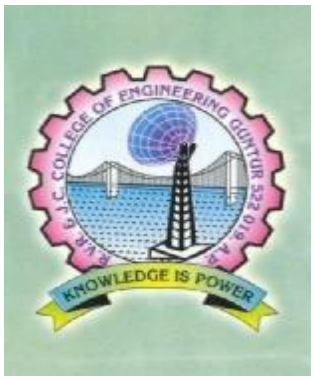

R.V.R. & J.C. COLLEGE OF ENGINEERING

(Autonomous)

Accredited by NBA and NAAC with "A" Grade

Chowdavaram GUNTUR- 522019

Scheme of Instruction, Examinations and Syllabi

for

Four year B.Tech. Degree Programme

(w.e.f. 2016-2017)

Computer Science & Engineering

COMPUTER SCIENCE & ENGINEERING

Department Profile

The R.V.R. & J.C. College of Engineering introduced the undergraduate program in Computer Science & Engineering (CSE) in 1994. Since its inception, the department has grown exponentially in the areas of student intake, quality of academic work and student achievements. The initial student enrollment was 30. Since then, the B.Tech programme has seen a gradual increase in the student enrollment, and current annual intake stands at 180. Taking the needs of the academic institutions and the industry into cognizance, the department of CSE started M.Tech programme in the year 2003. The current annual intake for the M.Tech programme is 25. This programme helps to enhance the quality of the academic atmosphere in the department.

The department has excellent infrastructure to support the teaching learning process. More than half of the class rooms of the department have the integrated computer-assisted teaching systems. The faculty of the department utilizes these systems to deliver lectures effectively. A new training facility named E-class room was developed in the year 2009. The E-class room is one of a kind training facility capable of hosting 75 participants at a time and has one dedicated computer terminal for each participant. The latest equipment required for video conferencing and remote lecture delivery are available in the E-class room. The department of CSE also maintains the MOODLE, the learning management system for electronic distribution of lecture material, online references and question papers. The learning management system, MOODLE is also being used by the faculty members to conduct online examinations.

The department has modern laboratories to serve the teaching and research needs of the students and faculty members. The laboratories of the department have substantial computing resources that include the latest hardware and software. The laboratories are equipped with the computers of latest configuration procured from MNCs. All the laboratory computers are connected to the campus network using hi-speed Fiber Optic Local Area Network. A dedicated leased line provides round-the clock Internet access to all the laboratory computers. The department also maintains a dedicated lab for improving the communication skills of the students.

The college and the department are well served by the central library. The central library has more than 5000 titles related to Computer Science and Engineering discipline. The central library has online subscription to various e-journals and INDEST (Indian National Digital Library in

Engineering Science and Technology) consortium. The subscription provides online access to reputed engineering journals from professional societies like IEEE, ASME, ASCE, SPRINGER, ELSEVIER etc. There is also a dedicated department library to serve the needs of the department.

The department is well supported in academics by qualified and experienced faculty including six doctorates. The faculty members of the department actively pursue research in their respective areas and publish research papers in renowned journals. The students are encouraged to participate in national and international conferences, workshops, student symposiums and to publish papers in national / international journals.

The department strives towards delivering quality education to the students. This fact is attested to by the National Board of Accreditation (NBA). The department of CSE received accreditation from NBA for 3 times during 2002, 2007 and 2012. The department invites experts from premiere educational institutions and the industry to conduct seminars / workshops on the advanced topics in Computer Science.

The department of CSE is justly proud of its high performing students. The students successfully secured top ranks in the university examinations for the past several years. The students secured admissions in the IISc, IITs, IIITs, NITs and other higher education institutions of India. A significant number of students also pursue their higher studies in renowned foreign universities. Students of this department are working in top MNC's like TCS, CTS, Infosys, Oracle, Accenture, IBM, Wipro, CISCO.

COMPUTER SCIENCE & ENGINEERING

Department Vision:

To produce globally competent engineers to cater the challenging computing needs of the society**.**

Department Mission:

To prepare graduates with

- Sound knowledge of Computer Science and Engineering discipline to solve real world problems.
- Adequate skills and behavior to exhibit code of conduct in their professional practice.

Programme Educational Objectives:

Programme Educational Objectives are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to achieve.

The engineering graduates are prepared to

1. Effectively apply mathematics, science, and engineering methodologies for analysis, design and implementation of real world problems.
2. Utilize breadth and depth of computer science, to adopt emerging tools and technologies for rapidly changing computing needs, of the society or for pursuing higher studies.
3. Demonstrate knowledge and understanding of professional responsibilities, and function in multi disciplinary environments, to have successful professional career.

Program Outcomes:

Program outcomes are narrower statements that describe what students are expected to know and be able to do upon the graduation.

Engineering graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified

needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: 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.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: 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.

11. **Project management and finance**: Demonstrate knowledge and understanding 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.

12. **Life-long learning**: 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.

Program Specific Outcomes:

Engineering graduates will be able to:

1. **Domain Knowledge**: Demonstrate knowledge of design and function of hardware and software components required to process the information.

2. **Problem solving Skills**: Analyze the data, identify required data structures, design suitable algorithms, develop and maintain software for real world problems.

3. **Paradigm shifts:** Understand the paradigm shifts in Computer Science and possess knowledge of context aware applicability of paradigms.

R V R & J C COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-19
(Autonomous)

Computer Science & Engineering

Curriculum Components for B.Tech. Programme
(w.e.f. the Academic year 2016-2017)

Curriculum Component	Number of contact hours	Number of credits	Credits(%)
Basic Sciences (BS)	38	28	14.81
Engineering Sciences (ES)	36	23	12.16
Humanities and Social Science (HS)	22	16	8.47
Program Core (PC)	148	102	53.96
Program Elective (PE)	20	17	8.99
Open Elective (OE)	4	3	1.59
Total	268	189	100

R V R & J C COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-19*(Autonomous)*

(w.e.f. the academic year 2016-2017)

B.Tech., Computer Science & Engineering

I / IV B.Tech. I Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 101	Differential Equations & Transforms	4	-	40	60	3	BS
2	CS/CE/ CHE/EC/ EE/IT/ME 102	Engineering Physics	4	-	40	60	3	BS
3	CS/CE/EC/ EE/IT/ME 103	Applied Chemistry	4	-	40	60	3	BS
4	CS/CHE/ EC/IT 104	Environmental Studies	4	-	40	60	3	HS
5	CS/CE/EE/ IT/ME 105	Problem Solving with C	4+1	-	40	60	3	ES
6	CS/IT 106	Mechanics For Engineers	4	-	40	60	3	ES
7	CS 151	Physics Lab	-	3	40	60	2	BS
8	CS 152	C-Programming Lab	-	3	40	60	2	ES
9	CS 153	Communication Skills Lab	-	3	40	60	2	HS
TOTAL			24+1	9	360	540	24	

I / IV B.Tech. II Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 107	Matrix Algebra & Numerical Analysis	4	-	40	60	3	BS
2	CS/EC/ EE/IT 108	Electronic & Electrical Engineering Materials	4	-	40	60	3	BS
3	CS/CE/EC/ EE/IT/ME 109	Chemistry for Engineering Materials	4	-	40	60	3	BS
4	CS/CHE/ EC/IT 110	English for Communication	4	-	40	60	3	HS
5	CS/IT 111	Object Oriented Programming	4+1	-	40	60	3	PC
6	CS/IT 112	Professional Ethics & Human Values	4	-	40	60	3	HS
7	CS 154	Chemistry Lab	-	3	40	60	2	BS
8	CS 155	Object Oriented Programming Lab	-	3	40	60	2	PC
9	CS 156	Engineering Graphics Lab	2	4	40	60	2	ES
TOTAL			26+1	10	360	540	24	

R V R & J C COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-19*(Autonomous)*
(w.e.f. the academic year 2016-2017)
B.Tech., Computer Science & Engineering

II / IV B.Tech. I Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 201	Probability-Statistics & Random Processes	4	-	40	60	3	BS
2	CS/IT 202	Basic Electrical & Electronics Engineering	4	-	40	60	3	ES
3	CS/IT 203	Digital Logic Design	4	-	40	60	3	ES
4	CS/IT 204	Data Structures	4+1	-	40	60	3	PC
5	CS/IT 205	Computer Organization	4	-	40	60	3	PC
6	CS/IT 206*	Discrete Mathematical Structures	4+1	-	40	60	3	PC
7	CS 251	Basic Electrical & Electronics Engineering Lab	-	3	40	60	2	ES
8	CS 252	Data Structures Lab	-	3	40	60	2	PC
9	CS 253	Professional Communication Skills Lab	-	3	40	60	2	HS
TOTAL			24+2	9	360	540	24	

Enrollment of NCC / NSO /NSS Program initiation from II/IV B.Tech. I semester.

II / IV B.Tech. II Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 207	Number theory & Algebra	4	-	40	60	3	BS
2	CS/IT 208	Microprocessors & Interfacing	4	-	40	60	3	ES
3	CS/IT 209	Theory of Computation	4	-	40	60	3	PC
4	CS/IT 210	Database Management Systems	4+1	-	40	60	3	PC
5	CS/IT 211	Java Programming	4+1	-	40	60	3	PC
6	CS/IT 212*	Operating Systems	4	-	40	60	3	PC
7	CS 254	Microprocessors & Interfacing Lab	-	3	40	60	2	ES
8	CS 255	Database Management Systems Lab	-	3	40	60	2	PC
9	CS 256	Java Programming Lab	-	3	40	60	2	PC
TOTAL			24+2	9	360	540	24	

Enrollment of Internship / Industrial training / Certification course initiation from II/IV B.Tech. II semester

*Subjects offered in both I & II Semesters:
CS 206 : Discrete Mathematical Structures
CS 212 : Operating Systems

R V R & J C COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-19*(Autonomous)*
(w.e.f. the academic year 2016-2017)
B.Tech., Computer Science & Engineering

III/IV B.Tech. I Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 301	Computer Networks	4	-	40	60	3	PC
2	CS/IT 302	Web Technologies	4+1	-	40	60	3	PC
3	CS/IT 303	Design & Analysis of Algorithms	4+1	-	40	60	3	PC
4	CS/IT 304	Unix Programming	4	-	40	60	3	PC
5	CS/IT 305*	Compiler Design	4	-	40	60	3	PC
6	CS/IT 306*	Software Engineering	4	-	40	60	3	PC
7	CS 351	Web Technologies Lab	-	3	40	60	2	PC
8	CS 352	Design & Analysis of Algorithms Lab	-	3	40	60	2	PC
9	CS 353	Unix Programming Lab	-	3	40	60	2	PC
TOTAL			24+2	9	360	540	24	

Enrollment of MOOCs course initiation from III/IV B.Tech. I Semester

III / IV B.Tech. II Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 307	Network Programming	4+1	-	40	60	3	PC
2	CS/IT 308	Data Engineering	4+1	-	40	60	3	PC
3	CS/IT 309	Object Oriented Analysis & Design	4	-	40	60	3	PC
4	CS/IT 310	Cryptography & Network Security	4	-	40	60	3	PC
5	CS/IT 311*	Elective-I	4	-	40	60	3	PE
6	CS/IT 312*	Elective-II	4	-	40	60	3	PE
7	CS 354	Network Programming Lab	-	3	40	60	2	PC
8	CS 355	Data Engineering Lab	-	3	40	60	2	PC
9	CS 356	OOAD Lab	-	3	40	60	2	PC
TOTAL			24+2	9	360	540	24	

NCC / NSO / NSS Program certificate submission on or before last instruction day of III/IV B.Tech. II Semester

*Subjects offered in both I & II Semesters:
CS 305 : Complier Design
CS 306 : Software Engineering
CS 311 : Elective – I
CS 312 : Elective – II

R V R & J C COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-19*(Autonomous)*
(w.e.f. the academic year 2016-2017)
B.Tech., Computer Science & Engineering

IV / IV B.Tech. I Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 401	Distributed Systems	4	-	40	60	3	PC
2	CS/IT 402	Web Services	4+1	-	40	60	3	PC
3	CS/IT 403	MOOCS*	-	-	-	-	-	OE
4	CS/IT 404	Elective-III (Open Elective)	4	-	40	60	3	OE
5	CS 405*	Wireless Networks	4	-	40	60	3	PC
6	CS/IT 406*	Elective-IV	4+1	-	40	60	3	PE
7	CS 451	Term Paper / Mini Project	-	4	100	--	2	PC
8	CS 452	Web Services Lab	--	3	40	60	2	PC
9	CS 453	Elective-IV Lab	-	3	40	60	2	PE
TOTAL			20+2	10	380	420	21	

MOOCs course completion certificate submission on or before last instruction day of IV/IV B.Tech. I semester
Internship / Industrial training / Certification course certificate submission on or before last instruction day of IV/IV B.Tech. I semester

IV / IV B.Tech. II Semester:

S.NO.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK		SCHEME OF EXAMINATION			CATEGORY CODE
			THEORY + TUTORIAL	LAB	INTERNAL MARKS	SEM END EXAM MARKS	CREDITS	
1	CS/IT 407	Industrial Engineering & Management	4	-	40	60	3	HS
2	CS 408	Internet of Things	4	-	40	60	3	PC
3	CS/IT 409*	Elective-V	4	-	40	60	3	PE
4	CS/IT 410*	Elective-VI	4	-	40	60	3	PE
5	CS 454	Internet of Things Lab	-	3	40	60	2	PC
6	CS 455	Project Work	-	6	40	60	10	PC
TOTAL			16	9	360	540	24	

*Subjects offered in both I & II Semesters:

CS 405 : Wireless Networks
CS 406 : Elective – IV
CS 409 : Elective – V
CS 410 : Elective – VI

List of Electives:

Elective-I	CS 311	(A) Artificial Intelligence (CS/IT) (B) Principles of Programming Languages (CS/IT) (C) Software Testing Methodologies (D) Multimedia Computing
Elective-II	CS 312	(A) Embedded Systems (CS/IT) (B) Advanced Databases (CS/IT) (C) Advanced Data Structures (D) Advanced Computer Architecture
Elective-III (Open Elective)	ChE 404	(A) Energy Engineering (B) Bio-Fuels
	CE 404	(A) Basic Surveying (B) Building Materials & Estimation
	EC 404	(A) Applied Electronics (B) Basic Communication
	EE 404	(A) Non-conventional Energy Sources (B) Utilization of Electrical Energy
	ME 404	(A) Robotics (B) Operations Research
Elective-IV	CS 406	(A) Open Source Systems (CS/IT) (B) .NET Technologies (CS/IT) (C) Cyber Security (D) Data Analytics
Elective-V	CS 409	(A) Parallel Algorithms (CS/IT) (B) Digital Image Processing (CS/IT) (C) ARM Processor (D) Big Data Analytics / IRC*
Elective-VI	CS 410	(A) Machine Learning (CS/IT) (B) Semantic Web (CS/IT) (C) Cloud Computing (D) Secure Software Engineering / IRC*

IRC– Industry Recommended Course

I / IV B.Tech I Semester

CS/ IT 101	Differential Equations & Transforms	L	T	P	C
		4	0	0	3

Course Objectives:

1. To acquire knowledge on solving ordinary differential equations.
2. To learn solving higher order ordinary differential equations.
3. To learn solving partial differential equations.
4. To acquire knowledge on Fourier transforms.
5. To learn Laplace and inverse transforms of a function.

Course outcomes:

1. Understand methods of solving first order differential equations.
2. Able to solve higher order differential equations.
3. Able to solve partial differential equations.
4. Find Fourier transforms.
5. Find Laplace and inverse transforms of a function.

Course Content:

UNIT I 12 periods

Differential Equations of First Order: Definition-Formation of differential equation-Equations of first order and first degree: Linear equations, Bernoulli's equation.

Exact differential equations - Equations reducible to exact equations.

UNIT II 12 periods

Linear Differential Equations: Definitions–Operator D–Rules for finding the complementary function–Inverse operator–Rules for finding Particular Integral–working procedure.

Method of variation of parameters–Equations reducible to linear equations with constant coefficients: Cauchy's and Legendre's Linear equations.

UNIT III 12 periods

Partial Differential Equations: Formation - Equations solvable by direct integration-Linear equations of first order- Lagrange's linear equation.

Linear Homogeneous partial differential equations of higher order with constant coefficients.

UNIT IV 12 periods

Laplace Transforms: Introduction-Transforms of elementary functions – Properties of Laplace transforms – Transforms of derivatives and integrals – Multiplication by tn and division by t – Evaluation of integrals by Laplace transforms.
Inverse transforms – Convolution theorem (without proof).

UNIT V 12 periods

Fourier Transforms: Introduction-Fourier integral theorem (without proof)-Fourier sine and cosine integrals-Complex form of Fourier integral-Fourier transform-Fourier Sine and Cosine transforms.

Properties of Fourier transform (without proofs)-Linear-Change of scale-Shifting Convolution theorem (without proof) - Parseval's identity for Fourier transforms.

Learning Resources:

Textbook:

1. Dr. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

Reference Book:

1. Erwin Kreyszig, Advanced Engineering Mathematics.

Web References:

1. www.wikipedia.com
2.NPTEL Lectures (IIT M)

CS/CE/ChE/EC/EE/IT/ME 102	Engineering Physics	L	T	P	C
		4	0	0	3

Course Objectives:

1. To impart knowledge and understanding of basic principles of Ultrasound and its applications in imaging and industry.
2. To understand about basic phenomena of light waves.
3. To understand about fundamentals of Laser, its types and applications. 3-D photography principle and applications of optical fiber.
4. To understand Essential formulation of physics in the micro world.
5. To understand development of Electromagnetic wave equations.

Course Outcomes:

1. Understand the concepts of Ultrasonic waves, production and applications in NDT.
2. Understand the interference in thin films and its application, Concept of diffraction and grating, birefringence and production and detection of different polarized lights.
3. Acquire Knowledge on basics of lasers, holography, fibers and their applications.
4. Understand Schrodinger wave equation and its applications in 1-D with respect to the domain of quantum world.
5. Describe the nature of electromagnetic radiation and matter in terms of the particles.

Course Content:

UNIT I 12 periods

Ultrasonics: Properties, production of ultrasonics by magnetostriction, piezo electric oscillator methods, detection by acoustic grating method, General applications of ultrasonics in industry and medicine.

NDT: Pulse echo testing methods (reflection & transmission modes), Ultrasonic imaging (A Scan & B scan).

UNIT II 12 periods

Physics Optics: **Interference:** Introduction, Stoke's principle (change of phase on reflection), interference in thin films due to reflected light (Cosine law), theory of air wedge (fringes produced by a wedge shaped thin film), theory of Newton's rings(reflected system).

Diffraction: Introduction, Fraunhofer diffraction due to a single slit (quantitative), theory of plane transmission diffraction grating.

Polarization: Introduction, double refraction, construction and working of a nicol prism, quarter wave plate, production and detection of circular and elliptical polarizations (qualitative).

UNIT III 12 periods

Lasers: Characteristics, spontaneous and stimulated emissions, Einstein coefficients and Relation between them, population inversion, pumping, active system, gas (He-Ne) laser, Nd: YAG laser and semiconductor (GaAs) laser, applications of lasers.

Holography: basic principle, recording, reproduction and applications.

Fiber optics: Principle & structure of an optical fiber, numerical aperture, acceptance angle and acceptance cone, fractional index change, types of optical fibers, fiber optics in communication system and its advantages, Applications of optical fibers.

UNIT IV 12 periods

Principles of Quantum Mechanics: De Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle-experimental verification (electron diffraction - single slit),

Schrodinger equation and application: Time independent Schrodinger's wave equation, physical significance of the wave function, particle in a box (one dimensional), tunneling effect, expression for transition probability (Qualitative treatment).

UNIT V 12 periods

Electromagnetism: Induced electric fields, displacement current and conduction current, Maxwell's equation – qualitative (differential & integral forms)-significance, velocity of electromagnetic wave equation in free space, Poynting Theorem, LC oscillations (quantitative)

Learning Resources:

Text Books

1. M.N. Avadhanulu & P.G. Kshirasagar, Engineering Physics, S.Chand & Co.Ltd.
2. V. Rajendran, Engineering Physics

Reference Books

1. Resnick & Halliday, Fundamentals of Physics, John Wiley sons.
2. SL Kakani & Shubhrakakani, Engineering Physics (3rd Edition), CBS Publications Pvt. Ltd. Delhi.
3. B. K. Pandey & S. Chaturvedi, Engineering Physics, Cengage Learning India Pvt. Ltd., Delhi.
4. Hitendra K. Malik & A.K.Singh, Engineering Physics, Tata MacGraw Hill, New Delhi.
5. P.K.Palanisamy, Engineering Physics, Scitech Publications

Web Reference:

1.http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Guwahati/engg_physics/index_cont.htm

CS/CE/EC/EE/IT/ME 103	Applied Chemistry	L	T	P	C
		4	0	0	3

Course Objectives:

1. To know the softening methods and quality parameters of water used in industries.
2. To know the requirements and purification methods of drinking water.
3. To understand the construction and functioning of electrochemical energy systems.
4. To study the mechanisms, types, factors influencing corrosion and protection methods of corrosion.
5. To acquire knowledge on latest analytical techniques.

