glass plate) and spherical surfaces (Plano-convex lens) that produces puddles of Newton's rings, the application of which is an accurate measure of the size of any hollows and heights on a surface by counting the rings and knowing the wavelength of the illumination 5. Comprehend the diffraction property of light through a spectrometer grating element which yields the wavelength of mercury spectral lines 6. Know the concept of interference of light between two reflected lights from a thin air wedge. 7. Understand the concept of a wave encountering an obstacle (particle) that is comparable in size to its wavelength, undergoing scattering (diffraction) by particles and to apply it find the wavelength of light and the particle size. 8. Apply the knowledge of semiconductor thin films in conversion of optical energy into electrical energy, the application being the photovoltaic solar cells employed as one of the potential and perennial renewable energy source

List of Experiments

1. Determination of Young's modulus of a steel bar by uniform bending method.
2. Determination of Young's modulus of a cantilever (Pin & Microscope method).
3. Determination of rigidity modulus of a wire by torsional pendulum.
4. Comparison of co-efficient of viscosity of two different liquids by Poiseuille's method.
5. Comparision of surface tension of two different liquids by capillary rise method.
6. Determination of radius of curvature of a plano convex lens using Newton's rings.
7. Determination of wavelength of mercury spectral lines using spectrometer grating element.
8. Determination of thickness of a fiber by air wedge.
9. Determination of wavelength of laser and particle size.
10. V-I characteristics of Solar cell.

Lab Manual :

"Physics Lab Manual", Department of Physics, KSRCT.

K.S.Rangasamy College of Technology – Autonomous								
40 ME 0P2 Engineering Practices Laboratory								
Common to ME,EEE,CSE,IT,EIE,NST								
Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	3	45	2	50	50	100
Objectives	To provide exposure to the students with hands on experience on various basic engineering practices in Mechanical Engineering							
Course Outcomes	**At the end of the course, the student will be able to:** 1. Make a model of fitting like Square and V fitting using fitting tools 2. Make a model of carpentry like Dovetail joint, and cross lap joint using carpentry tools 3. Fabricate the models of sheet metal in sheet metal shop. 4. Prepare joints by arc welding 5. Construct electrical wiring circuit and demonstrate in electrical wiring section 6. Construct the water pipe line in plumbing shop							

Fitting
Safety aspects in Fitting, Study of tools and equipments, Preparation of models- Filing, Square, Vee.

Carpentry
Safety aspects in Carpentry, Study of tools and equipments, Preparation of models- Planning, Dove tail, Cross Lap.

Sheet Metal
Safety aspects in Sheet metal, Study of tools and equipments, Preparation of models- Scoope, Cone, Tray.

Welding
Safety aspects of welding, Study of arc welding equipments, Preparation of models -Lap, butt, T-joints. Study of Gas Welding and Equipments.

Electrical Wiring And Plumbing
Safety aspects of Electrical wiring, Study of Electrical Materials and wiring components, Wiring circuit for a lamp using single and stair case switches. Wiring circuit for fluorescent lamps, wiring circuit for 3 phase motor.
Study of plumbing tools, assembly of G.I. pipes/ PVC and pipe fittings, Cutting of threads in G.I.Pipes/PVC by thread cutting dies.

Lab Manual :

"Engineering Practices Lab Manual", Department of Mechanical Engineering, KSRCT.

K.S.Rangasamy College of Technology – Autonomous								
40 EN 002 & Communication Skills								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	50	50	100
Objectives	• To equip students with effective speaking and listening skills in English. • To help them develop soft skills and people skills which will make them excel in their jobs. • To enhance students' performance in placement interviews.							
Course Outcomes	**At the end of the course the students will be able to** 1. Look for specific details and overcome speech barriers. 2. Pick key points by listening and improve casual conversational skills. 3. Understand different forms of communication with differences among them. 4. Know about formal speech and descriptive techniques,and use specific words in specific contexts. 5. Fine tune language for different conversational contexts and purposes. 6. Learn telephone etiquette by using language for assent and dissent. 7. Understand grammatical structures, its technical aspects and usage 8. Use discourse markers, enhance punctuation and learn discourse coherence 9. Comprehend content, generate different forms of template and enhance reference skills 10. Construct well-knit documents for job readiness and career competence							

The Listening Process

Barriers in Listening - Listening to academic lectures - Listening to announcements at railway stations, airports, etc - Listening to news on the radio / TV - Listening to casual conversation - Listening to live speech

Suggested activities

Listening to casual conversations, talks, interviews, lectures, specific information relating to technical content, statistical information, retrieving information, gapped texts-listening comprehension through video clippings and lectures.

Nature of Communication

Stages of communicationChannels of communication- Barriers to effective communication - Differences between spoken and written communication - Giving directions - Art of small talk-presentation skills - Taking part in casual conversation - Making a short formal speech-Describing people, place, and events.

Suggested activities

Motivating and conducting prepared speech – debate on topics of interest - conversation (dialogue based on particular situation by using pleasantries) – extempore - picture description (people, place, things and events)

Telephonic Conversational Skill

Using the telephone - Greeting and introduction - Making requests - Asking for permission, Giving / Denying permission - Giving information on the phone – Leaving messages on Answer Machines - Making / changing appointments - Making complaints – Reminding - Listening and Taking messages - Giving instructions & Responding to instructions

Suggested activities

Familiarizing the telephone etiquette and telephone jargon – use of role play cards – conversational practices – games for spelling out proper nouns, long words, numbers, etc., -- useful phrases for complaints or making appointments – providing the needed vocabulary and expressions for agreeing and disagreeing – video clippings of speeches to drill note taking – providing context for framing yes or no questions for making requests.

Remedial Grammar

Tenses - 'Do' forms – Impersonal Passive voice - Imperatives – using should form – Direct, Indirect speech – Discourse markers – SI Units - Numerical adjectives – Prepositions (intermediate level) - Phrasal verbs (usage)- Correct use of words - Use of formal words in informal situations - Commonly confused words –

Editing.

Suggested activities

Providing various contexts to fill tense gaps (stories , demos, future plans etc.,) Technical context for impersonal passive structures – transformation drills for imperatives – elucidating suggestion and recommendation formats – contextual frames for preposition and phrasal verbs – editing exercises – standard paradigm for negative structures – use of SI units (25 common units to be taught) numerical adjectives in various contexts – providing examples and drill units for commonly confused words-exemplifying the structures for direct and indirect speech – monitoring the drill units for conversion of direct to indirect, imperatives to recommendations and vice versa – reinforcing skills for discourse markers.

Written Communication & Career Skills

Writing e-mails - Writing Reports – Lab Reports - Preparing Curriculum Vitae and cover letters - Facing an Interview - Flow Charts, Interpreting the data from Tables– Recommendations – Check List – Slide Preparation –Theme Detection – Deriving Conclusions from the passages – Situation Reaction Test – Statements - Conclusions-Statement and Courses of Action

Suggested activities

Deliberating the content, format and diction for drafting e-mails -- elucidating the structure and content for writing reports especially Accident and Lab Reports -- mentoring strategy to construe the difference between Résumé and CV , and preparing the wards for the recruitment -- building self confidence in facing an interview with flawless presentation and persuasion skills -- reinforcing the interpretative skills of transcoding flow charts and Tables by employing appropriate discourse markers -- inculcating the language and format of writing Recommendations and Checklists -- enforcing innovatively the Reasoning and Logical Detection in Verbal Ability for the effective equipment of grooming for the primary leg of the recruitment process.

Text book :

1.	Ashraf M Rizvi, 'Effective Technical Communication', 1st Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2005.

Reference(s) :

1.	P.KiranmaiDutt, GeethaRajeevan and CLN.Prakash, 'A Course in Communication Skills', by Ebek – Cambridge University Press India Pvt. Ltd., 2008.
2.	B. Jean Naterop, 'Telephoning in English' – Cambridge University Press India Pvt.Ltd., 2007.
3.	Jack. C. Richards, 'New Interchange Services (Student's Book)' – Introduction, Level – 1, Level – 2, Level – 3, Cambridge University Press India Pvt.Ltd., 2007.
4.	R.S. Aggarwal, 'A Modern Approach to Verbal & Non – Verbal Reasoning',S.Chand& Company Ltd., New Delhi, Revised Edition, 2012.
5.	NPTEL Video Courses on Communication Skills.

K.S.Rangasamy College of Technology - Autonomous								
40 MA 002 Laplace Transform and Complex Variables								
Common to MECH, CIVIL, MCT, EEE, EIE, CSE, IT, TT, BT &NST								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	50	50	100

Objectives	• To use multiple integration to solve problems involving volume and surface area. • To introduce the concepts of Laplace transform, complex variables and complex integration which are imperative for effective understanding of engineering subjects. • To identify the properties of planar and solid geometric shapes and use these properties to solve common applications.
Course Outcomes	**At the end of the course, the students will be able to** 1. (i) Apply double integral to find area between two curves. (ii) Evaluate double integral by changing the order of integration and triple integral. 2. Study the concepts of Beta and Gamma functions. 3. Understand the concepts of Laplace transforms for some elementary functions, some special functions, periodic functions, derivatives and integrals. 4. Apply the techniques of inverse Laplace transform to solve linear ordinary differential equation and simultaneous differential equations. 5. Know about the construction of analytic and conjugate harmonic functions and their properties. 6. Employ conformal maps to determine images of curves and find the bilinear transformation. 7. Expand the functions as Taylor's and Laurent's series and evaluate the complex integrals. 8. Evaluate real definite integrals with suitable contours using Cauchy's residue theorem. 9. Understand the notions of plane, straight line and skew lines. 10. Relate the concepts between tangent planes and spheres.

Multiple Integrals

Double integration – Cartesian and polar coordinates – Change of order of integration – Area between two curves – Area as double integral – Triple integration in Cartesian coordinates.

Beta and Gamma functions**:** Relationship between Beta and Gamma functions – Properties – Problems.

Laplace Transform

Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Derivatives and integrals of transforms – Initial and final value theorem – Transform of unit step function – Dirac's delta function – Transform of periodic functions. Inverse Laplace transform – Convolution theorem – Solution of linear ordinary differential equation with constant co-efficients – First order simultaneous equations with constant co-efficients.

Complex Variables

Functions of a complex variable – Analytic functions – Necessary conditions (Cauchy–Riemann equations) – Sufficient conditions (excluding proof) – Properties of analytic functions – Harmonic function – Conjugate harmonic functions– Construction of analytic functions– Conformal mapping: w = z + a, az, 1/z and bilinear transformation.

Complex Integration

Cauchy's Integral theorem (without proof) – Cauchy's integral formula – Taylor and Laurent series (without proof) – Classification of singularities – Cauchy's residue theorem – Contour integration – Circular and semi-circular contours (excluding poles on real axis).

Solid Geometry

Direction cosines – Plane – Straight lines – Coplanar – Point of intersection – Skew lines – Sphere – Tangent plane – Great circle – Orthogonal sphere.

Text book:

1	Kreyszig E, "Advanced Engineering Mathematics", 9th Edition, John Wiley and Sons (Asia) Limited, New Delhi, Reprint 2012.

Reference(s):

1	GrewalB.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, Delhi, 2013.
2	Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", 9th Edition, Lakshmi Publications Pvt Ltd, New Delhi, 2014.

K.S. Rangasamy College of Technology - Autonomous								
40 CH 001 - Engineering Chemistry								
Common to EEE, ECE, CSE, EIE& IT								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
II	3	0	0		3	50	50	100

Objectives	• To help the learners to analyze the hardness of water and its removal. • To familiarize the learners with the basics of electrochemistry, its applications,corrosion and its control. • To endow with an overview of batteries and fuel cells. • To impart the knowledge of photochemistry and its applications. • To enlighten the learners on polymers.
Course Outcomes	**At the end of the course, the students will be able to** 1. Recognize sources of water, quality parameter and hardness of water. 2. Analyze and appraise methods to overcome hardness. 3. Relate the basic tenets of electrochemistry to arrive at mathematical expression and outline its various applications. 4. Identify the types, mechanism, and factors influencing corrosion and describe its control measures. 5. Analyze the principle and applications of batteries. 6. Apply the knowledge of electro chemistry in fuel cells and working principle of solar battery. 7. Recall the laws of photochemistry and infer their applications. 8. Analyze the principle and applications of colorimeter and UV-VIS spectrophotometer. 9. Explain the basic concepts, characteristics of polymer and mechanisms of polymerization. 10. Discuss the preparation, properties and uses of select polymers.

Water Treatment

Sources of water and its properties - Water quality parameter (EPA) - Hard and soft water - Hardness of water - Types - Units of hardness - ppm and mg/L - Estimation of hardness - EDTA method - Boiler feed water - Boiler problems - Internal treatment - Carbonate, Phosphate and Calgon conditioning. External treatment - Zeolite and deionization process - Desalination - Reverse osmosis and Electro dialysis.

Electrochemistry and Corrosion

Basics of electrochemistry - Reversible and irreversible cells - Nernst equation (problems) - EMF - measurement - EMF series - Applications - Types of electrodes - Reference electrodes - Conductometric titration. Corrosion - Types - Galvanic and differential aeration corrosion - Mechanism (Dry and wet) - Factors influencing corrosion - Corrosion control - Cathodic protection - Corrosion inhibitors. Electroplating of nickel and chromium.

Batteries and Fuel Cells

Batteries - Characteristics - Primary and secondary batteries - Principle - Working - Charging and discharging - Applications of Laclanche cell - Alkaline battery - NICAD battery - Lithium battery - Lead acid battery - Nickel-metal hydride battery. Fuel cells - Types - Hydrogen - Oxygen fuel cell, PEFC and SOFC - Principle, operation and uses - Construction and applications of solar battery.

Photochemistry and Instrumental Methods of Analysis

Photochemistry - Lambert's law - Beer's Law - Quantum efficiency - Applications of photo chemistry - Photo electric effect - Definition - Jablonski diagram - Fluorescence - Phosphorescence - Chemiluminescence. Colorimeter and UV-Visible spectrophotometer - Principle, instrumentation and applications (Block diagram only).

Polymers

Introduction - Types of polymerization - Mechanism of polymerization - Free radical polymerization - Co-ordination polymerization - Properties of polymers - Tg, tacticity and degradation of polymers - Plastics - Thermo and thermosetting - Preparation, properties and uses of PE, PVC, PTFE, PMMA, epoxy resin, nylon 6,6 and bakelite. Basic materials and properties of LCD and LED.

Text book(s):

1	Vairam S "Engineering Chemistry", Wiley India, Delhi, 2 nd Edition, 2013.

Reference Books:

1.	Dara.S.S. 'A Text Book of Engineering Chemistry', S Chand &Co.Ltd., 2003
2.	Bill Mayer F. W., 'Text Book of Polymer Science ', Wiley - New York, 3rd Edition, 1991.
3.	Jain and Jain, Engineering Chemistry, DhanpatRai Publishing Company Pvt. Ltd., Delhi.15th Edition, 2008.

K.S.Rangasamy College of Technology - Autonomous								
40 CE 001 Basics of Civil Engineering and Mechanics								
Common to EEE, CSE, IT, E& I and Nano								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	50	50	100
Objectives	• To impart the fundamental knowledge about building materials and building component • To study the basics of engineering mechanics which includes statics, dynamics and properties of surfaces and solids							
Course Outcomes	**At the end of the course, the students will be able to** 1. Identify the construction materials required and describe its uses. 2. Discuss the objectives and types of surveying 3. Identify the components of substructure of a building 4. Identify the components of superstructure of a building 5. Apply the laws of mechanics 6. Illustrate the free body diagram of a system; determine the forces and various moments and couples 7. Compute the centroid and first moment of area of various sections 8. Apply the parallel and perpendicular axis theorem to find out the moment of inertia of various sections 9. Calculate the displacement, velocity and acceleration of particles 10. Analyse the relative motion and types of friction.							

Introduction and Civil Engineering Materials

Introduction – Construction Materials – Classification – Uses –Requirements: - Bricks-Stone – Cement – Sand – Concrete – Steel Sections, Surveying – Objectives and Types.

Building Components

Components: – Selection of site for building- Substructure- Bearing capacity of soil - Requirement of good foundation– Types of foundation- Superstructure– Technical terms: - Types – Brick masonry – Stone masonry.

Statics of Particles

Introduction to Mechanics - Laws of Mechanics – Lame's theorem - Parallelogram law of forces-system of forces - Free body diagram - Moment and Couples - Moment of force about a point and axis - Types of support and reaction.

Properties of Surfaces and Solids

Determination of areas – First moment of area and the centroid of section - Second moment of area - Rectangle, circle, triangle by integration – T section, I section and angle section by using standard formula - Parallel axis theorem and Perpendicular axis theorem.

Dynamics of Particles

Displacement, Velocity, Acceleration and their relationship - Relative motion – Frictional forces - Simple contact friction - Ladder friction - Rolling resistance – Belt friction.

Text book (s) :	
1	M.S. Palanichamy, "Basic of Civil Engineering "Tata McGraw Hill Education Pvt. Ltd, 2008.
2	Kottiswaran.N, "Engineering Mechanics – Statics and Dynamics", Sri Balaji Publications, Coimbatore, 2006.
Reference(s) :	
1	Dr. B.C. Punmia, Ashok K. Jain, Arun K. Jain " Basic Civil Engineering", Laxmi Publication, New Delhi, 2010.
2	Bansal, R.K., "Engineering Mechanics", Laxmi Publications Private Ltd, New Delhi, 2008.

K.S.Rangasamy College of Technology – Autonomous								
41 EE 001 Basics of Electrical Engineering								
Common to (CIVIL, BT, NST,CSE & IT)								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I/II	3	0	0	45	3	50	50	100

Course Objectives	1. To determine the voltage, current, power in resistive elements of simple DC circuits by understanding the concept of series-parallel circuit reduction technique. 2. To determine the Impedance,Power and Power factor in series RL, RC and RLC circuits by understanding the concept of instantaneous,RMS and average value of Voltage/Current in an AC source. 3. To describe the application of Faraday's,Lenz'slaws and Fleming's rules, and determine the performance of transformers. 4. To explain the construction, working principle, types and applications of electromechanical energy conversion devices such as DC machines, Induction motors, synchronous generators and stepper motors. 5. To impart the basic knowledge on power system and its components, simple house wiring layout, types and need for earthing, and energy conservation.
Course Outcomes	**At the end of the course, the students will be able to** 1. Identify the basic elements of electrical circuits and define important terms with their units. 2. Solve DC circuits using Ohm's & Kirchhoff's laws. 3. Characterize the single and three phase AC supply. 4. Calculate impedance, power and power factor of single phase AC circuits. 5. Express the principle of electromagnetic induction and identify its usefulness in electrical engineering. 6. Explain the principle of operation of transformers and calculate its regulation and efficiency. 7. Describe the construction and working of DC machines and identify their applications. 8. Explain the construction and working of AC machines and identify their applications. 9. Outline the components of various sub-systems in a power system. 10. Sketch the layout of simple house wiring by identifying the wiring materials and express the need for energy conservation.

DC Circuits

Basic elements – resistance, inductance and capacitance – Definitions and Units: Current, Voltage, Power and Energy – Ohm's law – Kirchhoff**'**s laws – Simple Series and Parallel circuits.

AC Circuits

Introduction to AC circuits –Single and Three phase AC supply – Advantages of Three phase AC system – Instantaneous, RMS and average value for sine wave form –Series RL,RC and RLC Circuits – Impedance, Admittance, Power and Power factor – Practical importance of power factor – Power & Energy Measurement.

Electromagnetic Induction

Faraday's law of Electromagnetic Induction, Fleming's rules and Lenz's law.

Transformers

Construction, Principle of operation, types, regulation and efficiency, all day efficiency -– Current and Potential transformers.

Generators and Motors

DC Machines:Construction, Principle of operation, types and applications - Three phase and Single phase Induction motors:Construction, Principle of operation, types and applications – Synchronous Generators:
Construction, types, principle of operation, regulation – Stepper Motor: Construction, Principle of operation and applications.

Power Systems

Structure of power system – Generation system – Transmission System – Distribution system – Power system protection.

House Wiring

Wiring material and Accessories – Simple wiring layout – Earthing – Lightning Arrestor – UPS – Energy Conservation.

Text book(s):

1.	S. Sukhija, T.K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford University Press, 2012.
2.	M.Maria Louis, "Elements of Electrical Engineering", PHI, New Delhi, 2014.

Reference(s):

1.	V.K.Mehta, Rohit Mehta, "Principles of Electrical Engineering", S.Chand Publications, New Delhi, 2014.
2.	Edward Hughes, "Electrical and Electronic Technology", Pearson Education, 9th Edition, New Delhi, 2009.
3.	Del Tora "Electrical Engineering Fundamentals" Pearson Education, New Delhi, 2007
4.	S.P.Bihari and BhuPendraSehgal, "Basic Electrical Engineering – Made Easy", Cengage Learning
5.	Alan S Moris, Principles of Measurements and Instruments, Prentice – Hall of India Pvt. Ltd, New Delhi, 1999.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 002 Computer Programming								
Common to CSE,IT								
Semester	Hours/Week		Total hrs		Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	50	50	100

Objectives	• To enable students to learn the basic concepts and developing skills in programming using C language • To apply the knowledge of pointers, structures and unions to solve basic problems in C language • To enhance the knowledge in file handling functions for storage and retrieval of data • To gain the knowledge of software development
Course Outcomes	**At the end of the course, the students will be able to** 1. Recognize the concepts of data types, tokens, storage class specifiers and expressions 2. Examine the execution of branching and looping statements 3. Affirm the concepts of arrays and strings 4. Recognize the concepts of functions, recursion with its features 5. Identify the purpose of pointers with its associated features 6. Comprehend basic concepts of structures and unions 7. Annotate the concept of console Input and output features 8. Interpret the concept of file Input and output features 9. Relate the concept of user defined data types and preprocessor 10. Examine the various software engineering approaches to built a C program

Introduction

An Overview of C - Data types - Identifiers - Variables - Type Qualifiers - Storage Class Specifiers – ConstantsOperators - Expressions - Selection Statements - Iteration Statements - Jump Statements.

Arrays, Strings and Functions

Arrays - Single Dimensional Arrays - Two Dimensional Arrays - Multidimensional Arrays - Arrays Initialization –Strings - Arrays of Strings - String and Character Functions – Functions - Scope of a Function – Library Functions and User Defined Functions - Function Prototypes - Function Categorization - Function Arguments –Arguments to main() Function - The return Statement - Recursion - Passing Arrays to Functions.

Pointers, Structures and Unions

Pointers - Pointer Variables - The Pointer Operators - Pointer Expressions - Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers - Dynamic Memory Allocation - Structures - Arrays of Structures – Passing Structures to Functions - Structure Pointers - Arrays and Structures within Structures – Unions.

Console I/O and File I/O

Console I/O - Reading and Writing Characters - Reading and Writing Strings - Formatted Console I/O – File I/O - Streams and Files - File System Basics - fread( ) and fwrite( ) - Random Access I/O - fprintf( ) and fscanf( ) - The Standard Streams.

BitFields, **Enumerations, Typedef, Preprocessors and Software Development**

BitFields - Enumerations - typedef - The Preprocessor and Comments - Software Engineering using C – Top Down Design - Bulletproof Functions - Using MAKE - Efficiency - Porting Programs – Debugging.

Text book(s):

1	Herbert Schildt, “The Complete Reference C”, Fourth Edition, Tata McGraw Hill Edition, 2010.

Reference(s):

1	Byron Gottfried, “Programming with C”, Third Edition, McGraw Hill Education, 2014.
2	E.Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill Edition, New Delhi, 2010.
3	Brian W. Kernighan and Dennis M. Ritchie, “C Programming Language”, Prentice-Hall.

K.S. Rangasamy College of Technology - Autonomous								
40 CH 0P1 & Chemistry Laboratory								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
II	0	0	3		2	50	50	100
Objectives	• Test the knowledge of theoretical concepts. • To develop the experimental skills of the learners. • To facilitate data interpretation • To expose the learners to various industrial and environmental applications.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Estimate the hardness of water sample. 2. Estimate the alkalinity of water sample. 3. Estimate the chloride content in water sample. 4. Determine the dissolved oxygen in water. 5. Determine the molecular weight of polymer. 6. Estimate the mixture of acids by conductometry 7. Estimate the ferrous ion by potentiometry. 8. Estimate the strength of acid by pH metry and apply the knowledge of pH determination for health drinks, beverages, soil, effluent and other biological samples. 9. Estimateferrous ion by spectrophotometry. 10. Determine the corrosion by weight loss method.							

List of Experiments

1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water sample.
3. Estimation of chloride content in water sample (Argentometric method)
4. Determination of dissolved oxygen in boiler feed water (Winkler's method)
5. Determination of molecular weight of a polymer by viscometry method.
6. Estimation of mixture of acids by conductometric titration.
7. Estimation of ferrous ion by potentiometric titration.
8. Estimation of HCl beverages and other biological samples by pH meter.