Course Outcomes:

1. Acquire knowledge on quality and utility of water in industries.
2. Gain knowledge on water treatment for drinking purpose.
3. Understand functioning of electrochemical energy systems.
4. Relate corrosion and environment and suggest methods to prevent corrosion.
5. Analyze substances using techniques like Spectrophotometry, Colorimetry, Conductometry and Potentiometry.

Course Content:

UNITI Text Book 1 12 periods

Water Technology: Types of Hardness- units and determination by EDTA method (simple problems),Water technology for industrial purpose: Boiler troubles- scales, sludges, caustic Embrittlement, boiler corrosion, priming and foaming- causes and prevention.

Internal conditioning-phosphate, calgon and carbonate treatment. External conditioning-lime soda process (simple problems), softening by ion exchange process. Desalination of brackish water by electro dialysis and reverse osmosis**.**

UNIT II Text Book 1 12 periods

Water treatment for drinking purpose- WHO guidelines, sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Phase Rule: Statement and explanation of the terms involved, one component water system, condensed phase rule- construction of phase diagram by thermal analysis, simple eutectic system (Pb-Ag system only), applications eutectic compounds.

UNIT III Text Book 1 12 periods

Electrochemistry: Electrode potential, electrochemical series and its significance, Nernst equation-derivation-related problems, Reference electrodes (SHE and Calomel electrode) Ion-selective electrode-glass electrode and measurement of pH.

Electrochemical Energy Systems: Types of electrochemical energy systems, electrochemistry of primary batteries (Lachlanche or dry cell), Secondary cells (Lead Acid

cell, Ni-Cd cell), Lithium batteries (Li-MnO_2, Lithium organic electrolyte) and their advantages. Fuel cells (Oxygen-Hydrogen)

UNITIV Text Book 1 12 periods

Corrosion and its control: Introduction, dry corrosion, electrochemical theory of corrosion, Types of corrosion- differential aeration, galvanic (galvanic series) and Stress corrosion Factors affecting corrosion-design, pH, over voltage and temperature.

Protection methods: Cathodic protection, (Impressed current and sacrificial anode) corrosion inhibitors- types and mechanism of inhibition, metallic coatings-Galvanization, Tinning, Electroplating (Cu) and electro less plating (Ni)

UNIT V Text Books 1, 2 12 periods

Analytical Techniques: Spectroscopy- Beer-Lambert's law, UV-electronic transitions-chromophores-auxochromes-shifts, and IR- modes of vibrations, ex.H_2O, CO_2 Instrumentation of UV and IR

Colorimetry- estimation of Iron, Conductometric (HClvsNaOH) and potentiometric titrations (Fe(II)vs $K_2Cr_2O_7$)

Learning Resources:

Text Books:

1. P.C. Jain and Monika Jain, Engineering Chemistry, 15th Edition, 2008, Dhanpat Rai Publishing Company, New Delhi.
2. ShashiChawla, A Text Book of Engineering Chemistry, 3rd Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi.

Reference book:

1. S.S. Dara and S.S. Umare, A Text Book of Engineering Chemistry, 12th Edition, 2010, S.Chand and Co.Ltd.

Web references:

1.http://www.powerstream.com/BatteryFAQ.html#lec
2.http://freevideolectures.com/Course/3029/Modern-Instrumental-Methods-of-Analysis
3.http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/EngineeringChemistry2011

CS/ChE/EC/IT 104	Environmental Studies	L	T	P	C
		4	0	0	3

Course Objectives:

1. To give a comprehensive insight into natural resources, ecosystems and bio-diversity.
2. To create an awareness on various aspects of environmental pollution and effects.
3. To educate the ways and means to protect the environment from pollution.
4. To impart fundamental knowledge on human welfare and environmental acts.
5. To demonstrate the environmental problems like global warming, ozone layer depletion, acid rains.

Course Outcomes:

1. Define and explain the basic issues concerning the ability of the human community to interact in a sustainable way with the environment.
2. Describe and discuss the environmental implications of biologically important materials through the ecosystems.
3. Describe and discuss the environmental pollution implications and watershed management.
4. Discuss the benefits of sustaining each of the following resources - food, health, habitats, energy, water, air, soil and minerals.
5. Understand the causes, effects and controlling measures of different types of environmental pollutions with some case studies.

Course Content:

UNIT I Text books 1, 2 12 periods

Introduction: Definition, Multidisciplinary nature, Scope and Importance of environmental studies.

Natural Resources: Forest Resources: Use and over-exploitation, Deforestation, Effects of Mining and Big dams on forests and tribal people. Water Resources: Use and over-utilization of surface and groundwater, floods and droughts, Water logging and salinity, Conflicts over water. Energy resources: Renewable and non-renewable Energy sources; Land as a resource, land degradation, Soil erosion & Desertification.

UNIT II Text books 1, 2 12 periods

Ecosystems: Definition, Structure and functions of Ecosystems, a general account of types of ecosystems with examples. Bio-geo chemical cycles (water, carbon, and nitrogen).

Biodiversity and its Conservation: Definition of Biodiversity, Values and threats to biodiversity and conservation of biodiversity. Bio-geographical classification of India, India as a mega-diversity nation, Hot-spots of biodiversity, IUCN classification of Biodiversity, Endemic, Exotic and Endangered species – Meaning with a few examples from India.

UNIT III Text books 1, 2 12 periods

Environmental Pollution: Causes, effects and control measures of Air pollution including Noise, Fresh Water pollution, Marine pollution, Thermal pollution, and nuclear pollution. Solid

wastes – Types based on source (Ex. municipal, industrial, constructional and medical) and nature (degradable and non-degradable); Effects of improper dumping. Solid waste management – Objectives, practices.

Water shed and its management: Definition and importance, Water shed management methods including rain water harvestment.

UNIT IV Text books 1, 2 12 periods

Social Issues and Environment: Definition of sustainable development, key types and measures for sustainable development; salient features of Stockholm conference 1972, Earth summit, 1992; Human Population and environment, Green revolution, Resettlement and rehabilitation of people - problems and concerns.

Climate Changes: Green House Gases, Kyoto Protocol, Global warming (The story of Tuvalu), Ozone depletion and Acid rain, Environmental Impact Assessment.

UNIT V Text books 1, 2 12 periods

Environmental acts: Environmental Legislation, Wild life protection act, 1972; Water (Prevention and Control of pollution) act, 1974; Forest Conservation act, 1980; Air (Prevention and Control of pollution) act, 1981; Environmental protection act, 1986.

Case Studies
Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Chernobyl Nuclear Disaster, Bhopal Tragedy, Ralegaon Siddhi, The story of Ganga.

Field work (For Internal Evaluation only)
Visit to a local area to document environmental assets - river/ forest/grassland / hill /mountain.
Study of local environment-common plants, insects, birds.
Study of simple ecosystems - pond, river, hill, slopes etc.
Visits to industries, water treatment plants, and effluent treatment plants.

Learning Resources:

Text Books:
1. Anubha Kaushik and C.P.Kaushik, Environmental Studies, 3rd Edition, New Age International Publishers, New Delhi, 2012.
2. R. Rajagopalan, Environmental studies from crisis to cure, 3rd Edition, Oxford University press, 2012.

Reference Books:
1. T Benny Joseph, Environmental Studies, Tata McGraw-Hill Publishing Company Limited, 2006.
2. G. Tyler Miller Jr., Environmental Science, 3rd edition, Cengage Learning, New Delhi, 2011.

Web References:
1. http://nptel.ac.in/courses/120108004/
2. http://www.nptel.ac.in/courses/122102006/

CS/CE/EE/IT/ME 105	Problem Solving with C	L	T	P	C
		4	1	0	3

Course Objectives:

1. To know the basic problem solving process using Flow Charts and algorithms.
2. To understand the basic concepts of control structures in C.
3. To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. To use the concepts of structures, unions, files and command line arguments in C.

Course Outcomes:

1. Develop algorithms and flow charts for simple problems.
2. Use suitable control structures for developing code in C.
3. Design modular programs using the concepts of functions and arrays.
4. Design well-structured programs using the concepts of structures and pointers.
5. Develop code for complex applications using file handling features.

Course Content:

UNIT I 12 periods

Introduction: Computer & it's Components, Hardware , Software, programming languages, Algorithm, Characteristics of algorithm, Flowchart, Symbols used in flowchart, history of C, structure of C program, C language features.

C Tokens: Character set, Identifiers, Keywords, constants, Data types, type qualifiers, Declaration and Initialization of variables.

Operators & Expressions: C operators and expressions, Type-conversion methods, Operators Precedence and Associativity, Input/ Output functions and other library functions.

Programming Exercises: C-Expressions for algebraic expressions, Evaluation of arithmetic and Boolean expressions. Values of variables at the end of execution of a program fragment, Computation of values using scientific and engineering formulae.

UNIT II 12 periods

Control Statements: If-Else statement, Else-If statement, Switch statement and goto statement.

Control Statements: Looping- While, Do-While and for statements, Break and continue statements.

Programming Exercises: Finding the largest of three given numbers, Computation of discount on different types of products with different ranges of discount, finding the type of triangle formed by the given sides, Computation of income-tax, Computation of Electricity bill, finding roots of a quadratic equation. Finding the factorial of a given number, test whether a given number is-prime, perfect, palindrome or not, Generation of prime and Fibonacci numbers.

UNIT III 12 periods

Arrays: One - dimensional, Two-dimensional numeric and character arrays.

Functions: Function Definition, Function prototype, types of User Defined Functions, Function calling mechanisms, Built-in string handling and character handling functions, recursion, Storage Classes, multi-file compilation, Function with Arrays.

Programming Exercises: Computation of statistical parameters of a list of numbers, sorting and searching a given list of numbers, Operations on Matrices such as addition, multiplication, Transpose of a matrix. Finding whether a given string is palindrome or not, sorting of names, operations on strings with and without using library functions, recursive functions to find the factorial value, Fibonacci series, GCD, swapping of two variables, calling the function by passing arrays.

UNIT IV 12 periods

Pointers: Pointer, Accessing a variable through pointer, pointer Arithmetic, pointer and Arrays, Dynamic memory allocation, pointer to pointer, Array of pointers.

Structures: Structures, Nested structures, Array of structures, Pointer to structures, passing structures to functions, self referential structure, Unions.

Programming Exercises: Sort and search the given list using functions and pointers, operations on arrays using functions and pointers. Operations on complex numbers, maintaining the books details by passing array of structures to functions, sorting the list of records.

UNIT V 12 periods

Files: defining and opening a file, closing a file, input/output operations on files using file handling functions, random access to files.

Files: Command line arguments, C-preprocessor directives.

Programming Exercises: create and display the contents of text file, copy the contents of one file into another, merging the contents of two files, writing, reading and updating the student records in a file, programs to display the contents of a file and copy the contents of one file into other using command line arguments.

Learning Resources:

Text Book:

1. Programming with C (Schaum's Outlines) by Byron Gottfried, Third Edition, Tata McGraw-Hill.

Reference Books:

1. Programming in C by Stephen G. Kochan, Fourth Edition, Pearson
2. C Complete Reference, Herbert Sheildt, TMH., 2000.
3. Programming with C by K R Venugopal & Sudeep R Prasad, TMH., 1997.
4. The C programming Language by Brian W. Kernighan & Dennis M. Ritchie, Second Edition, Prentice Hall.

Web References:

1. http://cprogramminglanguage.net/
2. http://lectures-c.blogspot.com/
3. http://www.coronadoenterprises.com/tutorials/c/c_intro.htm
4. http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

CS/IT 106	Mechanics for Engineers	L	T	P	C
		4	0	0	3

Course Objectives:

1. To study various types of force systems, basic principles of mechanics of rigid bodies and to analyze problems in a simple and logical manner.
2. To analyze simple trusses using method of joints.
3. To study and determine centroids and center of gravity of various standard geometrical shapes.
4. To learn basic concepts of dry friction on inclined planes and wedges.
5. To develop an understanding of rectilinear and curvilinear translation of a particle.
6. To study and analyze the rotation of a rigid body about a fixed axis.
7. To study the concept of moment of inertia and the mathematical calculations involved in finding moments of inertia of two dimensional areas and material bodies.

Course Outcomes:

1. Apply principles of mechanics to determine the resultant of several forces acting on a plane.
2. Determine the axial forces in the members of simple trusses using method of joints.
3. Determine the centroids and center of gravity of mathematically definable areas as well as composite areas of standard geometrical shapes.
4. Analyze the problems involving dry frictional contact and wedge friction
5. Apply dynamic Equilibrium Equation for rigid bodies under rectilinear and curvilinear translation
6. Understand kinematics and kinetics of rotation of a rigid body about a fixed axis.
7. Calculate the moment of inertia of composite areas and material bodies of standard shapes.

Course Content:

UNIT I Text books 1, 2 12 periods

Concurrent Forces in a Plane: Principles of statics, composition and resolution of forces, equilibrium of concurrent forces in a plane, method of projections, Method of moments.

Non Concurrent Forces in a Plane: Couple, equilibrium of parallel forces in a plane, resultant and equilibrium of general case of forces in a plane, plane trusses-method of joints.

UNIT II Text books 1, 2 12 periods

Centroid and Centre of Gravity: Concept of centroid and center of gravity, Centroids of simple figures from basic principles, centroids of composite plane figures.

Friction: Types of friction, laws of friction, simple contact friction, wedge friction.

UNIT III Text books 1, 2 12 periods

Moment of Inertia of Plane Figures: Moment of inertia of a plane figure with respect to an axis in its plane, polar moment of inertia, parallel axis theorem, moment of inertia of standard sections by integration, Moment of inertia of composite areas.

UNIT IV Text books 1, 2 12 periods

Rectilinear Motion: Kinematics of rectilinear motion, D'Alemberts principle, work and energy, impulse and momentum, direct central impact.

Curvilinear Motion: Kinematics of curvilinear motion, D'Alembert's principle in curvilinear motion.

UNIT V Text books 1, 2 12 periods

Moment of Inertia of Material Bodies: Moment of inertia of a rigid body, Moment of inertia of a lamina, Moments of inertia of three – dimensional bodies (sphere, right circular cone and cylinder).

Rotation of a Rigid Body about a Fixed Axis: Kinematics of rotation, Equation of motion for a rigid body rotating about a fixed axis.

Learning Resources:

Text Books:

1. S. Timoshenko, D. H. Young, J V Rao and Sukumar Pati, Engineering Mechanics, 5th edition, McGraw Hill Education (India) Private Limited, (For concepts).
2. A.K.Tayal, Engineering mechanics-statics and dynamics, 14th edition, Umesh publications (For numerical problems)

Reference Books:

1. S.S.Bhavikatti, Engineering Mechanics, 4th edition, New Age international Publishers
2. K.Vijaya Kumar Reddy and J Suresh Kumar, Singer's Engineering Mechanics: Statics and Dynamics, 3rd Edition SI Units - BSP Books Pvt. Ltd. Publications.
3. J. L. Meriam and L. Kraige, A textbook of Engineering mechanics statics and dynamics

Web References:

1. www.learnerstv.com / Free-Engineering-Video-lecture-Courses.htm
2. htpp://nptel.iitm.ac.in/
3. http://en.wikibooks.org/wiki/statics

CS 151	Physics Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To give background in experimental techniques and to reinforce instruction in physical principles.
2. To find measurement, data, error, or graphical analysis in addition to illustrating a physical principle.
3. To give skills that can transfer critical thinking into problem solving methods. How to identify what data is important, how to collect that data, and then draw conclusions from it.

Course Outcomes:

1. Use CRO, signal generator, spectrometer for making measurements.
2. Test the optical components using principles of interference & diffraction.
3. Determination of the selectivity parameter in electrical circuits.

(Any 10 out of the following experiments)

1. Interference fringes – measurement of thickness of a foil using wedge method.
2. Newton's rings - measurement of radius of curvature of Plano- convex lens.
3. Lissajous' figures – calibration of an audio oscillator.
4. Photo cell – characteristic curves and determination of stopping potential.
5. Diffraction grating - measurement of wavelengths.
6. Torsional pendulum – determination of Rigidity modulus of a wire.
7. Photo-Voltaic cell – determination of fill factor.
8. Series LCR resonance circuit –determination of Q factor.
9. Sonometer – determination of A.C. frequency.
10. Laser- determination of wave length using diffraction grating.
11. Variation of magnetic field along the axis of a circular current carrying coil.
12. Optical Fiber – Determination of Numerical Aperture and Acceptance Angle

Reference Book:

Physics Lab Manual, R.V.R. & J.C. C.E, Guntur

Note: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 152	C - Programming Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To know the fundamentals of C and working with ANSI C/Turbo C compilers.
2. To understand the basic concepts of control structures in C.
3. To learn the concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. To use the concepts of structures, unions, files and command line arguments in C.

Course Outcomes:

1. Write simple programs using C fundamentals and control statements.
2. Develop various menu driven programs using concepts of control statements, arrays, functions and pointers.
3. Use dynamic memory allocation for efficient memory management.
4. Develop well-structured programs using the concepts of structures, unions and file handling features.
5. Design applications using C.

List of Programs:

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement or Switch statement).

Domestic level consumption as follows	
Consumption units	Rate of charges(Rs.)
0-200	0.50 per unit
201-400	100 plus 0.65 per unit
401-600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Street level consumption as follows	
Consumption units	Rate of charges(Rs.)
0-100	0.50 per unit
101-200	50 plus 0.60 per unit
201-300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the following (using loops):
   a) $x-x^3/3!+x^5/5!-x^7/7!+$----------up to n terms
   b) $1+x+x^2/2!+x^3/3!+$----------up to n terms
   c) $1-x^2/2!+x^4/4!-x^6/6!+$----------up to n terms

3. A menu driven program to test whether a given number is (using Loops):
   a) Prime or not
   b) Perfect or not
   c) Armstrong or not
   d) Strong or not
   e) Palindrome or not

4. A menu driven program to display statistical parameters (using one - dimensional array)
   a) Mean
   b) Median
   c) Mode
   d) Standard deviation

5. A menu driven program to perform the following operations in a list (using one -Dimensional array)
   a) Insertion of an element
   b) Deletion of an element
   c) Remove duplicates form the list
   d) Print the list

6. A menu driven program with options (using two dimensional arrays)
   a) To compute A+B
   b) To compute A x B
   c) To find transpose of matrix A.
      Where A and B are matrices.

7. Write C programs to perform the following using Strings
   a) To test the given string is palindrome or not
   b) To sort strings in alphabetical order

8. Write C programs using recursive functions
   a) To find the Factorial value
   b) To generate Fibonacci series
   c) To find the GCD of two given numbers

9. A menu driven program with options (using dynamic memory allocation)
   a) Linear search
   b) Binary search

10. A menu driven program with options (using Character array of pointers)
    a) To insert a student name
    b) To delete a name
    c) To sort names in alphabetical order
    d) To print list of names

11. Write a program to perform the following operations on Complex numbers (using Structures & pointers):
    a) Read a Complex number
    b) Addition, subtraction and multiplication of two complex numbers
    c) Display a Complex number

12. Write C programs to perform the following operations on files
    a) merging the contents of two files
    b) writing, reading and updating student records in a file
    c) Copy the contents of one file into another using command line arguments

Note: A minimum of 10(Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 153	Communication Skills Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To acquaint the students with the Standard English pronunciation, i.e., Received Pronunciation (RP), with the knowledge of stress and intonation.
2. To develop the art of effective reading and answer comprehension passages.
3. To enable the students use phrasal verbs and idiomatic expressions in an apt manner.
4. To equip with appropriate and spontaneous speech dynamics.
5. To develop production and process of language useful for social and professional life.

Course Outcomes:

1. Know the IPA phonetics symbols and their relation to pronunciation; recognize the difference among the native, regional and neutral accent of English.
2. Employ different skills, inferring lexical and contextual meaning and attempt comprehension passages.
3. Use confidently phrases and idioms for effective communication.
4. Develop appropriate speech dynamics in professional situations.
5. Focus on communication skills and social graces necessary for effective communication.

List of Activities:

1. Phonetics:
(i) Sounds, Symbols, Stress and Intonation.
(ii) Pronunciation – Mother tongue influence – Indianisms etc.

2. Reading Comprehension:
Strategies, Reading skills – Skimming and Scanning, Intensive and Extensive reading.

3. Idioms & Phrases: Idioms of variety.

4. Interactive classroom activities:
Jam– (Guided & Free) – Extempore –Elocution – Telephonic Skills.
Articulation and flow of oral presentation – voice modulation – content generation – Key Word Approach(KWA).

5. Communication Skills:
Greeting and Introducing; Making Requests; Agreeing and disagreeing; Asking for and giving permissions; Offering help; Art of small talk; making a short formal speech; Describing people, places, events & things.

Reference books:
1. G. Raja Gopal, A Course in Listening & Speaking II, Foundation books 2012. (Unit I & Unit IV)
2. Books on GRE, IELTS & TOEFEL (Unit II)
3. Jennifer Seidl W. McMordie, English Idioms, OUP, V Edition , 2009
4. Interactive classroom activities. (10 titles -CUP) (Unit IV)
5. KiranmaiDutt, Rajeevan, C.L.N Prakash, A course in English Communication 2013. (Unit V).
6. J.D.O' Connor, Better English Pronunciation, Second Edition, 2009, Cambridge Semester Press. (Unit I).

Software:
1. Pronunciation power I & II
2. Author plus - Clarity.
3. Call Centre Communication - Clarity.

I / IV B.Tech II Semester

CS / IT 107	Matrix Algebra & Numerical Analysis	L	T	P	C
		4	0	0	3

Course Objectives:

1. Finding the Eigen values and Eigen vectors and inverse of a matrix and getting familiarity with diagonalization and quadratic forms.
2. To give basic knowledge on evaluation of double, triple integrals, area and volume.
3. To provide sufficient theoretical and analytical background of differentiation and integration of vector functions.
4. To provide basic knowledge of numerical methods including solving systems of linear equations.
5. To provide knowledge on numerical differentiation and integration.

Course outcomes:

1. Understand the basic linear algebraic concepts.
2. Evaluate double, triple integrals and the area, volume by double & triple integrals respectively.
3. Solve gradient, divergence, curl and integration of vector function problems.
4. Solve system of equations.
5. Evaluate derivatives and integrals using numerical techniques.

Course Content:

UNIT I 12 periods

Matrices: Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values (without proofs) – Cayley – Hamilton theorem (without proof).
Reduction to diagonal form, Reduction of quadratic form to canonical form by orthogonal transformations, Nature of a quadratic form.

UNIT II 12 periods

Multiple Integrals: Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral.
Triple integration in Cartesian coordinates – Change of variables in double integrals from Cartesian to polar – Volume as a Triple Integral.

UNIT III 12 periods

Vector Calculus: Gradient, Directional derivatives, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof).
Line, surface and volume integrals – Green's theorem in the plane, Stoke's theorem and Gauss divergence theorem (without proofs).

UNIT IV 12 periods

Numerical Solution of Equations and Interpolation: Newton - Raphson method – Gauss Seidel method. Forward and backward differences – Differences of a polynomial.
Interpolation – Newton-Gregory Forward and Backward Interpolation formulae (without proof), Lagrange's Interpolation formula (without proof) – Inverse interpolation.

UNIT V 12 periods

Numerical differentiation and Integration: Newton's forward and backward differences formulae to compute first and second order derivatives.
Trapezoidal rule – Simpson's one third rule.

Learning Resources:

Text Book:

1. Dr. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

Reference Book:

1. Erwin Kreyszig, Advanced Engineering Mathematics.

Web Reference:

1. https://drive.google.com/file/d/0B0vdR_jt9M--YkVMTjV0eVFMNWc/edit?pli=1

CS/ EC/EE/IT 108	Electronic & Electrical Engineering Materials	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand the concept of electron motion in a periodic potential and classification of solids through bands and intrinsic and extrinsic semiconductors and their carrier densities.
2. To understanding Energy level diagrams in PN junction, its characteristic equation and the related optoelectronic devices.
3. To understand Basics of Dielectrics and magnetism, Classification of materials on Polarization and Magnetization and applications.
4. To understand Properties and applications of super conductors.
5. To understand Nano materials and characterization with X-rays and electron probe techniques.

Course Outcomes:

1. Understand the nature of formation of bands in solid and classifying the solids, Importance of Fermi level and law of mass action in semiconductors.
2. Understand theory of P-N junction and the devices.
3. Acquire knowledge on Importance of polarization and magnetization phenomena and their applications.
4. Acquire knowledge on Relevance of superconductivity and its applications.
5. Acquire knowledge on Nano material and their characterization principles.

Course Content:

UNIT I Text book1 12 periods

Electron theory of solids: Failures of Classical free electron theory and quantum free electron theory (qualitative), Bloch theorem (Qualitative), Kronig-Penney model (Qualitative treatment), effective mass of electron, energy band formation in solids, Classification of solids into metals, semiconductors and insulators.

Semiconductor Physics: Intrinsic & extrinsic semiconductors, density of states, derivation for intrinsic& extrinsic carrier concentration (P Type & N-type), location of Fermi level, Hall effect and its uses, direct & indirect band gap semiconductors, donor and acceptor energy levels, charge neutrality, law of mass action.

UNIT II Text book1 12 periods

Physics of Semiconductor materials: Drift and Diffusion current, Continuity equation Formation of P-N junction, energy level diagram and built in potential, I-V Characteristics of P-N junction diode, Photodiode, LED, LCD, solar cell (qualitative).

Unit III Text book1 12 periods

Magnetic Materials: Introduction, origin of magnetic moment, Langevin's theory of paramagnetism, weiss theory of ferromagnetism, hysteresis curve, soft and hard magnetic materials, Ferrites and their applications.

Dielectric Materials: Fundamental definitions: Electric dipole moment, polarization vector, polarizability, electric displacement, dielectric constant and electric susceptibility. Types of polarizations - Electric and ionic polarizations, internal fields in solids (Lorentz method), Clausius-Mossotti equation, Frequency dependence of polarization, loss tangent, and dielectric loss, Ferroelectrics and their applications.

UNITIV Text book1 12 periods

Superconducting materials: Introduction, critical parameters (Tc, Hc, Ic), Meissner effect, types of superconductors, entropy, specific heat, energy gap, BCS Theory(in brief), Josephson effect, London equation and penetration depth, high temperature superconductors, applications of superconductors.

UNITV Text book1 12 periods

Nano materials: Introduction to nano materials, surface to volume ratio, General properties of nano materials in brief, fabrication of nano materials (sol-gel and chemical vapour deposition methods), applications of nano materials.

Characterization techniques: XRD, SEM, STEM, AFM

Learning Resources:

Text Books:

1. V. Rajendran, Engineering Physics
2. M.N.Avadhanulu & P.G. Kshirasagar, Engineering Physics, S.Chand & Co.Ltd.

Reference Books:

1. M. Vijaya and G. Rangarajan, Materials science, McGraw Hill Education, 2014.
2. S.O. Pillai, Solid State physics
3. R.K.Puri and V.K.Bubber, Solid state physics and Electronics

Web Resource:

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

CS/CE/EC/EE/IT/ME 109 Chemistry for Engineering Materials

L	T	P	C
4	0	0	3

Course Objectives:

1. To acquire knowledge on formation of polymers and conditions to act as conducting polymers.
2. To gain knowledge on the chemistry of some important plastics and rubbers commonly used.
3. To understand parameters related to efficiency of various fuels.
4. To gain knowledge on the characteristics of refractories and lubricants.
5. To understand the requirements and chemistry of explosives and utility of liquid crystals.

Course Outcomes:

1. Know the formation of polymers and the utility of conducting polymers in electronics, electrical and other fields.
2. Know usage of plastics and elastomers in day-to-day life and in fields like automobile, electronics, etc.
3. Acquire knowledge on composition, quality and uses of various fuels.
4. Capable of selecting appropriate lubricant for a given system, and know the characteristics and utility of refractories.
5. acquire knowledge on the requirements, applications of liquid crystals and explosives.

Course Content:

UNIT I Text books 1, 2 12 periods

Polymers: Monomer functionality, degree of polymerization, Tacticity, classification of polymerization- addition, condensation and co-polymerization, mechanism of free radical polymerization.

Conducting polymers: Introduction, examples and applications, Polyacetylene- mechanism of conduction.

UNIT II Text book 1 12 periods

Plastics: Thermoplastic and thermosetting resins, preparation, properties and uses of Bakelite, polyesters, Teflon and PVC, Compounding of plastics.

Rubber: Processing of latex, Drawbacks of natural rubber- Vulcanization, Chemistry of Synthetic rubbers- Buna-S and Buna-N, polyurethane rubber and silicone rubber, epoxy & resins (adhesive)

UNIT III Text book 1 12 periods

Fuels: Classification of fuels, calorific value- LCV and HCV-units and determination by Bomb calorimeter, Coal- Ranking, proximate and ultimate analysis, carbonization of coal-types (using Beehive oven), Metallurgical coke-properties and uses.

Petroleum based: Fractional distillation, cracking-fixed bed, reforming, octane number and cetane number of liquid fuels, composition and uses of petrol, diesel**,** CNG and LPG.

UNIT IV Text books 1, 2 12 periods

Refractories: Characteristics, classification, properties and their significance refractoriness, strength of refractoriness under load, dimensional stability, thermal spalling, thermal expansion, thermal conductivity, porosity Common refractory bricks- silica, fire clay and carborundum.

Lubricants: Classification, functions, properties of lubricants- Viscosity, Viscosity index, Flash point, Fire point, Cloud point, Pour point, Oilyness. Solid lubricants –Graphite and Molybdenum sulphide, Additives, determination of viscosity by Red wood viscometer.

UNIT V Textbook 1 12 periods

Liquid crystals: Structure of liquid crystal forming compounds, Classification and applications

Explosives: Characteristics, terms related to explosives, classification-primary, low and high explosives. Manufacture of gun powder, lead azide, nitroglycerine and RDX.

Learning Resources:

Text Books:

1. P.C. Jain and Monika Jain, Engineering Chemistry, 15th Edition, 2008, Dhanpat Rai Publishing Company, New Delhi.
2. Shashi Chawla, A Text Book of Engineering Chemistry, 3rd Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi.

Reference Books:

1. S.Chand and Co.Ltd., A Text Book of Engineering Chemistry, 12th Edition, 2010
2. P.Bahadur and N.V. Sastry, Principles of Polymer Science, Narora Publishing House

Web References:

1.http://www.wiziq.com/tutorial/ http://www.chem1.com/acad/webtext/states/polymers.html
2.http://freevideolectures.com/Course/3029/Modern-Instrumental-Methodsof-Analysis
3.http://www.cdeep.iitb.ac.in/nptel/Core%20Science/

CS/ChE/EC/IT 110	English for Communication	L	T	P	C
		4	0	0	3

Course Objectives:

- To enable students improve their lexical and communicative competence.
- To equip students with oral and written communication skills.
- To help students understand and learn the correct usage and application of Grammar principles.
- To get them acquainted with the features of successful professional communication.
- To enable students acquire various specific features of effective written communication.

Course Outcomes:
At the end of the course, the student will be able to:

- Use vocabulary contextually.
- Compose effectively the various forms of professional communication.
- Apply grammar rules efficiently in spoken and written forms.
- Understand and overcome the barriers in communication.
- Develop professional writing.

Course Content:

UNIT I 12 periods

Lexis:

a. i. Synonyms & Antonyms ii. Words often confused
b. i. One Word Substitutes ii. Analogies

UNIT II 12 periods

Written Communication:

a. Note-taking & Note-making
b. Writing a Proposal
c. Memo Writing
d. Paragraph writing

UNIT III 12 periods

Principles of Grammar:

Exposure to basics of grammar with emphasis on

a. Articles & Prepositions
b. Tenses
c. Voice
d. Speech

UNIT IV 12 periods

Communication:

Types: Oral & Written – Barriers to communication – Non-verbal Communication - Kinesics, Proxemics, Occulesics, Haptics

UNIT V 12 periods

Composition:

a) E-mail
b) Letter-writing: order, complaint, job application, invitation.
c) Precis writing
d) Biographical writing:
   i. APJ Abdul Kalam
   ii. Ratan Tata
   iii. Sudha Murthy
   iv. Mother Teresa

Learning Resources:

Text Books:

1. Technical English - by Dr. M. Sambaiah, Wiley India Pvt. Ltd, New Delhi 2015.
2. Communication Skills – OUP, by Sanjay Kumar & Pushpa Latha
   (This text is prescribed for the topics; (1) One Word Substitutes (2) Note-taking and (3) Haptics.)

Reference Books:

1. Dictionary of Synonyms and Antonyms, Oxford & IBH, III Ed
2. Objective English III Edition, Mc-Graw Hill Companies- by Hari Mohan Prasad, Uma Rani Sharma.
3. Technical Communication – Principles & Practice. II Ed, by Meenakshi Raman & Sangeetha Sharma
4. Oxford Michael Swan- Practical English Usage – III Ed . New international Students ' Ed,OUP.
5. Business Communication II Ed. Meenakshi Raman & Prakash Singh, OUP.
6. Handouts.
7. A course in English Communication – by Kiranmai Dutt, Rajeevan, C.L.N Prakash.
8. The Most Common Mistakes in English Usage – Thomas Elliott Berry.

CS/IT 111	Object Oriented Programming	L	T	P	C
		4	1	0	3

Course Objectives:

1. To know Object Oriented Programming features of C++.
2. To understand the concepts of encapsulation and compile time polymorphism.
3. To learn the concepts inheritance and Runtime polymorphism.
4. To use the concepts of templates and exception handling.
5. To understand the disk access through C++ I/O and other advanced concepts.

Course Outcomes:

1. Describe basic Object Oriented features of C++.
2. Apply the concept of encapsulation and compile time polymorphism.
3. Implement the concepts of Inheritance and Runtime polymorphism.
4. Use the concepts of exception handling and Templates.
5. Develop applications using C++ File I/O and other advanced concepts.

Course Content:

UNIT I 15 periods

An Overview of C++: The Origins of C++, What is Object Oriented Programming, some C++ fundamentals, Old-Style Vs Modern C++, Introducing C++ Classes, Function Overloading, Operator Overloading, Inheritance, Constructors and Destructors, The C++ Keywords, The General Form of a C++ Program.

Classes and Objects: Classes, Structures and Classes, Unions and Classes are Related, Friend Functions, Friend Classes, Inline Functions, Parameterized Constructors, Static Class Members, When Constructors and Destructors are Executed, Scope Resolution Operator, Nested Classes, Local Classes, Passing and Returning Objects, Object Assignment.

Arrays, Pointers, References and the Dynamic Allocation: Arrays of Objects, Pointers, References, Dynamic Allocation Operators, and the Placement Forms of new and delete.

UNIT II 15 periods

Function Overloading, Copy Constructors and Default Arguments: Function Overloading, Overloading Constructor Functions, Copy Constructors, Finding the Address of an Overloaded Function, Overload Anachronism, Default Arguments, Function Overloading and Ambiguity.

Operator Overloading: Creating Member Operator Function, Overloading Using a Friend Function, Overloading new delete, Overloading Special Operators & Comma Operator.

UNIT III 15 periods

Inheritance: Base-Class Access Control, Inheritance and protected members, Inheriting Multiple Base Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes.

Virtual Functions & Polymorphism: Virtual Functions, The Virtual Attribute is inherited, Virtual Functions are Hierarchical, Pure Virtual Functions, Using Virtual Functions, Early Vs Late Binding.

UNIT IV 15 periods

Templates: Generic Functions, Applying Generic Functions, Generic Classes, Typename and export Keywords, Power of Templates.

Exception Handling: Fundamentals, Derived-Class Exceptions, Options, Terminate() and unexpected(), uncaught_exception(), exception and bad_exception Classes, Applying Exception Handling.

The C++ I/O System Basics: Old Vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O, Overloading << and >>, Creating Manipulators.

15 periods

UNIT V

C++ File I/O: File Classes, Opening and Closing a File, Text Files, Unformatted Binary I/O, get(), Getline() functions, Detecting EOF Random Access.

Runtime Type ID and the Casting Operators: RTTI, Casting Operators, Dynamic_cast, Reinterpret_cast.

Namespaces, Conversion Functions and other Advanced Topics: Namespaces, The std Namespace, Creating Conversion Functions, const Member Functions and mutable, Volatile Member Functions, Explicit Constructors, asm Keyword, Linkage Specification, Array-Based I/O, Dynamic Arrays, Binary I/O with Array-Based Streams, Differences between C and C++.

Introducing Standard Template Library: An Overview of STL.

Learning Resources:

Text Book:

1. The Complete Reference - C++ by Herbert Schieldt, 4/e, Tata McGraw Hill.

Reference Books:

1. The C++ Programming Language by Bjarne Stroustrup, Special Edition, Pearson india
2. C++ How to Program – Paul Dietel & Harvey Dietel,8th edition, Pearson education.
3. Object Oriented Programming in C++ by Barkakati and nabajyoti, SAMS,1991.
4. Mastering C++ by K.R.Venugopal & Rajkumar Buyya Tata McGraw Hill 2013.

Thinking in C++ , Volume I and II by Bruce Eckel, Pearson india.

Web References:

1. http://www.cplusplus.com/reference
2. http://en.cppreference.com/w/
3. http://www.decompile.com
4. http://www.programmingsimplified.com/cpp

CS/IT 112	Professional Ethics and Human Values	L	T	P	C
		4	0	0	3

Course Objectives:

1. To provide essential complementarily between "VALUES" and "SKILLS" to ensure sustained happiness and prosperity.
2. To introduce Ethical concepts that are relevant to resolving Moral issues in Engineering and to impart reasoning and analytical skills needed to apply ethical concepts to Engineering decisions.
3. To facilitate the development of a Holistic perspective towards life, profession and happiness, based on a correct understanding of the Human reality.
4. To understand the need for lifelong learning and have the knowledge and skills that prepare them to identify the moral issues involved in engineering areas.
5. To provide an understanding of the interface between Social, Technological and Natural environments.

Course Outcomes:

1. Comprehend a specific set of behaviors and values the professional interpreter must know and must abide by, including confidentiality, honesty and integrity.
2. Strive to achieve the highest quality, effectiveness and dignity in both the process and products of professional work.
3. Understand the moral requirements of engineering experiments, and have the ability to apply their knowledge to the solution of practical and useful problems.
4. Understand Lack of communication, prejudice in not asking for clarification, fear of law and plain neglect will lead to the occurrence of many repetitions of past mistakes.
5. Know and respect existing laws pertaining to professional work. The students can speak out against abuses in these areas affecting the public interest.

Course Content:

UNIT I Text books 1, 2 12 periods

Morals, Values and Ethics - Self-Confidence - Character - Valuing Time - Courage - Honesty - Caring - Sharing-Self respect - Respect for Others - Spirituality - Living Peacefully. Integrity- Commitment - Empathy - Work Ethics - Service Learning - Stress management - Civic Virtue - Co-operation.

UNIT II Text books 1, 2 12 periods

Scope and aims of Engineering Ethics - Senses of 'Engineering Ethics'- Variety of Moral Issues -Types of Inquiry - Engineering Ethics and Philosophy.

Moral Dilemmas - Moral Autonomy - Kohlberg's theory - Gilligan's theory - Criteria for a profession -Multiple Motives - Models of Professional Roles.

UNIT III Text books 1, 2 12 periods

Moral reasoning and Ethical Theories - Virtue Ethics - Utilitarianism-Duty ethics - Right ethics-Self interest, Customs and Religion - Uses of Ethical Theories-Testing of Ethical Theories.

Engineering as experimentation - Similarities to Standard Experiments - Contrasts with Standard Experiments - Engineers as Responsible Experimenters - A Balanced Outlook on Law - Problems with Law in engineering - The Challenger Case Study.

UNIT IV Text books 1, 2 12 periods

Safety and Risk - Assessment of safety and risk - Risk benefit analysis and reducing risk - Testing forsafety The Three Mile Island and Chernobyl case studies and safe exit.

Collegiality and loyalty - Respect for authority - Collective bargaining - Confidentiality - Conflicts of interest - Occupational crime - Intellectual property rights (IPR) - Discrimination.

UNIT V Text books 1, 2 12 periods

Professional rights - Employee rights - Whistle blowing - discrimination - Multinational corporations -Environmental ethics - Computer ethics - Weapons development.

Engineers as managers - Consulting engineers - Engineers as expert witnesses and advisors – Moral leadership - codes of ethics - role and limitations of codes - Sample code of ethics like ASME, ASCE, IEEE, Institution of Engineers (IE), India Indian Institute of Materials Management, Institution of electronic and telecommunication engineers (IETE), India, etc.

Learning Resources:

Text Books:

1. Mkie Martin and Roland Schinzinger, Ethics in Engineering, McGraw - Hill, New Jersey, 2004 (Indian Reprint)
2. Govindarajan M, Natarajan S, Senthil Kumar V.S - Engineering Ethics, Prentice Hall of India, New Delhi, 2004

Reference Books:

1. Charles D. Fleddermann - Engineering Ethics, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, Engineering Ethics - Concepts and Cases, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint).

Web Resources:

1. http://www.nptel.ac.in/courses/109104068/30
2. http://nptel.ac.in/courses/109104030

CS 154	Chemistry Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To learn the concepts of equivalent weight, molecular weight, normality, molarity, weight percent, volume percent.
2. To prepare molar solutions of different compounds.
3. To know the methods of determining alkalinity, hardness and chloride ion content of water sample.
4. To know the methods to determining purity of washing soda, percentage of available chlorine in bleaching powder.
5. To learn the redox methods to determine Fe2+ ions present in solution.
6. To know principles and methods involved in using instruments like conductivity bridge, spectrophotometer, pH meter and potentiometer.

Course Outcomes:

1. Acquire knowledge on normality, molarity, molecular weight, equivalent weight, oxidizing agent, reducing agent.
2. Prepare solutions with different concentrations.
3. Analyze water for its hardness, alkalinity, chloride ion content, iron content.
4. Understand the principles behind the development of instruments suitable for chemical analysis.