Lab Manual:

1	Vairam S "Engineering Chemistry", Wiley India, Delhi, 2 nd Edition, 2013

Reference:

1.	Mendham. J, Denney. R.C, Barnes. J.D and Thomas. N.J.K, "Vogel's text book of quantitative chemical analysis", 6th Edition, Pearson Education, 2004.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2014
40 CS 0P2 Computer Programming Laboratory								
Common to CSE,IT								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	3	45	2	50	50	100

Objective(s)	• To enable the students to apply the concepts of C to solve simple problems • To apply the knowledge of library functions in C programming • To implement the concepts of arrays, functions, structures and pointers in C • To implement the file handling operations through C
Course Outcomes	**At the end of the course the students will be able to** 1. Write a simple C program to read and display basic information 2. Develop a C program using selection and iterative statements 3. Demonstrate a C program to manage collection related data 4. Interpret a C program to perform string manipulation functions 5. Perform dynamic memory allocation using pointers 6. Design and Implement different ways of passing arguments to functions 7. Implement a C program to manage collection of different data using structures 8. Demonstrate a C program to store and retrieve data using file concepts 9. Apply a C program to manage data using preprocessor directives 10. Develop a mini project

LIST OF EXPERIMENTS

1. Implement basic calculations using MS EXCEL.
2. Implement a simple C program to read and display basic information.
3. Implement a C program using selection and iterative statements.
4. Implement a C program to manage collection related data.
5. Implement a C program to perform string manipulation functions.
6. Implement a C program to perform dynamic memory allocationusing pointers.
7. Implement different ways of passing arguments to functions.
8. Implement a C program to manage collection of different data using structures.
9. Implement a C program to store and retrieve data using file concepts.
10. Implement a C program using preprocessor directives.

K.S.Rangasamy College of Technology – Autonomous								
40 ME 0P1 Engineering Graphics Laboratory								
Common to CSE,EEE,ECE,IT,NST, EIE								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	3	45	2	50	50	100
Objectives	• To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient To impart the graphic skills for communicating concepts, ideas and designs of engineering products							
Course outcomes	**At the end of the course the students will be able to** 1. Use the drawing instruments, drafting software and construct the conics 2. Draw the projection of points, straight lines and plane surfaces 3. Draw the projection of simple solids 4. Draw the true of section of solids 5. Develop the lateral surfaces of prism, pyramid, cylinder and cone 6. Convert the pictorial views in to orthographic views 7. Sketch the three dimensional view of solids given orthographic views.							

Introduction to Engineering Drawing

Introduction to Drafting Software, Drawing Sheet Layouts - Title Block - Lines - Dimensioning, Construction of Pentagon, Hexagon, Conic Sections. Construction of Ellipse and Parabola (Eccentricity method only) with tangent and normal. Introduction to cycloid Involutes of square and circle.

Projection of Points, Lines And Planes

Projection of points, straight lines and plane surfaces in first quadrant (parallel to one plane and inclined to other), true length, true inclinations.

Projection of Solids

Projection of solids of Prisms, Pyramids, Cylinder and Cone using change of position method (axis is parallel to one plane).

Section of Solids

Section of solids of Prisms, Pyramids, Cylinder and Cone by cutting plane inclined to one reference plane (base is on HP and axis perpendicular to HP), true shape of section.

Development of Surfaces

Development of lateral surfaces of simple and truncated solids: Prisms, Pyramids and Cones with square hole perpendicular to the axis.

Orthographic Projection

Theory of projection - Terminology, Method of projection – Introduction of First angle and Third angle projection. Conversion of pictorial views into orthographic views.

Isometric Projection

Principles of isometric projection, Isometric scale - isometric projections of simple solids - Prisms, Pyramids and Cones.

Text book (s) :

1	Bhatt N.D., “Engineering Drawing”, Charotar Publishing House Pvt. Ltd., 49th Edition, Anand, Gujarat, 2006.
2	Venugopal K., “Engineering Graphics”, New Age International (P) Limited, 2002.

Reference(s) :

1	KulkaniD.M, RastogiA.P, SarkarA.K, “Engineering Graphics with AutoCAD”, PHI Learning Private Limited, New Delhi, 2009.
2	NatarajanK.V., “A textbook of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2006
3	Shah M.B. and Rana B.C., “Engineering Drawing”, Pearson Education, 2005.

K.S.Rangasamy College of Technology - Autonomous								
40 MA 004 Boundary Value Problems and Transform Methods								
Common to CIVIL, CSE, IT, MCT, MECH and NST								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	50	50	100

Objective(s)	To apply Fourier series and Fourier transform for engineering discipline. To acquire analytical skills in the areas of one dimensional and two dimensional boundary value problems. To introduce the concepts of Z- transform and its application to various problems related to engineering and technology.
Course Outcomes	**At the end of the course, the students will be able to** 1. Obtain the Fourier series expansion for the periodic function. 2. Understand the notions of half – range Fourier series and harmonic analysis. 3. Know about the procedure to find the solution of one-dimensional wave equation with zero or non-zero velocity. 4. Understand the procedure to find the solution of one-dimensional heat equation with steady state or unsteady state condition. 5. Solve the solution of two dimensional heat flow equation for finite plates. 6. Solve the solution of two dimensional heat flow equation for infinite plates. 7. Apply Fourier transform technique and Parseval's identity for the continuous function. 8. Discuss the Fourier sine and cosine transforms and properties of Fourier transforms. 9. Understand the concepts of Z- transform for some elementary functions and its properties. 10. Apply the inverse Z-transform techniques to the function and solve the difference equation using Z-transform.

Fourier Series
Dirichlet's conditions – Fourier series – Odd and even functions – Half range Fourier series – Root mean square value of a function – Parseval's identity – Harmonic analysis.

Boundary Value Problems – I
Classification of second order quasi - linear partial differential equations – Solution of one-dimensional wave equation – Solution of one-dimensional heat equation – Problems.

Boundary Value Problems – II
Two dimensional heat flow equation (Insulated edges excluded): Finite plates – Square plates temperature given in horizontal edge – Square plate temperature given in horizontal and vertical edges – Rectangular plates temperature given in horizontal edge – Rectangular plates temperature given in horizontal and vertical edges – Infinite plates – Vertically infinite plates – Horizontally infinite plates.

Fourier Transform
Fourier transform pair – Fourier transform of simple functions – Fourier sine and cosine transform – Properties – Convolution theorem – Parseval's identity – Problems.

Z –Transform
Z-transform – Elementary properties – Initial and final value theorem – Inverse Z – transform – Partial fraction method – Residue method – Convolution theorem – Solution of difference equations using Z - transform.

Text book(s):	
1	GrewalB.S, "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
2	Kreyszig E, "Advanced Engineering Mathematics", 9thEdition, John Wiley & Sons (Asia) Limited, New Delhi, Reprint 2012.
Reference(s):	
1	Veerarajan T, "Engineering Mathematics-III", Tata McGraw-Hill Publishing Company Limited, New Delhi.
2	Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", 9th Edition, Lakshmi Publications Pvt Ltd, New Delhi, 2014.
3	Glyn James, "Advanced Modern Engineering Mathematics", 4th Edition, Pearson Education, 2011.

K.S. Rangasamy College of Technology – Autonomous								
40 CS 003 - Data Structures								
Common to CS,IT,EE,EC,EI								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	50	50	100
Objective(s)	To choose the appropriate data structure for a specified application Design and implement abstract data types such as linked list, stack , queue and trees Demonstrate various sorting , searching and graph algorithms							
Course Outcomes	**At the end of the course, the students will be able to** 1. Express the concept of List ADT and its implementations 2. Describe the operations of Stack and Queue ADT and its applications 3. Compare the concept of Binary, Binary Search and AVL Trees with its operations 4. Gain the knowledge of Splay ,B-Trees and B+ Trees 5. Apprise the various Hashing techniques 6. Review various implementations and operations of Priority Queue 7. Recognize the concept of Sorting ,Searching and its types 8. Employ various Internal and External sorting techniques 9. Apply Shortest Path and Minimum Spanning Tree algorithms 10. Illustrate the concept of Depth First Search and Biconnectivity							

Lists, Stacks And Queues

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT

Trees

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Splay Trees – B – Trees –B+Trees.

Hashing And Priority Queues (Heaps)

Hashing – Hash Function – Separate chaining – Open addressing – Rehashing – Extendible hashing – Priority Queues (Heaps) – Model – Simple Implementations – Binary Heap – Applications of Priority Queues – d -Heaps.

Sorting and Searching

Preliminaries – Insertion Sort – Shellsort – Heapsort – Mergesort – Quicksort – External Sorting –Searching: Sequential search- Binary Search –Hashed list searches

Graphs

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm, Kruskal's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity.

Text book:

1	M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson Education Asia.2008

Reference(s) :

.	Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009
.	Rajesh K.Sukla," Data structure using C & C++", Wiley India,2012

K.S. Rangasamy College of Technology – Autonomous								
40 CS 004- Object Oriented Programming								
Common toCS,IT,EC,EE,EI,MC								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	50	50	100
Objective(s)	To enable the students to learn how C++ supports object Oriented properties To create and use classes and objects for specific applications To understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code							
Course Outcomes	**At the end of the course, the students will be able to** 1. Recognize the principles of object-oriented problem solving and programming. 2. Review the essential features and elements of the C++ programming language 3. Implement the concept of class and objects 4. Comprehend the concept of constructors and destructors 5. Analyze the reusability through various types of Inheritance 6. Interpret the concept of operator overloading 7. Recognize the concept of dynamic memory allocation 8. Implement the concept of runtime polymorphism by using virtual functions 9. Identify the uses of generic programming and exception handling 10. Interpret the file operation concepts to manipulate the data							

Introduction to C++ and Functions:
Evolution of C++ - The Object Oriented Technology - Disadvantages of Conventional Programming- Concepts of OOP - Advantages of OOP,Basics of C++:Structure of a C++Program- Streams in C++ and Stream Classes - Formatted Console I/O Operations-Bit Fields - Manipulators - User-defined Manipulators, C++ Declarations, Functions: L Values and RValues - Return by Reference - Returning more Values by Reference - Default Arguments -Constarguments - Inline Functions - Function Overloading.

Classes and Objects, Constructors and Destructors:
Classes in C++ - Declaring Objects- Access Specifiers and their Scope - Defining Member Functions - Static Members - Array of Objects - Constant object and Constant Member Functions - Object as Function Arguments -Friend Function and FriendClasses, Constructors and Destructors: Characteristics - Parameterized Constructors - Overloading Constructors - Copy Constructors - Dynamic Initialization Constructors – Destructors.

Inheritance, Operator Overloading and Type Conversion:
Inheritance: Reusability - Types of Inheritance - Object as Class Member, Operator Overloading: The Keyword Operator - Unary, Binary and Stream Operators Overloading- Constraint on Increment and Decrement Operators - Rules for Operator Overloading -Overloading usingFriend Function -Type Conversion.

Pointers, Memory models, Binding and polymorphism:
Pointers: Pointer to Class - Pointer to Object –void, wild and this Pointers, Memory Models: Dynamic Memory Allocation - Heap Consumption - Object Address - Dynamic Objects, Binding: Binding in C++ - Pointer to Base and Derived class objects -Working with Virtual Functions - Pure Virtual Functions -Abstract Classes - Object Slicing - Virtual Destructor, Working with Strings.

Generic Programming with Templates, Exception Handling and Applications of Files:
Class and Function Templates -Overloading of Template Functions, Exception Handling: Principles of Exception Handling -try, catch and throw- Re-throwing Exception - Specifying Exception, Class Templates with Exception, File Stream Classes - Steps of File Operations - File Opening Modes - File Pointers and Manipulators - File Access - Command Line Arguments - Error Handling Functions.

Text book:

1	Ashok N. Kamthane, “Programming in C++”, Pearson, Second Edition, 2013.

Reference(s) :

1.	Herbert Schildt, “ The Complete Reference C++”, Fourth Edition, McGraw-Hill Education, 2013.
2.	BjarneStroustrup, “The C++ programming language”, Addison Wesley, 2013.
3.	VenugopalK.R., RajkumarBuyya, "Mastering C++", Second Edition,McGraw-Hill Education, 2013.

K.S.Rangasamy College of Technology - Autonomous								
40 EC 003 Digital Principles and System Design								
Common to CS, EC, IT, EE, E&I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	50	50	100

Objective(s)	1. To introduce number systems and codes, basic postulates of Boolean algebra and show the correlation between Boolean expressions. 2. To design and analyse combinational circuits and sequential circuits. 3. To introduce the concept of memories and programmable logic devices.
Course outcomes	**At the end of the course, the students will be able to** 1. Explain the fundamentals ofs numbering system, Binary arithmetic and codes 2. Apply the Boolean laws and reduce the Boolean functions using K-map. 3. Implement the Boolean functions using logic gates. 4. Design the combinational logic circuits 5. Discuss the basics of flip flops and realize one flip flop from other flip flop 6. Design the clocked sequential circuits 7. Analyse the asynchronous sequential circuits. 8. Design the fundamental mode circuits. 9. Discuss the operation of various memory devices and their applications. 10. Describe the operation of programmable logic devices and implement combinational logic using PLDs.

Number Systems

Review of Binary, Octal and Hexadecimal Number Systems –Conversion methods – complements – signed and unsigned Binary numbers. - Binary codes: Weighted and non Weighted codes - ASCII – Error detecting code –Boolean postulates and laws – De-Morgan's Theorem - Boolean function - Minimization of Boolean expressions – Sum of Products (SOP) – Product of Sums (POS)- Canonical forms –– Karnaugh map Minimization – Don't care conditions.

Logic Gates & Combinational Circuits

LOGIC GATES: AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR - Implementations of Logic Functions using gates, NAND – NOR implementations – TTL and CMOS Logic families and their characteristics –Tristate gates.

COMBINATIONAL CIRCUITS: Design procedure – Adders - Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor - BCD adder - Magnitude Comparator – Multiplexer / Demultiplexer - encoder / decoder – parity checker – code converters: binary to gray, gray to binary, BCD to excess 3 code. Implementation of combinational logic using MUX.

Sequential Circuits

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation – Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter – Classification of sequential circuits – Moore and Mealy machines – Analysis of clocked sequential circuits: state equation - State table – State diagram – State reduction & assignment - Register : shift registers - Universal shift register– Shift counters.

Asynchronous Sequential Circuits

Analysis procedure – Transition table - Flow table – Race conditions -Design of fundamental mode circuits – Primitive flow table – Reduction of state and flow table – Race free state assignment - Hazards: Static – Dynamic – Essential – Hazards elimination.

Memory Devices

Classification of memories : ROM - PROM – EPROM – EEPROM – EAPROM, RAM – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell –Programmable Logic Devices : Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL.

Text book

1	M. Morris Mano, Michael D. Ciletti, 'Digital Design', 5th Edition, Pearson Education, New Delhi, 2012.

Reference(s) :

1	Anand Kumar, 'Fundamentals of Digital Circuits', 3rd Edition, Prentice Hall, 2014.
2	Donald P.Leach and Albert Paul Malvino, GoutamSaha, 'Digital Principles and Applications', 7th Edition, Tata McGraw-Hill, New Delhi, 2010.
3	S. Salivahanan and S. Arivazhagan, 'Digital Circuits and Design', 3rd Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 2009.
4	John F.Wakerly, 'Digital Design: principles and practices', 4th Edition, Pearson Education, 2008.
5	Charles H.Roth, 'Fundamentals of Logic Design', 5th Edition, Brooks/cole, 2004.
6	John .M Yarbrough, 'Digital Logic Applications and Design', 1st Edition, Nelson Engineering, 2006.

K.S. Rangasamy College of Technology - Autonomous								
40 EC 004 - Electronic Devices and Circuits								
Common to CS & IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	50	50	100

Objective(s)	• To describe the operation of semiconductor diodes and transistors • To design and analyze transistor biasing circuits • To analyze feedback amplifiers and oscillators • To analyze the performance of various power amplifiers
Course Outcomes	**At the end of the course, the students will be able to** 1. Describe the construction and working of various diodes 2. Discuss the working principle of rectifier and regulator circuits 3. Explain the construction and operation of BJT 4. Explain the construction and operation of FET. 5. Discuss the concepts of biasing and stabilization in BJT 6. Design appropriate biasing circuits for FET 7. Describe the concept of feedback and the feedback amplifier types 8. Design the various oscillator circuits. 9. Describe the working principle of power amplifiers 10. Compare the performance of various power amplifiers

Semiconductor Diodes

PN junction–Biased junctions - PN junction diode:characteristics and parameters – Diode approximations – Zener diode –LED, photodiode, PIN diode, shockley diode, varactor diode, tunnel diode.

Applications: Half wave rectification, full wave rectification, zener diode as a voltage regulator

Transistors

Bipolar junction transistor operation – BJT voltage and currents – BJT amplification – BJT switching – CB, CE and CC characteristics – Field Effect Transistors – Junction Field Effect transistor operation – JFET characteristics – MOSFET: Enhancement and depletion types – Comparison of BJT with FET.

Transistor Biasing

BJT biasing: DC load line and bias point – Base bias, collector to base bias, voltage divider bias. – comparision of basic bias circuits – Thermal stability of bias circuits – FET biasing : DC load line and bias point – Gate bias, self bias, voltage divider bias – Bias circuit design

Feedback Circuits

Concept of feedback- Topological classification : Voltage series, Voltage shunt, Current series, Current shunt - Effect of feedback on gain, bandwidth, input and output impedances, Barkhausen criterion for sustained oscillations - RC oscillators : RC phase shift oscillator , Wein bridge oscillator –LC Oscillators: Colpitts , Hartley oscillators.

Power Amplifiers

Classification of amplifiers – Class A direct coupled and transformer-coupled power amplifiers – Class B complementary-symmetry and push-pull power amplifiers – Calculation of power output, efficiency and power dissipation – Crossover distortion and its elimination.

Text book:

1	David A. Bell, ' Electronic devices and circuits ', Oxford University press, 5th edition, 2008
2	Robert L. Boylestad , Louis Nashelsky, ' Electronic Devices and circuit theory', 11th Edition, Pearson, 2013

Reference(s) :

1.	Millman J. and Halkias .C, ' Electronic devices and circuits ', Tata McGraw-Hill, 2013
2.	Floyd, 'Electronic Devices', Sixth edition, Pearson Education, 2003.

K.S. Rangasamy College of Technology - Autonomous								
40 CS 301 Software Engineering								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
III	3	0	0		3	50	50	100
Objective(s)	To enable students to learn basic concepts of Software engineering and its applications. To explain the phases of software development life cycle. To introduce the recent trends in software engineering and agile development							
Course Outcomes	**At the end of the course, the students will be able to** 1. Outline the basics of software engineering and software process. 2. Explain software process models and products. 3. Explore the fundamental concepts of requirement engineering. 4. Describe the requirement analysis modeling. 5. Outline the design process and design models. 6. Identify the user interface designing and user interface models of design process. 7. Examine the software coding principles, guidelines and key concepts. 8. Examine the objective of testing and types of testing. 9. Realize the emerging trends in software engineering.. 10. Infer the agile process and agile methodologies.							

Introduction to Software Engineering

Introduction to software engineering – software process – software process models – software products.

Requirement Engineering

What is Requirement Engineering? – Importance of requirements – types of requirements – steps involved in requirement engineering. Requirement analysis modeling: Analysis modeling approach – structured analysis – object oriented analysis.

Design and architectural engineering

Design process and concepts - Basic issues and characters of design – function oriented Vs object oriented system – Modularity, chohesion, coupling, layering - real-time software design –Design models – design documentation. User interface Design : concepts of user interface – Elements of the user interface – Designing the user interface – golden rules of user interface design – user interface models.

Software Coding

Introduction – Programming principles-Programming guidelines – coding conventions – key concepts in software coding.

Software Testing

Software testing: Psychology of testing – software testing scope - Software testing objectives – strategic approach to software testing – types of testing – test plan - test case – test automation.

Emerging trends in software engineering

Emerging trends:WAP 2.0 – rapid delivery – open source software development – security engineering – service oriented software engineering – web service – service oriented architecture – cloud computing – social computing.

Agile Software Development: What is agile? – Characteristics of Agile projects - Agile project life cycle – communication in agile projects – Agile Methodologies.

Text book:

1	Chandramouli Subramanian, Sai Kat Dutt, ChandramouliSeetharaman, B.G.Geetha,"Software Engineering", Pearson.

Reference(s) :

1.	Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 7th edition, 2010.
2.	Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.

K.S. Rangasamy College of Technology - Autonomous								
40 CS 0P3 Data Structures Laboratory								
Common toCS,IT,EE,EC								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
III	0	0	3		2	50	50	100
Objective(s)	To design and implement simple linear and non linear data structures To strengthen the ability to identify and apply the suitable data structure for the given real world problem To gain knowledge of graph applications							
Course Outcomes	**At the end of the course, the students will be able to** 1. Demonstrate the implementation of List ADT 2. Demonstrate the implementation of Stack ADT 3. Demonstrate the implementation of Queue ADT 4. Investigate Balanced Parenthesis and Postfix expressions with the help of Stack ADT 5. Implement Search Tree ADT 6. Demonstrate various collision resolution techniques in Hashing 7. Implement Internal sorting 8. Perform various Searching Techniques 9. Implement Shortest Path algorithm 10. Implement Minimum Spanning Tree algorithm							

1. Implementation of List Abstract Data Type (ADT)
2. Implementation of Stack ADT
3. Implementation of Queue ADT
4. Implementation of stack applications:
   (a) Program for 'Balanced Paranthesis'
   (b) Program for 'Evaluating Postfix Expressions'
5. Search Tree ADT
6. Develop a program for various collision resolution techniques in Hashing
7. Implementation of Internal Sorting
8. Develop a program for various Searching Techniques.
9. Implementation of Shortest Path algorithm
10. Implementation of Minimum Spanning tree algorithm.

K.S. Rangasamy College of Technology - Autonomous								
41CS 0P4 Object Oriented Programming Laboratory								
Common to CS,IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
III	0	0	3		2	50	50	100
Objective(s)	• To design various UML diagrams and develop object oriented programs using C++ with associated libraries • To understand and apply various object oriented features such as inheritance, operator overloading and polymorphism to solve various computing problems using C++ language • To apply exception handling and use built in classes from STL							
Course Outcomes	**At the end of the course, the students will be able to** 1. Demonstrate the input and output operations using stream classes 2. Create a function to manage large amount of statements 3. Implement the concept of class and objects 4. Demonstrate the concept of constructors and destructors 5. Implement the concept of reusability using inheritance 6. Perform operator overloading and type conversion 7. Implement the concept of dynamic objects 8. Implement virtual function to handle function overriding 9. Demonstrate the concept of templates 10. Perform exception handling							

The laboratory should be preceded by a tutorial to design UML diagrams.

1. Construct a C++ program to manage the input and output operations using stream classes
2. Construct a C++ program to manage large amount of statements using functions
3. Design a C++ program to implement the concept of class and objects
4. Develop a C++ program to initialize the class members using constructors and destroy the objects by using destructor
5. Design a C++ program for reusability using inheritance
6. Write a C++ program to perform operator overloading and type conversion
7. Develop a C++ program to implement the concept of dynamic objects
8. Develop a C++ program to handle function overriding by using virtual function.
9. Develop a C++ program to allow functions and classes to operate with generic types using templates
10. Construct a class in C++ to handle predefined and user defined exceptions
11. Design a C++ program to perform various operations using STL

K.S. Rangasamy College of Technology - Autonomous								
40 EC 0P1 Analog and Digital Circuits Laboratory								
Common to CS & IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
III	0	0	3		2	50	50	100
Objective(s)	• To demonstrate the characteristics of electronic devices • To illustrate the working principle of rectifiers, amplifier and oscillator • To design and implement digital circuits							
Course Outcomes	**At the end of the course, the students will be able to** 1. Demonstrate the characteristics of PN junction diode and Zener diode 2. Test the characteristics of Bipolar Junction Transistor in Common Emitter configuration 3. Determine the characteristics of JFET 4. Test the rectifiers with and without filters 5. Determine the frequency response of CE amplifier 6. Construct and test RC phase shift oscillator 7. Construct and test logic gates 8. Design and implement combinational logic circuits 9. Design and implement sequential circuits							

1. Characteristics of PN Junction Diode and Zener Diode.
2. Characteristics of BJT (common emitter configuration).
3. Characteristics of JFET
4. Half Wave and full wave Rectifier.
5. Frequency response of CE amplifier using voltage divider bias.
6. RC phase shift oscillator.
7. Study of logic gates.
8. Design of JK, D and T flip flops.
9. Design of Mod-n counter.
10. Design of encoder and decoder.
11. Design of multiplexer and demultiplexer.
12. Design of shift register (SISO&PIPO)

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2014
Department	Computer Science and Engineering	**Programme Code & Name**			CS : B.E. Computer Science and Engineering			
Semester III								
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ES**	**Total**
40 TP 0P1	**Career Competency Development I**	**0**	**0**	**2**	**0**	**100**	**00**	**100**
Objective(s)	To enhance employability skills and to develop career competency							

Unit – 1	**Written Communication – Part 1**	**Hrs**
Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition - Change of Voice - Change of Speech - Synonyms & Antonyms - One Word Substitution - Using the Same Word as Different Parts of Speech - Odd Man Out **Materials:** Instructor Manual, Word Power Made Easy Book		8
Unit – 2	**Written Communication – Part 2**	6
Analogies - Sentence Formation - Sentence Completion - Sentence Correction - Idioms & Phrases - Jumbled Sentences, Letter Drafting (Formal Letters) - Reading Comprehension(Level 1) - Contextual Usage - **Materials:** Instructor Manual, Word Power Made Easy Book		
Unit – 3	**Written Communication – Part 3**	4
Jumbled Sentences, Letter Drafting (Formal Letters) - Foreign Language Words used in English - - Spelling & Punctuation (Editing) **Materials:** Instructor Manual, News Papers		
Unit – 3	**Oral Communication – Part 1**	6
Self Introduction - Situational Dialogues / Role Play (Telephonic Skills) - Oral Presentations- Prepared -'Just A Minute' Sessions (JAM) **Materials:** Instructor Manual, News Papers		
Unit – 5	**Oral Communication – Part 2**	6
Describing Objects / Situations / People, Information Transfer - Picture Talk - News Paper and Book Review **Materials:** Instructor Manual, News Papers		
Total		**30**

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	50 Questions – 30Questions from Unit 1 & 2, 20 Questions from Unit 5, (External Evaluation)	50
2	Evaluation 2 Oral Communication 1	Self Introduction, Role Play & Picture Talk from Unit-3 (External Evaluation by English and MBA Dept)	30
3	Evaluation 3 Oral Communication 2	Book Review & Prepared Speech from Unit-4 (External Evaluation by English and MBA Dept)	20
Total			**100**

Reference Books

Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand& Co Ltd., New Delhi.
Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note :

Instructor can cover the syllabus by Class room activities and Assignments(5 Assignments/week)
Instructor Manual has Class work questions, Assignment questions and Rough work pages
Each Assignment has 20 questions from Unit 1, 2 and Unit 5 and 5 questions from Unit 3 and 4
Evaluation has to be conducted as like Lab Examination.