List of Experiments:

1. Determination of total alkalinity of water sample
a. Standardization of HCl solution b. Determination of alkalinity of water

2. Determination of purity of washing soda
a. Standardization of HCl solution b. Determination of percentage purity of washing soda

3. Estimation of Chlorides in water sample
a. Standardization of $AgNO_3$ solution b. Estimation of Chlorides in water

4. Determination of Total Hardness of water sample
a. Standardization of EDTA solution b. Determination of Total Hardness of water

5. Estimation of Mohr's salt - Permanganometry
a. Standardization of $KMnO_4$ solution b. Estimation of Mohr's salt

6. Estimation of Mohr's salt - Dichrometry
a. Standardization of $K_2Cr_2O_7$ solution b. Estimation of Mohr's salt

7. Determination of available chlorine in bleaching powder
a. Standardization of Hypo b. Determination of available chlorine in bleaching powder

8. Estimation of Magnesium
a. Standardization of EDTA solution b. Estimation of Magnesium

9. Conductometric titration of an acid vs base

10. Potentiometric titrations: Ferrous Salt vs Dichromate

Demonstration Experiments:

11. pH metric titrations of an acid vs base

12. Spectrophotometry: Estimation of Mn/Fe

Note: A minimum of 10(Ten) experiments should be performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

Learning Resources:

Text Books:

1. P.C. Jain and Monika Jain, Engineering Chemistry, 15th Edition, 2008, Dhanpat Rai Publishing Company, New Delhi.
2. Shashi Chawla, A Text Book of Engineering Chemistry, 3rd Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi.

CS 155	Object Oriented Programming Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To know Object Oriented Programming features of C++.
2. To understand the concepts of encapsulation and compile time polymorphism.
3. To learn the concepts inheritance and Runtime polymorphism.
4. To use the concepts of templates and exception handling.
5. To understand the disk access through C++ I/O and other advanced concepts.

Course Outcomes:

1. Write programs using basic Object Oriented features of C++.
2. Apply the concept of encapsulation and compile time polymorphism.
3. Implement the concepts of Inheritance and Runtime polymorphism.
4. Use the concepts of exception handling and Templates.
5. Develop applications using C++ File I/O and other advanced concepts.

List of Programs:

1. Create a class HUGEINT by which we would be able to use much wider range of integers. Perform addition operation on two HUGEINTs.
2. Create a class TIME with appropriate data members to represent TIME. Construct a class implementation section to compare two TIMEs, to increment TIME by one second, to decrement TIME by one second and appropriate constructors to create TIME objects.
3. Write a class declaration for DATE and allow the operations to find nextday(), previousday(), leapyear(), compare() with appropriate constructors and destructors.
4. Create a user defined datatype STRING, allow possible operations by overloading (Relational operators,[], ( ), <<,>>, =).
5. Define RATIONAL class. Allow possible operations on RATIONALs by overloading operators (Arithmetic, Unary operators,<<,>>).
6. a. A program to implement Single inheritance
   b. A program to implement multiple inheritances
   c. A program to implement Hierarchical inheritance
   d. A program to implement Multipath inheritance
7. a. A program to implement runtime polymorphism
   b. A program to implement abstract base class concept.
8. Develop a program to sort elements using function template
9. A program on class template
10. A program to implement Exception Handling
11. Write a program to read STUDENT records and write into file “STUDENT” by defining STUDENT class. Display STUDENTs data in a tabular format by defining appropriate manipulators.
12. a. A program on FILEs.
    b. A program on command line arguments.

Note: A minimum of 10(Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 156	Engineering Graphics Lab	L	T	P	C
		2	0	4	2

Course Objectives:

1. To comprehend general projection theory with emphasis on orthographic projection to represent three dimensional objects in two dimensional views.
2. To construct letters & Numerals in a legible freehand form.
3. To be able to plan and prepare neat orthographic drawings of points, Straight lines, Regular planes and solids.
4. To draw and identify various types of section and Auxiliary views.
5. To enable the students the aspects of development of surfaces in sheet metal working.
6. To introduce Auto CAD software for the creation of basic entities and usage of different tool bars.

Course Outcomes:

1. Acquire basic skills in Technical graphic communication.
2. Visualize and communicate with 2D as well as three dimensional shapes.
3. Understand the application of Industry standards and best practices applied in Engineering Graphics.
4. Apply the knowledge of development of surfaces in real life situations.
5. Draw simple 2D Engineering Drawings using Auto CAD.

(To be taught & examined in First angle projection)

General: Use of Drawing instruments, Lettering - Single stroke letters, Dimensioning-Representation of various type lines, Geometrical Constructions, Representative fraction.

Curves: Curves used in Engineering practice - conic sections – general construction and special methods for ellipse, parabola and hyperbola.
cycloidal curves - cycloid, epicycloid and hypocycloid; involute of circle and Archemedian spiral.

Method of Projections: Principles of projection - First angle and third angle projection of points, Projection of straight lines, Traces of lines.

Projections of Planes: Projections of planes, projections on auxiliary planes.

Projections of Solids: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

Sections Of Solids: Sections of Cubes, Prisms, Pyramids, cylinders and Cones, true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes)

Development of Surfaces: Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones.

Isometric Projections: Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only)

Orthographic Projections: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings)

Computer Aided Drafting (Using any standard package) (Demonstration only): Setting up a drawing: starting, main menu (New, Open, Save, Save As etc.), Opening screen, error correction onscreen, units, co-ordinate system, limits, grid, snap, ortho.

Tool bars: Draw tool bar, object snap tool bar, modify tool bar, dimension tool Bar

Practice of 2D Drawings: Exercises of Orthographic views for simple solids using all commands in various tool bars.

Learning Resources:

Text Book:

1. N.D. Bhatt & V.M. Panchal, Engineering Drawing, 50th Edition, Charotar publishing house, 2010.

Reference Books:

1. Prof.K.L.Narayana & Prof. R.K.Kannaiah, Engineering Drawing, Scitech Publications, 2010.
2. James D. Bethune - Engineering Graphics with AutoCAD 2002, PHI, 2011.

Web References:

1. www.wikipedia.com
2. NPTEL Lectures

II / IV B.Tech – I Semester

CS / IT 201	Probability-Statistics & Random Processes	L	T	P	C
		4	0	0	3

Course Objectives:

1. To acquire knowledge of a random variable and its prominence in analyzing the data.
2. To understand the basic principles of various probability distributions.
3. To acquire basic knowledge of statistical inference and applying it to practical problems.
4. To understand the Concepts of Random, Markov and Gaussian Processes and their applications.

Course Outcomes:

1. Apply knowledge of distribution theory to both software and hardware design problems.
2. Apply various distribution models to design and conduct experiments, as well as to analyze and interpret data.
3. Obtain knowledge to estimate and test different criterion.
4. Test hypotheses and draw inference for engineering problems.
5. Get knowledge of various processes and their application in analyzing the data.

Course Content:

UNIT I 12 periods

Probability Distributions: Random variables, binomial distribution, mean and variance of a probability distribution, Poisson approximation to the binomial distribution, Continuous random variables, normal Distribution, normal approximation to the binomial distribution.

Other Probability Densities: exponential distribution, uniform distribution, gamma distribution, beta distribution, Weibull distribution.

UNIT II 12 periods

Sampling Distribution: Population and samples, sampling distribution of the mean (σ known) sampling distribution of the mean (σ unknown), sampling distribution of variance.

Inferences Concerning Means: Point estimation, interval estimation, tests of hypotheses, hypothesis concerning one mean, hypothesis concerning two means.

UNIT III 12 periods

Inferences concerning Variances: Estimation of variances, hypotheses concerning one variance, hypotheses concerning two variances.

Inferences Concerning Proportions: Estimation of proportions, hypothesis concerning one proportion, hypothesis concerning several proportions.

UNIT IV 12 periods

Random Processes: Classification of Random Processes, Methods of description of a random process, Special classes of random processes, Average values of random processes.

Analytical Representation of Random processes: Auto correlation function and its properties, Cross correlation functions and its properties.

UNIT V 12 periods

Gaussian Process: Definition of Gaussian Process, properties, Definition of Poisson Process, Properties, Mean and Auto correlation of the Poisson process.

Markov Process: Definition of a Markov chain, Chapman-Kolmogorov theorem, Classification of states of a Markov chain.

Learning Resources:

Text Books:

1. Richard A. Johnson, Probability and Statistics for Engineers, 6th Edition, (Prentice Hall of India) (Unit I to Unit III)
2. T. Veerarajan, Probability, Statistics and Random processes, (Tata McGraw- Hill) (Unit IV to Unit V)

Reference Books:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye., Probability and Statistics for Engineers and Scientists, 9th Edition, Prentice Hall, 2011.

2. S.C.Gupta & V.K.Kapoor, Fundamentals of Mathematical Statistics (Sultan Chand & Sons).

Web References:

1. www.britannica.com
2. www.math.uah.edu/stat

CS/IT 202	Basic Electrical & Electronics Engineering	L	T	P	C
		4	0	0	3

Course Objectives:

1. To develop an understanding of the fundamental laws and elements of electrical circuits.
2. To develop the ability to apply circuit analysis to DC and AC circuits.
3. To understand the principle of operation and characteristics of Electronic Devices like Diode, transistor.
4. To analyze the transistor biasing and Oscillator circuits.

Course Outcomes:

1. Understand basic elements and laws of electrical circuits.
2. Analyze electrical circuits using different theorems.
3. Know about AC single phase and three phase systems.
4. Know about Various Electronic devices and their operation.
5. Know about Applications of various electronic devices such as Diode and transistor.

Course Content:

UNIT I 12 periods

Introduction to Circuit Elements: charge, Voltage, Current, Power and Energy, Circuit concept, Active and Passive circuit elements, Ideal, Practical and dependent sources and their V-I characteristics, Ohm's Law.

Series Parallel Circuits: Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / Parallel combination.

UNIT II 12 periods

Response of the Network using different Techniques: Kirchhoff's Voltage law and Kirchhoff's Current law, Mesh and Nodal Analysis, Star - Delta transformation.

Network Theorems: Superposition, Thevenin, Norton, Maximum power, and Application of theorems to DC circuits.

UNIT III 12 periods

Alternative Periodic Waveforms: Instantaneous current, voltage and power, peak, effective and average voltage and current, crest factor and form factor, phase difference, J notation and phasor representation.

Introduction to 1-Phase and 3-phase circuits: Response of RLC series and parallel circuits to sinusoidal excitation, Analysis of 3-phase balanced loads only.

UNIT IV 12 periods

Semiconductor Diodes: Semiconductor diode, Zener diode, Load line analysis, Half-Wave Rectifier, Full-Wave rectifier, Clippers and Clampers (unbiased only).

Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitter configuration, Common collector configuration, Operating point, JFET and characteristics of JFET.

UNIT V 12 periods

Amplifiers: Need of biasing, Thermal runaway, Types of biasing-fixed bias, collector base bias, self-bias, Transistor h-parameter model, Analysis of transistor amplifier using h-parameters.

Feedback and Oscillator Circuits: Feedback concepts, feedback connection types, Barkhausen criteria, Phase-Shift oscillator, Wien bridge oscillator, Hartley oscillator, Colpitt's oscillator.

Learning Resources:

Text Books:

1. A.Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 5th Edition, TMH, 2015. (Unit I to Unit III)
2. N.N.Bhargava & D.C.Kulshreshtha, Basic Electronics, Tata McGrawHill Publishers. (Unit IV to Unit V)

Reference Books:

1. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outline series, TMH, 2004.
2. S.Salivahanan, A.Vallavaraj, Electronic Devices and Circuits, Tata McGraw Hill Publishers

Web References:

1. http://nptel.ac.in/courses/117106101/
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/syllabus/
3. http://nptel.ac.in/courses/122106025/

CS/IT 203	Digital Logic Design	L	T	P	C
		4	0	0	3

Course Objectives

1. To provide the basic concepts used in the Design and analysis of Digital systems.
2. To understand the Boolean algebra concepts and basic Gates.
3. To construct Combinational circuits by using Gates.
4. To construct sequential logic circuits by using Flip Flops.
5. To understand about the Memory elements and PLD's.

Course Outcomes

1. Understand the basic digital logic fundamentals such as numbering system, binary codes.
2. Understand the Boolean algebra concepts which are used to describe mathematical relationship between input and output signals.
3. Understand the design procedure of combinational circuits and design the different types of combinational circuits like Encoders, Decoders, Multiplexers & Demultiplexers.
4. Understand the design procedure of Sequential logic circuits and design the different types of Sequential circuits.
5. Understand the different types of memory elements like RAM, ROM, and PROM.

Course Content:

UNIT I 10 periods

Digital Systems and Binary Numbers: Digital Systems, Binary Numbers, Number-Base Conversions, Octal and Hexadecimal Number systems and their conversions, complements of Numbers. Codes: BCD, Excess 3, Gray codes.

UNIT II 12 periods

Boolean Algebra and Logic Gates: Introduction, Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic theorems and Properties of Boolean Algebra, Boolean functions, Canonical and Standard Forms, Digital Logic gates.
Gate-Level Minimization: Introduction, The Map Method, Four-Variable K-Map,Five-Variable K-Map, Product of sums simplification Don't-Care conditions, NAND and NOR implementations.

UNIT III 15 periods

Combinational Logic : Introduction, Combinational Circuits, Analysis Procedure, General design procedure, Binary adder-Sub tractor, Decimal Adder, Magnitude comparator, Encoders, Decoders, Multiplexers

UNIT IV 13 periods

Synchronous Sequential Logic: Introduction, Sequential Circuits**,** Latches, Flip Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure.

UNIT V 15 periods

Registers: Register, Left Shift register, Right shift register, Bidirectional Shift register, Universal Shift register.

Counters: Design of Synchronous counters, Ripple counters, Ring counter, Johnson counter.

Memory and Programmable Logic: Read – Only Memory, Programmable logic array (PLA), Programmable array logic (PAL).
Note: Except Verilog HDL

Learning Resources:

Text Book:

1. M Morris Mano, Digital Design With an introduction to the Verilog HDL, 5th Edition, Pearson Education, 2015.

Reference Book:
1. RP Jain, Modern Digital Electronics, 3rd Edition, TMH, 2013.
2. Anand Kumar ,Fundamentals of Digital Circuits,4th Edition,PHI,2009
3. Thomas L. Floyd, Digital Fundamentals, 10th Edition, Person Education, 2011

Web References:

1. http://nptel.ac.in/courses/117105080/3
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-111-introductory-

CS/IT 204	Data Structures	L	T	P	C
		4	1	0	3

Course Objectives:

1. To understand different time complexity notations and to find the time and space complexities of algorithms.
2. To understand different linear data structures, their operations and applications.
3. To learn searching, hashing and sorting techniques and to estimate their time complexities.
4. To understand the basic concepts of non linear data structures like trees and graphs.

Course Outcomes:

1. Determine the time complexities of different algorithms.
2. Implement different linked list ADT's and polynomial ADT.
3. Implement stack and its applications.
4. Implement queue ADT and its applications.
5. Implement and analyze different searching and hashing techniques.
6. Understand and implement various concepts of tree and graph ADT.
7. Implement and analyze different sorting techniques.

Course Content:

UNIT I 15 periods

Algorithm Analysis: Mathematical Back Ground, Model, What to Analyze, Running Time Calculations.

Lists: Abstract Data Types, The List ADT, Singly Linked List ADT, Doubly Linked List ADT, Circular Linked List ADT, Polynomial ADT.

UNIT II 15 periods

Stacks: The Stack ADT implementations using Arrays and Linked Lists

Stack applications: Infix to Postfix expression conversions, Evaluation of Postfix expressions, Delimiter Matching.

UNIT III 15 periods

Queues: The Queue ADT implementations using Arrays and Linked Lists, The Circular Queue ADT.

Searching: Linear and Binary searching, Hashing-Hash functions, separate chaining, Open Addressing.

UNIT IV 15 periods

Trees: Preliminaries - Binary Trees - Expression trees, Binary tree traversals, The search tree ADT-Binary search trees, Implementation, Construction of B-Trees.

Trees: Heap-building Heap, Heap Sorting, AVL trees-single Rotations, and Double Rotations.

UNIT V 15 periods

Internal Sorting: Preliminaries, Bubble sort, Selection sort, Insertion sort, Shell sort, Merge sort, Quick sort, Comparison of searching and sorting in terms of time complexities.

Graphs: Definitions, representations, graph traversals.

Learning Resources:

Text Book:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education

Reference Books:

1. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, Data Structures Using C, Pearson Education Asia, 2004.
2. E.Horowitz and Sahani, Fundamentals of Data Structures
3. Debasis Samantha, Classical Data Structures, and PHI
4. Jean Paul Trembly and P.G.Sorenson, An Introduction of Data Structures with Applications.

Web Reference:

1. http://nptel.ac.in/courses/106103069/

CS/IT 205	Computer Organization	L	T	P	C
		4	0	0	3

Course Objectives:

1. To learn basic organization of computer system.
2. To understand the design of control unit and I/O organization.
3. To be aware of the concepts of ALU and pipelining.
4. To acquire the knowledge of memory organization.

Course Outcomes:

1. Familiarize with hardware components of a computer system and various instructions.
2. Familiarize with assembly language programs and instruction execution.
3. Know the design of control unit and various data transfer schemes.
4. Know the design of ALU and pipelining operations.
5. Familiarize with memory hierarchy.

Course Content:

UNIT I 12 periods

Basic structure of computers: Computer types, Functional units, Basic operational concepts, Bus structures, Performance, multiprocessors and multi computers.

Instructions and Instruction sequencing: Numbers, Arithmetic operations and characters, Memory location and addresses, Memory operations, Instructions and instruction sequencing, Addressing modes.

UNIT II 12 periods

Machine instructions and programs: Basic Input and Output operations, Stacks and Queues, Subroutines, Additional instructions, Encoding of machine instructions.

Basic processing unit: Some fundamental concepts, Execution of a complete instruction, multiple bus organization.

UNIT III 12 periods

Control unit organization: Hard wired control, Micro programmed control.

Input/Output Organization: Accessing I/O devices, Interrupts, Direct memory access, Buses.

UNIT IV 14 periods

Arithmetic: Addition and subtraction of signed numbers, Multiplication of positive numbers, Signed operand multiplication, Integer division, Floating point numbers and operations.

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence of instruction sets, Data path and control considerations, Performance considerations.

UNIT V 14 periods

The Memory system: Some basic concepts, Semi conductor RAM memories, Read only memories, speed, size and cost.

Cache and Secondary Memory: Cache memories, Performance considerations, Virtual memories, Secondary storage.

Learning Resources:

Text Book:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization Fifth Edition, McGraw Hill.

Reference Books:

1. John P.Hayes, Computer Architecture and Organization, Third Edition, McGraw Hill.
2. William Stallings, Computer Organization and Architecture, Sixth Edition, Pearson/PHI.
3. M. Moris Mano, Computer Systems Architecture, Third Edition, Pearson/PHI.

Web References:

1. http://prezi.com/swvy4dq3jzyb/comorla-basic-structure-of-computerhardware-and-software/%Basic structure of computers.
2. http://www.eecg.toronto.edu/~moshovos/ACA05/004-pipelining.pdf Overview of pipelining.

CS/IT 206*	Discrete Mathematical Structures	L	T	P	C
		4	1	0	3

Course Objectives:

1. To know the notations used in the discrete mathematics associated with computer science and engineering.
2. To learn the rudiments of elementary mathematical reasoning(elementary proofs; proofs by induction).
3. To learn logic and Boolean algebra from a mathematical perspective, but relating it to computer engineering applications.
4. To understand basic set-theoretical notions: relations, functions, graphs, equivalence relations, and orderings.
5. To relate these notions to applications in CSE.

Course Outcomes:

1. Understand set theory notation and fundamentals of first order predicate logic.
2. Understand and use counting and combinatorics techniques.
3. Understand and solve recurrence relations.
4. Understand Lattice theory concepts.
5. Solve graph theory problems.

Course Content:

UNIT I 12 periods

Foundations: Sets, Relations and Functions, Methods of Proof and Problem Solving Strategies, Fundamentals of Logic, Logical Inferences, Methods of Proof of an implication.

Foundations: First order Logic &Other methods of proof, Rules of Inference for Quantified propositions, Mathematical Induction.

UNIT II 12 periods

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations.

Elementary Combinatorics: Enumerating Combinations and Permutations with repetitions, Enumerating Permutations with Constrained repetitions.

UNIT III 12 periods

Recurrence relations: Generating functions of sequences, Calculating Coefficients of Generating Functions. Solving recurrence relations by Substitution and generating functions.

Recurrence relations: The methods of characteristic roots, solutions of inhomogeneous recurrence relations.

UNIT IV 12 periods

Relations and digraphs: Relations and directed graphs, Special properties of binary relations.

Relations and digraphs: Equivalence relations, Operations on relations.

UNIT V 12 periods

Ordering relations: Ordering relations, Lattices and Enumerations, Paths and closures, Directed Graphs and Adjacency Matrices.

Graphs: Basic Concepts, Isomorphisms and Subgraphs, Planar Graphs, Euler's Formula; Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem.

Learning Resources:

Text Book:

1. Joe L.Mott, Abraham Kandel & Theodore P.Baker, Discrete Mathematics for Computer Scientists & Mathematicians, PHI 2nd Edition.

Reference Books:

1. C.L. Liu and D.P., Mohapatra, Elements of Discrete Mathematics, Tata McGraw-Hill, 3rd Edition.
2. Kenneth H Rosen, Discrete Mathematics & its Applications, TMH, 6th Edition.
3. J.P.Trembly and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, TMH.

Web References:

1. www.cs.odu.edu/~cs381/cs381content/intro2discrete/intro2discrete.htm
2. https://www.cs.cornell.edu/~rafael

CS / IT 251	Basic Electrical & Electronics Engineering Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To provide hands-on experience with elementary electrical and electronic devices and circuits.
2. To learn principles of operation of fundamental electronic devices such as PN Junction diodes, Transistors, FETs and UJTs.
3. To learn Diode characteristics, and basic diode applications as rectifiers and regulators.
4. To learn BJT and MOSFET characteristics and basic transistor applications as amplifiers.

Course Outcomes:

1. Explain working of electronic devices, analyze and design.
2. Calculate parameters from the characteristics like static, dynamic and reverse resistances of PN junction diode.
3. Design Zener voltage regulator to meet the specifications.
4. Verify experimentally popular BJT applications such as Amplification and digital logic.

List of Experiments:

1. Verification of KVL & KCL.
2. Parameters of choke coil.
3. Verification of Thevenin's Theorem.
4. Verification of Superposition theorem.
5. Verification of maximum power transfer theorem.
6. Time response of RL & RC Circuits.
7. Time response of RLC Circuits.
8. Characteristics of Silicon, Germanium diodes.
9. Characteristics of Zener diode.
10. Half Wave Rectifier and Full Wave Rectifier.
11. Transistor Characteristics in CE configuration.
12. Characteristics of FET.
13. Self Bias circuit.
14. Wein Bridge Oscillator.
15. Colpitt's Oscillator.

Note: A minimum of 10 (Ten) experiments should be performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 252	Data Structures Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To understand ADT's of stack and queue and stack applications.
2. To learn Linked list ADTs and its applications.
3. To know searching, sorting and hashing techniques.
4. To be aware of Binary trees and BST ADT.

Course Outcomes:

1. Implement stack and queue ADT's using arrays and their applications.
2. Implement different types of linked list ADT's.
3. Implement searching, hashing techniques and different linked list applications.
4. Implement BST ADT and Expression tree.
5. Implement different sorting algorithms.

List of Programs:

1. Write C programs to perform the following ADT operations on singly linked list and Double linked list.

   a) Creation, b) insert at begins, c) insert at end, d) insert after specified position,

   e) Deletion, f) display, g) search an element, h) sorting the list, i) reversing the list

   j) Concatenation of two linked lists.

2. If L1 and L2 are two sorted singly linked lists, write a C program to perform the following operations

   a) L1UL2 b) L1 ∩L2

3. Write a C program to perform insertion and deletion operations on single circular linked list.

4. Write a C program to perform polynomials addition and multiplication using linked lists.

5. Write a C program that reads two lists of elements, prints the lists, reverses the lists, prints the reverse lists, sorts the lists, prints the sorted lists, merges the lists and prints the merged list.

6. Write a C program to implement stack using arrays and linked lists.

7. Write a C program to convert infix expression to postfix expression and evaluation of postfix expression.

8. Write C programs to implement Queues using arrays and linked list.

9. Write a C program that reads postfix arithmetic expression, builds an Expression tree and perform tree traversals on it.

10. Write a C program to construct Binary search tree and to perform the following operations.

    a. Insertion
    c. Find_min d.Find_max
    e. Searching f. Sorting

11. Write C programs to implement Hashing Techniques.

12. Implement the following sorting techniques.
    a. Selection sort
    b. Insertion sort
    c. Shell sort
    d. Quick sort
    e. Merge sort
    f. Heap sort

Note: A minimum of 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 253	Professional Communication Skills Lab	L	T	P	C
		0	0	3	2

Course objectives:

1. To improve the dynamics of professional presentations.
2. To develop the ability to compeer professional occasions.
3. To enable to read news paper for their communicative competence.
4. To equip with effective business correspondence.
5. To develop in them communication and social graces necessary for functioning.
    a. For employable ready skills.
    b. win in the job interviews.
    c. Build confidence to handle professional tasks.

Course Outcomes:

1. Develop effective communication and presentation skills.
2. Learn corporate etiquette - organizing and managing professional events.
3. Understands how reading enhances their communicative competency.
4. Conduct effective correspondence and prepare reports which produce results.
5. Develop all-round personalities with a mature outlook to function effectively in different circumstances.

List of Activities:

I. Presentation skills:

a. Key presentation skills inspired by Steve Jobs – You Tube.
b. Personality & finishing skills training videos.

How to make Effective Presentations, Methodology, Structure, using Technology and Conclusion.

II. Speech writing:

a. Welcoming guests on to the stage.
b. Proposing vote of thanks.

Invite and thank people with professional etiquette

III. Reading skills:

a. News paper reading
b. Reading and interpretation

News paper reading – loud reading within the groups.
Reporting the news to one another without the help of the news paper.
(Besides this, motivate students to read News Paper every day without fail.)

IV. Writing skills:

Report writing

a. Feasibility report
b. Project report

(Writing an Abstract - Parts of a report - Title page – Declaration - Acknowledgements – Table of contents – Introduction – Conclusion – Citations – References – Appendices.)

V. Career skills:

a. Resume & Cover letter.
b. Interview – The purpose & preparation for an interview.

Discover oneself – Self Introduction – Social background (family, home and town) – interests, Hobbies, likes & dislikes (persons, places, food, music, etc) – Strengths, Weaknesses, Skills, Qualities, Achievements – Opinions (love, life, marriage, politics, India, etc) what is life according to me? A creative narration with factual information is expected.

Effective Resume writing: structure and presentation – planning and defining the career objective – strengths and skills set – format - cover letter

Facing Interviews: Interview Process – Understanding employer expectations – Pre- interview planning – Opening strategies – Answering strategies, Frequently Asked Questions(FAQs).

Learning Resources:

Text Books:

1. Meenakshi Raman & Prakash Singh, Business Communication, II Ed, OUP, 2012.
2. Meenakshi Raman & Sangeetha Sharma, Technical Communication – English Skills for Engineers, II Ed, OUP,(Unit –IV)2011.
3. Meenakshi Raman & Sangeetha Sharma Technical Communication- Principles and Practice, II Ed, OUP, (Unit –V) 2015.

Software:

1. TOEFL Mastery, Rosetta Stone, TED Talks, Globarena , Clarity.

Web References:

1. www.esl-lab.com
2. www.eslgold.com

II / IV B.Tech - II Semester

CS / IT 207	Number Theory & Algebra	L	T	P	C
		4	0	0	3

Course Objectives:

1. To get familiarity on divisibility and prime aspects of number theory.
2. To get knowledge of Congruences and its related theorems.
3. To provide sufficient theoretical and analytical background of group theory.
4. To make the student to learn concepts of rings, polynomial rings and fields.
5. To give an integrated approach to number theory and abstract algebra.

Course Outcomes:

1. Understand the basic number theory concepts.
2. Assess the importance of Congruences and its related theorems.
3. Able to solve group theoretic problems.
4. Obtain the solution of problems related to polynomial rings and fields.
5. Ability of applying mathematical concepts in relevant engineering applications.

Course Content:

UNIT I 12 periods

Theory of Numbers: Divisibility, the division algorithm, greatest common divisor, the Euclidean algorithm.

Prime Numbers: Primes, fundamental theorem of arithmetic.

UNIT II 12 periods

Congruences: Congruences, solution of congruences, congruences of degree 1, Euler's phi-function.

Congruence Theorems: Fermat's theorem, Euler's theorem, Wilson's theorem, chinese remainder theorem.

UNIT III 12 periods

Group Theory: Group, subgroup, direct product of two groups, homomorphism, isomorphism, congruence Relations, factor group, normal subgroup, homomorphism theorem for groups (without proof).

Group Theory Problem: Lagrange's theorem, Fermat's little theorem, principal theorem on finite abelian groups (without proof).

UNIT IV 12 periods

Rings Theory: Rings, fields, Wedderburn's theorem (without proof), ideal, homomorphism theorem (without proof), maximal ideals.

Rings of Polynomials: Rings of polynomials, degree of a polynomial, fundamental theorem of algebra (without proof), division algorithm, greatest common divisor, prime polynomials, unique factorization theorem(without proof).

UNIT V 12 periods

Fields: Integral domains and fields, subfield, extension field, prime field, prime fields theorem.

Finite Fields: Finite field, primitive element, order of a finite field, Galois field, cyclotomic polynomial, irreducible polynomials over finite fields.

Learning Resources:

Text Books:

1. Niven.I, Zuckerman.H.S., and Montgomery, H.L., An Introduction to Theory of Numbers, John Wiley and Sons, Singapore, 2004. (Unit I & Unit II)

2.Lidl.R., and Pilz. G., Applied Abstract Algebra, Springer-Verlag, New Delhi, 2nd Edition. (Unit III to Unit V)

Reference Books:

1. V. Shoup, A computational Introduction to Number Theory and Algebra, Cambridge University Press.
2. Thomas Koshy, Elementary Number Theory with Applications, Elsevier Publications, New Delhi.

Web References:

1. msp.org/ant/about/journal/submissions.html
2. https://web.math.pmf.unizg.hr/~duje/tbkripteng.htm

CS/IT 208	Microprocessors & Interfacing	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand the architecture of 8086 family, addressing modes, instructions and assembler directives of 8086 microprocessors.
2. To develop the programming skills for applying them on various applications.
3. To understand the 8086 system connections.
4. To understand the 8086 interrupts and interrupt responses.
5. To understand the digital interfacing with 8086.

Course Outcomes:

1. Use 8086 microprocessor addressing modes, registers and instruction sets.
2. Debug their assembly language programs.
3. Understand the Minimum mode and Maximum mode configurations during Read and Write machine cycles.
4. Understand interrupts and interrupt responses.
5. Understand digital interfacing with 8086.

Course Content:

UNIT I 14 periods

The 8086 Microprocessor Family: The 8086 Internal Architecture, Introduction to Programming the 8086, Addressing modes, writing programs using with an assembler, Assembly language program development tools, 8086 Instruction descriptions and Assembler directives.

UNIT II 12 periods

8086 Strings: 8086 strings Instructions, writing Assembly language program using strings, Procedures and Macros: 8086 CALL, RET, PUSH and POP instructions, 8086 stack, A near procedure call example, passing parameters to from procedures, reentrant and recursive procedures, writing programs using assembler macros.

UNIT III 13 periods

8086 System Connections Timing: 8086 pin Diagram,8086 minimum mode configuration, 8086 maximum mode configuration, system bus timing ,Bus activities (timing diagrams) during the Read and Write Machine Cycles. Addressing memory and ports in microcomputer systems: address decoder concepts, An example ROM decoder, An example RAM decoder, 8086 Memory Banks.

UNIT IV 15 periods

8086 Interrupts and Interrupts Responses: 8086 Interrupt types, an 8086 Interrupt response example for type 0, software Interrupts, INTR (Hardware) Interrupts, 8259 Priority Interrupt Controller, DMA Controller.

UNIT V 15 periods

Digital Interfacing: 8255A Internal block diagram and system connections, 8255A operation modes and initialization, Constructing and sending 8255A control words, Interfacing Microprocessor to keyboards: Keyboard circuit connections and Interfacing, software keyboard Interfacing, Interfacing to alphanumeric displays.

Learning Resources:

Text Books:

1. Douglas V. Hall, Microprocessor and Interfacing, Revised 2nd Edition, TMH, 2006.

Reference Books:

1.Yu-cheng Liu, Glenn A. Gibson, Microcomputer systems: The 8086 /8088 Family architecture, Programming and Design, Second edition, Prentice Hall of India, 2003.

2.John Uffenbeck, the 80X86 Family, Design, Programming and Interfacing, 3rd Edition, Pearson Education, 2002.

web References:

1. http://en.wikipedia.org/wiki/Intel_8086
2. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/
3. http://www.cpu-world.com/Arch/8086.html
4. http://vmcpatiala.com/download/1271489378.pdf

CS/IT 209	Theory Of Computation	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand concepts of Finite automata theory and its applications.
2. To discuss finite Automata with **ϵ**- Transitions, Regular expressions, and Regular languages.
3. To know the properties of Regular languages and Context-free grammars.
4. To understand push-down automata, Context-free languages and its properties.
5. To learn Turing machines and Undecidability.

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Course Outcomes:

1. Design finite state machines.
2. Design ϵ-NFA, conversion between Finite automata and Regular expressions.
3. Apply pumping lemma for Regular languages, construct parse trees for CFG and ambiguous grammars.
4. Construct push-down automata and apply pumping lemma for CFL.
5. Design Turing Machines and analyze Undecidability.

Course Content:

UNIT I 15 periods

Automata: Introduction to Automata, The central concepts of automata theory - Alphabets, Strings, Languages. **Finite Automata:** An Informal picture of finite automata, Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Extended transition function, the language of DFA, Non deterministic finite automata (NFA) - Definition of NFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA.

Finite Automata with ϵ-transitions: Use of **ϵ-**transition, notation for an**ϵ-**NFA,**ϵ-**closures, extended transitions and languages, Applications, Moore and mealy machines.

UNIT II 14 periods

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions.

Properties of Regular Languages: Proving languages are not regular -Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages, Equivalence and minimization of automata - Minimization of DFA

UNIT III 14 periods

(Construction based treatment & proofs are excluded)

Context Free Grammars: Context Free Grammars, Parse Trees, Constructing parse trees, derivations and parse trees, ambiguous grammars.

Pushdown Automata: Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA's and CFG's.

UNIT IV 14 periods

Context free languages: Normal form's for context- Free grammars, the pumping lemma for context free languages.

Properties of Context free languages: closure properties for context free languages, Decision properties for CFL's.

UNIT V 13 periods

Introduction to Turing Machines: The Turing Machine, programming techniques for Turing machines.

Undecidability: a language that is not recursively enumerable, an undecidable problem that is RE, Undecidability problems about TM, Post's Correspondence problem.

Learning Resources:

Text Book:

1. John.E.Hopcroft, R.Motwani, &Jeffery.D Ullman, Introduction to Automata Theory, Languages and Computation, 3rdEdition, Pearson Education, 2009.

Reference Books:

1. Daniel I.A. Cohen, Introduction to Computer Theory, 4thEdition, John Wiley & sons, 2003.
2. KLP Mishra & N.Chandrasekharan, Theory of Computation, 3rdEdition, PHI, 2006.

Web References:

1. http://nptel.ittm.ac.in/courses
2. www.cs.umb.edu/~sbaraty/cs105
3. www.utdallas.edu/~dzdu/cs7301/

CS/IT 210	Database Management Systems	L	T	P	C
		4	1	0	3

Course Objectives:

1. To understand the fundamental concepts of database system.
2. To learn conceptual data modeling and relational data model.
3. To know about advanced formal relational Languages and SQL.
4. To understand database design and Implementation.
5. To learn various modules in Database management system.

Course Outcomes:

1. Familiarize with fundamental concepts of database and various database architectures.
2. Design relations for Relational databases using conceptual data modelling.
3. Implement formal relational operations in relational algebra and SQL.
4. Identify the normalization process for relational databases.
5. Use mechanisms for the development of multi user database applications.

Course Content:

UNIT I 15 periods

Introduction to Databases: Introduction - An Example - Characteristics of the Database Approach - Actors on the Scene - Workers behind the Scene - Advantages of Using the DBMS Approach - A Brief History of Database Applications.

Overview of Database Languages and Architecture: Data Models, Schemas, and Instances - Three-Schema Architecture and Data Independence - Database Languages and Interfaces - The Database System Environment - Centralized and Client/Server Architectures for DBMSs - Classification of Database Management Systems.

UNIT II 15 periods

Conceptual Data Modeling Using Entities and Relationships : Using High-Level Conceptual Data Models for Database Design – A Sample Database Application - Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets, Roles, and Structural Constraints - Weak Entity Types - Refining the ER Design for the COMPANY Database - ER Diagrams, Naming Conventions, and Design Issues.

The Basic Relational Model : Relational Model Concepts - Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations - Relational Database Design Using ER-to-Relational Mapping.

UNIT III 15 periods

Formal Relational Languages: Unary Relational Algebra Operations-Relational Algebra Operations from Set Theory - Binary Relational Operations: JOIN and DIVISION - Additional Relational Operations - The Tuple Relational Calculus - The Domain Relational Calculus.

SQL: SQL Data Definition and Data Types - Specifying Constraints in SQL – Basic Retrieval Queries in SQL- INSERT, DELETE, and UPDATE Statements in SQL-More Complex SQL Retrieval Queries- Views (Virtual Tables) in SQL-Schema Change Statements in SQL.

UNIT IV 15 periods

Database Design Theory: Informal Design Guidelines for Relation Schemas - Functional Dependencies - Normal Forms Based on Primary Keys: 1NF, 2NF, 3NF - Boyce-Codd Normal Form-Multi valued Dependency and Fourth Normal Form- Join Dependencies and Fifth Normal Form.

Normalization Algorithms: Inference rules, Equivalence, Closure set and minimal cover in Functional Dependencies-Properties of Relational Decompositions - Algorithms for Relational Database Schema Design – About Nulls, Dangling Tuples and Alternative Relational Designs.

UNIT V 15 periods

Foundations of Database Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts - Desirable Properties of Transactions - Characterizing Schedules Based on Recoverability - Characterizing Schedules Based on Serializability.

Introduction to Protocols for Concurrency Control in Databases: Two-Phase Locking Techniques for Concurrency Control - Concurrency Control Based on Timestamp Ordering – Multi version Concurrency Control Techniques - Validation (Optimistic) Concurrency Control Techniques.

Introduction to Database Recovery Protocols: Recovery Concepts - Recovery Techniques Based on Deferred Update - Recovery Techniques Based on Immediate Update - Shadow Paging.

Learning Resources:

Text Book:

1. Ramez Elmasri and Shamkant B.Navathe, Database Systems, Pearson Education, 6th edition.

Reference Books:

1. C.J.Date, Introduction to Database Systems, Pearson Education, Fifth edition.
2. Raghurama Krishnan, Johannes Gehrke, Data base Management Systems, TATA McGrawHill 3rd Edition.
3. Silberschatz, Korth, Data base System Concepts, McGraw hill, 5th edition.

Web References:

1. http://www.tutorialspoint.com/dbms/
2. http://www.w3schools.in/dbms/

CS/IT 211	Java Programming	L	T	P	C
		4	1	0	3

Course Objectives:

1. To understand the basic concepts and fundamentals of platform independent object oriented language.
2. To develop skills in writing programs using exception handling techniques and multithreading.
3. To understand streams and efficient user interface design techniques.
4. To gain in-depth understanding of java database connectivity and Networking.

Course Outcomes:

1. Apply the syntax and semantics of java programming language and basic concepts of OOP.
2. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
3. Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
4. Demonstrate how the java program communicates with the console and disk files using the concept of streams.
5. Design event driven GUI and web related applications which mimic the real word scenarios.
6. Develop Interactive programs related to data base connectivity and client server communications.

Course Content:

UNIT I 12 periods

Introduction: The History and Evolution of Java, an Overview of Java.

Data Types, Variables, and Arrays: The primitive types, variables, type conversion and casting, Automatic Type Promotion in Expressions, Arrays, Operators, Control statements.

Introducing Classes : Class fundamentals, Declaring the objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this keyword, Garbage Collection, the finalize() Method.
A Closer Look at Methods and Classes: Overloading Methods, Using objects as Parameters, Returning Objects, Introducing Access control, Understanding static and final keywords, Nested and Inner Classes, Varargs.

UNIT II 12 periods

Inheritance: Inheritance Basics, Using super, Creating multilevel Hierarchy, When Constructors are executed, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, using final with Inheritance, The Object class.

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface.

String Handling: String class, StringBuffer class, StringBuilder Class.

UNIT III 14 periods

Exception Handling: Fundamentals, Exception types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses.

Multithreaded Programming : The Java Threaded Model, The Main Thread , Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter Thread Communication, Suspending, Resuming, Stopping Threads, Obtaining A Thread's State.

I/O Basics: Streams, Byte streams, Character streams, Reading Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files.

UNIT IV 14 periods

The Applet Class: Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repainting, The HTML APPLET Tag, Passing Parameters to Applets.

Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, Event Classes, The KeyEvent Class, Sources of Events, Event Listener Interfaces, Using The Delegation Event Model, Adapter Classes , Inner Classes.

Introducing the AWT: Working with Windows, Graphics and Text, Using AWT Controls, Layout Managers and Menus.

UNIT V 14 periods

Introducing GUI Programming With Swing: Introducing Swing, Exploring Swing –Jlabel and ImageIcon, JTextField, The Swing Buttons, JTabbedPane, JScrollPane JList, JComboBox, Trees and JTable.

JDBC Conectivity: JDBC connectivity, types of Jdbc Drivers, connecting to the database, JDBC Statements, JDBC Exceptions, Manipulations on the database.

Networking: Networking Basics, The Networking Classes and Interfaces, InetAddress, TCP/IP Client sockets, URL, URL connection, TCP/IP sockets Server Sockets, Datagrams

Learning Resources:

Text Books:

1. Herbert Schildt, Java The Complete Reference 9th Edition, McGraw Hill Education (India) Private
Limited, New Delhi.
2. Cay Horstmann, John Wiley and Sons, Big Java 2nd Edition, Pearson Education.

Reference Books:

1. H.M.Dietel and P.J.Dietel, Java How to Program, Sixth Edition, Pearson Education/PHI.
2. Y.DanielLiang, Introduction to Java programming, Pearson Publication.