K.S.Rangasamy College of Technology - Autonomous								
40MA011 Statistics and Queuing Theory								
Common to CSE and IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	1	0	60	4	50	50	100

Objective(s)	• To acquire skills in the concepts of the probability. • To familiarize the student with various methods in hypothesis testing. • To develop the knowledge in queuing system.
Course Outcomes	**At the end of the course the student will be able to** 1.Gain the knowledge of probability in more events. 2.Solve the probabilities of one and two dimensional random variable. 3.Apply discrete probability distributions in engineering problems. 4.Apply continuous probability distributions in engineering problems. 5.Analyze the average relationship between two characteristics. 6.Test the statistical hypothesis using t Test, F Test and Chi Square Test. 7.Analyze the variance of factors using CRD and RBD. 8.Analyze the multi-factorial design of experiment using Latin square. 9.Acquire the knowledge to find the average customer and time in the infinite queue. 10 .Acquire the knowledge to find the average customer and time in the finite queue and general queue.

Probability and Random Variables

Axioms of probability – Conditional probability – Baye's theorem – Random variable – Probability mass function – Probability density function – Moments – Moments generating function – Two dimensional random variables – Joint distributions – Marginal and Conditional distributions.

Standard Distributions

Binomial, Poisson, Geometric distributions- Uniform, Exponential, Gamma and Normal distributions - properties and problems.

Correlation and Testing of Hypothesis

Covariance – Correlation and Regression – Small Sampling distributions – Testing of hypothesis, Student t, F Test – Chi-square Tests for independence of attributes and Goodness of fit.

Design of Experiments

Analysis of variance – One way classification – Completely Randomized block Design – Two-way classification – Randomized Block Design – Latin square.

Queuing Theory

Markovian models – Single and Multiple server queuing models finite and infinite capacity – M/G/1 queue – Pollaczek-Khintchine formula (excluding proof) – Problems

Text book(s):

1	Gupta S.P, "Statistical Methods", 34th Edition, Sultan Chand & sons, New Delhi, 2005.
2	Veerarajan T, "Probability Statistics and Random Process", Tata McGraw-Hill Education Private Limited, New Delhi, 2007.

Reference(s):

1	Ross S, "A first Course in Probability", 5th Edition, Pearson Education, Delhi, 2002.
2	Johnson R.A, "Miller & Freund's Probability and Statistics for Engineers", 6th Edition, Pearson Education, Delhi, 2000 – (Chapters - 7, 8, 9, 12).
3	TrivediK.S, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.
4	Palaniammal S, "Probability and Queuing Theory ", Learning Centre, New Delhi.

K.S. Rangasamy College of Technology - Autonomous								
40 PH 008 - Applied Physics								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	50	50	100
Objective(s)	• To enhance students' knowledge of theoretical and modern technological aspects in physics • To enable the students to correlate the theoretical principles with application oriented studies							
Course Outcomes	**At the end of the course the students will be able to** 1. Explain the principle of laser emission and classification of lasers 2. Identify the applications of lasers. 3.Explain the propagation of lights in fibre optic cables, classification of fibre, splicing and their fabrication. 4. Describe the fibre optic communication link, its applications and light propagation losses. 5. Explain the production and detection of ultrasonic waves. 6. Identify the industrial and medical applications of ultrasonic waves. 7. Explain the development of quantum theory and its applications. 8. Describe the concepts of nuclear physics and identify the elementary particles. 9. Classify the sound and analyze its characteristics 10. Give suggestions for buildings with good acoustics							

LASER TECHNOLOGY

Introduction – Principle of spontaneous emission, stimulated absorption and emission – Einstein's co-efficient (derivation)-population inversion-pumping mechanisms – Types of lasers: Nd:YAG, Semiconductor laser (homo junction and hetero junction), CO_2 laser – Industrial applications: Lasers in welding, cutting, drilling and soldering- Medical applications: laser endoscopy,– Holography: Construction and reconstruction of hologram –Applications.

FIBER OPTICS AND SENSORS

Principles – cone of acceptance, numerical aperture (derivation)- Modes of propagation –Fabrication: Crucible-crucible technique - Classification: based on materials, modes and refractive index profile– Splicing – types of splicing- Losses in optical fiber – Light sources for fiber optics – Detectors – Fiber optical communication links(Block diagram) – Advantage of fiber optical cable over copper cables- Fiber optic sensors-principle-liquid level sensors- Temperature, Displacement,measurement.

ULTRASONICS AND APPLICATIONS

Introduction-Properties-Production: Magnetostriction effect, magnetostriction generator- piezoelectric effect, piezoelectric generator – Ultrasonic detection- acoustical grating-Applications: Cavitation, cleaning, SONAR,– Non destructive testing: Pulse echo system, through transmission, resonance system- Medical applications: cardiology, neurology, ultrasonic imaging (A, B and TM- Scan).

QUANTUM AND NUCLEAR PHYSICS

Quantum physics: Introduction – de-Broglie hypothesis –Matter waves– Uncertainty principle, application: single slit experiment – wave function-physical significance-Schrodinger's wave equation: Time dependent and time independent – Particle in a box (one dimensional and three dimensional)–Microscopy: Scanning Electron Microscope.

Nuclear Physics: Introduction, atomic nucleus, nuclear force, nuclear density, atomic mass unit - mass defect - Binding energy-Nuclear fission-Energy released in fission- Stellar energy-elementary particles:Leptons, Hadrons: Mesons and Baryons

ACOUSTICS

Introduction-Classification of sound – Characteristics of musical sound – sound intensity level – Weber-Fechner law – loudness level and intensity: Bel, Decibel–Reverberation – Reverberation time – Sabine's formula (derivation) – sound absorption coefficient measuring method -Absorption co-efficient (derivation)– Factors affecting the acoustics of buildings and their remedies - basic requirements for acoustically good halls - acoustical materials.

Text book:

1.	V.Rajendran, Engineering Physics, Tata McGraw Hill Publishers, New Delhi, 2011

Reference(s) :

1.	Jeremy Bernstein, Paul M.Fishbane, Stephen Gasiorowicz, Modern Physics, Pearson Education, 2009.
2.	S.Kalainathan, A.Rubankumar, Physics for Engineers, ,RBA publications, Chennai, 2010.
3.	A.Arumugham, Engineering Physics, Anuradha Agencies, Chennai, 2005.

K.S.Rangasamy College Of Technology - Autonomous								
40IT002 - Design and Analysis of Algorithms								
Common to CS, IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	1	0	60	4	50	50	100

Objective(s)	• To design algorithms in both the science and practice of computing. • To analyze classic algorithms with analytical methods for efficiency. • Tosolve NP-hard and NP-complete problems.
Course Outcomes	**At the end of the course, the students will be able to** 1. Define algorithm and identify the problem types. 2. Compare orders of growth to represent asymptotic notations and solve recurrence relations. 3. Apply and inspect recursive and non-recursive algorithms using sample algorithms. 4. Apply 'Brute Force' technique to analyze problems. 5. Apply 'Divide and conquer' and 'Decrease and conquer' design techniques to solve problems. 6. Apply hashing technique for searching problems. 7. Apply 'Transform and conquer', 'Dynamic programming' and 'Greedy' techniques to find shortest path in tree/graph based problems. 8. Construct analogous algorithms for Optimal Binary Search Tree, Huffman trees, Prim's, Kruskal's, and Dijikstra's techniques. 9. Apply 'Backtracking' technique to solve NP-hard problems. 10. Apply 'Branch and bound' technique to solve NP-hard problems.

BASIC CONCEPTS OF ALGORITHMS

Introduction - Fundamentals of Algorithmic Problem Solving - Important Problem types - Fundamentals of the analysis of algorithm efficiency - Analysis Framework - Asymptotic Notations and Basic Efficiency Classes - Recurrence relations: Methods for solving recurrence relations

MATHEMATICAL ANALYSIS OF ALGORITHMS

Mathematical Analysis of Non-recursive Algorithms and Examples - Mathematical Analysis of Recursive Algorithms - Example: Fibonacci numbers - Empirical Analysis of Algorithms - Algorithm Visualization

BRUTE FORCE AND DIVIDE AND CONQUER TECHNIQUES

Selection Sort and Bubble Sort - Sequential Search and Brute-force string matching - Merge sort - Multiplication of Two n-Bit Numbers - Quick Sort - Binary Search - Binary tree Traversal and Related Properties

ALGORITHM DESIGN PARADIGM

Decrease and Conquer Technique: Insertion Sort - Depth first Search and Breadth First Search - Space and Time Tradeoffs: Hashing - Transform and Conquer Technique: Presorting - Balanced Search trees: AVL Trees - Heaps and Heap sort

DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE

Warshall's and Floyd's Algorithm - Optimal Binary Search trees - Prim's Algorithm - Kruskal's Algorithm - Dijikstra's Algorithm - Huffman trees

NP HARD AND NP-COMPLETE PROBLEMS

P and NP problems- NP complete problems – Backtracking: N-Queen's Problem – Hamiltonian Circuit problem - Subset-Sum Problem- Branch and Bound Techniques: Knapsack problem – Traveling salesman problem - Assignment problem

Text book(s):

1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Second Edition, Tenth Impression, Pearson Education Asia, 2013.

Reference(s):

1.	T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI Pvt. Ltd., 2001.
2.	Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2003.
3.	A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2003.

K.S.Rangasamy College of Technology - Autonomous								
40 EC 005 Microprocessors and Microcontrollers								
Common to CS & IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	50	50	100

Objective(s)	• To introduce the architecture and programming of 8086 microprocessors, interfacing of peripheral devices with 8086 microprocessors. • To introduce the architecture, programming and interfacing of 8051 micro controller. • To explore the applications using microcontroller 8051
Course Outcomes	**At the end of the course, the students will be able to** 1: Describe the concept of 16 bit microprocessor and its architecture 2: Develop the assembly language program using instruction set of 8086 microprocessor 3: Describe the functional units of peripheral IC's 4: Interface the peripheral IC's with 8086 Microprocessor and can configure its functionality 5: Describe the fundamental features and operation of 8051 microcontroller 6: Develop the assembly language program using instruction set of 8051 microcontroller 7: Program the ports, timers, counters and UART of 8051 microcontroller for various applications 8: Interface ADC/DAC with 8051microcontroller 9: Interface the input and output devices with 8051Microcontroller 10: Develop the 8051 microcontroller based system for various applications

8086 Microprocessor
8086 Internal Architecture - Addressing modes - Instruction set - Assembly language Programming- signals and timing – MIN/MAX mode of operation – Interrupts - Interfacing memory and I/O devices.

Peripherals Interfacing
Programmable Peripheral Interface (PPI 8255) –Programmable Interval Timer (PIT 8253) – 8259 Programmable Interrupt Controller – keyboard & display controller (8279) - Interfacing serial I /O (8251)- ADC/DAC interfacing.

8051 Microcontroller
8051 Architecture- Memory origination-Addressing modes -Instruction set - Microcontroller hardware - I/O pins and ports - Assembly language programming- I/O port programming.

8051 Peripheral and Its Programming
Interrupts -Counters and Timers- Timer and counter programming - Serial Communication - Interrupt programming, ADC, DAC and sensor interfacing.

8051 Applications
LCD and Keyboard Interfacing – RTC Interfacing and programming- Stepper motor and DC motor interfacing. Case study: raffic light control and washing machine control.

Text book(s):

1	Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Revised second Edition 2006, Eleventh Reprint 2010. Tata McGraw Hill
2	Krishna Kant, Microprocessors and microcontrollers Architecture , Programming and System design 8085,8086,8051,8096,PHI-Third Printing-2010

Reference(s) :

1	Muhammad Ali Mazidi, Janice GillispieMazidi, RolinD.MCKinlay The 8051Microcontroller and Embedded Systems, Second Edition 2008, Fifth Impression 2010,Pearson Education 2008.
2	Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fifth edition, Penram International Publishing 2010.
3	A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition. Twelfth reprint 2009
4	Nilesh B Bahadure, " Microprocessors The 8086 to Pentium Family, PHI, 2010

K.S. Rangasamy College of Technology - Autonomous

40 CS 401 Java Programming

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	60	C	CA	ES	Total
IV	3	1	0		4	50	50	100

Objective(s)	• To provide the basic knowledge in java platform and to study the basic java packages. • To implement a java concepts, client-server programming and GUI. • To design interactive web pages using swing
Course Outcomes	**At the end of the course, the students will be able to** 1. Recall the basic object oriented programming concepts and the outline the java features 2. Infer the concept of classes, objects and it's interaction with methods 3. Rephrase the purpose of I/O streams and reusability using inheritance 4. Interpret the purpose of package and experiment with Exception 5. Infer the features of threads 6. Apply the concept of TCP,UDP and RMI in client server application 7. Rephrase the concept of Applets in programming. 8. Design and develop applications using layout managers and event handling controls 9. Illustrate the concept of server side programming using servlet 10. Develop the web pages using swing features

Java Fundamentals

An overview of java – fundamentals of OOPS – Java Features – Constants – Variables – Data types - Operators – Arrays – Strings - vectors – control statements – Class – object – methods

I/O Streams, Class Hierarchy and Exception Handling

IO Streams – Inheritance - Interfaces – Packages – Exception Handling.

Multi Threading and Java Networking

Multi threading - Java Thread model – Main thread – creating thread – creating multiple thread – Thread priority – methods – synchronization – IPC, Sockets – TCP Socket – UDP Socket – RMI – Basics – RMI Layer – Stub, Skeleton - RMI Implementation.

Applets

Applet Life cycle – Graphics and Applet – AWT – Windows Fundamentals – Frames – creating frame window in applet – AWT controls – Layout Manager – Menu – Event Handling.

Servlet and Swing Programming

Server Side Programming – Servlet Architecture –Eclipse Editor Servlet Get and Post Method – Servlet Life cycle – Container – Executing simple servlet –Java Swing.

Text book:

1	Herbert Schildt, "the Java 2 : Complete Reference", Fifth edition, TMH, 2002.

Reference(s) :

1.	Patrick Naughton " Complete Reference Java 2" Tata McGraw Hill
2.	ElliotteRustry Harold " Java Network Programming" 'O' Reilly Publications
3.	E.Balagurusamy "Programming with Java" Tata McGraw Hill

K.S. Rangasamy College of Technology - Autonomous								
40 CS 402 Operating Systems								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
IV	3	0	0		3	50	50	100
Objective(s)	• This course provides the comprehensive knowledge on components of Operating system with its working principles. • This course provides an ample way to identify and solve the issues related to Operating System Components. • To implement page replacement and disk scheduling algorithms							
Course Outcomes	**At the end of the course, the students will be able to** 1. Recognize the basics of operating systems and its components. 2. Analyze the process and its scheduling algorithms 3. Examine the CPU scheduling algorithms and critical section problem. 4. Illustrate classical synchronization problem and semaphores and deadlocks 5. Annotate Memory partitioning 6. Classify the Storage Management, paging and segmentation 7. Outline the memory management scheme and page replacement algorithms 8. comprehend the File concept and Directory structure 9. examine the concept of allocation methods, directory structure and free space management 10. Understand disk structure and disk scheduling algorithms							

Introduction to Operating System

Introduction – History of Computing and operating system – Computer System Overview – Operating system Overview – Types of Operating System – Hardware Protection - Operating System Components, services, system calls and system programs - Process: Concept – Scheduling – Operations – Cooperation – Inter Process Communication- Mobile Operating System

Process Management

Thread – CPU Scheduling : Concepts, Criteria, Algorithms, Types – The Critical Section Problem – Synchronization Hardware: Semaphores, Classic Problems, Critical Regions, Monitors – Deadlock: Characterization, Methods, Detection, Prevention and Recovery

Storage Management

Memory Management Requirements – Memory Partitioning – Storage Management – Swapping – Contiguous Memory Allocation – Paging – Segmentation – Segmentation with Paging– Security issues in Memory

Memory Management

Virtual Memory: Hardware and Architecture - Demand Paging – Page Replacement: Algorithms – Allocation of Frames – Thrashing – File Concepts – Access Methods – Directory Structure – File Mounting – File Sharing – Protection

File Management

File System: Structure, Implementation – Directory Implementation – Allocation Methods – Free Space Management – Disk: Structure, Scheduling, Management – Swap Space Management – Design Principles – Case Study: Design and Implementation of Small Operating Systems.

Text book:

1	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

Reference(s) :

1.	William Stallings, “Operating System: Internals and Design Principles”, Prentice Hall of India, 6th Edition, 2009.
2.	Harvey M. Deitel, Paul J. Deitel andDavid R. Choffnes, “Operating Systems”, Prentice Hall of India, 3rd Edition, 2003.

K.S. Rangasamy College of Technology - Autonomous								
40 EC 0P2 Microprocessors and Microcontrollers Laboratory								
Common to CS & IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
IV	0	0	3		2	50	50	100
Objective(s)	• To introduce the programming concepts of 8086 microprocessors • To interface peripheral devices with 8086 microprocessors • To introduce the programming concepts of 8051 micro controllers • To interface peripheral devices with 8051 microcontrollers							
Course Outcomes	**At the end of the course, the students will be able to** 1: Perform the basic arithmetic, sorting and searching operations using 8086 2: Demonstrate the interfacing of keyboard and display controller using 8086 3: Demonstrate the interfacing of interrupt controller using 8086 4: Demonstrate the interfacing of Timer using 8086 5: Demonstrate the interfacing of ADC/DAC using 8086 6: Perform the basic arithmetic and logical instructions in 8051 using KEIL IDE 7: Program and verify Timer, Interrupts and UART operations through KEIL IDE in 8051 8: Demonstrate the interfacing of parallel and serial communication in 8051 9: Demonstrate the interfacing of Traffic light controller in 8051 10: Demonstrate the interfacing of Stepper Motor & DC Motor Speed control in 8051							

1. Programs for 16 bit arithmetic, sorting and searching operations.
2. Interfacing and programming of keyboard & display controller
3. Interfacing and programming of interrupt controller
4. Interfacing and programming of Timer
5. Interfacing ADC and DAC.
6. Microcontroller 8051 - Programming using Arithmetic and Logical instructions through KEIL IDE.
7. Microcontroller 8051 - Programming and verifying Timer, Interrupts and UART operations through KEIL IDE.
8. Parallel Communication and Serial Communication
9. Interfacing and Programming of Traffic light controller.
10. Interfacing, Programming of Stepper Motor & DC Motor Speed control.

K.S. Rangasamy College of Technology - Autonomous								
41 CS 4P1 Java Programming Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
IV	0	0	3		2	50	50	100
Objective(s)	This course enable the students to apply the basic concepts and to design UML diagram and solve real time problems							
Course Outcomes	**At the end of the course, the students will be able to** 1. Implement the various operations of vector. 2. Demonstrate different operations using string and string buffer 3. Create and import different applications using packages 4. Implement the concept of interfaces and to check abnormal conditions using exception handling. 5. Implement Inter Process Communication using threads 6. Demonstrate the networking applications using TCP and UDP concepts. 7. Implement the concept of remote access using RMI 8. Create layout windows for real time applications using layout managers 9. Perform server side programming using servlet 10. Demonstrate the concept of swing to create different graphical user interface							

The laboratory should be preceded by a tutorial to design UML diagram.

1. Develop a Java program to compute basic operations using vectors.
2. Develop a Java program to perform string manipulation.
3. Develop a Java program to perform mathematical operations using package concepts.
4. Develop a Java program to create a class with interface and to check abnormal errors using Exception handling concepts.
5. Develop a Java program to perform multi task using threads.
6. Develop a Java program to commune the information using networking concepts.
7. Develop a Java program to commune the information remotely.
8. Develop an application in java using layouts.
9. Develop a Java program to perform server side programming.
10. Develop a GUI for any applications using java swing.
11. Mini Project.

K.S. Rangasamy College of Technology - Autonomous								
40 CS 4P2 Operating Systems Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
IV	0	0	3		2	50	50	100
Objective(s)	This course provides an ample way to identify and solve the issues related to Operating System Components.							
Prerequisite	Subject Knowledge In Fundamentals of Programming, Basics of DOS, UNIX and Linux Commands, Shell Script Fundamentals.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Learn the basics of Operating system installation and shell scripts. 2. Analyze the System calls for Process and inter process communications 3. Examine the Steps in process operation 4. Examine the criteria involved in CPU scheduling algorithms. 5. Analyzing the different deadlock avoidance mechanism 6. Implement Classic problem of Synchronization using semaphores 7. Classifying the Storage Management 8. Outline the page replacement algorithms 9. comprehend the File concept and its allocations 10. Understand the factors in disk scheduling algorithms							

1. Installation of Operating system and implementation of Basic Shell Programming Concepts like Loops, Functions, Patterns, Substitutions.
2. Familiarization with System calls for Process and inter process communications.
3. Implement the operation on process.
4. Implement and analyze the scheduling criteria's of CPU Scheduling Algorithms.
5. Implement Deadlock avoidance mechanism from deadlock in a real time environment using C.
6. Implement Classic problem of Synchronization using semaphores.
7. Implement Contiguous Memory Allocation.
8. Implement Page replacement algorithm.
9. Implement various file allocation Methods.
10. Implement Disk Scheduling to find the seek time of accessing the required information using different scheduling algorithm.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2014
Department	Computer Science and Engineering		**Programme Code & Name**		CS : B.E. Computer Science and Engineering			
Semester IV								
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**ES**	**Total**
40 TP 0P2	**Career Competency Development II**	**0**	**0**	**2**	**0**	**100**	**00**	**100**
Objective(s)	To enhance employability skills and to develop career competency							

Unit – 1	**Written Communication – Part 3**	**Hrs**
	Reading Comprehension Level 2 (Paraphrasing Poems) - Letter Drafting - Email Writing - Paragraph Writing - News paper and Book Review Writing - Skimming and Scanning - Interpretation of Pictorial Representations. **Practices:** Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Editing **Materials:** Instructor Manual, Word power Made Easy Book, News Papers	6
Unit – 2	**Oral Communication – Part 3**	
	Self Introduction - Miming (Body Language) - Introduction to the Sounds of English - Vowels, Diphthongs & Consonants, Introduction to Stress and Intonation - Extempore - News Paper and Book Review - Technical Paper Presentation. **Material:**Instructor Manual, News Papers	4
Unit – 3	**Verbal Reasoning – Part 1**	
	Analogies - Alphabet Test - Theme Detection - Family Tree - Blood Relations (Identifying relationships among group of people) - Coding & Decoding - Situation Reaction Test - Statement & Conclusions **Material:**Instructor Manual, Verbal Reasoning by R.S.Aggarwal	8
Unit – 4	**Quantitative Aptitude – Part 1**	
	Problem on Ages - Percentages - Profit and Loss - Simple & Compound Interest - Averages - Ratio, Proportion **Material:**Instructor Manual, Aptitude Book	6
Unit – 5	**Quantitative Aptitude – Part 2**	
	Speed, Time & Work and Distance - Pipes and Cisterns - Mixtures and Allegations - Races - Problem on Trains - Boats and Streams **Practices** : Puzzles, Sudoku, Series Completion, Problem on Numbers **Material:**Instructor Manual, Aptitude Book	6
	Total	**30**

Evaluation Criteria

S.No.	**Particular**	**Test Portion**	**Marks**
1	Evaluation 1 Written Test	15 Questions Each from Unit 1, 3, 4 & 5 (External Evaluation)	60
2	Evaluation 2 Oral Communication	Extempore & Miming – Unit 2 (External Evaluation by English, MBA Dept.)	20
3	Evaluation 3 Technical Paper Presentation	Internal Evaluation by the Dept.	20
	Total		**100**

Reference Books

Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand& Co Ltd., New Delhi.
Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
Objective Instant Arithmetic by M.B. Lal&GoswamiUpkar Publications.
Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note :

Instructor can cover the syllabus by Class room activities and Assignments (5 Assignments/week)
Instructor Manual has Class work questions, Assignment questions and Rough work pages
Each Assignment has 20 questions from Unit 1, 3, 4 and Unit 5 and 5 questions from Unit 2.
Evaluation has to be conducted as like Lab Examination.

K.S. Rangasamy College of Technology - Autonomous								
40 MA 014 Discrete Mathematics								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	60	C	CA	ES	Total
V	3	1	0		4	50	50	100

Objective(s)	• At the end of the course, students would have knowledge of the concepts needed to test the logic of a program, gain knowledge which has application in expert system, data base and a basic for the prolog language. • An understanding in identifying patterns on many levels, be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science. • Exposure to concepts and properties of algebraic structures such as semi groups, monoids and groups.
Course Outcomes	**At the end of the course, the students will be able to** 1. Comprehend the concepts of statements, connectives and its symbolic forms 2. Learn the truth value, validity and conclusion of arguments 3. Comprehend the predicates and statement function and its quantifiers 4. Comprehend the rules of universal specification and generalization and validity of arguments 5. Augment the knowledge of set concepts, ordered pairs and Cartesian product 6. Learn the relation , function and its inverse 7. Gain the knowledge of the partial ordering, poset, lattices and their properties 8. Learn the Boolean algebra and minimization of Boolean function 9. Learn the algebric systems , semigroup and monoid 10. Expertise to know the normal subgroups definition, theorem, cosets and lagrange's theorem

Propositional Calculus

Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Contrapositive – Logical equivalences and implications – DeMorgan's Laws - Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference – Arguments - Validity of arguments.

PredicateCalculus

Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – The rules of universal specification and generalization – Validity of arguments.

SetTheory

Basic concepts – Notations – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets –Types of relations and their properties – Relational matrix and the graph of a relation – Equivalence relations –functions – Classification of functions –Type of functions - Examples – Composition of functions – Inverse functions

Lattice & Boolean Algebra

Partial ordering – Poset – Hasse diagram – Lattices and their properties – sublattices - Boolean Algebra – representation and minimization of Boolean function

Groups

Algebraic systems – Definitions – Examples – Properties – Semigroups – Monoids – Homomorphism – Sub semigroups and Submonoids - Cosets and Lagrange's theorem – Normal subgroups

Text book:

1	Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2003.

Reference(s) :

1	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2003.
2	Kenneth H.Rosen, "Discrete Mathematics and its Applications", Fifth Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2003.
3	Richard Johnsonbaugh, "Discrete Mathematics", Fifth Edition, Pearson Education Asia, New Delhi, 2002.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 501 - Database Management Systems								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	50	50	100

Objective(s)	• To familiarize the students with various data models and query language. • Gain knowledge on data storage and indexing concepts. • To expose the fundamentals of transaction processing and recovery concepts. • To make the students aware of the various current trends in database system.
Course Outcomes	**At the end of the course, the students will be able to** 1. Express the knowledge of data base systems and analyze the various data models 2. Apply Relational Algebra and Relational Calculus to retrieve the data from database 3. Employ the concept of Data Definition Language and Data Manipulation Language 4. Apply the various Normal Forms in database design 5. Express the knowledge of secondary storage device to store the data 6. Appraise the concepts of hashing, B Tree, B+ Tree in indexing to retrieve the data efficiently from the database 7. Apply the various concurrency control techniques in database transactions 8. Describe the various techniques that ensures database recovery 9. Classify the recent databases such as object based, object oriented and distributed 10. Express the knowledge of data warehousing and data mining

Introduction and Conceptual Modeling
Introduction Database systems – DBMS Applications – Purpose of DBMS – Views of Data - Database System Architecture –Data Storage and Querying – DB Users and Administrators - Data Models – ER model – Relational Model – Relational Algebra and Calculus.

Relational Model
Introduction to SQL – Intermediate SQL – Advanced SQL– Triggers – Functions and Procedures –Embedded SQL - Normalization for Relational Databases (up to 5NF).

Data Storage and Indexing Concepts
Record storage and Primary file organization –RAID – Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree.

Transaction Management
Transaction – Transaction Concepts- Transaction Model- Desirable properties of Transaction- Schedule and Recoverability- Serializability – Concurrency Control – Types of Locks- Two Phase locking- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update.

Current Trends
Object Oriented Databases –Distributed databases- Homogenous and Heterogeneous- Distributed data Storage – Distributed Transaction – Commit Protocols - Data Mining– Data Mining Applications –Data Warehousing.

Text book(s):

1	Abraham Silberschatz, Henry F. Korth and S. Sudarshan - “Database System Concepts”, sixth Edition, McGraw-Hill, 2011.

Reference(s):

1	RamezElmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Fifth Edition, Pearson Education, 2009.
2	Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003.
3	Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2003.
4	Peter Rob and Corlos Coronel- “Database System, Design, Implementation and Management”, Thompson Learning Course Technology- Fifth edition, 2003.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 502 Computer Architecture								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	50	50	100

Objective(s)	Having a thorough understanding of the basic structure and operation of a digital computer and discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division, to study in detail the different types of control and the concept of pipelining and study the hierarchical memory system including cache memories and virtual memory, to study the different ways of communicating with I/O devices and standard I/O interfaces.
Course Outcomes	**At the end of the course student will able to** 1. Describe the basic structure of computer. 2. Identify about Instruction sequencing and Addressing modes. 3. Express the basic design of Addition and subtraction for fixed point numbers. 4. Illustrate multiplication and division of fixed and basics of floating point numbers using algorithm. 5. Discuss the concept of Instruction execution and generation of control signals. 6. Gain knowledge about pipelining and hazards. 7. Review the concept of interrupts and types of buses. 8. Gain Knowledge about Direct Memory Access and Standard I/O Interfaces. 9. Summarize the concept of Cache memory and its performance 10. Outline multiprocessor architecture and parallelism.

Basic Structure of Computers

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

Arithmetic Unit

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

Basic Processing Unit

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

I/O Organization

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB)

Multiprocessor and Thread Level Parallelism

Cache memories - Performance considerations-Centralized Shared Memory Architecture-Performance of Symmetric Shared Memory Architecture-Distributed Shared Memory and Directory Based Coherence

Text book(s):

1	Carl Hamacher, ZvonkoVranesic and SafwatZaky, 5th Edition “Computer Organization”, McGraw-Hill, 2002.

Reference(s):

1.	David A.Patterson and John L.Hennessy, “Computer Organization and Design: The hardware / software interface”, 2nd Edition, Morgan Kaufmann, 2002.
2.	William Stallings, “Computer Organization and Architecture – Designing for Performance”, 6th Edition, Pearson Education, 2003.
3.	John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill, 1998.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 503 Computer Networks								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	50	50	100
Objective(s)	Understanding the concepts of data communications, functions of different layers, IEEE Standards employed in computer networking, and to make the students to get familiarized with different protocols and network components.							
Course Outcomes	**At the end of the course student will able to** 1. Know the concept of components, categories and ISO/OSI model of networks 2. Identify the purpose of various transmission media and interfaces. 3. Describe the Concept of various error detection techniques and Flow, Error control. 4. Review the applications of Ethernet and connecting devices. 5. Compare the concept of Circuit switching and Packet switching. 6. Gain the knowledge of various Routing algorithms. 7. Appraise User datagram and Transmission control protocol. 8. Gain the knowledge of Congestion control and QoS Techniques. 9. Identify the Purpose of Domain Name Space , Email and FTP. 10. Compare HTTP and HTTPs in World Wide Web.							

Data Communications

Networks – Components and Categories –Line Configuration – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics –Interfaces(RS232 Standard) and Modems

Data Link Layer

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control – Stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 – Connecting devices-Repeaters-Hubs-Bridges

Network Layer

Internetworks – Circuit Switching – Packet Switching– IP addressing methods – Sub netting –Super netting– Routers- Routing Algorithms – Distance Vector Routing – Link State Routing- ICMP / Frame format, Query Messages.

Transport Layer

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS)-Techniques

Application Layer

Domain Name Space (DNS) – Email (SMTP)-File Transfer protocol (FTP) – HTTP – HTTPS-World Wide Web.

Text book(s):

1	Behrouz A. Forouzan, “Data communication and Networking Update ”, Tata McGraw-Hill, Third Edition , 2006.

Reference(s):

1	James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2003
2	Larry L.Peterson and Peter S. Davie, “Computer Networks”, Harcourt Asia Pvt. Ltd., Second Edition.
3	Andrew S. Tanenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.
4	William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000

K.S.Rangasamy College of Technology - Autonomous								
40 CS 504 Web Technology								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	50	50	100

Objective(s)	Enable the students to learn basic web concepts, scripting languages and server side programming. To make aware of the students about development in web technologies.
Course Outcomes	**At the end of the course student will able to** 1. Express the features of HTML and employ various style sheet concepts in HTML. 2. Identify the purpose of CGI, scripting and its control structures 3. Describe the purpose of PERL language and different data types in PERL. 4. Compare DHTML and XML and know the purpose of XML with its Document Type Definition 5. Analyze various visual effects, Power point effects through different filters and Transitions. 6. Know the concept of Data binding and its features. 7. Gain the knowledge of JSP in server side programming and its elements. 8. Identify the needs of Servlets concepts and its various features 9. Analyze the different types of e-business models and various strategies in e-Marketing 10. Asses the various security features available for online Payments in e-Business

I**ntroduction**

Introduction – Web concepts – HTML – HTML Forms – Cascading Style Sheets – Scripting Languages: JavaScript.

Common Gateway Interface

Programming CGI Scripts – PERL – Applications - Server Side Includes – DBI to connect to a database – Cookies and Perl – XML.

Dynamic Html

Dynamic HTML – introduction – object model and collections – event model – filters and transition – data binding – data control – handling of multimedia data.

Server Side Programming

Server side Programming –Java server pages – Java Servlets: Introduction – Servlet overview and architecture – HTTP GET and POST requests – Redirecting requests – Session tracking – simple web applications – multitier applications.

Applications

e-Business Models – Building an e-Business – e-Marketing – Database connectivity – Online Payments – Security - XML and e-Commerce – m-Business.

Text book(s):

1	H.M.Deitel, P.J.Deitel, A.B.Goldberg, “INTERNET and WORLD WIDE WEB – How to program”, Pearson education, Third Edition, 2004.

Reference(s):

1	D.Norton and H. Schildt, “Java 2: The complete Reference”, TMH, 2000.
2	Eric Ladd and Jim O’Donnell, et al, “USING HTML 4, XML, and JAVA1.2”, PHI publications, 2003.
3	Jeffy Dwight, Michael Erwin and Robert Nikes “USING CGI”, PHI Publications, 1997.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 505 Theory of Computation								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	1	0	60	4	50	50	100

Objective(s)	• Tounderstandthetypesoffiniteautomata,therelationshipbetweenfiniteautomata. • To understand regularExpressionstheEquivalenceofpushdownautomataandcontextfreegrammar • To learn the programmingtechniquesofTuringmachineandundecidableproblems.
Course Outcomes	**At the end of the course student will able to** 1. Comprehend the formal and Inductive proofs 2. Construct the Deterministic and Non- Deterministic Finite Automata to describe languages 3. Understand the regular expressions and languages 4. Analyze the properties of regular languages 5. Construction of context-free grammar 6. Interpret the uses of push-down automata 7. Understand the context-free languages 8. Interpret the uses of Turing machine 9. Recognize the undecidability problems 10. Analyze the classes P and NP problems

Introduction to Automata

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA) – Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

Regular Expressions and Languages

Regular Expression – Finite Automata and Regular Expressions – Properties of regular languages - Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

Context-Free Grammar and Languages

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages

Pushdown Automata

Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and Context Free Grammer, Deterministic Pushdown Automata.

Properties of Context-Free Languages

Normal forms for Context Free Grammer – Pumping Lemma for Context Free Language - Closure Properties of Context Free Language

Turing Machines

Turing Machines – Programming Techniques for Turing Machine – Extensions of Turing Machine.

Undecidability

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem

Interactable Problems

The classes Polynomial Time (P) and Nondeterministic Polynomial Time(NP).

Text book(s):

1	J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

Reference(s):

1	H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pears Education/PHI, 2003
2	J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3	Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

K.S. Rangasamy College of Technology - Autonomous								
40 CS 5P1 Database Management Systems Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
V	0	0	3		2	50	50	100
Objectives	Improving knowledge in the Storage Techniques							
Course Outcomes	**At the end of the course, the students will be able to** 1. Implement the Data Definition Language commands in RDBMS 2. Demonstrate the Data Manipulation Language and Data Control Language Commands in RDBMS 3. Employ the Sub queries to retrieve data from multiple tables 4. Implement the High-level language extension with Cursors 5. Demonstrate the High-level language extension with Triggers 6. Implement the Procedures and Functions in PL/SQL 7. Perform the database design using E-R model and Normalization 8. Design and implementation of payroll, banking and library management system 9. Demonstrate the views in RDBMS 10. Implement the Embedded SQL								

List of Experiments

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML), Data Control Language (DCL) and Transaction Control Language (TCL) commands in RDBMS.
3. Implementation of Sub queries.
4. Creation of views and joins.
5. High-level language extension with Cursors.
6. High level language extension with Triggers
7. Procedures and Functions.
8. Embedded SQL.

K.S. Rangasamy College of Technology - Autonomous								
40 CS 5P2 Networking Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
V	0	0	3		2	50	50	100
Objectives	Understanding the overview of computer networks and data transmission, peer to peer communication application and to learn the socket programming to build a network application.							
Course Outcomes	**At the end of the course student will able to** 1. Implementation of client-server communication using TCP/IP. 2. Implementation of client-server communication using UDP. 3. Implementation of FILE TRANSFER PROTOCOL. 4. Implementation of ECHO/PING/TALK. 5. Implementation of REMOTE COMMAND EXECUTION. 6. Implementation of for ARP. 7. Implementation of RARP. 8. Implementation of REMOTE METHOD INVOCATION. 9. Implementation of SLIDING WINDOW PROTOCOL. 10. Implementation of SHORTEST PATH ROUTING ALGORITHM 11. Implementation of SOCKET PROGRAMMING.							

1. Implementation of client-server communication using TCP/IP.
2. Implementation of client-server communication using UDP.
3. Create and establish a connection by using FILE TRANSFER PROTOCOL.
4. Perform the operation on ECHO/PING/TALK.
5. Implementation of REMOTE COMMAND EXECUTION.
6. Design and develop a program for ARP.
7. Design and develop a program for RARP.
8. Perform an application to invoke REMOTE METHOD INVOCATION.
9. Construct a program for SLIDING WINDOW PROTOCOL.
10. Design and develop a program for SHORTEST PATH ROUTING ALGORITHM
11. Construct a program for SOCKET PROGRAMMING.

K.S. Rangasamy College of Technology - Autonomous								
40 CS 5P3 Web Technology Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
V	0	0	3		2	50	50	100
Objectives	Imparting practical knowledge in client-side programming and server-side programming. Design and Implementing online web applications and creating dynamic web pages.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Design a personal web page using HTML Forms. 2. Create a personal web page using using CSS. 3. Demonstrate the Java Script program which make use of Java Script's inbuilt objects 4. Interpret the concepts of XML declaration, Element Declaration, and attribute Declaration for XML documents. 5. Design a web page using PERL. 6. Design a DHTML web page which makes use of Object model and Event model. 7. Design a DHTML web page using JavaScript to implement Data binding and Data Control. 8. Demonstrate the servlets to invoke data from HTML forms using Java. 9. Implement Java Server Pages with JDBC. 10. Create a webpage using Java Server Pages for Online shopping							

List of Experiments

1. Design a personal web page using HTML Forms.
2. Design a personal web page using CSS.
3. Write a Java Script program which make use of Java Script's inbuilt objects.
4. Create a web page to import data from XML Documents.
5. Design a web page using PERL.
6. Design a DHTML web page which makes use of Object model and Event model.
7. Write a DHTML program using JavaScript to implement Data binding and Data Control.
8. Write a program in java using servlets to invoke servlets from HTML forms.
9. Write a JSP program to implement database connectivity.
10. Write a JSP program to implement online shopping.

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2014
Department	Computer Science and Engineering	**Programme Code & Name**	CS:B.E.Computer Science and Engineering					
Semester V								
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**		
		L	T	P	C	CA	ES	Total
40 TP 0P3	Career Competency Development III	0	0	2	0	100	00	100
Objective(s)	To enhance employability skills and to develop career competency							

Unit – 1	**Written and Oral Communication – Part 1**	Hrs
Reading Comprehension Level 3 - Self Introduction - News Paper Review - Self Marketing - Debate- Structured and Unstructured GDs Psychometric Assessment – Types & Strategies to answer the questions Practices: Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Interpretation of Pictorial Representations - Editing - GD - Debate. Materials: Instructor Manual, Word power Made Easy Book, News Papers		6
Unit – 2	**Verbal & Logical Reasoning – Part 1**	
Syllogism - Assertion and Reasons - Statements and Assumptions - Identifying Valid Inferences - identifying Strong Arguments and Weak Arguments - Statements and Conclusions - Cause and Effect - Deriving Conclusions from Passages - Seating Arrangements Practices: Analogies - Blood Relations - Statement & Conclusions Materials: Instructor Manual, Verbal Reasoning by R.S.Aggarwal		8
Unit – 3	**Quantitative Aptitude – Part 3**	
Probability - Calendar- Clocks - Logarithms - Permutations and Combinations Materials: Instructor Manual, Aptitude Book		6
Unit – 4	**Quantitative Aptitude – Part 4**	
Algebra - Linear Equations - Quadratic Equations - Polynomials Practices: Problem on Numbers - Ages - Train - Time and Work - Sudoku - Puzzles Materials: Instructor Manual, Aptitude Book		6
Unit – 5	**Technical & Programming Skills**	
C Language - Control Structures – Data Types – Arrays – Operators -Functions- Structures – Pointers-Files Practices : Programs and Find Output and Errors Materials: Instructor Manual , Exploring C by Yashwant Kanetkar		4
	Total	30

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	15 Questions each from Unit 1, 2, 3, 4 & 5 (External Evaluation)	60
2	Evaluation 2 - Oral Communication	GD and Debate (External Evaluation by English, MBA Dept & External Trainers)	20
3	Evaluation 3 – Technical Paper Presentation	Internal Evaluation by the Dept.	20
		Total	100

Reference Books

Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
Objective Instant Arithmetic by M.B. Lal & GoswamiUpkar Publications.
Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note :

- Instructor can cover the syllabus by Class room activities and Assignments (5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough work pages
- Each Assignment has 20 Questions from Unit 1,2,3,4 and 5 and 5 Questions from Unit 1
- Evaluation has to be conducted as like Lab Examination.

K.S. Rangasamy College of Technology - Autonomous								
40 HS 003 Total Quality Management								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P	45	C	CA	ES	Total
VI	2	0	0		2	50	50	100

Objective(s)	To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management, statistical approach for quality control, ISO and QS certification process and its need for the industries.
Course Outcomes	**At the end of the course, the students will be able to** 1 Recognize the basic concepts of total quality management 2 List the role of senior management. 3 Identify the customer satisfaction, retention and employee involvement. 4 Locate the continuous process improvement techniques. 5 List the seven tools of quality and new seven management tools 6 Demonstrate concept of six sigma 7 Implement the concept of quality function deployment. 8 Assess the total productive maintenance, failure mode and effective analyses 9 Demonstrate the need for ISO 9000 and other quality system. 10 Categorize the quality auditing.

Introduction

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Quality Council, Quality Statements, Deming Philosophy, Barriers to TQM Implementation.

TQM Principles

Customer satisfaction, Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement, Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership, Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures-Basic Concepts, Strategy.

Statistical Process Control (SPC)

The tools of quality, Statistical Fundamentals, Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma,

TQM Tools

Benchmarking, Reasons to Benchmark, Benchmarking Process, Quality Circle, Quality Function Deployment (QFD). House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM), Concept, Improvement Needs, FMEA–Stages, Types.

Quality Systems

Need for ISO 9000 Quality Systems, ISO 9001:2008 ISO 14000 Quality Systems, Elements Concepts, Implementation, Documentation, Quality Auditing, Requirements and Benefits, Non Conformance report, Case Studies on Educational System.

Text book:

1	Dale H.Besterfiled, et al., “Total Quality Management”, Pearson Education Asia, 1999. (Indian reprint 2002).

Reference(s) :

1.	James R.Evans & William M.Lidsay, “The Management and Control of Quality”, (5th Edition), South-Western (Thomson Learning), 2002.
2.	Feigenbaum.A.V. “Total Quality Management”, McGraw Hill, 1991.
3.	Jayakumar.V, Total Quality Management”, Lakshmi Publications, 2006.
4.	Suburaj, Ramasamy “Total Quality Management”, Tata McGraw Hill, 2005.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 601 System Software								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	50	50	100

Objective(s)	• To enable the students to learn the phases of the compilation process. • Develop an awareness of the function, design of a languages and grammars for modern compilers. • Exercise the execution of lexical analysis, parsing techniques, intermediate code generation, run time environment, code optimization and code generation that helps to understand the importance of appropriate techniques
Course Outcomes	**At the end of the course, the students will be able to** 1. Understanding the basic assembler functions. 2. Interpret the basic loader functions and loader design options. 3. Recognize the various phases of compiler and solve the left and right most derivation 4. Comprehend the top down parsing techniques 5. Examine about the intermediate code representation 6. Interpret the concept of statements and expression 7. Investigate the issues in the design of a code generator and target machine 8. Understanding the concepts of flow graphs and basic blocks 9. Analyze the principal sources of optimization 10. Summarize about runtime environments and storage organization

System Software

Introduction to System Software –Basic assembler functions – A simple SIC assembler – Assembler algorithm and data structures – Basic loader functions – Design of an Absolute Loader – A Simple Bootstrap Loader – Machine dependent loader features – Relocation – Program Linking – Algorithm and Data Structures for Linking Loader – Machine independent loader features – Automatic library Search – Loader Options – Loader design options – Linkage Editors – Dynamic Linking – Bootstrap Loaders.

Lexical and Syntax Analysis

Introduction to Compilers – Structure of a Compiler -Role of the Parser – Context-Free Grammars – Writing a Grammars – Top Down Parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up Parsing – Shift Reduce Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

Intermediate Code Generation

Intermediate languages – Three-Address Code – Types and Declarations – Translation of Expressions – Rules for Type Checking and Type Conversions – Control Flow – Backpatching – Switch Statements – Procedures.

Code Generation

Issues in the Design of a Code Generator – Target Language – Addresses in the Target Code – Basic Blocks and Flow Graphs – Optimization of Basic Blocks – A Simple Code Generator – Peephole Optimization.

Code Optimization and Run Time Environments

Code Optimization – Principal Sources of Optimization – Introduction to Data Flow Analysis – Run Time Environments – Storage Organization – Stack Allocation of Space – Access to Non-Local Data on the Stack.

Text book(s):

1	Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers Principles, Techniques and Tools”, Second Edition, Pearson Education, 2011.

Reference(s):

1	Leland L.Beck, “System Software – An Introduction to Systems Programming”, 3rd Edition, Pearson Education, sixth impression 2009.
2	Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003.
3	C. N. Fischer and R. J. LeBlanc, “Crafting a Compiler with C”, Benjamin Cummings, 2003.
4	J.P. Bennet, “Introduction to Compiler Techniques”, Second Edition, Tata McGraw-Hill, 2003.
5	Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001.
6	Kenneth C. Louden, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 602 Cryptography and Network Security								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	50	50	100

Objective(s)	Knowing the methods of conventional encryption, understanding the concepts of public key encryption and number theory , understanding authentication and Hash functions, knowing the network security tools and applications and understanding the system level security used.
Course Outcomes	**At the end of the course, the students will be able to** 1. Understand the OSI (open system interconnection) architecture framework for defining security attacks and various data encryption standards. 2. Realize the knowledge about Block Cipher design principles, Advanced Encryption Standard, and reliable transfer of keys between two users. 3. Recognize with Elliptic curve architecture which helps to learn the drawbacks over RSA algorithm. 4. Analyze the knowledge about the confidentiality factors and symmetric encryption techniques. 5. Realize the study of ensuring the right user from accessing a particular system and to discover about a function that used to produce an authenticator. 6. Know the authentication and confidentiality hash function and to expel the third party penetration in a mail transfer between two parties 7. Realize the authentication application and about Electronic mail security 8. Understand about the various IP security and Web security principles 9. Identify the behaviors of intruders, authorized users and principles of password management 10. Identify various kinds of virus and threats and learn about the firewall principles and techniques

Introduction

OSI security architecture - classical encryption techniques – cipher principles – data encryption standard – block cipher design principles and modes of operation - evaluation criteria for aes – aes cipher – triple des.

Public key cryptography

Key management - diffie-hellman key exchange – elliptic curve arithmetic and cryptography - introduction to number theory – traffic confidentiality – key distribution - public key cryptography and rsa.

Authentication and hash function

Authentication requirements – authentication functions – message authentication codes – cryptographic hash functions - secure hash algorithm – mac based on hash function: hmac - digital signatures – digital signature standard

Network security

Kerberos – x.509 certificates – electronic mail security – pretty good privacy – s/mime - ip security – transport level security - web security considerations – secure socket layer and transport layer security - transport layer security.

System level security

Intruders - intrusion detection – password management – viruses and related threats – virus counter measures – distributed denial of service attacks – firewalls – types – firewall location and configurations.