Web References:

1. http://www.cplusplus.com/reference/
2. http://en.cppreference.com/w/
3. http://www.decompile.com/
4. http://www.programmingsimplified.com/cpp
5. http://www.learncpp.com/
6. http://www.stroustrup.com/

CS/IT 212*	Operating Systems	L	T	P	C
		4	0	0	3

Course Objectives:

1. To learn the basics of computer system and operating system overview.
2. To understand the concepts of process and thread management and process Synchronization.
3. To know about various Deadlock handling techniques and I/O Management.
4. To understand various Memory management techniques.
5. To know the concepts of File management and Secondary storage Management.

Course Outcomes:

1. Familiarize with different types of operating systems and services.
2. Familiarize with process management, multithreading and dead lock handling mechanisms.
3. Familiarize with different memory management mechanisms.
4. Familiarize with I/O Management, Secondary storage management and file management of various operating systems.

Course Content:

UNIT I 12 periods

Computer System And Operating System Overview: Overview Of Computer System Hardware, Operating System Objectives And Functions, Evaluation Of Operating System, Example Systems, Operating System Services, System Calls, System Programs.

Process Management: Process Description, Process Control, Process States, Cooperating Processes, Inter –Process Communication.

UNIT II 14 periods

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms and Evaluation, Threads Overviews, Threading Issues.

Concurrency: Principles of Concurrency, Mutual Exclusion, Software and Hardware Approaches, Semaphores, Monitors, Message Passing, Classic Problems Of Synchronization.

UNIT III 12 periods

Principles Of Deadlock: System Model, Deadlock Characterization, Methods For Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlocks, Dining Philosopher's Problem.

I/O Systems: I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Request to Hardware Operations, Streams.

UNIT IV 14 periods

Memory Management: Basic Concepts, Swapping, Contiguous Memory Allocation, Paging, Segmentation.

Virtual Memory: Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing.

UNIT V 12 periods

File Management: File System-File Concepts, Access Methods, Directory Structure, File System Mounting, File Sharing And Protection, Implementing File System-File System Structure And Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency And Performance.

Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure.

Security: Security Threats, Protection.

Learning Resources:

Text Books:

1. Abraham Silberchatz, Peter B, Galvin, Greg Gange, Operating System Principles - 7th Edition, John Wiley.
2. Stallings, Operating Systems, Internal and Design Principles, Fifth Edition-2005, Pearson education/PHI.

Reference Books:

1. Crowley, Operating system A Design Approach, TMH.
2. Andrew S Tenenbaum, Modern Operating Systems, 2nd Edition Pearson/PHI.
3. Pramod Chandra P. Bhat, An Introduction to Operating Systems, Concepts and Practice, PHI, 2003.
4. DM Dhamdhere, Operating Systems, A concept based approach, 2nd Edition TMH.

Web References:

1. http://www.cs.kent.edu/~farrell/osf03/oldnotes/index.html: Lecture Notes
2. http://www.computerhope.com/os.htm: Different Types of Operating Systems
3. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/
4. Operating%20Systems/New_index1.html: Question Bank and Test Problems
5. http://www.personal.kent.edu/~rmuhamma/OpSystems/os.html: OS Lecture Notes

CS 254	Microprocessors & Interfacing Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To develop the microprocessor based programs for various problems.
2. To develop the microprocessor and microcontroller based programs for various applications.

Course Outcomes:

1. To gain the logical development programs on the 8086 microprocessor.
2. To interface 8086 microprocessor for various simple applications.

List of Experiments:

1. Write a 8086 assembly language program to add two sixteen bit numbers and to subtract two sixteen bit numbers.
2. Write an assembly language program to verify the following logical operations on 16 bit numbers, AND,OR,XOR and also find 1's complement and 2's complement of 16 bit number.
3. Write a 8086 assembly language program to arrange the given numbers in ascending order.
4. Write a 8086 assembly language program to count number of +ve elements, -ve elements and zeros in the given array.
5. Write a 8086 assembly language program to find the square of a number using look-up-table.
6. Write a 8086 assembly language program to move a string byte from a memory location to another memory location.
7. Write a 8086 assembly language program to calculate the maximum and minimum in an array.
8. Write a 8086 assembly language program to convert BCD to binary using near procedures.
9. Write a 8086 assembly language program to n_{cr} by using near procedures.
10. Write a program to display a string of characters (use Keyboard / Display Interfacing).
11. Write a program to generate an interrupt using 8259 Interrupt Controller. Assume two sources are connected to the IR lines of the 8259. Of these Key board has highest priority and printer has lowest priority.
12. Write a 8086 Assembly language to interface a 8-bit D-A converter and convert digital to analog (generate square and triangular).
13. To write an ALP to control the stepper motor and its speed of operation.

Note: A minimum of 10 (Ten) experiments have to be performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 255	Database Management Systems Lab	L	T	P	C

0 0 3 2

Course Objectives:

1. To learn the syntax of DDL, DML, DCL statements and means of implementing database integrity constraints in SQL.
2. To learn the syntax and semantics of SQL for implementing the user queries on a relational database.
3. To learn the concepts of PL / SQL programming.

Course Outcomes:

1. Define, manipulate and control data using Structured Query Language (SQL).
2. Enforce database integrity constraints such as primary & foreign keys, null, unique and check constraints.
3. Write both simple and complex SQL queries by utilizing single row and group functions.
4. Develop applications using various features of PL/SQL like Database cursors, Functions, Stored Procedures, Packages, and Triggers.

List of Programs:

1. DDL Commands.
   a. Creating objects: tables and views.
   b. Altering the Schema of objects
   c. Dropping the objects

2. DML Commands
   a. Inserting data into a database
   b. Modifying data in a database
   c. Deleting data from a database

3. Simple queries: selection, projection, sorting on a simple table
   a. Small-large number of attributes
   b. Distinct output values
   c. Renaming attributes
   d. Computed attributes
   e. Simple-complex conditions (AND, OR, NOT)
   f. Partial Matching operators (LIKE, %, _, *, ?)
   g. ASC-DESC ordering combinations
   h. Checking for Nulls

4. Multi-table queries (JOIN OPERATIONS) Simple joins
   a. Aliasing tables - Full/Partial name qualification Inner-joins (two and more (different) tables)
   b. Inner-recursive-joins (joining to itself)
   c. Outer-joins (restrictions as part of the WHERE and ON clauses)
   d. Using where & having clauses

1. Nested queries
   a. In, Not In
   b. Exists, Not Exists
   c. Dynamic relations (as part of SELECT, FROM, and WHERE clauses)

6. Set Oriented Operations

a. Union
b. Difference
c. Intersection
d. Division

7. TCL Commands
   a. Privilege management through the Grant/Revoke commands
   b. Transaction processing using Commit/Rollback
   c. Save points.

8. PL/SQL Programs using named and unnamed blocks

9. PL/SQL Programs for implementing Implicit and Explicit Cursors

10. PL/SQL Programs for handling pre-defined and user defined exceptions

11. PL/SQL Programs for creating stored procedures, functions and packages

12. PL/SQL Programs for implementing database triggers

Note: A minimum o f 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 256	Java Programming Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To gain knowledge of reusable and extendable java programs.
2. To understand the use of Exception handling and multi threading.
3. To learn design and development of event driven Graphical User Interfaces (GUI) and Web Browser related applications.
4. To understand the need of Java-Database connectivity and client server communications.

Course Outcomes:

1. Develop efficient console applications applying OOP concepts.
2. Develop secure java applications applying Exception Handling techniques.
3. Develop Multi threaded programs and demonstrate the use of inter thread communication.
4. Develop interactive programs using awt, swings and event handling techniques.
5. Develop solutions for complex real world problems involving data bases and networking.

List of Programs:

1. Write a java program to demonstrate static member, static method and static block.

2. Write a java program to demonstrate method overloading and method overriding.

3. Write a java program to demonstrate finals, blank finals, final methods, and final classes.

4. Write a java program to demonstrate synchronized keyword.

5. Write a java program to implement multiple inheritance.

6. Write a program to demonstrate packages.

7. Write a java program to crate user defined exception class and test this class.

8. Write an applet program to demonstrate Graphics class.

9. Write GUI application which uses awt components like label, button, text filed, text area, choice, checkbox, checkbox group.

10. Write a program to demonstrate MouseListener, MouseMotionListener, KeyboardListener, ActionListener, ItemListener.

11. Develop swing application which uses JTree, Jtable, JComboBox.

12. Write a program to demonstrate login validation using rich GUI components.

13. Write a JDBC Application to implement DDL and DML commands.

14. Write a program to implement client/server applications using connection oriented & connection less mechanisms.

Note: A minimum o f 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

III / IV B.Tech - I Semester

CS / IT 301	Computer Networks	L	T	P	C
		4	0	0	3

Course Objectives:

1. To learn the key concepts of computer networks.
2. To gain knowledge about layered architecture of ISO OSI network reference model and it's functionalities.
3. To understand the principles, key protocols & design issues of TCP/IP reference model.
4. To identify requirements to design a computer network.

Course Outcomes:

1. Distinguish network architectures of ISO OSI and TCP/IP reference models.
2. Understand design issues of the layers of the reference models.
3. Know various media & switching techniques used for data transmission.
4. Acquire knowledge of access control, flow control, error control & congestion control techniques used in different layers.
5. Obtain knowledge of various routing protocols.
6. Understand the design and functionality of protocols used for internetworking.
7. Demonstrate knowledge of applications DNS & E-mail.

Course Content:

UNIT I 10 periods

Introduction: Uses of Computer Networks, Network Hardware, Network Software, Reference Models.

The Physical Layer: The Theoretical Basis for Data Communication**,** Guided Transmission Media, Digital Subscriber Lines, Switching.

UNIT II 12 periods

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols.

The Medium Access Control Sub-layer: Multiple Access Protocols-ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited-Contention Protocols, Ethernet**,** Data Link Layer Switching.

UNIT III 13 periods

The Network Layer: Network Layer Design Issues, Routing Algorithms-Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.

The Network Layer: Broadcast Routing, Multicast Routing, Congestion control algorithms, Quality of Service-Application Requirements, Traffic Shaping, Packet Scheduling, Admission Control.

UNIT IV 13 periods

The Network Layer: Internetworking, The Network Layer in the Internet-The IP version 4.0 protocol, IP Addresses, IP Version 6.0, Internet Control Protocols, Label Switching and MPLS.

The Transport Layer: The Transport Service-Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols-Addressing, Connection establishment, Connection Release, Error Control and Flow Control, Congestion Control –Desirable Bandwidth Allocation, Regulating the Sending Rate.

UNIT V 12 periods

The Transport Layer: The Internet Transport Protocols: Introduction to UDP, Remote procedure call, Real-Time transport protocols, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release.

The Application Layer: DNS- The Domain Name System, Electronic mail.

Learning Resources:

Text Book:

1. Andrew S. Tanenbaum, David J.Wetherall, Computer Networks, Fifth Edition, Pearson Education.

Reference Books:

1. James F.Kurose, Keith W.Ross, Computer Networking, Third Edition, Pearson Education
2. Behrouz A Forouzan, Data Communications and Networking, Fourth Edition, TMH.
3. Kurose & Ross, Computer Networks, A Top-down approach featuring the Internet, Pearson Education, Alberto Leon, Garciak.

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2.https://www.pearsonhighered.com/cs-resources/products/series.html

CS/IT 302	Web Technologies	L	T	P	C
		4	1	0	3

Course Objectives:

1. To understand the basic web technologies to develop static documents.
2. To learn dynamic HTML Pages and Event handling mechanism.
3. To use XML, Web Servers and Ruby scripting.
4. To know about java Servlet technologies.
5. To use rich internet applications.

Course Outcomes:

1. Create static web pages using XHTML, CSS, and JavaScript.
2. Design dynamic WebPages using client side scripting.
3. Create XML documents and work with web servers to create web applications with ruby on rails platform.
4. Write server side programs with Java Servlet Technologies.
5. Design Rich Internet Applications with AJAX.

Course Content:

UNIT I 15 periods

Introduction: Introduction to HTML5 Part-1 and Part-2.

Introduction to Cascading Style Sheets (CSS): Part 1 and Part 2.

UNIT II 15 periods

JavaScript-1: Introduction to Scripting and Control Statements-I & II.

JavaScript: Functions, Arrays and Objects.

UNIT III 15 periods

DOM: Objects and Collections and Event Handling.

XML and RSS: Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions(DTDs), W3C XML Schema Documents, XML Vocabularies Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM), RSS.

UNIT IV 15 periods

Web Servers: Introduction, HTTP Transactions, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, Accessing Web Servers.

Ruby on Rails: Introduction, Ruby Script, Rails framework, Database driven web application.

UNIT V 15 periods

Servlets: Servlet Life cycle, Thejavax.servlet package, The javax.servlet.http package, Generic Servlet, Http Servlet, Servlet Parameters, Handling Http Request & Responses, Cookies, Session Tracking.

Ajax-Enabled Rich Internet Applications: Introduction, Rich Internet Applications (RIAs) with Ajax, History of Ajax, Raw Ajax Example Using the XMLHttpRequest Object.

Learning Resources:

Text Books:

1. Harvey M. Deitel and Paul J.Deitel, Internet & World Wide Web How to Program, Pearson Education, 2012.

Reference Books:

1. Subrahmanyam Allamaraju and Cedric Buest, Professional Java Server Programming: J2EE.
2. Jason Cranford Teague, Visual Quick Start Guide CSS, DHTML & AJAX, 4/e, Perason Education.
3. Tom Nerino Doli Smith, JavaScript & AJAX for the Web, Pearson Education, 2007.
4. Hal Fulton, The Ruby Way, 2/e, Pearson Education, 2007.
5. David A. Black, Ruby for Rails, Dreamtech Press, 2006.
6. Bill Dudney, Johathan Lehr, Bill Willies, Lery Mattingly, Mastering Java Server Faces, Wiely India, 2006.
7. Web Technology – Uttam K.Roy, Oxford University Press, 2010.

Web References:

1. www.deitel.com
2. www.w3schools.com
3. www.tutorialspot.com

CS/IT 303	Design & Analysis of Algorithms	L	T	P	C
		4	1	0	3

Course Objectives:

1. To use methods for designing efficient algorithms using various data structures.
2. To understand the performance analysis of algorithms.
3. To know the application of mathematical tools in computing to solve fundamental problems.
4. To learn the concepts of classification of algorithms.

Course Outcomes:

1. Compute time and space complexity of algorithms.
2. Deduce the recurrence relations that describe the time complexity of recursively-defined algorithms, and solve recurrence relations.
3. Design algorithms using divide and conquer, greedy, and dynamic programming strategies and recite algorithms that employ these strategies.
4. Design algorithms using backtracking and branch and bound strategies and recite algorithms that employ these strategies.
5. Know the fundamental concepts of classification of algorithms.

Course Content:

UNIT I 15 periods

Introduction: Algorithm, Algorithm specification, performance analysis, Divide and Conquer-The general method. Running time calculation of Divide and Conquer technique.

Divide and Conquer: Finding maximum and Minimum, Merge sort, quick sort, Strassen's matrix multiplication.

UNIT II 15 periods

The Greedy Method: The general method, Knapsack Problem, Tree vertex splitting, Job sequencing with deadlines.

The Greedy Method: Minimum-cost spanning trees – Kruskal, Prims, Single source shortest paths.

UNIT III 15 periods

Dynamic Programming: The General method, Multi-stage graph, All pairs shortest path, Single-source shortest path, Optimal Binary search trees.

Dynamic Programming: String Editing, 0/1 Knapsack, Reliability design, The traveling salesman problem.

UNIT IV 15 periods

Basic traversal & search techniques: Traversal techniques for graphs, connected components & spanning trees, Bi-connected components.

Backtracking: The General Method, The 8-Queens Problem, Graph coloring, Hamiltonian cycle, Knapsack problem.

UNIT V 15 periods

Branch and Bound: The general method, 0/1 Knapsack problem, Traveling salesperson.

NP hard and NP Complete Problems: Basic concepts, Cook's Theorem statement.

Learning Resources:

Text Book:

1. L Ellis Horwitz, SartajSahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second edition, Galgotia Publications.

Reference Books:

1. Hopcraft.J.E, Ullman.J.D, The design and analysis of algorithms ANOVA, First edition, Pearson publishers.
2. Thomos H Cormen, Charles E Leisevson, Ronald ,Revart Clifford stein, Introduction to algorithms, Third edition, PHI.

Web References:

1. http://www.wiley.com/college/engin/balabanian293512/pdf/preface.pdf
2. http://www.filecrop.com/Digital-Logic-Design-Principles.html
3. http://people.seas.harvard.edu/~jones/es154/lectures/lecture_7/ lecture_7.html
4. http://s3.amazonaws.com/cramster-resource/104438_Logic%20Families.pdf

CS/IT 304	Unix Programming	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand UNIX Architecture and its key features.
2. To study different UNIX commands and AWK programming.
3. To study functions of UNIX shells and the concepts of Bourn shell programming.
4. To learn file and process management system calls and signal handling mechanism in UNIX.
5. To understand IPC mechanisms like pipes, sockets, shared memory, and semaphores and UNIX internals.

Course Outcomes:

1. To use UNIX commands for solving problems and work with AWK programming.
2. To write shell scripts for solving problems that can't be solved by simple commands.
3. To use system calls for system programming.
4. To implement client/server communication using IPC mechanisms.
5. To use resources of computers effectively and efficiently.

Course Content:

15 periods

UNIT I

Introduction: UNIX architecture, Features of UNIX. **UNIX Utilities**: pwd, mkdir, ls, cd , rmdir, cat, more, page, head, tail, Editing a file: vi, cp, mv, rm, wc, ln, unlink, chmod, chown, chgrp, who, sort, nl, grep, egrep, fgrep, find, cmp, diff, uniq, tr, sed, cut, paste, join, tee, tty.

Programmable text processing: **AWK** - awk programs, accessing individual fields, Begin and end, operators, variables, control structures, extended regular expressions, condition ranges, field separators, Built - in functions.

UNIT II 15 periods

UNIX Shells: Introduction, shell functionality, Built - in commands, meta characters, input/output redirection, filename substitution, pipes, command substitution, sequences, grouping commands, background processing, scripts, subshells, shell variables, Quoting

Bourne Shell: Working with variables, Arithmetic, conditional expressions, control structures, positional parameters, passing command line arguments, shell programs, functions, and arrays.

UNIT III 16 periods

File Management : Introduction to system calls and file management, Regular file management system calls - open( ), read( ), write( ), lseek( ), Close(), unlink( ),stat( ), getdents( ). Miscellaneous file management system calls - chown( ) and fchown( ), chmod( ) and fchmod( ), dup( ) and dup2( ), fcntl( ), ioctl( ), link( ), mknod( ), sync( ), truncate( ) and ftruncate( ).

Process Management: Creating a new process - fork( ), orphan processes, terminating a process - exit( ), zombie processes, waiting for a child - wait( ), Differentiating a process - exec( ), changing directories - chdir( ), changing priorities- nice( ), Accessing user and Group ID's.

Signals: Introduction, A list of signals, terminal signals, Requesting an Alarm signal - alarm( ), handling signals - signal( ), protecting critical code and chaining interrupt handlers, sending signals - kill( ), Death of children, suspending and Resuming processes, process Group's and control terminals.

UNIT IV 15 periods

Inter process communication: Pipes and Sockets.

Inter process communication: shared memory and semaphores.

14 periods

UNIT V

UNIX Internals: Kernel Basics, the File System, Process Management.

UNIX Internals: Memory Management, Input/Output.

Learning Resources:

Text Book:

1. Unix for programmers and users, Graham Glass, King Ables, 3rd edition, Pearson education.

Reference Books:

1. W. Richard Stevens, Advanced programming in the unix environment, 3rd Edition Pearson education.
2. Kernighan W.Brian and Pike Rob, Unix programming environment, Pearson education.
3. Sumitabha Das, Your Unix the ultimate guide, TMH 2rd edition.
4. Marc J.Rochkind, Advanced UNIX programming, 2nd edition Pearson Education.
5. Meeta Gandhi, Rajiv Shah, TilakShetty, The "C" Odyssey UNIX - The Open, Boundless C, BPB Publications.

Web References:

1. www.webreference.com › Programming
2. www.iu.hio.no/~mark/unix/unix.html

CS/IT 305*	Compiler Design	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand different phases of compiler and lexical analyzer.
2. To study about parsing techniques and syntax direct translation schemes.
3. To know about run-Time storage allocations strategies and Symbol Table implementation.
4. To understand different intermediate code forms and code generation.

Course Outcomes:

1. Able to familiarize with phases of compiler and Lexical analysis.
2. Implement different Parsers.
3. Create symbol tables and specify various intermediate code forms for compiler construction
4. Design code generator through optimized intermediate code forms.
5. Specify the various code optimization methods and runtime allocation strategies.

Course Content:

UNIT I 12 periods

Introduction to Compiling: Compilers - Analysis of the source program - Phases of a compiler - Cousins of the Compiler - Grouping of Phases - Compiler construction tools.

Lexical Analysis: Role of Lexical Analyzer - Input Buffering - Specification of Tokens- Recognition of tokens- a language for specifying lexical analyzers- design of a lexical analyzer generator.

UNIT II 14 periods

Syntax Analysis: Role of the parser - Top Down parsing - Recursive Descent Parsing, Predictive Parsing, LL(1) Parser -Bottom-up parsing - Shift Reduce Parsing , Operator Precedent Parsing .