Text book(s):

1	William Stallings, “Cryptography And Network Security – Principles and Practices”, Prentice Hall of India, Fifth Edition, 2012.

Reference(s):

1	Behrouz A. Forouzen, Dabdeep Mukhopadhya, “Cryptography and Network Security”, Tata McGraw-Hill, 2012.
2	Bruce Schneier, “Applied Cryptography”, John Wiley & Sons Inc, Second Edition, 2008.
3	V.K.Pachghare, “Cryptography and Information Security”, PHI Publications, 2011.
4	William Stallings, “Cryptography And Network Security – Principles and Practices”, Prentice Hall of India, Fourth Edition, 2008.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 603 Graphics and Multimedia System								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)	Understanding the graphics techniques, algorithms and the multimedia concepts and VariousI/Otechnologies and enable thestudentstodeveloptheircreativity.
Course Outcomes	**At the end of the course student will able to** 1. Acquire knowledge in different Line, Circle and Ellipse Generating Algorithms. 2. Comprehend Two-Dimensional Geometric Transformations, Two-Dimensional Clipping and Viewing. 3. Outline Three-Dimensional concepts and Object Representations. 4. Understand the Blobby objects and Spline representations. 5. Predict Three-Dimensional Viewing of object projections and color models. 6. Understand the animation concepts and languages. 7. Comprehend different multimedia applications and Architecture of Multimedia Systems, Evolving Technologies for Multimedia Systems, Multimedia data in a Database. 8. Compare different Data and File Format standards of multimedia system and revise the different multimedia I/O, storage and retrieval technologies. 9. Identify different types of Multimedia Systems, Virtual Reality design. 10. Outline factors involved in Distributed Application Design issues, User Interface Design.

IntroductionToGraphicsSystems

Introduction - Line, Circle and Ellipse Drawing Algorithms – Attributes – Two-Dimensional Geometric Transformations: Basic, Composite and other transformation – Two-Dimensional Clipping and Viewing: Point, Line, Curve and text.

Three-DimensionalConcepts and Transformations

Introduction - Three-Dimensional Object Representations: Polygon surface, Quadric surface, Bezier curves and Surfaces, Blobby objects, Spline representations.

Three Dimensional Viewing and Animation

Three-Dimensional Viewing –Visible surface detection methods- Color models and Color Applications: RGB, YIQ, CMY, HSV, and HLS– Animation: Design of Animation sequences, Raster Animations, Computer Animation languages, Key frame systems, Motion specifications.

Multimedia SystemsDesign andFileHandling

AnIntroduction –Multimediaapplications –MultimediaSystem Architecture –Evolvingtechnologies for Multimedia–DefiningobjectsforMultimediasystemsMultimediaDatabases -TypesofCompression&Decompression– Data&FileFormatstandards–MultimediaI/Otechnologies–**Self Learning:**Digitalvoiceandaudio– Videoimageandanimation–Fullmotionvideo

Multimedia Application Design

FundamentalDesignissues-MultimediaApplicationClasses–TypesofMultimediaSystems–Virtualrealitydesign– ComponentsofMultimediasystems–ApplicationWorkflowdesign–DistributedApplicationDesignissues–**Self Learning:** UserInterfaceDesign-Multimedia authoring and user interface

Text book(s):

1	Donald Hearn and M.Pauline Baker, “Computer Graphics C Version”, Second Edition, Pearson Education,2003.
2	PrabhatKAndleighandKiranThakrar,“MultimediaSystemsDesign”,PHI,2007.

Reference(s):

1	JudithJeffcoate,“MultimediainpracticetechnologyandApplications”,PHI,1998.
2	Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles &Practice”, Pearson Education, secondedition2003.

K.S.Rangasamy College of Technology - Autonomous

40 CS 604 Data Mining

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)

This subject introduces basic concepts, tasks, methods, and techniques in data mining. The emphasis is on various data mining problems and their solutions. Students will develop an understanding of the data mining process and issues, learn various techniques for data mining, and apply the techniques in solving data mining problems using data mining tools and systems.

Course Outcomes

At the end of the course student will able to

1. Elucidate the basic concept of Data Mining
2. Discuss the issues related to data mining
3. Explore about multidimensional model
4. Expected to understand about cube operations
5. Narrate the steps of data preprocessing
6. Enumerate about multidimensional association rules
7. Discuss different classification techniques
8. State association rule mining and its applications
9. Outline different clustering techniques
10. Describe about outlier analysis and its applications

Introduction to Data Mining

Motivation and importance - What is Data Mining - Relational Databases - Data Warehouses - Transactional Databases - Advanced Database Systems - Data Mining Functionalities - Interestingness of a pattern Classification of Data Mining Systems - Major issues in Data Mining.

Data Warehouse and Olap Technology for Data Mining

What is a Data Warehouse - Multi-Dimensional Data Model - Data Warehouse Architecture – Data Warehouse Implementation - Development of Data Cube Technology - Data Warehousing to Data Mining.

Data Preprocessing

Why Pre-process the Data? - Data Cleaning - Data Integration and Transformation Data Reduction - Discretization and Concept Hierarchy Generation - Data Mining Primitives: Mining Association rule in large Databases - Association Rule Mining - Mining Single-dimensional Boolean Association rules from Transactional Databases - Mining Multi-dimensional Association rules from relational databases & Data Warehouses.

Classification and Prediction

Concepts and Issues regarding Classification and Prediction - Classification by Decision Tree Induction – Bayesian Classification - Classification by Back-propagation - Classification Based on Concepts from Association Rule Mining.

Cluster Analysis

What is Cluster Analysis? - Types of Data in Cluster Analysis - A Categorization of Major clustering methods - partitioning methods - Hierarchial methods - Density-Based Methods: DBSCAN - Grid-based Method: STING - Model-based Clustering Method: Statistical approach - Outlier analysis

Text book(s):

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 3rd Edition, 2011 Morgan Kaufman Publications.

Reference(s):

1. Adriaan, “Introduction to Data Mining”, Addison Wesley Publication
2. A.K.Pujari, “Data Mining Techniques”, University Press

K.S. Rangasamy College of Technology - Autonomous								
40 CS 6P1 System Software Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
VI	0	0	3		2	50	50	100

Objectives	• To design and implement the different phases of a compiler • Enable the students to learn the conversion of high level to machine code. • Understanding the intermediate representations of the compilation process
Course Outcomes	**At the end of the course, the students will be able to** 1. Implement the pass one and pass two of a two pass assembler 2. Interpret the syntax of any programming language using syntax analyzer 3. Determine whether the string for the given regular expression is valid or not 4. Design a finite automata to compute a NFA using regular expression 5. Implement the top down parser for the given grammar 6. Demonstrate the working of the shift reduce parser 7. Implement a simple LR parsing algorithm 8. Develop the three address code for intermediate representation 9. Optimize the code for intermediate representation 10. Create the DAG representation for the given postfix expression

List of Experiments

1. Pass one and Pass two of a two pass assembler
2. Syntax analyzer
3. Validate string for the given regular expression
4. NFA using regular expression
5. Top down parsing
6. Shift reduce parsing
7. Simple LR parsing
8. Three address Code generator
9. Code optimization
10. DAG creation

K.S. Rangasamy College of Technology - Autonomous								
40 CS 6P2 Data Mining and Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
VI	0	0	3		2	50	50	100
Objectives	This subject introduces basic concepts, tasks, methods, and techniques in data mining. The emphasis is on various data mining problems and their solutions. Students will develop an understanding of the data mining process and issues, learn various techniques for data mining, and apply the techniques in solving data mining problems using data mining tools and systems.							
Course Outcomes	**At the end of the course student will able to** 1. Demonstrate WEKA tool with an illustration 2. Demonstrate R tool and execute R commands in R tool 3. Execute additional R commands in R tool 4. Identify the attribute relationship 5. Implement the Preprocessing phase 6. Implement the Association rule mining 7. Implement the Classification algorithm 8. Implement the Decision tree 9. Implement the Clustering mechanism 10. Implement the k-means clustering algorithm							

List of Experiments

1. Introduction and implementation of WEKA tool
2. Introduction and execution of R commands in R tool
3. Execution of additional R commands in R tool
4. Implementation of attribute relationship
5. Implementation of preprocessing phase
6. Implementation of Association rule mining
7. Implementation of classification algorithm
8. Implementation of Decision tree
9. Implementation of clustering mechanism
10. Implementation of k-means clustering algorithm

K.S. Rangasamy College of Technology - Autonomous								
40 CS 6P3 Graphics and Multimedia System Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
VI	0	0	3		2	50	50	100
Objectives	Understanding the C graphics, to develop their creativity, to have a hands on experience in image editing and animation and to understand the graphics algorithms							
Course Outcomes	**At the end of the course student will able to** 1. Implement Bresenham's algorithms for line, circle and ellipse drawing 2. Perform 2D Transformations such as translation, rotation, scaling, reflection and shearing 3. Implement Cohen-Sutherland 2D clipping and window-viewport mapping 4. Perform 3D Transformations such as translation, rotation and scaling 5. Visualize projections of 3D images and detecting the visible surface 6. Convert color models RGB to CMY and CMY to RGB. 7. Implement text compression algorithm 8. Perform animation using any Animation software and assigning Actions to an object 9. Perform basic operations on image like mirroring an object, attaching objects, overlapping objects 10. Implement audio mixing and audio editing and video mixing and video editing operations using any open source audio/video editing software.							

List of Experiments

1. To implementBresenham'salgorithmsforline,circleandellipsedrawing.
2. Toperform2DTransformationssuchastranslation,rotation,scaling,reflectionandshearing.
3. ToimplementCohen-Sutherland2Dclippingandwindow-viewportmapping.
4. Toperform3DTransformationssuchastranslation,rotationandscaling.
5. Tovisualizeprojectionsof3Dimages and perform visible surface Identification.
6. ToconvertbetweencolormodelsRGBtoCMYandCMYtoRGB.
7. Toimplementcompressionalgorithm
8. ToperformanimationusinganyAnimationsoftware and AssigningActionstoanobject.
9. Toperformbasicoperationsonimagelikemirroringanobject,attachingobjects,overlappingobjects.
10. To implement audio mixing and audio editing operations using any open source audio editing software.
11. To implement video mixing and audio editing operations using any open source video editing software

K.S.Rangasamy College of Technology - Autonomous Regulation								R 2014
Department	Computer Science and Engineering	**Programme Code & Name**			CS:B.E. Computer Science and Engineering			
Semester VI								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
40 TP 0P4	Career Competency Development IV	0	0	2	0	100	00	100
Objective(s)	To enhance employability skills and to develop career competency							

Unit – 1	**Written and Oral Communication – Part 2**	Hrs
Self Introduction – GD - Personal Interview Skills Practices on Reading Comprehension Level 2 – Paragraph Writing - News paper and Book Review Writing - Skimming and Scanning – Interpretation of Pictorial Representations - Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Editing Materials: Instructor Manual, Word power Made Easy Book, News Papers		4
Unit – 2	**Verbal & Logical Reasoning – Part 2**	8
Analogies – Blood Relations – Seating Arrangements – Syllogism - Statements and Conclusions, Cause and Effect – Deriving Conclusions from Passages – Series Completion (Numbers, Alphabets & Figures) – Analytical Reasoning – Classification – Critical Reasoning Practices: Analogies – Blood Relations - Statement & Conclusions Materials: Instructor Manual, Verbal Reasoning by R.S.Aggarwal		
Unit – 3	**Quantitative Aptitude - Part – 5**	6
Geometry - Straight Line – Triangles – Quadrilaterals – Circles – Co-ordinate Geometry – Cube – Cone – Sphere. Materials: Instructor Manual, Aptitude book		
Unit – 4	**Data Interpretation and Analysis**	6
Data Interpretation based on Text – Data Interpretation based on Graphs and Tables. Graphs can be Column Graphs, Bar Graphs, Line Charts, Pie Chart, Graphs representing Area, Venn Diagram & Flow Charts. Materials: Instructor Manual, Aptitude Book		
Unit – 5	**Technical & Programming Skills – Part 2**	6
Programming Language C++ - Classes – Objects – Polymorphism – Inheritance – Abstraction		
	Total	30

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	15 Questions each from Unit 1, 2, 3, 4 & 5 (External Evaluation)	60
2	Evaluation 2 - Oral Communication	GD and HR Interview (External Evaluation by English, MBA Dept.)	20
3	Evaluation 3 – Technical Interview	Internal Evaluation by the Dept. – 3 Core Subjects	20
		Total	100

Reference Books

1. Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2. Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
3. Objective Instant Arithmetic by M.B. Lal & GoswamiUpkar Publications.
4. Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note:

- Instructor can cover the syllabus by Class room activities and Assignments (5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough Work pages
- Each Assignment has 20 questions from Unit 1,2,3,4,5 and 5 questions from Unit 1(Oral Communication) & Unit 5(Programs)
- Evaluation has to be conducted as like Lab Examination.

K.S.RangasamyCollegeofTechnology–Autonomous								
40 HS 002 Engineering Economics and Financial Accounting								
Common to all Branches								
Semester	Hours / Week			Totalhrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	0	45	2	50	50	100
Course Objective(s)	The main objective of this course is to make the Engineering student to know about the basic of economics, how to organize a business, financial aspects related to business, different methods of appraisal of projects and pricing techniques.							
Course Outcomes	**At the end of the course, the student will be able to** 1. Apply suitable demand forecasting techniques. 2. Appraise the prevailing market structure. 3. Describe forms of business in an organization. 4. Distinguish between proprietorship and partnership. 5. Explain the various kinds of banking. 6. Illustrate the balance sheet with a suitable example. 7. Differentiate between fixed cost and variable cost. 8. Interpret technical feasibility and economic feasibility. 9. Apply break even analysis in engineering projects. 10. Summarize the managerial uses of break even analysis.							

Basic Economics

Definition of economics – nature and scope of economics – basic concepts of economics – factors of production – demand analysis – definition of demand – Law of demand – Exception to law of demand – Factors affecting demand – elasticity of demand – demand forecasting – definition of supply – factors affecting supply – elasticity of supply – market structure – perfect competition – imperfect competition - monopoly – duopoly – oligopoly and bilateral monopoly .

Organization and Business Financing

Forms of business – proprietorship – partnership - joint stock company - cooperative organization – stateEnterprise - mixed economy - Money and banking – kinds of banking - commercial banks - central banking functions - control of credit - monetary policy - credit instrument – Types of financing - Short term borrowing - Long term borrowing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations.

Financial Accounting and Capital Budgeting

The balance Sheet and related concepts – The profit and loss statement and related concepts – Financial ratio analysis – Cash flow analysis – fund flow analysis – Capital budgeting– Average rate of return – Payback period – Net present value and internal rate of return.

Cost Analysis

Types of costing – traditional costing approach - activity based costing - Fixed Cost – variable cost – marginal cost – cost output relationship in the short run and in long run – pricing practice – full cost pricing – marginal cost pricing – going rate pricing – bid pricing – pricing for a rate of return – appraising project profitability - cost benefit analysis – feasibility reports – appraisal process – technical feasibility - economic feasibility – financial feasibility.

Break Even Analysis

Basic assumptions –break even chart – managerial uses of break even analysis - applications of break even analysis in engineering projects.

Textbook(s):

1. Khan MY and Jain PK., “Financial Management” McGraw - Hill Publishing Co., Ltd., New York, 2000.
2. Varshney RL and Maheshwary KL. “Managerial Economics” S Chand and Co., New Delhi, 2001.

Reference(s):

1. Barthwal R.R., “Industrial Economics - An Introductory” Text Book, New Age Publications, New Delhi, 2001.
2. Samuelson P.A., “Economics - An Introductory Analysis”, McGraw - Hill & Co., New York, 2000.
3. S.K.Bhattacharyya, John Deardon and Y.M.Koppikar, “Accounting for Management Text and Cases”,
4. V.L.Mote, Samuel and G.S.Gupta, “Managerial Economics – Concepts and Cases”, Tata Mcgraw Hill

K.S.Rangasamy College of Technology - Autonomous								
40 CS 702 Cloud Computing								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100
Objective(s)	Be able to understand what the current challenges are in cloud computing and be able to understand how to design and implement cloud-based applications.							
Course outcomes	1. Know the Characteristics of Cloud computing and its types 2. Understand the Architecture of Cloud Computing and assessing the role of open standards 3. Illustrate the Cloud service models and Cloud Deployment Models 4. Apply knowledge of Abstraction, and Virtualization Technologies using hypervisors 5. Develop an application using Paas Application frameworks 6. Demonstrate how to use Amazon Web Services(EC2) and Storage Systems to deploy the applications in the cloud environment 7. Explore the Microsoft Cloud services- windows Azure Platform 8. Reveal the major security and privacy problems in theCloud with security mechanisms 9. Understand the purpose of Service Oriented Architecture(SOA) 10. Demonstrate to work with Cloud-Based storage							

Introduction

Cloud computing basics: Defining Cloud computing –Cloud Types - Characteristics of Cloud computing – Assessing the role of Open Standards - Measuring the cloud's value - Cloud Architecture: Exploring the cloud computing stack.

Cloud Services and Applications

Understanding Services and Applications by Type: Defining Infrastructure as a service- Defining Platform as a Service- Defining software as a Service – Defining Identity as a Service, Understanding Abstraction and virtualization: Virtualization Technologies – Load Balancing and virtualization-Understanding Hypervisors-Machine Imaging – Porting applications

Cloud Platforms

Platform as a Service: PaaS Applications Frameworks – Using Amazon Web Services: Amazon Web service components and Services – Working with Elastic Compute Cloud (EC2) – Working with Amazon Storage systems- Understanding Amazon Database Services

Cloud Security

Microsoft Cloud Services: Exploring Microsoft Cloud services – Windows Azure Platform, Cloud Security: Securing the cloud – Securing Data –Establishing Identity and Presence

Cloud Storage And Case Studies:

CloudArray cloud storage gateway-sync and share cloud storage-Google cloud service-application to application integration-Cloud Services to Introduce SaaS-Based Log Management Product-Salesforce.com's Force.com for Work Management-Cloud storage forensics.

Text book	
1	Barrie Sosinsky, "Cloud Computing Bible". Wiley Publishing, 2011.
Reference(s):	
1	Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs". Emereo Pty Limited, 2008.
2	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud". [First Edition]Publisher - Orelly's, 2009

K.S.Rangasamy College of Technology - Autonomous								
40 CS 703 Big Data								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100
Objective(s)	This course provides a broad introduction to big data with a focus on big data technology and tools, including Hadoop and its ecosystem .That serves foundation for the advanced studies in the area of Big Data Analytics.							
Course outcomes	1. Illustrate the basic of Big Data 2. Infer the core concepts of Big Data 3. Interpret role of HDFS in Hadoop 4. Interpret role of Map Reduce in Hadoop 5. To understand cluster implementation of Hadoop 6. Comprehend the administration of Hadoop 7. Infer the features of PIG 8. Infer the features of HIVE 9. Rephrase Hadoop and its ecosystem of tools 10.Analyze the Applications of Big data							

Introduction to Big Data

Introduction to Big Data Platform – Nuances of big data – Value – Issues – Case for Big data – Big data options Team challenge – Big data sources – Features of Big Data - Security, Compliance, auditing and protection - Evolution of Big data – Best Practices for Big data Analytics- Big data characteristics - Volume, Veracity, Velocity, Variety – Data Appliance and Integration tools

Introduction to 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-Shuff le and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

Exploring Hadoop Environment

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hbase.

Programming In Pig and Hive

PIG – installation and execution – PIG Data Model – PIG Latin – Input, Output- Relational Operators – User Defined Functions – Join– Integrating Pig with Legacy Code and Map Reduce –HIVE – Data Types and File Formats – Databases in Hive – HiveQL: Data Definition – Data Manipulation – Queries – Views – Indexes

Hadoop Ecosystem of Tools and Applications

Streaming data into Hadoop -Apache Flume –Sqoop-NoSQL Databases- Case Studies -Analyzing big data with twitter – Big data for E- Commerce- Big data for Healthcare

Text book

1	Frank J Ohlhorst, “Big Data Analytics: Turning Big Data into Big Money”, Wiley and SAS Business Series, 2012
2	Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.

Reference(s):

1	Gates, A. Programming Pig. " O'Reilly Media, Inc.", 2011.
2	Capriolo, E., Wampler, D., & Rutherglen, J., Programming hive. " O'Reilly Media, Inc.", 2012.
3	Alex Holmes, “Hadoop in practice”, Manning Publications, 2012
4	Lin and Chris Dyer,”Data-Intensive Text Processing with MapReduce Jimmy”, Morgan & Claypool Synthesis, 2010

K.S.Rangasamy College of Technology - Autonomous								
40 CS 801 Software Testing								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100
Objective(s)	To explain the basics of software testing. To highlight the strategies for software testing. To stress the need and conduct of testing levels. To identify the issues in testing management. To bring out the ways and means of controlling and monitoring testing activity							
Course outcomes	1. Know the basic concepts of software testing 2. Justify about computer based system, verification & validation 3. Analyze the functional requirements of the system 4. Interpret the use of conducting the review 5. Implement internal and external views of software testing 6. Determine the need for White box, Basis path, Black box and Control structure testing 7. Classify different strategic approaches and types in software testing 8. Describe the concepts of data warehouse testing and Mobile testing 9. Implement the guidelines to generate test cases 10. Explore about Risk Based Testing Approach in test cases							

Introduction to Testing

Software Testing – Definition of Software Testing – Objective and limits of testing – Testing Strategy – Roles and Responsibilities of a Software Tester in Organizations – Independent Verification and Validation

Software testing Requirements

Software Testing Requirements - Analyzing the requirements -Classifying the Functional and Non Functional Requirements. Software Testing Review Process - Objective of Software Testing Review - Types of Reviews - Peer Review, Walkthrough, Inspection - Checklists of Review Process - Review Log

Testing Techniques

White box testing techniques – Static and Dynamic Testing – Statement Coverage – Decision Coverage – Basic Path Testing – Control Flow Graph Coverage – Branch Coverage – Conditional Coverage – McCabe's Cyclomatic Complexity – Mutation Testing. Black Box Test Techniques – Boundary Value Analysis – Equivalent Class Partition – Error Guessing – Decision Table – State Transition Table – Pair Wise Testing – Use Case Testing.

Testing Types

Unit Testing, Smoke Testing, Functional Testing and its types – Integration, System Testing, User Acceptance Testing (Alpha & Beta)- Non Functional Testing and its types – Performance Testing (Load, Volume, Stress) – Recovery Testing, Browser Compatibility Testing – Security Testing – Scalability Testing – Usability Testing – Ad Hoc Testing – Internationalization Testing – Configuration Testing - DataWare House Testing and Business Intelligence Testing – Mobile Testing

Test Case Design

Definition of Test Case - Standard, Guidelines and Naming Conventions for Test Case Design – Characteristics of Good Test Cases and its templates – Creation of Test Case – Requirement Coverage – Traceability Matrix – Test Case Review Process – Test Execution – Test Log - Reporting of Test Execution – Risk Based Testing Approach – Definition of Risk - Importance of RBT – Classifying the Test Cases using RBT approach

Text book

1	S.Subashni, N.Sathees Kumar, Dr.B.G.Geetha, Dr.G.Singaravel, "Software Testing", Umayam Publications , 1st edition ,2013.
2	.

Reference(s):

1	Marnie L.Hutchson, "Software Testing Fundamentals Methods and Metrics",Wiley,2003 edition
2	Glenford J.Myess,"The Art of testing", Wiley, 2003 edition.
3	Mauro pezze,Michal young, "Software Testing and Analysis: Process, Principles, and Techniques",Wiley,2008 edition
4	Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, New Delhi, 1995
5	Elfriede Dustin, "Effective Software Testing", Pearson Education, New Delhi, 2003
6	Renu Rajani and Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw-Hill, New Delhi, 2003

K.S. Rangasamy College of Technology - Autonomous								
40 CS 7P1 Open Source System Laboratory								
Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P	45	C	CA	ES	Total
VII	1	0	2		2	50	50	100
Objectives	Providing knowledgeinOpen Source Programming.Understandingthe conceptsof Linux, MYSQL, and PHP.							
Course Outcomes	**At the end of the course student will able to** 1. Interpret the concepts of MySql 2. Experiment the Record selection technology in MySql 3. Demonstrate the basic concept in PHP 4. Develop the simple PHP application using operators and Functions. 5. Demonstrate the string handling functions in PHP 6. Compare the strings between them and displays the comparison result **7.** Demonstrate the MySql database connectivity in PHP 8. Express the concepts of file handling functions in PHP 9. Create a webpage using PHP. 10. Create a webpage using JOOMLA.							

1. Connecting the MYSQL database and perform the following
   a. Creating and Deleting Database.
   b. Creating a Table.
   c. Examining the Results.
   d. Inserting / Retrieving Data into / from Tables.
2.
   a. Selecting Specific Rows and Columns.
   b. Deleting and Updating Rows.
   c. Loading a Database from a File.
3. PHP program that displays a welcome message
4. PHP program to implement Simple data storage, operators and Functions.
5. PHP script implements string handling functions.
6. PHP Script that implements the database connectivity.
7. PHP scripts that implement the following file handling operations
   i. Reading data from the file
   ii. Writing data to the file
   iii. Printing all the records.
8. Write a PHP script to add the Rollno, name, six subjects' marks into Mark table in MySQL and display the average and result.
9. Develop web page using JOOMLA.
10. Develop web page using Word press

K.S.Rangasamy College of Technology - Autonomous								
40 CS 7P4 Cloud Computing Laboratory								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	3	45	2	50	50	100
Objective(s)	1. Be exposed to tool kits for grid and cloud environment. 2. Be familiar with developing web services/Applications in grid framework 3. Learn to run virtual machines of different configuration. 4. Learn to configure and use Hadoop							
Course outcomes	1. Ability to use the relevant tools necessary for cloud computing. 2. Demonstrate the use of cloud computing in various applications. 3. Apply different cloud programming model as per need. 4. Ability to develop cloud architecture and model. 5. Analyze and implement the best practice model to deploy cloud architecture. 6. Ability to configure Hadoop file system and framework in multi node cluster							

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular timein host machine. (Virtual Box or VM Ware or Hyper-V)
2. Install a C compiler in the virtual machine and execute a sample program.
3. Develop a web application to provide Storage as a Servicethat offers a simple interface which allowsusers to manage file systems quickly and easily.
4. Configure IaaS architecture for installing guest operating systemusing Eucalyptus.
5. Configure IaaS architecture in Eucalyptus for installing multiple operating systems in same host machine by sharing different core in the same processor.
6. To set up the single and multi node Hadoop cluster in guest operating systems. Demonstrate the use of Map and Reduce tasks using wordcount program.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 7P3 Project Work – Phase I								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	3	45	2	50	50	100
Objective(s)	Imparting the practical knowledge to the students and also to make them to carry out the technical procedures in their project work. To provide an exposure to the students to refer, read and review the research articles, journals and conference proceedings rele4vant to their project work and placing this as their beginning stage for their final presentation.							
Course outcomes	a. Identify a problem in the domain of interest b. Perform literature survey and identify the existing issues c. Identify the possible solutions d. Identify tools and techniques to implement the project e. Prepare technical report							

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide
2. Problem should be selected
3. Students have to collect about 20 papers related to their work
4. Reports has to be prepared by the students as per the format in Annexure – 1
5. Preliminary implementation can be done if possible
6. Internal evaluation has to be done for 100 Marks`

K.S.RangasamyCollege of Technology - Autonomous Regulation								R 2014
Department	Computer Science and Engineering		Programme Code & Name		CS:B.E. Computer Science and Engineering			
Semester VII								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
40 TP 0P5	Career Competency Development V	0	0	2	0	100	00	100
Objective(s)	To enhance employability skills and to develop career competency							

Unit – 1	Written and Oral Communication	Hrs
Self Introduction – GD – HR Interview Skills – Corporate Profile Review Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		6
Unit – 2	Verbal & Logical Reasoning	6
Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		
Unit – 3	Quantitative Aptitude	6
Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		
Unit – 4	Data Interpretation and Analysis	6
Practices on Company Based Questions and Competitive Exams Materials: Instructor Manual		
Unit – 5	Programming & Technical Skills – Part 3	6
Data Structure - Arrays – Linked List – Stack – Queues – Tree – Graph Practices on Algorithms and Objective Type Questions Materials: Instructor Manual		
	Total	30

Evaluation Criteria

S.No.	Particular	Test Portion	Marks
1	Evaluation 1 Written Test	15 Questions each from Unit 1, 2,3, 4 & 5 (External Evaluation)	60
2	Evaluation 2 - Oral Communication	GD and HR Interview (External Evaluation by English, MBA Dept.)	20
3	Evaluation 3 – Technical Interview	Internal Evaluation by the Dept. – 3 Core Subjects	20
		Total	100

Reference Books

1. Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2. Abhijit Guha, “Quantitative Aptitude”, TMH, 3rd edition
3. Objective Instant Arithmetic by M.B. Lal & GoswamiUpkar Publications.
4. Word Power Made Easy by Norman Lewis W.R. GOYAL PUBlications

Note:

- Instructor can cover the syllabus by Class room activities and Assignments(5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough work pages
- Each Assignment has 20 questions for Unit 1,2,3,4 & 5 and Unit 5 and 5 questions from Unit 5(Algorithms) & Unit 1(Oral Communication)
- Evaluation has to be conducted as like Lab Examination.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 701 Mobile Computing								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	50	50	100
Objective(s)	To learn the basics of Wireless voice and data communications technologies. To build working knowledge on various telephone and satellite networks. To study the working principles of wireless LAN and its standards. To build knowledge on various Mobile Computing Algorithms. To build skills in working with Wireless Application Protocols to develop mobile content applications.							
Course Outcomes	1 Gain Knowledge in basics of radio transmission. 2 Identify the reason for need of special MAC in wireless network. 3 Describe second generation digital cellular network and its architecture. 4 Recognize the role of unidirectional broadcast systems within mobile communication scenario. 5 Observe various WLAN products , its system and protocol architecture 6 Examine the basics and various phases of HIPERLAN 1and bluetooth 7 Identify the requirements of Mobile IP for Ipv4 and Ipv6. 8 Gain knowledge on various types of routing protocols. 9 Acquire the knowledge of TCP for mobility 10 Obtain the knowledge of WAP and its components and architecture							

Wireless Communication Fundamentals

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks

Telecommunication Networks

Telecommunication systems – GSM – GPRS – DECT – UMTS – IMT-2000 –Satellite Systems - Broadcast Systems – DAB - DVB.

Wireless Lan

Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a - 802.11b standards – Hiperlan – Blue Tooth.

Mobile Network Layer

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR –Least Interference Routing-Hierarchical-Geographic Position Assisted Ad Hoc Routing .

Transport and Application Layers

Traditional TCP – Classical TCP improvements – WAP

Text book

1	Jochen Schiller, “Mobile Communications”, PHI/Pearson Education, Second Edition, 2008.

Reference(s):

1	William Stallings, “Wireless Communications and Networks”, PHI/Pearson Education, 2002.
2	Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.
3	Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, New York, 2003.
4	Hazysztof Wesolowshi, “Mobile Communication Systems”, John Wiley and Sons Ltd, 2002.

K.S.Rangasamy College of Technology - Autonomous								
40 CS 8P1 Project Work – Phase II								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	0	0	3	45	16	50	50	100
Objective(s)	Enabling and strengthening the students to carry out the project on their own and to implement their innovative ideas to forefront the risk issues and to retrieve the hazards by adopting suitable assessment methodologies and stating it to global.							
Course outcomes	1 Design modules of the project 2 Integrate the modules and arrive the final output 3 Investigate the results with available solutions 4 Demonstrate the outcome of the project and verify. 5 Prepare technical report							

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide
2. Each review has to be evaluated for 100 Marks
3. Attendance is compulsory for all reviews. If a student fails to attend review for some valid reason, one or more chance may be given
4. They should publish the paper preferably in the journals / conference
5. Final review will be done by the committee that consists of minimum of three members one of which should be the guide (If possible include one external expert examiner with in the college)
6. The Report should be submitted by the students around at the end of April.

K.S.Rangasamy College of Technology - Autonomous								
40 HS 001 Professional Ethics								
Elective - I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	0	45	2	50	50	100
Objective(s)	To create an awareness on Ethics and Human Values and instill Moral and Social Values in students							
Course Outcomes	**At the end of the course student will able to** 1. Know the concept of ethics and engineering as a profession. 2. Learn the core qualities of professional practitioners. 3. Realize engineering as experimentation. 4. Study the role of codes and industrial standards as per law. 5. Understand the need of safety in testing and designing. 6. Know about risk benefit analysis and reducing risk. 7. Understand the importance of collegiality, conflict of interest, and professional rights. 8. Know the employee rights and IPR. 9. Understand the ethics in MNC's, Computers and Social Medias. 10. Know the values of engineers as managers and engineers responsibilities in weapons development.							

Introduction

Morals, values and ethics – Integrity – Respect for others, Honesty – Commitment – Character– Core qualities of professional practitioners –Theories of right action – Types of inquiry – Kohlberg's stages of moral development – Carol Gilligan theory – Moral dilemmas – Moral autonomy.

Engineering as Social Experimentation

Engineering as Experimentation – Engineers as Responsible Experiments – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study and Volks Wagon's Case Study.

Engineers Responsibility For Safety And Risk

Safety and Risk – Assessment of Safety and Risk – Risk Benefit analysis and reducing Risk – The Three Mile Island Disaster Case Study and Chennai Moulivakkam Building Accident case study.

Responsibilities And Rights

Collegiality and Loyalty – Respect for Authority – Conflict of Interest – Collective Bargaining – Confidentiality - Occupational Crime – Professional Rights – Employee Rights – Customers Rights - Intellectual Property Rights (IPR) – Discrimination – Nestle Maggi Case Study.

Global Issues

Multinational corporations(MNC) – Environmental Ethics – Computer ethics – Social Media Ethics – Engineers as Managers, Expert Witnesses and Advisors – Moral leadership - Weapons development – The Bhopal Gas Tragedy Case Study.

Text book(s):

1	Govindarajan M, Natarajan S, Senthil Kumar V.S, "Engineering Ethics", Prentice Hall of India (P) Ltd, New Delhi, 10th Reprint, 2009.

Reference(s):

1	Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw -Hill Publishing Company Limited, New Delhi, 2007.
2	Govindan K.R., and Sendhil Kumar S., "Professional Ethics and Human Values", Anuradha Publications, Chennai, 2011.

K.S.Rangasamy College of Technology - Autonomous								
40 CS E11 Foundation Skills in Integrated Product Development								
Elective – I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)	• Learn basic concepts and characteristics of software products and the associated software product lifecycle • Learn important practices required for fulfilling the product management and product design
Course Outcomes	**At the end of the course student will able to** 1. Review the essentials of PESTEL analysis in product development 2. Explore the various product development methodologies 3. Realize the process of requirement engineering and management 4. Identify the steps in system design and 74odeling 5. Realize the various levels in product design 6. Review the product development using various testing strategies 7. Identify the importance of product maintenance and repair 8. Review the End-of-Life disposal of products 9. Understand the growth of engineering services industry 10. Know the IPD essentials in product development and management

Fundamentals of Product Development

Types of various trends affecting product decision –PESTEL Analysis –Introduction to product development methodologies and management –Overview of Product Development methodologies – Product life cycle –Product development planning and Management

Requirements and System Design

Requirement Engineering –Traceability –Requirement management – Zachman Framework –Introduction to system specifications – System Modeling – System Optimization – Introduction to system specifications – Interface Design

Design and Testing

Introduction – Industrial Design and User Interface Design – Concept generation Techniques – Concept Screening and Evaluation – Detailed Design – Application of Design Verification Testing –Hardware Schematic, Component design, Layout and Hardware testing – Prototyping – Product validation & certification – Product Testing standards and certification – Product Documentation

Sustenance Engineering and End-of-Life (EoL) Support

Maintenance and Repair – Enhancement – Definition of Obsolescence Management – Configuration Management – EoL Disposal – Software Sustenance

Business Dynamics – Engineering Service Industry

The Industry: Overview of Engineering Services Industry – Product Development in Industry versus Academia, The IPD Essentials: Vertical specific product development process – Product Development Trade Offs – Intellectual Property Rights and Confidentiality – Security & Configuration management

Text book(s):

1	Anna University-NASSCOM Implementation Committee, “Foundation Skills in Integrated Product Development”, IT-IteS SSC NASSCOM, First Edition, 2015.

Reference(s):

1	Pressman R.S., “Software Engineering: A Practitioners Approach”, Mcgraw Hill Eduction Private Limited, Seventh Edition, 2015.
2	Watts S.Humphrey, “Managing the Software Process”, Pearson, 2014.
3	Kelkar S.A., “Software Project Management-A Concise Study”, PHI, Third Edition, 2013.

K.S.Rangasamy College of Technology – Autonomous								
41 CS E12 User Interface Technologies								
Elective - I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)	• To study the concept of menus, windows, interfaces, about business functions, • Characteristics and components of windows. • To understand various controls for the windows, various problems in windows design with color, text, graphics and testing methods.
Course Outcomes	**At the end of the course, the students will be able to** 1. Understand the human-computer interface and its characteristics. 2. Identify the characteristics of web user interface. 3. Analyze the user interface design process and its usability. 4. Develop the requirement analysis and human considerations in screen design. 5. Create the process for designing of menus. 6. Understand the steps involved in designing of windows. 7. Identify the device based controls and its characteristics. 8. Analyze the screen based controls and its characteristics. 9. Develop steps for designing of web pages. 10. Understand the designing of windows layout.

Human Computer Interface

Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles.

User Interface Design Process

User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings-Human consideration in screen design.

Designing of Menus And Windows

Menus: Structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus. Windows: Characteristics-components-presentation styles-types-managements-organizations - Operations - web systems.

Designing of Controls

Device-based controls: characteristics-selecting the proper device based controls. Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

Designing of Web Pages

Text for web pages - effective feedback-guidance & assistance-Internationalization-accesssibility-Icons-Image-Multimedia -coloring. Windows layout-test: prototypes - kinds of tests – retest. Usability of Web Sites and Case Study of e-commerce sites.

Text book(s):

1	Wilbert. O. Galitz, “The Essential Guide to User Interface Design”, John Wiley& Sons, 2001.

Reference(s):

1	Ben Sheiderman, “Design the User Interface”, Pearson Education, 1998.
2	Jacob Nielsen, “Usability Engineering ", Academic Press, 1993.
3	Alan Cooper, “The Essential of User Interface Design”, Wiley – Dream Tech Ltd., 2002.

K.S.Rangasamy College of Technology - Autonomous								
40 CS E13 Information Storage and Management								
Elective – I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100
Objective(s)	It provides comprehensive learning of storage technology, allow to make more informed decisions in an increasingly complex IT environment.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Understand the origin of storage systems and observe the virtualization 2. Interpret the various storage resources for storing the information 3. Classify the connectivity between the storage devices and servers 4. Recognize the connection between the storage host and bridging device over IP using iSCSI 5. Apprehend the network attached storage in sharing environment 6. Understand the concepts of object based system in content addressed storage Analyse the technique of masking or abstracting physical resources 7. Recognize the business continuity process for mitigation 8. Revise the data backup the data archive in the event of data loss 9. Analyse the concept of local replication technologies							

Introduction To Information Storage

Information Storage – evolution of storage architecture – data center infrastructure – virtualization and cloud computing. Data Center Environment: host – connectivity – disk dive performance – DAS benefits and limitations – flash drives. Intelligent Storage Systems: components – storage provisioning – types of Intelligent storage systems

Storage Networking Technologies

Fibre Channel Storage Area Networks: components – FC connectivity – switched fabric ports – FC architecture – fabric services – switched fabric login types – zoning – FC SAN topologies – virtualization in SAN. IP SAN and FcoE: iSCSI – FCIP – FcoE

Network Attached Storage

NAS: Benefits – file sharing and network file sharing – components – I/O operations – implementations – file sharing protocols – factors affecting NAS performance – file level virtualization. Object-Based and Unified Storage: Object-Based storage devices – content-addressed storage – CAS use case – Unified storage.

Backup and Archive

Introduction to Business Continuity: Information Availability – BC: terminologies – planning life cycle – failure analysis – business impact analysis – technology solutions. Backup: Purpose – considerations – granularity – methods – architecture – operations – topologies – backup in NAS environments – targets – data duplication for backup – Data Archive.

Replication

Local replication: terminology – uses – replica consistency – technologies – restore and restart considerations – virtualization environment. Remote replication: modes – technologies – migration in virtualization environment.

Text book(s):

1	Somasundaram Gnanasundaram, AlokShivastava, Information Storage and Management, (storing, managing and protecting digital information in classic, virtualization and cloud environments), EMC2Corporation, Second Edition Wiley India, 2010.

Reference(s):

1	Robert Spalding, storage Networks: The Complete Reference, Tata McGraw Hill, Osborne, 2003.
2	Marc Farley, Building Storage Networks, Tata McGraw Hill, Osborne, 2001.

K.S.Rangasamy College of Technology – Autonomous								
40 CS E14 Distributed Computing								
Elective - I								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	50	50	100

Objective(s)	Learning the basics of Distributed Systems, Client Server model and algorithms based on Distributed deadlock, enhancing the knowledge on File Replication and Distributed Operating Systems.
Course Outcomes	**At the end of the course, the students will be able to** 1. Observe the characterization and challenges in Distributed Systems. 2. Analyze various models of distributed systems and compare the types of Networks. 3. Identify the purpose of Marshalling and Un-marshalling 4. Recognize the purpose of inter process communication with the help of RMI. 5. Compare Process and threads with its features. 6. Appraise the techniques to provide security with the help of various cryptographic algorithms 7. Identify the purpose of Domain Name Service. 8. Acquire the needs of Logical clocks and observe the features of Mutual exclusion 9. Acquire the concept of Locks and compare flat and nested transactions 10. Observe ACID properties in concurrency control in distributed transactions

Introduction

Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges - System Models - Architectural and Fundamental Models - Networking and Internetworking - Types of Networks - Network Principles - Internet Protocols - Case Studies.

Processes And Distributed Objects

Interprocess Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client-Server Communication - Group Communication - Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI - Case Study

Operating System Issues – I

The OS Layer - Protection - Processes and Threads - Communication and Invocation – OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures - Cryptography Pragmatics - Case Studies - Distributed File Systems - File Service Architecture - Sun Network File System - The Andrew File System .

Operating System Issues – Ii

Name Services -Domain Name System - Directory and Discovery Services - Global Name Service - X.500 Directory Service - Clocks, Events and Process States - Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States - Distributed Debugging - Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

Distributed Transaction Processing

Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery - Overview of Replication And Distributed Multimedia Systems.

Text book(s):

1	George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems Concepts and Design, Pearson Education, 4rd Edition, 2009.
2	Sape Mullender, Distributed Systems, Addison Wesley, 2nd Edition, 1993.

Reference(s):

1	Andrew S Tanenbaum , Maartenvan Steen,Distibuted Systems –Principles and Pardigms,Pearson Education, 2002.
2	Mugesh Singhal,Niranjan G Shivaratri,Advanced Concepts in Operating Systems,Tata McGraw Hill Edition, 2001.
3	Andrew S Tanenbaum , Maartenvan Steen,Distibuted Systems –Principles and Pardigms,Pearson Education, 2002.

K.S.Rangasamy College of Technology - Autonomous								
40 CS E21 Pattern Recognition								
Elective - II								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	• To know about Supervised and unsupervised Learning. • To study about feature extraction and structural pattern recognition. • To explore different classification models. • To understand Fuzzy Pattern Classifiers and Perception.
Course Outcomes	**At the end of the course, the students will be able to** 1. Know the basis pattern recognition and feature extraction concepts 2. Interpret the pattern recognition approaches in various applications 3. Implement the fundamental concept of unsupervised learning. 4. Demonstrate the supervised learning methods using parametric and non parametric approaches 5. Recognize the binary classification problems and to obtain linear classifiers 6. Implement the concept of clustering for unsupervised learning 7. Employ the parsing and grammar concept using Syntactic pattern recognition 8. Develop the graphical and learning approaches for syntactic pattern recognition

Pattern Classifier

Overview of Pattern recognition – Discriminant functions – Supervised learning – Parametric estimation – Maximum Likelihood Estimation – Bayesian parameter Estimation – Problems with Bayes approach– Pattern classification by distance functions – Minimum distance pattern classifier.

Clustering

Clustering for unsupervised learning and classification – Clustering concept – C Means algorithm – Hierarchical clustering – Graph theoretic approach to pattern Clustering – Validity of Clusters.

Feature Extraction And Structural Pattern Recognition

KL Transforms – Feature selection through functional approximation – Binary selection -Elements of formal grammars - Syntactic description - Stochastic grammars - Structural representation. .

Hidden Markov Models And Support Vector Machine

State Machines – Hidden Markov Models – Training – Classification – Support vector Machine – Feature Selection.

Recent Advances

Fuzzy logic – Fuzzy Pattern Classifiers – Pattern Classification using Genetic Algorithms – Case Study Using Fuzzy Pattern Classifiers and Perception.

Text book(s):

1	M. Narasimha Murthy and V. Susheela Devi, “Pattern Recognition”, Springer 2011.

Reference(s):

1	S.Theodoridis and K.Koutroumbas, “Pattern Recognition”, 4th Ed., Academic Press, 2009.
2	Robert J.Schalkoff, “Pattern Recognition Statistical, Structural and Neural Approaches”, John Wiley & Sons Inc., New York, 1992.
3	C.M.Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
4	R.O.Duda, P.E.Hart and D.G.Stork, “Pattern Classification”, John Wiley, 2001
5	Andrew Webb, “Stastical Pattern Recognition”, Arnold publishers, London,1999.

K.S.Rangasamy College of Technology - Autonomous

40 CS E22 Artificial Intelligence

Elective - II

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)

- To know about Supervised and unsupervised Learning.
- To study about feature extraction and structural pattern recognition.
- To explore different classification models.
- To understand Fuzzy Pattern Classifiers and Perception.

Course Outcomes

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

1. Understand the concepts of intelligence agent.
2. Describe the ideas of structure of agents.
3. Know the performance of problem solving agents.
4. Interpret the knowledge of searching strategies.
5. Analyze the issues of knowledge representation.
6. Interpret the knowledge of logics, proposition and interface.
7. Understand the issues of planning problems.
8. Describe the Uncertainty and probabilistic reasoning.
9. Discuss about neural network techniques for learning.
10. Understand use the leaning agents for applications.

Problem Solving

Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction

Logical Reasoning

Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – forward chaining – backward chaining – unification – resolution

Planning And Probabilistic Agents

Planning with state-space search – partial-order planning – Conditional planning, Multi agent planning, Uncertainty and probabilistic reasoning- planning graphs – planning and acting in the real world.

Uncertain Knowledge and Reasoning

Uncertainty – review of probability - probabilistic Reasoning – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models

Learning Agents and Applications

Learning from observation - Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods - Reinforcement Learning. Applications - Artificial intelligence in medicine, Industrial automation, FMS and Robotics, Management and business intelligence.

Text book(s):

1	M. Narasimha Murthy and V. Susheela Devi, “Pattern Recognition”, Springer 2011.

Reference(s):

1	S.Theodoridis and K.Koutroumbas, “Pattern Recognition”, 4th Ed., Academic Press, 2009.
2	Robert J.Schalkoff, “Pattern Recognition Statistical, Structural and Neural Approaches”, John Wiley & Sons Inc., New York, 1992.
3	C.M.Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
4	R.O.Duda, P.E.Hart and D.G.Stork, “Pattern Classification”, John Wiley, 2001
5	Andrew Webb, “Stastical Pattern Recognition”, Arnold publishers, London,1999.

K.S.Rangasamy College of Technology - Autonomous								
40 CS E23 XML and Web Services								
Elective – II								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	• To provide an in-depth knowledge of XML and Web Services. • To understand the fundamental concepts of Web services. • To Understand the fundamental concepts of XML Technology. • To design Web service Architecture. • To Study Building Blocks of Web services. • To understand the content management using XML
Course Outcomes	**At the end of the course, the students will be able to** 1. To Know the fundamental elements in XML 2. To Know the XML Technologies and schemes 3. To design the Architecture of Web Services. 4. To Analysis the Architecture of Web Services. 5. To Understand the web services building blocks 6. To Construct building blocks of Web services. 7. To Design XML web service in E-Business 8. To implement xml in E-Business 9. To Know the content management in XML 10. To analyze Content Management in XML.

Xml Technology Family

XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX- presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ

Architecting Web Services

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime

Web Services Building Block

Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad- Hoc Discovery – Securing web services.

Implementing Xml In E-Business

B2B – B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.

Xml And Content Management

Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG –WSFL.

Text book(s):

1	Ron schmelzer et al, “XML and Web Services”, Pearson Education, 2002.
2	SandeepChatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall, 2004.

Reference(s):

1	Frank P. Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002.
2	Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education, 2003.
3	Henry Bequet and MeerajKunnumpurath, “Beginning Java Web Services”, Apress, 2004.
4	Russ Basiura and Mike Batongbacal, “Professional ASP.NET Web Services”, Apress,

K.S.Rangasamy College of Technology – Autonomous								
40 CS E24 Embedded Systems and Programming								
Elective - II								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	• To know the various components within an embedded system have with each other, Techniques of interfacing between processors & peripheral device related to embedded processing • To understand the design tradeoffs made by different models of embedded systems • To apply knowledge gained in software-hardware integration in team-based projects.
Course Outcomes	**At the end of the course, the students will be able to** 1. Identify the basic functional building blocks of embedded systems 2. Recognize the functionality of register and other memory devices 3. Comprehend about shared memory concepts 4. Classify the Cache mapping techniques and dynamic allocation 5. Acquire the knowledge of I/O device timer & counting devices 6. Realize the interfacing of devices in a system 7. Analyze the concept of interrupts and how it occurs in a system 8. Analyze the performance of various scheduling algorithms 9. Recognize the basic concepts of RTOS 10. Utilize the software tools for various applications

INTRODUCTION

Introduction to functional building blocks of embedded systems – Register – memory devices – ports, timer – interrupt controllers using circuit block diagram representation for each category.

PROCESSOR AND MEMORY ORGANIZATION

Structural units in a processor – selection of processor & memory devices – shared memory – DMA – interfacing processor – memory and I/O units – memory management – Cache mapping techniques – dynamic allocation – Fragmentation.