Bottom-up parsing - LR Parsers - SLR Parser, Canonical LR Parser, and LALR Parser-Yacc Tool.

UNIT III 12 periods

Symbol Tables: Symbol table entries, Data structures for symbol tables implementation, representing scope information - Syntax Directed Translation: Syntax Directed definition-construction of syntax trees.

Intermediate Code Generation: Intermediate languages – SDT scheme for Assignment Statements - SDT scheme for Case Statements.

UNIT IV 12 periods

Back patching - SDT scheme for Boolean Expressions, SDT scheme for Flow of control constructs - SDT scheme for Procedure calls.

Code Generation: Issues in the design of code generator - The target machine - Runtime Storage management - Basic Blocks and Flow Graphs - Next-use Information - A simple Code generator - DAG representation of Basic Blocks.

UNIT V 14 periods

Code Optimization: Introduction- Principal Sources of Optimization - Optimization of basic Blocks - Introduction to Global Data Flow Analysis- Peephole Optimization.

Run Time Environments: Source Language issues - Storage Organization - Storage Allocation strategies –Static allocation scheme, Stack allocation scheme, Heap allocation scheme-Access to non-local names - Parameter Passing methods.

Learning Resources:

Text Book:

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, Compilers Principles, Techniques and Tools, Pearson Education Asia, 2007.

Reference Books:

1. Alfred V.Aho, Jeffrey D. Ullman, Principles of Compiler Design, Narosa publishing, 2002.
2. Lex &Yacc - John R. Levine, Tony Mason, Doug Brown, 2nd Edition, O'reilly
3. Engineering a Compiler - Keith Cooper & Linda Torezon, 2nd Edition Elsevier.

Web References:

1. www.science.uva.nl/~andy/compiler/
2. https://www.cs.fsu.edu/~engelen/courses/COP5621/
3. www.cs.nthu.edu.tw/~ychung/slides/Compiler/
4. nptel.ac.in/courses/.../IIT.../compilers/

CS/IT 306*	Software Engineering	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand different software processes or process models.
2. To understand and document software requirements for a client.
3. To design in the principled choice of software architectures and its components.
4. To understand good code practices.
5. To understand various qulity assurence techniques, including unit testing, functional testing and automated analysis tools.

Course Outcomes:

1. Ability to understand the importance of software engineering processes and process models.
2. Understand the principles and practices in Software Development Life Cycle (SDLC).
3. Adequate knowledge to prepare software Requirements Specifications (SRS) documents needed to build a working software component.
4. Capabilities to identify, formulate, and develop quality software programs or components.
5. Ability to design and implement software components as per the requirements of various stakeholders for a software project.

Course Content:

UNIT I 12 periods

Software and Software Engineering: The nature of Software, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. **The software Process: Process models:** A Generic process model, Process Assessment and Improvement. Prescriptive Process Models, Specialized Process models,

The software Process: Process models: The Unified Process, Personal and Team Process Models, Process Technology, Product and Process. **Agile Development**: What Is Agility? What Is an Agile Process?, Extreme Programming(XP),Other Agile process models, A Tool Set for the Agile Process.

UNIT II 12 periods

Modeling: Principles that guide Practice: Software Engineering Knowledge, Core Principles, Principles that guide each framework activity. **Understanding Requirements:** Requirements Engineering, Establishing the Groundwork, Eliciting requirements, Developing Use Cases,

Understanding Requirements: Building the requirements Model, Negotiating Requirements, Validating Requirements. **Requirements Modeling: Scenarios, Information, and Analysis Classes:** Requirement Analysis, Scenario-based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class Based Modeling.

UNIT III 12 periods

Requirements Modeling: Flow, Behavior, Patterns and WebApps, Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for WebApps. **Design Concepts**: Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model.

Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Assessing Alternative Architectural Designs, Architecture Mapping Using Data Flow.

UNIT IV 12 periods

Component-Level Design: What is a Component?, Designing Class-Based Components, Conducting Component-Level Design, Component-level Design for WebApps, Designing Traditional Components, Component Based Development. **Quality Management: Quality Concepts:** What is Quality? Software Quality, the Software Quality Dilemma, Achieving Software Quality.

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps Validation Testing, System Testing, The Art of Debugging

UNIT V 12 periods

Testing Conventional Applications: Software testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model-Based Testing, Testing for Specialized Environments, Architectures, and Applications, Patterns for Software Testing. **Process and Project Metrics:** Metrics in the process and Project Domains, Software Measurements, Metrics for Software Quality,

Process and Project Metrics: Integrating Metrics within the Software Process, Metrics for small Organizations, Establishing a Software Metrics Program. **Estimation for Software Projects:** Observations on Estimation, The Project Planning Process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object-Oriented Projects, Specialized Estimation Techniques, the Make/Buy Decision.

Learning Resources:

Text Book:

1. Roger S.Pressman, Software Engineering A Practitioner's Approach, Seventh Edition.

Reference Books:

1. Ian Sommerville, Software Engineering, Sixth Edition, Pearson Education.
2. CarloGhezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, Second Edition, PHI.
3. Rajib Mall, Fundamentals of Software Engineering, Second Edition, PHI.

Web References:

1. www.rspa.com/spi/ www.sei.cmu.edu/
2. http://www.pearsonhighered.com/educator/product/Software- Engineering/ 9780137035151.page
3. http://www.agilemanifesto.org/
4. http://www.isworld.org

CS 351	Web Technologies Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To understand the basic technologies to develop web documents.
2. To learn dynamic HTML Pages and Event handling mechanism.
3. To use XML, Web Servers and Ruby scripting.
4. To know about java Servlet technologies.
5. To use rich internet applications.

Course Outcomes:

1. Create static web pages using XHTML, CSS, and JavaScript.
2. Design dynamic WebPages using client side scripting.
3. Create XML documents and work with web servers to create web applications with ruby on rails platform.
4. Write server side programs with Java Servlet Technologies.
5. Design Rich Internet Applications with AJAX.

List of Programs:

1. Develop a simple static website using XHTML.
2. Develop a simple static web page using different types of styles in CSS.
3. Write java scripts covering Function, recursive functions, Arrays and Objects.
4. Write a program on collection objects.
5. Write a program on event bubbling and mouse event model.
6. Write well-formed and valid XML documents.
7. Write code for displaying XML using XSL.
8. Write Programs on Ruby & Ruby on Rail.
9. Write a program on Generic Servlets.
10. Write a program on Http Servlets.
11. Write programs on cookie and session.
12. Design a Rich Internet Application using AJAX.

Note: A minimum of 10(Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 352	Design & Analysis of Algorithms Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To learn fundamental algorithmic problems
2. To understand methods of designing and analyzing algorithms
3. To know various designing paradigms of algorithms for solving real world problems.

Course Outcomes:

1. Analyze the efficiency and correctness of algorithms.
2. Implement algorithms using various design strategies.
3. Choose appropriate algorithmic design technique to solve a given problem.

List of Programs:

1. Write a program to find min-max using DAC.
2. Write a program to find the k^{th} smallest element using DAC.
3. Write a program to find the optimal profit of a Knapsack using Greedy method
4. Write a program to determine the path length from a source vertex to the other vertices in a given graph. (Dijkstra's algorithm)
5. Write a program to find the minimum cost of a spanning tree for the given graph. (Kruskal's algorithm)
6. Write a program to determine shortest path in a multi stage graph using forward and backward approach
7. Write a program to find all pair shortest path from any node to any other node within a graph.
8. Write a program to find the spanning trees using DFS and BFS graph traversals.
9. Write a program to find the bi-connected components in a graph
10. Write a program to find the non attacking positions of Queens in a given chess board using backtracking
11. Write a program to color the nodes in a given graph such that no two adjacent can have the same color using backtracking
12. Write a program to find the optimal profit of a Knapsack using Branch and Bound Technique.

Note: A minimum of 10(Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 353	Unix Programming Lab	L	T	P	C
		0	0	3	2

Course objectives:

1. To study and write Unix Commands to interact and solve in problems in system.
2. To learn file and process management system calls in Unix.
3. To understand the use of signals, threads and IPC mechanisms.

Course outcomes:

1. To execute command utilities to perform system functions.
2. To write and implement shell scripts for solving system related problems.
3. To write system calls programs for file and process management.
4. To apply signals and IPC mechanisms in Unix.

Lab Cycle I: (Using Commands and Shell Programming)

1. Working with different UNIX commands.
   a) Directory utilities
   b) Text processing utilities
   c) File processing utilities
   d) Network utilities
   e) Disc utilities

2. Working with AWK Programming.

Lab Cycle II: (Using Shell Programming)

3. Write Shell Programs which takes two file names as arguments, if their contents are same then delete the second file.

4. Write Shell Programs for the following
   a) To verify whether permissions, contents and size of two given files are same or not.
   b) To display the name, maximum file size and no. of files in each subdirectory of a given directory.
   c) To display the current users, their home directory and period of working of each users.

5. Write Shell Programs for the following
   a) To display the given arguments in reverse order
   b) To simulating a calculator
   c) To count no. of lines, characters, words in a given file

6. Write shell script for the following
   a) For sorting, searching and insertion, deletion of elements in the list
   b) To delete all lines which match the given word in the files supplied as arguments.

Lab Cycle III: (File & Process Management Programming)

7. Write a C program for copy data from source file to destination file, where the file names are provided as command-line arguments.
8. Write a C program for demonstrating dup and dup2 system calls.
9. Write a C program that prints files recursively in a given directory.
10. Write a C program to create a process by using fork( ) system call.
11. Write a C program to create an Orphan Process.
12. Write a C program to demonstrate Zombie process.

Lab Cycle IV: (Signals and threads)

13. Write a C program for requesting an alarm signal to execute user defined alarm handler.
14. Write a C program to demonstrate terminal signals (control-c & control-z).
15. Write a C program to override child termination signal by the parent process.
16. Write a C program to demonstrate Suspending and Resuming Processes.
17. Write a C program to protect a critical region of code from a specific signal.
18. Write a C program to implement abort function using signals.

Lab Cycle V: (IPC Programming)

19. Write a C program for Un-named pipes to send data from first process to the second process.
20. Write two C programs that demonstrate Named pipes, Reader and Writer Processes.
21. Write C programs to demonstrate IPC through semaphores & shared memory.

Note: A minimum of 15(Fifteen) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

III / IV B.Tech - II Semester

CS / IT 307	Network Programming	L	T	P	C
		4	1	0	3

Course Objectives:

- To understand client/server programming design issues and protocols.
- To know about elementary TCP/UDP system calls.
- To learn the translation of the DNS name to IP address and vice versa.
- To understand the performance of server process using threads
- To know TCP client/server design alternatives.

Course Outcomes:

- Familiarize the basics of network programming.
- Implement client/server applications using elementary socket functions.
- Develop concurrent client/server programs using multiplexing system calls.
- Implement DNS server to translate between names and IP addresses.
- Write client/Server program using threads and compare different TCP client/server design alternatives.

Course Content:

UNIT I 15 periods

Introduction: A Simple Daytime Client , Protocol independence, Error Handling, A Simple Daytime Server, OSI model, Unix Standards, 64 bit architectures.

The Transport Layer: Introduction, User datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP Connection Establishment and Termination, TIME_WAIT State, Port Numbers, TCP Port Numbers and Concurrent Servers, Buffer Sizes and Limitations, Standard Internet Services, Protocol Usage.

UNIT II 15 periods

Sockets Introduction: Introduction, Socket Address structures, Value-Result Arguments, Byte Ordering Functions, inet_aton, inet_addr, and inet_ntoa Functions, inet_pton and inet_ntop Functions, sock_ntop and Related Functions, readn, writen and readline Functions.

Elementary TCP Sockets: Introduction, socket Function, connect Function, bind function, listen function, accept Function, fork and exec Functions, Concurrent Servers, close Function, getsockname and getpeername Functions.

UNIT III 15 periods

TCP Client-Server Example: Introduction, TCP Echo Server: main Function, TCP Echo Server: str_echo Function, TCP Echo Client: main Function, TCP Echo Client: str_cli Function, Normal Startup, Normal Termination, POSIX Signal Handling, Handling SIGCHLD Signals, wait and waitpid Functions, Connection Abort before accept Returns, Termination of Server Process, SIGPIPE Signal, Crashing of Server Host, Crashing and rebooting of Server Host.

I/O Multiplexing: The select and poll Functions: Introduction, I/O Models, select Function, str_cli Function, Batch Input and Buffering, shutdown Function, str_cli Function, TCP Echo Server, pselect Function, poll Function, TCP Echo Server.

UNIT IV 15 periods

Elementary UDP Sockets: Introduction, recvfrom and sendto Functions, UDP Echo Server: main Function, UDP Echo Server:dg_echo Function, UDP Echo Client: main Function, UDP Echo Client:dg_cli Function, Lost Datagrams, Verifying Received Response, Server Not Running, Summary of UDP Example, connect Function with UDP, dg_cli Function (Revisited), Lack of Flow Control with UDP, Determining Outgoing Interface with UDP,TCP and UDP echo Server Using select.

Daemon Processes and the inetd Superserver: Introduction, syslogd Daemon, syslog Function, daemon_init Function, inetd Daemon, daemon_inetd Function.

UNIT V 15 periods

Threads: Introduction, Basic Thread Functions: Creation and Termination, str_cli Function Using Threads, TCP Echo Server Using Threads, Thread-Specific Data, Web Client and Simultaneous Connections, Mutexes:Mutual Exclusion, Condition Variables, Web Client and Simultaneous Connections.

Client/Server Design Alternatives: Introduction, TCP Client Alternatives, TCP Test Client, TCP Iterative Server, TCP Concurrent Server, One Child per Client, TCP Preforked Server, No Locking Around accept, TCP Preforked Server, File Locking Around accept, TCP Preforked Server, Thread Locking Around accept, TCP Preforked Server, Descriptor Passing, TCP Concurrent Server, One Thread per Client, TCP Prethreaded Server, per-Thread accept, TCP Prethreaded Server, Main Thread accept.

Learning Resources:

Text Book:

1. W.Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming. The Sockets Networking API, Volume 1 , 3rd edition, 2004.

Reference Books:

1. Douglas E.Comer, David L.Stevens, Internetworking With TCP/IP: Design, Implementation and Internals,prentice hall,1991.
2. Rochkind, Advanced Unix Programming, Addison-Wesley Professional,2nd edition.

Web References:

1. http://www.pearsoned.co.in/wrichardstevens
2. http://www.iana.org

CS/IT 308	Data Engineering	L	T	P	C
		4	1	0	3

Course Objectives:

1. To understand basics of data warehousing and data mining.
2. To learn data pre-processing and association rule mining techniques.
3. To know about classification techniques.
4. To use applications of data mining on complex data objects.
5. To understand clustering techniques.

Course Outcomes:

1. Apply fundamental concepts for the construction of Data Warehouse.
2. Familiarize with Data Mining concepts.
3. Extract association rules from transactional databases.
4. Demonstrate different classification techniques and data mining concepts on complex data objects.
5. Implement various clustering techniques.

Course Content:

UNIT I 15 periods

Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts- Data Warehouse Modeling: Data Cube and OLAP-Data Warehouse Design and Usage- Data Warehouse Implementation.

Data Preprocessing: An overview of Data Preprocessing**-** Data cleaning- Data Integration- Data Reduction- Data Transformation and Data Discretization.

UNIT II 15 periods

Getting to know Your Data: Data Objects and Attribute Types- Basic Statistical Descriptions of Data- Measuring Data Similarity and Dissimilarity.

Introduction: Why Data Mining- What is Data Mining?-What Kinds of Data can be mined?- What Kinds of Patterns can be mined?- Which Technologies are used?- Major Issues in Data Mining.

UNIT III 15 periods

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts- Frequent Item set Mining Methods: Apriori Algorithm, Generating Association Rules, Improving the efficiency of Apriori.

Frequent Item set Mining Methods: FP Growth Approach for Mining Frequent Item Sets, Mining Frequent Item Sets using Vertical Data Format Method. **Advanced Pattern Mining:** Mining Multilevel Associations- Mining Multidimensional Associations- Mining Quantitative Association Rules.

UNIT IV 15 periods

Classification: Basic Concepts- Decision tree induction- Bayes Classification Methods- Rule-Based Classification- Model Evaluation and Selection- Techniques to Improve Classification Accuracy.

Advanced Methods in Classification: Bayesian Belief Networks-Classification by Back propagation-Classification by Support Vector Machines-Lazy Learners-Other Classification Methods.

UNIT V 15 periods

Cluster Analysis: Introduction to cluster analysis- Partitioning methods, Hierarchical methods,

Density-Based Methods: DBSCAN - Grid-based Methods: STING.

Outlier Detection: Outliers and Outlier Analysis- Outlier Detection Methods, Statistical Approaches, Proximity based Approaches.

Learning Resources:

Text Book:

1. Data Mining Concepts & Techniques, Jiawei Han, Micheline Kamber, and Jian Pei, 3/e, Morgan Kaufmann Publishers.

Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison Wesley., 2006.
2. Data Warehouse Toolkit, Ralph Kimball, 2nd edition, John Wiley Publishers.
3. G.K.Gupta, Introduction to Data Mining with case studies, PHI Publications, 2006.

Web References:

1. http://cs.illinois.edu/%18hanj/bk
2. https://www.mkp.com/datamining3e

CS/IT 309 **Object Oriented Analysis & Design** **L T P C**
4 0 0 3

Course Objectives:

1. To learn the fundamental concepts of object-oriented software development and UML Notations.
2. To understand the importance of UML diagrams using Object Oriented Analysis and Design concepts.
3. To study the principles and practices to draw UML diagrams for an information system.
4. To Know Design patterns for object oriented software development.
5. To learn different object oriented project management approaches and implementation strategies.

Course Outcomes:

1. Ability to construct the requirements model for an Information system.
2. Understand the behavioral model and specify the dynamic behavior of the system.
3. Capability to specify the control and operation specifications of an information system.
4. Knowledge to design and model a system using design patterns.
5. Implement and manage a software project using Object Oriented modeling concepts.

Course Content:

UNIT I 15 periods

Information Systems- Introduction, Information systems in practice, General system theory, Information and information systems, Problems in Information Systems Development, Avoiding the Problems. **UML-** Principles of modelling, Definition of UML, Conceptual model of UML.

Modeling Concepts: Models and diagrams, Drawing Activity Diagrams, Unified Software Development Process; **Requirements Capture:** User Requirements, Fact Finding Techniques, User Involvement, Documenting Requirements, Use Cases, Requirements Capture and Modeling; **Agate Ltd Case study -** Introduction to Agate Ltd., Requirements Model.

UNIT II 15 periods

Requirements Analysis: What Must a Requirements Model Do? Use Case Realization, The Class Diagram, Drawing a Class Diagram, CRC Cards, Assembling the Analysis Class Diagram. **Agate Ltd Case study -** Requirements Analysis.

Refining the Requirements Model: Component based development, Adding further structure, Software development patterns. **Object Interaction:** Object Interaction and Collaboration, Interaction Sequence Diagrams, Interaction Collaboration Diagrams, Model Consistency;

UNIT III 15 periods

Specifying Operations: The Role of Operation Specifications, Contracts, Describing Operation Logic, Object Constraint Language, Creating an Operation Specification; **Specifying Control:** States and Events, Basic Notation, Further Notation, Preparing a State chart, Consistency Checking, Qualify Guidelines;

Moving Into Design: How is Design Different from Analysis?, Logical and Physical Design, System Design and Detailed Design, Qualities and objectives of Analysis and Design, Measurable Objectives in Design, Planning for Design.

UNIT IV 15 periods

System Design: The Major Elements of System Design, Software Architecture. Concurrency, Processor Allocation, Data Management Issues, Development Standards, Prioritizing Design Trade-offs, Design for Implementation; **Object Design:** Class Specification, Interfaces, Criteria for Good Design, Designing Associations, Integrity Constraints, Designing Operations, Normalization;

Design Patterns: Software Development Patterns, Documenting Patterns-Pattern Templates, Design Patterns, How to Use Design Patterns, Benefits and Dangers of Using Patterns;

UNIT V 15 periods

Designing Boundary Classes: The Architecture of the Presentation Layer, Prototyping the User Interface, Designing Classes, Designing Interaction with Sequence Diagrams, The Class Diagram Revisited, User Interface Design Patterns, Modeling the Interface Using State charts; **Implementation:** Software Implementation, Component Diagrams, Development Diagrams, Software Testing, Data Conversion.

Implementation: User Documentation and Training, Implementation Strategies, Review and Maintenance; **Managing Object-Oriented Projects:** Resource Allocation and Planning, Managing Iteration, Dynamic Systems Development Method, Extreme Programming.

Learning Resources:

Text Books:

1. Object-Oriented Systems Analysis And Design Using UML - Simon Bennett, Steve McRobb and Ray Farmer - Tata McGraw-Hili Edition – 2nd Edition. (UNIT I to UNIT V).
2. The Unified Modeling Language User Guide - Grady Booch, James Rumbaugh and Ivar Jacobson, Addison-Wesley Object Technology Series, 2nd edition. (UNIT I – 2nd chapter UML).