DEVICES & BUSES FOR DEVICES NETWORK

I/O devices – timer & counting devices – serial communication using I2C – CAN – USB buses – parallel communication using ISA – PCI – PCI/X buses – arm bus – interfacing with devices/ports – device drivers in a system – Serial port & parallel port.

I/O PROGRAMMING SCHEDULE MECHANISM

Intel I/O instruction – Transfer rate, latency – interrupt driven I/O – Non-maskable interrupts – software interrupts – writing interrupt service routine in C & assembly languages – preventing interrupt overrun – disability interrupts – Multi threaded programming – Context switching – premature & non-premature multitasking – semaphores – Scheduling – Thread states – pending threads – context switching – round robin scheduling – priority based scheduling – assigning priorities – deadlock – watchdog timers.

REAL TIME OPERATING SYSTEM (RTOS)

Introduction to basic concepts of RTOS – Basics of real time & embedded system operating systems – RTOS – Interrupt handling – task scheduling – embedded system design issues in system development process – Action plan – use of the target system – emulator – use of software tools.

Text book(s):

1	Rajkamal, 'Embedded System – Architecture, Programming, Design', 2nd Edition, Tata McGraw Hill, 2008.
2.	Daniel W. Lewis 'Fundamentals of Embedded Software', 2nd Edition, Prentice Hall of India, 2004.

Reference(s):

1	Steve Heath, "Embedded Systems Design", 2nd Edition, Newnes, 2003.
2	David E.Simon, "An Embedded Software Primer", 1st Edition, Addison-Wesley Professional, 2013.
3	Wayne Wolf, "Computers as Components; Principles of Embedded Computing System Design", Harcourt India, 2nd Edition, Morgan Kaufman Publishers, 2006.
4	Frank Vahid and Tony Givargis, "Embedded Systems Design – A unified Hardware /Software Introduction", 2nd Edition, John Wiley, 2002.
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.
7	Steve Heath, "Embedded System Design",Elsevier, 2005.

K.S.Rangasamy College of Technology – Autonomous								
40 CS E25 Mobile Ad hoc Networks								
Elective - II								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	Learning about MAC and ad hoc routing protocols and study in detail the transport layer and security protocols for ad hoc network, Quality of service issues and to learn about wireless sensor network
Course Outcomes	**At the end of the course, the students will be able to** 1. Comprehend the basics of Mobile ad-hoc networks and its Issues 2. Secure the knowledge of Content Based Protocols with the different Mechanisms 3. Acquire knowledge of the classifications and features of different Ad Hoc Routing Protocols 4. Acquire knowledge of the different transport layer solutions 5. Gain the knowledge of different transport layer protocols in Mobile Ad-Hoc Networks 6. Gain the knowledge of the Security aspects of Ad Hoc Wireless Networks 7. Secure the knowledge of the security protocols in Mobile Ad-Hoc Networks 8. Acquire knowledge of different QoS protocols in Mobile Ad-Hoc Networks 9. Comprehend the basic concept of wireless Sensor Networks 10. Acquire knowledge of the Issues in the wireless Sensor Networks and their solutions

Introduction

Introduction- Issues – Ad hoc wireless Internet- MAC protocols for ad hoc wireless networks - Classification of MAC protocols - Contention-Based protocols - Contention-Based protocols with Reservation Mechanisms - D-PRMA – CATA– HRMA - SRMA/PA - Contention-Based protocols with Scheduling Mechanisms.

Ad Hoc Routing Protocols

Introduction - Classifications of Routing Protocols - Table-Driven Routing Protocols – On-Demand Routing Protocols -DSR - AODV - TORA – LAR – ABR – Hybrid Routing Protocols.

Transport Layer And Security Protocols For Ad Hoc Wireless Networks

Classification of Transport Layer Solutions - TCP Over Ad Hoc Wireless Networks - Security in Ad Hoc Wireless Networks - Network Security Requirements - Network Security Attacks - Key Management - Secure Routing in Ad Hoc Wireless Networks.

Quality Of Service In Ad Hoc Wireless Networks

Introduction – Issues - Classifications of QoS Solutions - MAC Layer Solutions - Network Layer Solutions – QoS Routing Protocols – Ticket-Based QoS Routing Protocol - PLBQR – TDR - QoS Frameworks for Ad Hoc Wireless Networks.

Wireless Sensor Networks

Introduction – Sensor Network Architecture – Data Dissemination- Data Gathering – MAC Protocols for Sensor Networks – Location Discovery – Quality of a Sensor Network.

Text book(s):

1. C. Siva Ram Murthy and B.S. Manoj “Ad Hoc Wireless Networks: Architectures and Protocols”, Pearson Education 2004,Reprint 2012.

Reference(s):

1. S. Rajasekaran, G.A. Vijayalakshmi Pai “Neural Networks, Fuzzy Logic, and Genetic Algorithms “, Prentice Hall PTR, 2005.
2. C.K. Toh, Ad Hoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall PTR, 20010. Charles E. Perkins, Ad Hoc Networking, Addison Wesley, 2000.

K.S.Rangasamy College of Technology – Autonomous								
40 CS E31 Network Setup and Administration								
Elective - III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	To understand the functions of various networking devices. Study the switching, addressing and routing technologies. Understand the function and types of firewall.
Course Outcomes	**At the end of the course, the students will be able to** 1. Recognize the purpose and functions of various network devices 2. Identify the appropriate media to connect network devices 3. Configure and verify initial switch configuration 4. Configure switch IOS 5. Understand the IP addressing 6. Create a subnet 7. Acquire the knowledge of basic routing concepts 8. Configure and verify operation status of a router. 9. Working with proxies and application - level firewalls 10. Setting up a virtual private network

Introduction

Introduction to packet tracer: key features, benefits. Recognize the purpose and functions of various network devices such as routers, switches, bridges and hubs. Identify common applications and their impact on the network. Identify the appropriate media, cables, ports, and connectors to connect network devices to other network devices and hosts in a LAN.

LAN Switching Technologies

Packet tracer: create the topology, configure and verify initial switch configuration including remote access management. Configure switch IOS basics – hostnames, console, privilege password and telnet password.

IP Addressing

IPv4 address - necessity of using private and public IP addresses for IPv4 addressing, IPv4 addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN environment. Subnet mask and DNS lookup.

IP Routing Technologies

Basic routing concepts - boot process of IOS routers - configure and verify utilizing the CLI to set basic router configuration - configure and verify operation status of a device interface, both serial and Ethernet - verify router configuration and network connectivity.

Firewall and Network Security

Firewall configuration strategies-packet filtering-firewall configuration and administration - working with proxies and application - level firewalls-authenticating users- setting up a virtual private network- building your own firewall

Text book(s):

1	CCNA Routing and Switching Study Guide Paperback – 15 Oct 2013by Todd Lammle
2	Networking All-in-One For Dummies® Paperback – Import, 22 Oct 2010by Doug Lowe
3	Guide to Firewalls and Network Security by Greg Holden (Course Technology, 2004)

Reference(s):

1	Cisco ASA ConfigurationRichard A. Deal(McGraw Hill, 2009)ISBN: 978-0-07-162269-1

K.S.Rangasamy College of Technology – Autonomous								
40 CS E32 Machine Learning								
Elective - III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	• To understand the concepts of machine learning • To appreciate supervised and unsupervised learning and their applications • To understand the theoretical and practical aspects of Probabilistic Graphical Models
Course Outcomes	**At the end of the course, the students will be able to** 1 Understand the concepts of machine learning 2 Study the appreciate supervised and unsupervised learning and their applications 3 Gain the knowledge of linear models 4 Acquire the knowledge of neural network structures 5 Realize the concepts of clustering 6 Learn the meta learning techniques 7 Comprehend the tree models 8 Learn ordered and unordered rule list 9 Acquire the knowledge of passive reinforcement learning 10 Gain the knowledge of active reinforcement learning

Foundations of Learning

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound – approximation generalization tradeoff – bias and variance – learning curve

Linear Models

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – going beyond linearity –generalization and overfitting – regularization – validation

Distance-Based Models

Nearest neighbor models – K-means – clustering around medoids – silhouttes – hierarchical clustering – k-d trees – locality sensitive hashing – non-parametric regression – ensemble learning – bagging and random forests – boosting – meta learning

Tree and Rule Models

Decision trees – learning decision trees – ranking and probability estimation trees – regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rule learning

Reinforcement Learning

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal-difference learning – active reinforcement learning – exploration – learning an actionutility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

Reference(s):

1	Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, “Learning from Data”, AMLBook Publishers, 2012.
2	P. Flach, “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge University Press, 2012.
3	K. P. Murphy, “Machine Learning: A probabilistic perspective”, MIT Press, 2012
4	C. M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.
5	D. Barber, “Bayesian Reasoning and Machine Learning”, Cambridge University Press,2012.
6	M. Mohri, A. Rostamizadeh, and A. Talwalkar, “Foundations of Machine Learning”, MIT Press, 2012.
7	T. M. Mitchell, “Machine Learning”, McGraw Hill, 1997.
8	S. Russel and P. Norvig, “Artificial Intelligence: A Modern Approach”, Third Edition, Prentice Hall,

K.S.Rangasamy College of Technology – Autonomous								
40 CS E33 Python Programming								
Elective - III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100
Objective(s)	Gaining knowledge in Object Oriented Programming paradigm with python, studying about objects, inheritance, polymorphism, data structures, exception handling, files, strings and testing of open source language python.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Comprehend the concepts of Object Oriented Design and its characteristics 2. Create and Implement the objects in Python 3. Create and Implement the modules and packages in Python 4. Comprehend the concepts of Inheritance and polymorphism 5. Implement the concepts of Inheritance and Polymorphism in Python 6. Comprehend different data structures in Python and implement them 7. Comprehend different Exception handling techniques in Python and implement them 8. Comprehend the String manipulations in Python and implement them 9. Comprehend the I/O file operations in Python and implement them 10. Acquire the knowledge of testing in Python							

Object-Oriented Design

What is Object-oriented? - Objects and classes- Specifying attributes and behaviors- Hiding details and creating the public interface- Composition and inheritance- Inheritance

Objects In Python

Creating Python classes - Modules and packages - Organizing the modules- Absolute imports- Relative imports

Inheritance and Polymorphism

Extending built-ins- Overriding and super- Multiple inheritance- Polymorphism

Python Data Structures and Exception Handling

Empty objects- Tuples and named tuples- Dictionaries- Lists- Sets - Raising exceptions- What happens when an exception occurs?- Handling exceptions- Exception hierarchy- Defining our own exceptions- Exceptions aren't exceptional

Files, Strings and Testing Object-Oriented Programs

String manipulation-String formatting- File IO -Why test?-Unit testing-testing with py.test- How much testing is enough?

Text book(s):

1	Dusty Phillips “Python 3 Object Oriented Programming “ 2010 Packt Publishing

Reference(s):

1	James Payne “Beginning Python using Python 2.6 and Python 3.1” 2010 Willey India Pvt Ltd
2	Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001

K.S.Rangasamy College of Technology – Autonomous								
40 CS E34 Text Mining								
Elective - III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100
Objective(s)	Understanding the concepts of text mining and applications along with programming, Exploring Text, Markov Models and POS Tagging, Searching the Web, knowing Text Categorization							
Course Outcomes	**At the end of the course, the students will be able to** 1 Acquiring the basic concept of natural language processing 2 Elucidate the concept of distribution technique and its applications 3 Enriching about meaning of the words 4 Expected to understand about Indexing techniques 5 Exploring the indexing of google search engine 6 Illustrate about ranking algorithms of google 7 Narrate about text mine crawlers 8 Elucidate about the similarity measure techniques in text 9 Discuss categorization problem related to text 10 Elucidate about various categorization methods							

Introduction, Text Mine Installation, Mathematics Background

Origins of Text Mining - Information Retrieval- Natural Language Processing Understanding Text- Polysemi Synonymy- Applications- Business- Medicine and Law- Society-Information Visualization-An Architecture for Text Mining Applications -Text Mining Functions- A Layered Model-Software- Usage - Probability-Least Squares Method- Entropy-Related-Event Probabilities-Bayer's Rule-Probability Distributions-Binomial Distribution-Poisson Distribution- Normal Distribution-Sampling Distributions-T-Distribution Estimation-Expectation Maximization Algorithm-Hypothesis Testing-Chi-Square Test- Matrices Singular value Decomposition.

in Text Mine Google Index-Indexing Multimedia-Queries-Boolean Queries- Multimedia Queries-Relevance Feedback-Searching an Index- Searching in Text Mine-Google Search-Evaluation-Ranking Algorithms **Exploring Text, Markov Models and Pos Tagging**

Words-Token Assembly- Word Stems-Base Words-Word and Meaning Relationships- Patterns in Words and Letters- Word Statistics-Zipf's Law-Sentences-Indexing Document Text- Frequency-Based- Stop words Inverse Document Frequency-Latent Semantic Indexing. hidden Markov Models-Observation Probability- State Sequence-Parameter Estimation-POS Taggers-HMM Taggers-Rule – Based Taggers-Building a Tagger-Word Sense Disambiguation-A Implementation of a WSD- Evaluation of WSDs.

Information Extraction, Search Engines

IE Applications-Entity Extraction-HMMs for Entity Extraction -Implementation of an Entity Extractor Systems-Festus- Rapier-Phrase Extraction -Early Search Engines-Medline –Dialog- Indexing Text for Search- An Implementation Link Structure of Web Pages-Viewing Search Results.

SEARCHING THE WEB

Web Structure-Search Engine Coverage- Web Directories-A Distributed Search- Web Communities-The Hidden Web-Crawlers- Web Search Engine Crawlers-Focused Crawlers-Text Mine Crawler Crawl Visualization- - Clustering Documents-Cluster Organization Cluster –Parameters- Cluster – Based Search- Searching with a Taxonomy- Similarity Measures-Linking Methods Clustering Methods-K-Means-Simulated Annealing-Genetic Algorithms- Scatter\Gather-Visual Tools for Clusters-Cluster Evaluation.

Text Categorization

Categorization Problem- Filtering Email-A Bayesian Email Filter-Features of Spam-Requirements for a Spam Detector-An Email Archive-Email Categorization -Email Monitor-Personal Email Network-Chain EmaiCategorization Methods-Rocchio's Algorithm-Perceptions-Decision Trees-Nearest Neighbor-Support Vector Machines-Summarization-Training a Summarizer-Sentence Selection-News Articles- Email Threads- Web Pages-A Cluster-Based Summarizer-Implementation of a Summarizer-Evaluation of Summaries-Information Monitor-Event Detection-Event Tracking- Monitoring the News- Sentiment Analysis.

Text book(s):

1 Manu Konchady, "Text Mining Application Programming ", India edition, Cengage Leaning, 2006.

Reference(s):

1 Michael W. Berry, Jacob Kogan, quot,"Text Mining: Applications and Theory", Wiley, 2010.

2 Louise Francis and Matt Flynn, "Text Mining Handbook". Spring, 2010.

K.S.Rangasamy College of Technology – Autonomous								
40 CS E35 C# and .Net Frame Work								
Elective - III								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	50	50	100

Objective(s)	The student will gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the framework and they will gain programming skills in C# both in basic and advanced levels. By building sample applications, the student will get experience and be ready for large-scale projects.
Course Outcomes	**At the end of the course, the students will be able to** 1. Know the basic concepts of C#. 2. Apply the different dimensions of C# with looping and arrays 3. Understand the object oriented concepts in C# 4. Demonstrate the specific features of C# like delegates, events and exceptions 5. Understand The .NET Infrastructure And Its Components 6. Describe the concepts of Remoting and threads 7. Illustrate the concepts of web form fundamentals 8. Apply the knowledge of validation to the data entered in the web forms 9. Interpret how to connect the application with relational databases. 10. Develop an application to access and display data from database.

Introduction to C#
Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, and Enumerations.

Object Oriented Aspects of C#
Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

The Clr and the .Net Framework
Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

Web Based Application Development on .Net
Introducing .NET - The .NET Framework , Developing ASP.NET Applications – Creating Websites , The Anatomy of a web form , writing code, Webform Fundamentals – Introducing Server Controls , HTML Control Classes , The page class , Application , Events , ASP.NET Configuration, Web controls , Validation Controls.

Working with Database
ADO.NET Fundamentals , Understanding Databases , The Data Provider Model , Direct Data Access , Disconnect Data Access , DataBinding , Single Value DataBinding , Repeted-Value Data Binding , Data Source Controls , Data Controls - Grid View

Text book(s):

1	E. Balagurusamy, “Programming in C#”, Premier third edition Tata McGraw-Hill, 2011.
2	Beginning ASP.NET 4 in C# 2010” Matthew Mac Donald , 2010 Apress , Berkely, CA ,USA.(2011)

Reference(s):

1	J. Liberty, “Programming C#”, 2nd ed., O’Reilly, 2002. Fourth edition, reprint 2007.
2	Herbert Schildt, “The Complete Reference: C#”, Tata McGraw-Hill, 2004.
3	Robinson et al, “Professional C#”, 2nd ed., Wrox Press, 2002.
4	Andrew Troelsen, “C# and the .NET Platform”, A! Press, 2003.
5	Thamarai Selvi, R. Murugesan, “A Textbook on C#”, Pearson Education, 2003.

K.S.Rangasamy College of Technology – Autonomous								
40CS E41 Service Oriented Architecture								
Elective - IV								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	50	50	100

Objective(s)	Studying about SOA principles, and to study about SOA implementations, study about the data integration in SOA
Course Outcomes	**At the end of the course, the students will be able to** 1 Recognize the fundamentals, characteristics, benefits and pitfalls of SOA 2 Investigate the use of webs services, service descriptions and messaging 3 Review the activity management and composition of SOA 4 Examining the methods of messaging, policies, metadata and security 5 Comprehend the principles of service-orientation for web service 6 Interpret the information about different service layers and compare them 7 Compare the concepts of different SOA delivery strategies 8 Infer about the service-oriented analysis and process 9 Interpret the importance service-oriented design, WSDL and SOAP 10 Contrast the concept of service design and business process design

Introduction to SOA

Software architecture- Introduction- Roles,SOA principles- SOA plans- SOA definitions-SOA models-SOA service categories- SOA infrastructure layers- pillars of SOA-ESB technology

SOA Challenges and Anatomy

Introduction- Basic technology-Current trends and challenges, Anatomy-SOA-Service architecture-Infrastructure and components-Standard for development of services-Elements of SOA-Service oriented modeling, analysis and design

SOA Implementation Process

Model drive Architecture-Middle tier data management in SOA- Examples- Data integration in SOA

MIGRATING to SOA

Problems in existing system- Nature of service- Requirements of SOA- Addressing the problems- Benefits of SOA-Future models- SOA implementation Framework(SOAIF)- Benefits- requirements- components

SOA Implementation Challenges

Components-Challenges in SOA- Overcoming the road blocks to SOA success- Delivering adaptable SOA – Cases in SOA

Text book(s):

1	RAVI KUMAR JAIN BANDA by ICFAI university press

Reference(s):

1	Joshy Joseph & Craig Fellenstein, “Grid Computing”, PHI, PTR-2003.

K.S.Rangasamy College of Technology – Autonomous								
40 CS E42 Big Data Security								
Elective - IV								
Semester	Hours / Week			Total	Credit	Maximum Marks		
	L	T	P	hrs	C	CA	ES	Total
VIII	3	0	0	45	3	50	50	100
Objective(s)	With the data generated from electronic devices growing exponentially,the need to analyse data on a large scale is important. Such data are many types like financial, personal etc. Big Data environment also creates significant security challenges, when trying to make quick decisions. Data breach poses many complications. This course aims at introducing concepts related to big data security.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Understand the concepts of BigData privacy 2. Know about ethics and security 3. Able to classify the data 4. Acquire the knowledge of Intellectual Property Challenge 5. Able to design Hadoop model without security 6. Implement the Kerberos security and configure 7. Configure Kerberos for Hadoop ecosystem 8. Understand the concepts of Hadoop Ecosystem components 9. Gain the knowledge about data security 10. Acquire the knowledge of event logging							

Big Data Privacy, Ethics and Security

Privacy – Reidentification of Anonymous People – Why Big Data Privacy is self regulating? – Ethics – Ownership – Ethical Guidelines – Big Data Security – Organizational Security.

Security, Compliance, Auditing, and Protection

Steps to secure big data – Classifying Data – Protecting – Big Data Compliance – Intellectual Property Challenge – Research Questions in Cloud Security – Open Problems.

Hadoop Security Design

Kerberos – Default Hadoop Model without security - Hadoop Kerberos Security Implementation & Configuration.

Hadoop Ecosystem Security

Configuring Kerberos for Hadoop ecosystem components – Pig, Hive, Oozie, Flume, HBase, Sqoop.

Data Security & Event Logging

Integrating Hadoop with Enterprise Security Systems - Securing Sensitive Data in Hadoop – SIEM system – Setting up audit logging in hadoop cluster

Text book(s):

1	

Reference(s):

1	Mark Van Rijmenam, “Think Bigger: Developing a Successful Big Data Strategy for Your Business”, Amazon, 1 edition, 2014.
2	Frank Ohlhorst John Wiley & Sons, “Big Data Analytics: Turning Big Data into Big Money”, John Wiley & Sons, 2013.
3	herif Sakr, “Large Scale and Big Data: Processing and Management”, CRC Press, 2014.
4	udeesh Narayanan, “Securing Hadoop”, Packt Publishing, 2013.
5	Ben Spivey, Joey Echeverria, “Hadoop Security Protecting Your Big Data Problem”, O’Reilly Media, 2015.
6	Top Tips for Securing Big Data Environments: e-book (http://www.ibmbigdatahub.com/whitepaper/top-tips-securing-big-data-environments-e-book)
7	http://www.dataguise.com/?q=securing-hadoop-discovering-and-securing-sensitive-data-hadoop-data-stores
8	Gazzang for Hadoop http://www.cloudera.com/content/cloudera/en/solutions/enterprise-solutions/security-for-hadoop.html
9	eCryptfs for Hadoop https://launchpad.net/ecryptfs
10	Project Rhino - https://github.com/intel-hadoop/project-rhino/

K.S. Rangasamy College of Technology – Autonomous								
Elective IV								
40 CS E43 - Mobile Application Development								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VIII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**

Objective(s)	• Understand system requirements for mobile applications • Generate suitable design using specific mobile development frameworks • Generate mobile application design • Implement the design using specific mobile development frameworks • Deploy the mobile applications in marketplace for distribution
Course Outcomes	**At the end of the course, the students will be able to** 1. Know the Introduction to mobile applications. 2. Understand the Basics of embedded systems design. 3. Understand the Designing applications with multimedia. 4. Understand the Design patterns for mobile applications. 5. Describe the Establishing the development environment 6. Describe the Integration with social media applications 7. Discuss the applications using Core Location 8. Interpret the Data persistence using Core Data and SQLite 9. Understand the Integrating calendar and address book with social media application 10. Discuss the UI implementation

Introduction

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

Basic Design

Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

Advanced Design

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

Technology I – Android

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

Technology Ii–Ios

Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

Reference(s) :

1.	http://developer.android.com/develop/index.html
2.	Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox,
3.	Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech,
4.	James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012
5.	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6Development: Exploring the iOS SDK”, Apress, 2013.55

K.S.Rangasamy College of Technology – Autonomous								
40 CS E44 Cyber laws and Intellectual Property								
Elective - IV								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	50	50	100
Objective(s)	To learn the basic concepts of law. Understand the concepts of cyber crime and IP trademarks and its applications							
Course Outcome	**At the end of the course, the students will be able to** 1. Gain the knowledge of act 2000 2. Understand the concepts of necessity of arrest without warrant 3. Know about the cyber crime 4. Gain the knowledge of criminal justice 5. Understanding the concept of intellectual property rights 6. Know the concepts of basic types of property 7. Acquire the knowledge of IP trade marks 8. Describe the applications of trade marks 9. Know about WIPO 10. Acquire the concepts of GATT							

Power of Arrest Without Warrant Under the It Act 2000: A Critique
Crimes of this millennium-Section 80 of the IT Act 2000-Forgetting the line between cognizable and non cognizable offence. Necessity of Arrest without warrant from anyplace, public or otherwise- Checks and Balance Against Arbitrary Arrests - Arrest but No Punishment.

Cyber Crime and Criminal Justice
Concept of cyber crime and IT ACT 2000-Hacking-Teanage Web Vandals- Cyber Fraud and Cyber Cheating-Virus on the Internet-Defamation-Harassment and E-mail Abuse-Cyber Pornography-Nature of Cyber Criminality-Strategies to tackle Cyber Crime and Trends.

Intellectual Property Rights
Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).

Ip Trade Marks and Applications
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.

Wipo and Gatt
International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff

Text book(s):

1	Vivek Sood. “Cyber Law Simplified”-Tata McGraw-Hill Publishing, Second Edition 2003.
2	Subbaram N.R. “Handbook of Indian Patent Law and Practice “, S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998

Reference(s):

1	Susan K. Sell , “The Globalization of Intellectual Property Rights” , Kindle Edition - Jun 23, 2003

K.S. Rangasamy College of Technology – Autonomous								
Elective IV								
40 CS E45 Software Forensics								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VIII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**

Objective(s)	Learning basic concept of software forensics and studying Player-Hackers, Crackers, Phreaks, and other Doodz, Avanced tools, Law and Ethics-Software forensics in court, Computer Virus and Malware Concepts and Background, Programming Cultures and Indicators, Stylistic Analysis and Linguistic Forensics, Nalysauthorship AIS.
Course Outcomes	**At the end of the course, the students will be able to** 1. Realize basics of Software Forensics 2. Acquire knowledge on the Software Forensics technologies and practices 3. Comprehend the knowledge on players 4. Realize the various basic software forensics tools 5. Attain knowledge on advanced tools 6. Comprehend the law and ethics of forensics 7. Identify various computer viruses and malware 8. Attain knowledge on programming cultures 9. Perform stylistic analysis and linguistic forensics 10. Comprehend the plagiarism and authorship analysis

Introduction To Software Forensics, Software Code and Analysis Tools

Motivations and Rationales - General Characteristics - Black hat Products - Other Products - Summary - The Programming Process Digital Forensic Definitions - Software Forensics - Objectives and Objects of Software Forensics - Identity - Other Object of Study - Software Forensic Tools -The Process - The Products - Finally, Already, the Tools - Software Forensic Technologies and Practices - Content Analysis - Legal Considerations - Presentation in Court – Summary.

The Player-Hackers, Crackers, Phreaks, and Other Doodz

Terminology -Types of Black hats -The Products -The Resulting Objects -The Analytical Tools -Forensic Tools –Summary.

Advanced Tools, Law and Ethics-Software Forensics In Court

Decompilation -Desquirr -Dcc Boomerang -Plagiarism -JPlag -YAP -Other Approaches -summary -Legal Systems -Differences Within Common Law -Jurisdiction -Evidence -Types of Evidence - Rules of Evidence - Providing Expert Testimony -Ethics -Disclosure - Blackhat motivations as a Defense – Summary.

Computer Virus and Malware Concepts and Background, Programming Cultures and Indicators

History of Computer viruses and Worms -Malware Definition and Structure -Virus Structure -Trojan structure - Logic Bomb Structure -Remote Access Trojan (RAT) Structure -Distributed Denial of Service (DDoS) Structure Detection and Antidetection Techniques -Detection Technologies -tealth and Antidetection Measures -Summary -User Interface -Cultural Features and “Help” -Functions -Programming Style -Program structure -Programmer Skill and Objectives -Developmental Strictures -Technological Change –Summary.

Stylistic Analysis and Linguistic Forensics, Nalysauthorship Ais

Biblical Criticism -Shakespeare and Other Literature -Individual Identification and Authentication -Content Analysis Noncontent Analysis -The Content/Noncontent Debate -Noncontent Metrics as Evidence of Authorship -Additional Indicators - Summary -Problems - Plagiarism Detection Versus Authorship Analysis -How Can It Work? - Source Code Indicators - More General Indicators - Is It Reliable? – Summary.

Text book:

1	Robert M.Slade ,”Software forensics” , Tata McGraw – Hill Publishing Company Limited, New Delhi,2005.

Reference(s) :

1.	Bill Nelson, Amelia Phillips, Christopher Steuart, “Guide to computer forensics and investigations”, Cengage Learning, 2010
2.	Bill Nelson, Amelia Phillips, Frank Enfinger, Chris Stewart ,”Computer Forensics and Investigations”,2004

K.S. Rangasamy College of Technology – Autonomous								
Elective V								
40 CS E51 Python Programming for Data Analytics								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VIII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**
Objective(s)	Data which is available in abundance and in accessible forms. If analysed in an efficient manner unfolds many patterns and promising solutions. Data has to be pre-processed, converted to required format and fed to appropriately chosen algorithm to yield better results. This course aims at applying such techniques to raw data, using python, to arrive at meaningful results							
Course Outcomes	**At the end of the course, the students will be able to** 1. Understanding the basic concepts of Python 2. Remember the concepts of data structures 3. Understand the concept of data wrangling 4. Know the various ways of combining and merging datasets 5. Implement data aggregation and group operations 6. Know the basic concepts of time series basics 7. Preparing and pre-processing data 8. Understanding the data aggregation and grouping concepts 9. Leveraging web scraping 10.Visualizing the results of analytics effectively							

Python Concepts , Data Structures, Classes

Interpreter – Program Execution – Statements – Expressions – Flow Controls – Functions - Numeric Types – Sequences - Strings, Tuples, Lists and - Class Definition – Constructors – Inheritance – Overloading – Text & Binary Files - Reading and Writing.

Data Wrangling

Combining and Merging DataSets – Reshaping and Pivoting – Data Transformation – String Manipulation, Regular Expressions.

Data Aggregation, Group Operations ,Timeseries

GoupBy Mechanics – Data Aggregation – Groupwise Operations and Transformations – Pivot Tables and Cross Tabulations – Date and Time Date Type tools – Time Series Basics – Data Ranges, Frequencies and Shifting.

Web Scraping

Data Acquisition by Scraping web applications –Submitting a form - Fetching web pages – Downloading web pages through form submission – CSS Selectors.

Visualization In Python

Matplotlib package – Plotting Graphs – Controlling Graph – Adding Text – More Graph Types – Getting and setting values – Patches.

Reference(s) :

1	Mark Lutz, “Programming Python”, O'Reilly Media, 4th edition, 2010.
2	Mark Lutz, “Learning Python”, O'Reilly Media, 5th Edition, 2013
3	Tim Hall and J-P Stacey, “Python 3 for Absolute Beginners”, Apress, 1st edition, 2009.
4	Magnus Lie Hetland, “Beginning Python: From Novice to Professional”, Apress, Second Edition, 2005.
5	Shai Vaingast, “Beginning Python Visualization Crafting Visual Transformation Scripts”, Apress, 2nd edition, 2014
6	Wes Mc Kinney, “Python for Data Analysis”, O'Reilly Media, 2012
7	White, “Hadoop: The Definitive Guide”, Third Edition - O’Reilly , 2012.
8	Brandon Rhodes and John Goerzen, “Foundations of Python Network Programming: The Comprehensive Guide to Building Network Applications with Python”,Apress, Second Edition, 2010.
9	http://blog.matthewrathbone.com/2013/11/17/python-map-reduce-on-hadoop---a-beginners-tutorial.html
10	http://www.michael-noll.com/tutorials/writing-an-hadoop-mapreduce-program-in-python/
11	http://allthingshadoop.com/category/python/

K.S. Rangasamy College of Technology – Autonomous								
Elective V								
40 CS E52 Semantic Web								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VIII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**
Objective(s)	Introducing basic concepts, tasks, methods, and techniques in semantic web, understanding of the semantic web process and issues.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Gain knowledge in Semantic Web and its Technologies 2. Obtain the knowledge of the layering approach of semantic Web 3. Construct the RDF data model and defining the vocabularies used in RDF data model 4. Edit, Parse and Browse RDF / XML 5. Identify the requirements of Ontology and know the sublanguages 6. Describe the On-To-Knowledge Semantic Web Architecture 7. Write the Monotonic and Non monotonic Rules 8. Inferring new knowledge from existing knowledge 9. Realize the applications of semantic web technologies **10.** Examine the future of semantic web							

Introduction

History – Semantic Web Layers –Semantic Web technologies – Semantics in Semantic Web – XML**:** Structuring – Namespaces – Addressing – Querying – Processing

RDF

RDF and Semantic Web – Basic Ideas - RDF Specification – RDF Syntax: XML and Non- XML - RDF elements – RDF relationship: Reification, Container, and collaboration – RDF Schema –Editing, Parsing, and Browsing RDF/XML-RQL-RDQL

Ontology

Why Ontology – Ontology movement – OWL – OWL Specification - OWL Elements –OWL constructs: Simple and Complex – Ontology Engineering : Introduction –Constructing ontologies – Reusing ontologies – On-To-Knowledge Semantic Web architecture

Logic and Inference

Logic – Description Logics - Rules – Monotonic Rules: Syntax, Semantics and examples – Non- onotonic Rules – Motivation, Syntax, and Examples – Rule Markup in XML: Monotonic Rules, and Non-Monotonic Rules

Applications of Semantic Web Technologies

RDF Uses: Commercial and Non-Commercial use – Sample Ontology – e-Learning –Web Services – Web mining – Horizontal information – Data Integration – Future of Semantic Web

Text book:

1	Grigorous Antoniou and Van Hermelen - “A Semantic Web Primer”-The MIT Press –2004
2	Spinning the Semantic Web: Bringing the world wide web to its full potential – The MIT Press – 2004

Reference(s) :

1.	Shelley Powers – “Practical RDF” – O’reilly publishers – First Indian Reprint :2003

K.S. Rangasamy College of Technology – Autonomous								
Elective V								
40 CS E53 Social Network Analysis								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VIII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**
Objective(s)	To understand the components of the social network							
Course Outcomes	**At the end of the course, the students will be able to** 1. Understand the limitations of web and development of semantic web 2. Learn the key concepts and measures in network analysis 3. Gain the knowledge of graph representation of visualization 4. Acquire the knowledge of matrix and hybrid based visualization 5. Learn the advanced representation of social network data 6. Obtain the knowledge of applications of community mining 7. Comprehend the models and algorithms for social influence analysis 8. Examine the concepts of Algorithms and Systems for Expert Location in Social Networks 9. Learn the concepts of text mining 10. Acquire the knowledge of opinion mining							

Introduction

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis – Key concepts and measures in network analysis - Discussion networks -Blogs and online communities – Web based networks

Modeling and Visualization

Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation -Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-BasedRepresentations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregatingsocial network data – Random Walks and their Applications –Use of Hadoop and Map Reduce -Ontological representation of social individuals and relationships.

Mining Communities

Aggregating and reasoning with social network data, Advanced Representations – Extractingevolution of Web Community from a Series of Web Archive - Detecting Communities in SocialNetworks - Evaluating Communities – Core Methods for Community Detection & Mining -Applications of Community Mining Algorithms - Node Classification in Social Networks.

Evolution

Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities - Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence – Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks – Expert Location without Graph Constraints - with Score Propagation – ExpertTeam Formation - Link Prediction in Social Networks - Feature based Link Prediction – BayesianProbabilistic Models - Probabilistic Relational Models

Text and Opinion Mining

Text Mining in Social Networks -Opinion extraction – Sentiment classification and clustering -Temporal sentiment analysis - Irony detection in opinion mining - Wish analysis - Product reviewmining – Review Classification – Tracking sentiments towards topics over time Databases in social network , Graph based database, Case study – Twitter/ Facebook

Text book:

1	
2	

Reference(s) :

1	Charu C. Aggarwal, “Social Network Data Analytics”, Springer; 2011
2	Peter Mika, “Social Networks and the Semantic Web”, Springer, 1st edition, 2007.
3	Borko Furht, “Handbook of Social Network Technologies and Applications”, Springer, 1st edition, 2010.
4	Guandong Xu , Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, Springer, 1st edition, 2011.
5	Giles, Mark Smith, John Yen, “Advances in Social Network Mining and Analysis”, Springer, 2010.
6	Ajith Abraham, Aboul Ella Hassanien, Vaclav Snašel, “Computational Social Network Analysis: Trends, Tools and Research Advances”, Springer, 2009.
7	Toby Segaran, “Programming Collective Intelligence”, O’Reilly, 2012

K.S. Rangasamy College of Technology – Autonomous								
Elective V								
40 CS E54 Angular JS								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VIII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**
Objective(s)	Basic understanding of JavaScript, other web technologies such as HTML, CSS, AJAX, etc.							
Course Outcomes	**At the end of the course, the students will be able to** 1. Recall the concepts of HTML and JavaScript. 2. Express the features of AngularJS. 3. Rephrase the purpose of binding and template. 4. Analyze the various effects of elements and events. 5. Gain the knowledge of scopes and controllers. 6. Apply the concepts of various features of directives. 7. Identify the several services and its works. 8. Design the applications using AJAX. **9.** Understand the concepts of animation services. **10.** Comprehend the various actions of provision and injection services.							

Introduction

Introduction to AngularJS: HTML and Bootstrap CSS Primer - JavaScript Primer - Single Page Application – MVC Architecture – first Application of AngularJS.

Working with AngularJS

Binding – Template Directives – Elements – Events

Working with Forms

Forms – Controllers – Scopes – Filters - Custom & Complex Directives

Working with Services

Modules – Services – Global objects – Errors and Expressions – AJAX and Promises

Advanced Services

REST – Views – Animation – Touch – Provision – Injection

Text book:

1	Adam Freeman, “Pro AngularJS”, Apress Publications.

Reference(s) :

1	Brad Green, ShyamSeshadri, “AngularJS”, O’REILLY publications.
2	AgusKurniawan**, “**AngularJS Programming**”, Kindle Edition.**
3	ValeriKarpov, Diego Netto, “Professional AngularJS”, Kindle Edition.

K.S. Rangasamy College of Technology – Autonomous								
Elective V								
40 CS E55 Multimedia Computing								
Semester	**Hours / Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VIII	**3**	**0**	**0**	**45**	**3**	**50**	**50**	**100**
Objective(s)	Learning Concepts of Multimedia Tools, Multimedia Operating Systems, Multimedia Communication Systems, Data Compression and Multimedia Applications							
Course Outcomes	**At the end of the course, the students will be able to** 1. Examine Different elements of Multimedia system and parameters involved in multimedia application 2. Observe Different storage media for multimedia 3. Comprehend Multimedia editing tools for audio, video and image 4. Analyze Linking multimedia objects 5. Outline Real-time, process and resource management 6. Examine different Database management system for multimedia 7. Predict Multimedia communication subsystems 8. Generate Multimedia synchronization reference model 9. Compare Different data compression techniques 10. Gain knowledge about Multimedia applications							

Introduction to Multimedia

Elements of multimedia system – Need and aspects of multimedia - Information units. Sound - Audio file formats – MIDI – Images - Computer Image Processing - Principles of animation - Animation techniques - Creating animated scenes – Video - Basic concepts - Video Capture - Recording format - Storage for multimedia - CD Technologies - Multimedia Workstations

Multimedia Tools

Basic tools - Image-editing tool - Painting and drawing tools –Sound editing programs - Video formats - Linking multimedia objects – OLE -presentation tools - authoring tools.

Multimedia Operating Systems

Introduction - Real Time - Resource Management - Process Management - File Systems - Database Systems - Multimedia Database Management System - Characteristics of an MDBMS - Data Analysis - Data Structure - Operations on Data - Integration in a Database Model

Multimedia Communication Systems

Application Subsystem - Transport Subsystem – Synchronization -Introduction - Notion of Synchronization - Presentation Requirements - A Reference Model for Multimedia Synchronization - Synchronization in distributed environment.

Data Compression and Multimedia Applications

Source entropy and hybrid coding – JPEG – MPEG - H.261 - DVI. Video conferencing - Tele conferencing – Tele services – messaging services – retrieval services – Tele action services.

Text book:

1	Ralf Steinmetz, Klara Nahrstedt, "Multimedia: Computing, Communications and Applications", Pearson Education Asia, New Delhi, 2002.

Reference(s) :

1.	Tay Vaughan, “Multimedia: Making it work”, sixth edition, Tata McGraw Hill, New Delhi, 2002.
2.	Fred Halsall, “Multimedia Communication, Application Networks, Protocols and Standard”, fourth edition, Addison Wesley, New Delhi, 2001.
3.	John F.Koegal Buford, “Multimedia Systems”, Pearson Educational Asia, New Delhi, 2001.
4.	Ron, Goldberg, "Multimedia Producer's Bible", fifth edition, Comdex Computer Publishing, New Delhi, 1996.
5.	Tay Vaughan, “Multimedia: Making it work”, sixth edition, Tata McGraw Hill, New Delhi, 2002.

OPEN ELECTIVE COURSES

<table>
<tr><td colspan="8">K.S.Rangasamy College of Technology - Autonomous</td></tr>
<tr><td colspan="8">40CSL01 & Quick Response Code</td></tr>
<tr><td colspan="8">Common to all Branches</td></tr>
<tr><td rowspan="2">Semester</td><td colspan="3">Hours / Week</td><td rowspan="2">Total hrs</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td></td><td>3</td><td>0</td><td>0</td><td>45</td><td>3</td><td>50</td><td>50</td><td>100</td></tr>
<tr><td>Objective(s)</td><td colspan="7">• Understand the concepts of 1D barcode and 2D QR code development
• This course creates the students to learn QR code features and is encoding schemes
• To impart the knowledge and skills to develop QR code matrix using mathematical calculations</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">1. Know about 1D barcode and two dimensional Quick response code its features
2. Learn data analysis for different messages and apply various data encoding schemes
3. Learn about the QR code design layout and its formation matrix
4. Apply various Error correction coding techniques depend on the data type and QR code version
5. Know about the QR code standards and its types such as static and dynamic QR codes</td></tr>
<tr><td colspan="8">Introduction :1D-barcode-2D –QR Code- Data Analysis- Data Encoding-QR Code layout –Error correction coding- micro QR-QR Code types-Standards and uses-Static and Dynamic QR Codes –Problems in QR Codes

• Generate a QR code that can store website URL’s, plain text, phone numbers, email addresses and pretty much any other alphanumeric data.
• Adding QR code to Word documents for students checking their answers.
• Create QR Code for advertising College events.
• Use QR codes to get immediate access to wireless network.
• Use QR codes to vote using twitter tools
• identification of QR Codes based on pattern recognition</td></tr>
<tr><td colspan="8">Reference(s) :</td></tr>
<tr><td>1.</td><td colspan="7">http://www.thonky.com/qr-code-tutorial/data-analysis</td></tr>
<tr><td>2.,</td><td colspan="7">http://aftech.pbworks.com/f/40_Interesting_Ways_to_Use_QR_Codes_in_the_Cla(1).pdf</td></tr>
<tr><td>3.</td><td colspan="7">http://qrcode.kaywa.com/</td></tr>
</table>

K.S.Rangasamy College of Technology - Autonomous								
40 CS L02 &PRP in JAVA								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	50	50	100
Objective(s)	• Learn console application development usinginheritance collection, exception handling and packages • Learn web application development using HTML, JDBC and Servlets							
Course outcomes	1. Review the java fundamentals and essentials of inheritance 2. Realize the data management using collection framework 3. Explore the uses of exception handling and packages in console application 4. Realize the process of multithreading and junit 5. Review the various command in RDBMS for data management. 6. Identify the importance Java data base connectivity(JDBC) 7. Review the tags available in HTML for web page design 8. Relate the uses of java script and XML in web application development 9. Explore the dynamic web application development using servlets 10. Know the AJAX essentials in web application development							

Java Fundamentals, OOP and Collection Framework

Java Fundamentals: Java Architecture, Language basics, Flow Control Statements, Arrays – OOPS / Inheritance: Classes and Objects, Encapsulation and Abstraction, Inheritance, Overriding, Garbage collection, String, Stringbuffer, Collection Framework: Introduction to collection, List, Generics, set, Map.

Packages and Exception Handling12

Abstraction /Packages / Exception Handling: Abstract classes, Final keyword, Introduction to packages, Importing classes, Packages, Interfaces, Introduction to exception handling, Exception Types, Try catch.

Wrapper Classes, Annotation, Junit and Multithreading12

Wrapper Classes, Annotation, Junit: Introduction, Junit with Eclipse, Assert methods and Annotation, Parameterized test, Test suite, Multithreading: Introduction to Multithreading, Multithreading model, Creation threads by Thread class, creating threads by Runnable Interface, Thread control mechanism, Thread priorities, Thread Synchronization.

RDBMS and JDBC12

RDBMS/SQL/PL/SQL: Introduction to RDBMS, DML, DDL, Select statement, Restricting and Sorting data, Single row functions, Group functions, Joins, JDBC: Introduction, Establishing Connection, Execute query process results, Meta Data and Prepared Statement, Callable Statement and Transactions.

HTML, CSS, Java Scriptand XML12

HTML: Introduction, Layout tags and semantic tags, Tables, Forms, Frames, style, Div, Introduction to HTML5 - JavaScript / CSS: Introduction to Java script, Java script objects, Java script validations, Java script regular expression, XML: Introduction, DTD, XML namespaces, XSD, XSLT.

Servlets and AJAX

Introduction to Servlets, servlets get and post requests, Servlet config context, Servlet Cookies, JSP introduction, AJAX: Introduction, How AJAX works, AJAX application, AJAX database application

References :

1	Herbert Schildt, " The Java 2: Complete Reference", Fifth edition, TMH, 2002.
2	Jim Keogh, " J2EE: The Complete Reference", First edition, TMH, 2002.
3	Steven Douglas Olson, “Ajax on Java", First edition, O'Reilly Media, 2007.

K.S.Rangasamy College of Technology - Autonomous								
40 CS L03 Cloud Computing								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	50	50	100
Objective(s)	Be able to understand what the current challenges are in cloud computing and be able to understand how to design and implement cloud-based applications.							
Course outcomes	1. Know the Characteristics of Cloud computing and its types 2. Understand the Architecture of Cloud Computing and assessing the role of open standards 3. Illustrate the Cloud service models and Cloud Deployment Models 4. Apply knowledge of Abstraction, and Virtualization Technologies using hypervisors 5. Develop an application using Paas Application frameworks 6. Demonstrate how to use Amazon Web Services(EC2) and Storage Systems to deploy the applications in the cloud environment 7. Explore the Microsoft Cloud services- windows Azure Platform 8. Reveal the major security and privacy problems in the Cloud with security mechanisms 9. Understand the purpose of Service Oriented Architecture(SOA) 10. Demonstrate to work with Cloud-Based storage							

Introduction

Cloud computing basics: Defining Cloud computing –Cloud Types - Characteristics of Cloud computing – Assessing the role of Open Standards - Measuring the cloud's value - Cloud Architecture: Exploring the cloud computing stack.

Cloud Services and Applications

Understanding Services and Applications by Type: Defining Infrastructure as a service- Defining Platform as a Service- Defining software as a Service – Defining Identity as a Service, Understanding Abstraction and virtualization: Virtualization Technologies – Load Balancing and virtualization-Understanding Hypervisors-Machine Imaging – Porting applications

Cloud Platforms

Platform as a Service: PaaS Applications Frameworks – Using Amazon Web Services: Amazon Web service components and Services – Working with Elastic Compute Cloud (EC2) – Working with Amazon Storage systems- Understanding Amazon Database Services

Cloud Security

Microsoft Cloud Services: Exploring Microsoft Cloud services – Windows Azure Platform,
Cloud Security: Securing the cloud – Securing Data –Establishing Identity and Presence

Cloud Storage And Case Studies:

CloudArray cloud storage gateway-sync and share cloud storage-Google cloud service-application to application integration-Cloud Services to Introduce SaaS-Based Log Management Product-Salesforce.com's Force.com for Work Management-Cloud storage forensics.

Text book

1	Barrie Sosinsky, "Cloud Computing Bible". Wiley Publishing, 2011.

Reference(s):

1	Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs". Emereo Pty Limited, 2008.
2	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud". [First Edition]Publisher - Orelly's, 2009

K.S.Rangasamy College of Technology - Autonomous								
40 CS L04 Foundation Skills in Integrated Product Development								
Common to all Branches								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	50	50	100

Objective(s)	• Learn basic concepts and characteristics of software products and the associated software product lifecycle • Learn important practices required for fulfilling the product management and product design
Course Outcomes	**At the end of the course student will able to** 11. Review the essentials of PESTEL analysis in product development 12. Explore the various product development methodologies 13. Realize the process of requirement engineering and management 14. Identify the steps in system design and modeling 15. Realize the various levels in product design 16. Review the product development using various testing strategies 17. Identify the importance of product maintenance and repair 18. Review the End-of-Life disposal of products 19. Understand the growth of engineering services industry 20. Know the IPD essentials in product development and management

Fundamentals of Product Development

Types of various trends affecting product decision –PESTEL Analysis –Introduction to product development methodologies and management –Overview of Product Development methodologies – Product life cycle –Product development planning and Management

Requirements and System Design

Requirement Engineering –Traceability –Requirement management – Zachman Framework –Introduction to system specifications – System Modeling – System Optimization – Introduction to system specifications – Interface Design

Design and Testing

Introduction – Industrial Design and User Interface Design – Concept generation Techniques – Concept Screening and Evaluation – Detailed Design – Application of Design Verification Testing –Hardware Schematic, Component design, Layout and Hardware testing – Prototyping – Product validation & certification – Product Testing standards and certification – Product Documentation

Sustenance Engineering and End-of-Life (EoL) Support

Maintenance and Repair – Enhancement – Definition of Obsolescence Management – Configuration Management – EoL Disposal – Software Sustenance

Business Dynamics – Engineering Service Industry

The Industry: Overview of Engineering Services Industry – Product Development in Industry versus Academia, The IPD Essentials: Vertical specific product development process – Product Development Trade Offs – Intellectual Property Rights and Confidentiality – Security & Configuration management

Text book(s):

1	Anna University-NASSCOM Implementation Committee, “Foundation Skills in Integrated Product Development”, IT-IteS SSC NASSCOM, First Edition, 2015.

Reference(s):

1	Pressman R.S., “Software Engineering: A Practitioners Approach”, Mcgraw Hill Eduction Private Limited, Seventh Edition, 2015.
2	Watts S.Humphrey, “Managing the Software Process”, Pearson, 2014.
3	Kelkar S.A., “Software Project Management-A Concise Study”, PHI, Third Edition, 2013.