Reference Books:

1. James Rumbaugh, Jacobson, Booch, Unified Modeling Language Reference Manual, 2nd Edition, PHI.
2. Jacobson et al., The Unified Software Development Process, AW, 1999.
3. Atul Kahate, Object Oriented Analysis & Design, The McGraw-Hill Companies, 2004.

CS/IT 310	Cryptography & Network Security	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand network security attacks, Classical and symmetric encryption schemes.
2. To know about the concepts of public key encryption and key management schemes.
3. To learn authentication and Secure hash functions.
4. To understand network security applications like Kerberos, PGP and IP security.
5. To use web security and system security concepts.

Course Outcomes:

1. Identify common network security vulnerabilities/attacks, classical and symmetric encryption schemes.
2. Analyze the concepts of public key encryption and key management schemes.
3. Design MAC and Hashing techniques needed for authentication.
4. Analyze the IP security header formats and know the applications like Kerberos, PGP.
5. Know the concept of Firewalls configuration, Web security mechanisms and Intrusion detection techniques.

Course Content:

UNIT I 14 periods

Introduction: The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, a Model for Network Security. **Classical Encryption Techniques:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography.

Block Cipher Techniques: Block Cipher Principles, The DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles, The AES cipher, Block Cipher modes of Operation.

UNIT II 12 periods

Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, Chinese Remainder Theorem, Discrete Logarithms.

Public Key and RSA: Principles of Public –Key Cryptosystems, The RSA algorithm. **Key Management**: Key Management, Diffie-Hellman Key Exchange.

UNIT III 12 periods

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security Hash Functions and MACs. **Hash and MAC Algorithms:** Secure Hash Algorithm, HMAC

Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard.

UNIT IV 12 periods

Authentication Applications: Kerberos, X-509 Authentication Service. **Electronic Mail Security**: Pretty Good Privacy (PGP).

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay Load, Key Management.

UNIT V 10 periods

Web Security: Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Intruders: Intruders, Intrusion Detection, Password Management. **Firewalls**: Firewall Design Principles, Trusted Systems.

Learning Resources:

Text Book:

2. William Stallings, Cryptography and Network Security, 4th Edition, Pearson Education.

Reference Books:

1. Behrouz A. Forouzen, Debdeep Mukhopadhyay, Cryptography & Network Security, 2nd Edition, TMH.
2. Chalie Kaufman, Radia Perlman, Mike Speciner, Network Security, 2nd Edition, (PHI / Eastern Economy Edition)
3. Wade Trappe & Lawrence C.Washington, Introduction to Cryptography with Coding Theory, 2/e, Pearson.
4. AtulKahate, Cryptography & Network Security, Tata McGraw-Hill, 2003.

CS/IT 311*(A) (Elective-I)	Artificial Intelligence	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand the fundamental concepts of artificial intelligence, agents, and their environments.
2. To learn various search techniques that can be used for solving problems.
3. To learn adversarial search-based techniques of game playing.
4. To learn how to design and solve constraint satisfaction problems.
5. To present the concepts of logical agents.
6. To learn representation of natural language sentences and inference of knowledge using first-order logic.
7. To understand the role of various planning techniques in solving problems.

Course Outcomes:

1. Understand the fundamental concepts of artificial intelligence, agents, and their environments.
2. Apply search techniques for solving simple AI problems.
3. Utilize the knowledge of search-based techniques for game playing.
4. Solve constraint satisfaction problems.
5. Possess the knowledge of the concepts of logical agents.
6. Represent the given natural language sentences in predicate/ proposition logic and infer new knowledge.
7. Understand various planning techniques.

Course Content:

UNIT I 10 periods

Intelligent Agents: What is AI?, Agents and Environments.

Intelligent Agents: Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT II 12 periods

Solving Problems by Searching: Problem-Solving Agents, Example Problems, Searching for Solutions.

Solving Problems by Searching: Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.

UNIT III 13 periods

Adversarial Search: Game, Optimal Decisions in, Alpha—Beta Pruning, Imperfect Real-Time Decisions, Stochastic Games.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

UNIT IV 12 periods

Logical Agents: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic: A Very Simple Logic, Propositional Theorem Proving

First-Order Logic: Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

UNIT V 13 periods

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward, Resolution.

Classical Planning: Definition of Classical Planning, Algorithms for Planning as State-Space Search.

Learning Resources:

Text Book:

1. Stuart Russel and Peter Norvig, Artificial Intelligence – A Modern Approach, 3rd Edition, Pearson Education/ PHI.

Reference Books:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, 3rd Edition, (TMH).
2. Patrick Henry Winston, Artificial Intelligence, Pearson Education

Web Reference:

1. http://aima.cs.berkeley.edu/

CS/IT 311*(B) (Elective-I)	Principles of Programming Languages	L	T	P	C
		4	0	0	3

Course objectives:

1. To learn basic features of different programming languages.
2. To understand object-orientation, concurrency.
3. To understand exception and event handling facilities in different languages.

Course Outcomes:

1. Describe syntax and semantics of programming languages.
2. Explain data, data types, and basic statements of programming languages.
3. Design and implement subprogram constructs.
4. Design object - oriented, concurrency, and constructs.
5. Design exception & event handling programming.

Course Content:

UNIT I 12 periods

Describing Syntax and Semantics: Introduction, The General Problem of Describing Syntax, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs: Dynamic Semantics.

Names, Bindings, Type Checking, and Scopes: Introduction, Names, Variables, The Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants.

UNIT II 12 periods

Data Types: Introduction, Primitive Data Types, Character String Types, User-Defined Ordinal Types, Array Types, Associative Arrays, Record Types, Union Types, Pointer and Reference Types, Type Checking.

Expressions and Assignment Statements: Introduction, Arithmetic Expressions, Overloaded Operators, Type Conversion, Relational and Boolean Expressions, Assignment Statements, Mixed-mode Assignment. **Statement – Level Control Structures:** Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT III 10 periods

Subprograms: Introduction, Fundamentals of Subprograms, Design Issues for Subprograms, Parameter-Passing Methods, Parameters That Are Subprograms Names, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, Co-routines.

Implementing Sub Programs: The General Semantics of Calls and Returns, Implementing "Simple" Subprograms, Implementing Sub Programs with Stack –Dynamic Local Variables, Nested Sub programs, Blocks, Implementing Dynamic Scoping.

UNIT IV 12 periods

Support for Object-Oriented Programming: Introduction, Object-Oriented Programming, Design Issues for Object-Oriented Languages, Implementation of Object-Oriented Constructs.

Concurrency: Introduction, **Introduction to Subprogram-Level Concurrency,** Semaphores, Monitors, Message Passing.

UNIT V 14 periods

Exception Handling: Introduction to Exception Handling, Exception Handling in Java,

Event Handling: Introduction to Event Handling, Event Handling with Java.

Learning Resources:

Text Book:

1.Robert W. Sebesta, Concepts of Programming Languages, 10th Edition, Addison Wesley,2012.

Reference Books:

1. Allen B Tucker, Robert E Noonan, Programming Languages, Principles & Paradigms, 2ed,TMH
2. R. Kent Dybvig, The Scheme programming language, Fourth Edition, MIT Press, 2009.
3. Jeffrey D. Ullman, Elements of ML programming, Second Edition, Prentice Hall, 1998.
4. Richard A. O'Keefe, The craft of Prolog, MIT Press, 2009.
5. W. F. Clocksin and C. S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003

Web References:

1.http://www.cplusplus.com/reference/
2.http://en.cppreference.com/w/

CS 311*(C) (Elective-I)	Software Testing Methodologies	L	T	P	C
		4	0	0	3

Course Objectives:

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. To expose the advanced software testing topics, such as object-oriented software.
5. Testing methods and component-based software testing issues, challenges, and solutions.
6. To understand software test automation problems and solutions.
7. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Course Outcomes:

1. Apply software testing knowledge and engineering methods.
2. Design and conduct a software test process for a software testing project.
3. Identify the needs of software test automation, and define and develop a test tool to support test automation.
4. Ability to understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
5. Ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
6. Basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems.
7. Ability to use software testing methods and modern software testing tools for their testing projects.

Course Content:

UNIT I 10 periods

Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to development life cycle Software Testing Methodology.

UNIT II 10 periods

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation.

Dynamic Testing I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing.

UNIT III 15 periods

Dynamic Testing II: White-Box Testing: Need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing. **Static Testing:** inspections, Structured Walkthroughs, Technical reviews.

Regression testing: Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques.

UNIT IV 12 periods

Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing. **Efficient Test Suite Management:** Test case design, Why does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite.

Software Quality Management: Software Quality metrics, SQA models. **Debugging:** Process, Techniques, Correcting bugs, Basics of testing management tools.

UNIT V 13 periods

Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools. **Testing Object Oriented Software:** basics, Object oriented testing.

Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, testing mobile systems.

Learning Resources:

Text Books:

1. Naresh Chauhan, Software Testing, Principles and Practices, Oxford

Reference Books:

1. Baris Beizer, Software testing techniques, International Thomson computer press, second edition.
2. Aditya P Mathur, Foundations of Software testing, 2nd, Pearson
3. Yogesh Singh, Software Testing-Cambridge
4. M G Limaye, Software Testing, Principles, techniques and Tools, TMH
5. Willian E Perry, Effective Methods for Software testing, 3nd, Wiley

Web References:

1.www.softwaretestinghelp.com
2.https://www.atlassian.com/landing/software-testing/
3.www.mcr.org.in/sureshmudunuri/stm/unit1.php

CS 311*(D) (Elective-I)	Multimedia Computing	L	T	P	C
		4	0	0	3

Course Objectives:

1. To know the latest hardware and software available in various Multimedia Authoring tools.
2. To acquire knowledge on basic and standard file formats of video and audio.
3. To understand and evaluate various Image compression schemes.
4. To learn various coding and transformation techniques.
5. To study about multimedia media communication and Network technologies with assured Quality of Service (QoS) to the users.

Course Outcomes:

1. Acquire knowledge on various multimedia sotware tools & multimedia authoring tools.
2. Understand and handle the Graphics/Image data types and popular file formats on a computer or other systems.
3. Evaluate the use of various coding techniques implemented in different applications.
4. Understand the Quality of Services (Qos) in Multimedia networks.
5. Know about Multimedia Database and Image Database applications.

Course Content:

UNIT I 15 periods

Multimedia—An Overview: Introduction, Multimedia Presentation and Production, Characteristics of a Multimedia Presentation , Hardware and Software Requirements, Uses of Multimedia, Analog and Digital Representations Digitization, Nyquist's Sampling Theorem, Quantization Error, Visual Display Systems.

Text: Introduction, Types of Text, Unicode Standard, Font, Insertion of Text, Text Compression, Text File Formats. **Image:** Introduction, Image Data Representation, Image Acquisition, Image Processing, Binary Image Processing, Grayscale Image Processing, Color Image Processing, Image Output on Monitors, Image Output on Printers, Image File Formats, Image-Processing Software.

UNIT II 10 periods

Audio: Acoustics, Sound Waves, Types and Properties of Sounds, Psycho-Acoustics, Components of an Audio Systems, Digital Audio, Synthesizers, Musical Instrument Digital Interface (MIDI), Digital Audio Processing, Speech, Sound Card, Audio Transmission, Audio File Formats, Surround Sound Systems, Digital Audio Broadcasting, Audio-Processing Software.

Video: Motion Video, Analog Video Camera, Analog Video Signal Representation, Television Systems, Video Color Spaces, Digital Video, Digital Video Processing, Video Recording and Storage Formats, Video File Formats, Video Editing Concepts, Video-Processing Software.

UNIT III 14 periods

Animation: Historical Background, Uses of Animation, Traditional Animation, Principles of Animation, Computer-based Animation, Animation on the Web, 3D Animation, Rendering Algorithms, Animation File Formats, Animation Software.

Compression: Basic Concepts, Lossless Compression Techniques, Lossy Compression Techniques, Image Compression, Audio Compression, Video Compression, MPEG Standards Overview, Fractal Compression.

UNIT IV 11 periods

Multimedia Architecture: User Interfaces, OS Multimedia Support, Multimedia Extensions, Hardware Support Distributed Multimedia Applications, Real-time Protocols, Playback Architectures, Synchronization.

Multimedia Database: What is a Multimedia Database, Content-Based Storage and Retrieval (CBSR), Designing a Basic Multimedia Database, Image Color Features, Image Texture Features, Image-Shape Features, Audio Features, Video Features, Classification of Data, Artificial Neural Networks, Semantics in Multimedia Data, Prototype Implementations.

UNIT V 10 periods

Multimedia Documents: Document and Document Architecture, Hypermedia Concepts, Hypermedia Design, Digital Copyrights, Digital Library, Multimedia Archives.

Multimedia Application Development: Software Life-Cycle Overview, ADDIE Model, Multimedia Production Steps, Case Study, Authoring Software, Computer Games.

Learning Resources:

Text Book:

1. Ranjan Parekh, Principles of Multimedia, 2e**,** Second Edition.

Reference Books:

1. Steinmetz, Naharstedt, Multimedia Applications, Springer.
2. Fred Hassall, Multimedia Communications, Applications, Networks, Protocols and Standards, Pearson education.
3. Prabhat K. Andeliegh, Kiran Thakrar, Multimedia systems design, PHI, 2007.
4. Ron Goldberg,Multimedia producers Bible, Comdex computer publishing.

Web References:

1 https://en.wikipedia.org/wiki/Multimedia
2.www.encyclopedia.com/topic/multimedia.aspx

CS/IT 312*(A) (Elective-II)	Embedded Systems	L	T	P	C
		4	0	0	3

Course Objectives:

1. To demonstrate fundamental concepts of embedded systems.
2. To learn basic principles of designing embedded system software and architectures.
3. To understand various services offered by RTOS.
4. To gain knowledge of the embedded system development environment, and tools which are used for development and loading the code into target machine.

Course Outcomes:

1. Understand the role of basic hardware components in embedded systems.
2. Ability to choose appropriate embedded software architecture.
3. Be aware of the fundamental concepts of RTOS.
4. Ability to understand RTOS services like semaphores, message queues, mail boxes, pipes, etc.
5. Acquire the knowledge of embedded software design principles and able to differentiate between desktop versus real time operating systems.
6. Acquire the knowledge of hardware and software tools used for building and debugging embedded systems.

Course Content:

UNIT I 15 periods

A First Look at the Embedded Systems: Examples of Embedded Systems (Telegraph, cordless Bar-code scanner, Laser Printer, underground tank monitor, Nuclear Reactor Monitor), Typical Hardware. **Hardware Fundamentals:** Terminology, Gates, A few other basic considerations, Timing Diagrams, Memory.

Advanced Hardware Fundamentals: Micro Processors, Buses, Direct Memory Access, interrupts, other common parts, Built-ins on the Micro Processor, conventions used on the Schematics.

UNIT II 15 periods

Interrupts: Micro Processor Architecture, Interrupt Basics, The shared data problem, Interrupt Latency.

Survey of Software Architectures: Round-Robin, Round-Robin with Interrupts, Function-Queue-Scheduling Architecture, Real Time Operating System Architecture, Selecting an Architecture.

UNIT III 10 periods

Introduction to Real Time Operating Systems: Tasks and Task states, Tasks and data Semaphores and shared data.

More Operating System Services: Message Queues, Mail boxes and pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS environment.

UNIT IV 10 periods

Desktop Operating Systems versus RTOS – need for Board Support Packages – task management – race conditions – priority inversion – scheduling.

Basic Design Using a Real Time Operating System: Overview, Principles, An Example, Encapsulating Semaphores and Queues, Hard Real Time Considerations, Saving Memory Space, Saving Power.

UNIT V 10 periods

Embedded Software Development Tools: Host and Target Machines, Linker/Locators for Embedded Software, Getting Embedded Software into the target System.

Debugging Techniques: Testing on Host Machine, Instruction Set Simulators, the *assert* macro, using Laboratory Tools.

Learning Resources:

Text Book:

1. David E.Simon, An Embedded Software Primer, Pearson Education Asia., 2000. (Units I, II, III and V and 2nd chapter in IV).
2. Sriram V.Iyer, Pankaj Gupta, Embedded Real-time Systems Programming, Tata McGraw Hill publishers, 2004. (First chapter in IV unit)

Reference Books:

1. D.Gajski, F.Vahid, S.Narayan, J.Gong, Specification and Design of Embedded Systems, Prentice Hall of India Pvt. Ltd.
2. Raj Kamal, Embedded Systems Architecture & Programming, Tata McGraw-Hill.

Web References:

1. https://spin.atomicobject.com/…/learn-embedded-systems-programming/
2. http://esd.cs.ucr.edu/
3. www.montefiore.ulg.ac.be/~boigelot/cours/embedded/slides/embedded.pdf

CS/IT 312*(B) (Elective-II)	Advanced Databases	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand data base systems architecture and catalog and the importance of it in data base technology.
2. Implementing aggregate operations and outer joins combining operations using pipelining using heuristics in query optimization.
3. To define and discuss the importance of Distributed Transaction and Recovery Management.
4. To understand the Object Oriented DBMSs Concepts and Design and models required for Object Oriented Data design.
5. Narrates Emerging database technologies and applications like Mobile databases.

Course Outcomes:

1. Able to understand System Architecture and Catalog.
2. Can understand Distributed DataBase Concepts.
3. Able to design Distributed Relational Database system, ORDBMS and Object DBMSs concepts.
4. Able to understand and use the solutions related to advanced database concepts.

Course Content:

UNIT I 11 periods

Data base systems architecture and the system Catalog: System architectures for DBMSs, Catalogs for Relational DBMSs, System catalog information in oracle.

Distributed DBMS Concepts and Design: Introduction, function and architecture of a Distributed DBMS.

UNIT II 11 periods

Distributed DBMS Concepts and Design: Distributed Relational Database Design-transparencies in a Distributed DBMS. Date's Twelve Rules for Distributed DBMS.

Distributed DBMS Advanced Concepts: Distributed Transaction Management, Distributed Concurrency Control - Distributed Deadlock Management Distributed Database Recovery. The X/Open , Distributed Transaction processing model, Replication Servers.

UNIT III 11 periods

Introduction to Object DBMSs: Advanced Database Applications -Weaknesses of RDBMSs, Object oriented Concepts, Storing objects in a Relational Database, Next generation Database systems.

Object Oriented DBMSs Concepts and Design: Introduction to Object Oriented Data Models and DBMSs, OODBMS perspectives, Persistence, Issues in OODBMSs.

UNIT IV 11 periods

Object Oriented DBMSs Concepts and Design: The object Oriented Database, System Manifesto, Advantages and Disadvantages of OODBMSs, Object oriented Database Design.

Object relational DBMSs: Introduction to Object, relational Database systems, the third generation Database manifesto, Postgres, an early ORDBMS, SQL3.

UNIT V 9 periods

Emerging database technologies and applications: Mobile databases, multimedia databases, geographic information systems, genome data management.

XML and Internet Databases: Structured, semi structured, and unstructured data, XML Hierarchical (Tree) Data model.

Learning Resources:

Text Book:

1. ThomasM Connolly and Carolyn E.Begg., Database Systems, A practical approach to design, implementation and management
2. Elmasri Navate, Fundamentals of Database Systems, 5/e, Pearson Education.

Reference Book:

1. Ozsu, Principles of Distributed Database Systems, 2/e, PHI

Web References:

1.www.cs.uoi.gr/~pitoura/grdb01/sylabus.html
2.https://en.wikipedia.org/wiki/Databases
3.www.cs.duke.edu/courses/fall07/cps216/

CS 312*(C) (Elective-II)	Advanced Data Structures	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand the concepts of data structures such as dictionaries, skip lists and trees
2. To learn and implement hashing.
3. To develop algorithms for text processing applications.
4. To understand the concepts of computational geometry.

Course Outcomes:

1. Understand and implement dictionary and skip list ADTs.
2. Implement hashing techniques for solving a given problem.
3. Realize the need for randomizing data structures and algorithms.
4. Implement the operations of binary search trees and AVL trees.
5. Implement the operations of red black, splay and 2-3 trees.
6. Develop applications using text processing.
7. Present the concepts of computational geometry.

Course Content:

UNIT I 12 periods

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.

Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

UNIT II 10 periods

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.

Trees: Binary Search Trees (BST), AVL Trees.

UNIT III 14 periods

Red Black Trees: Height of a Red Black Tree, Red Black Trees Bottom-Up Insertion, Top Down Red Black Trees, Top-Down Deletion in Red Black Trees, Analysis of Operations.

2-3 Trees: Advantage of 2-3 trees over Binary Search Trees, Search and Update Operations on 2-3 Trees, Analysis of Operations. B-Trees: Advantage of B- trees over BSTs, Height of B-Tree, Search and Update Operations on 2-3 Trees, Analysis of Operations.

UNIT IV 12 periods

Splay Trees: Splaying, Search and Update Operations on Splay Trees, Amortized Analysis of Splaying.

Text Processing: String Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman

Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

UNIT V 12 periods

Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree.

Computational Geometry: Priority Range Trees, Quad trees, k-D Tree.

Learning Resources:

Text Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004. (Unit I, Unit II & Unit III)
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.(Unit IV and Unit V)

Reference Books:

1. A. V. Aho, J. E. Hopcroft, And J. D. Ullman, Data Structures And Algorithms, Pearson Education, First Edition Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, Data Structures, Second Edition, Thomson India Edition, 2005
3. Jean-Paul Tremblay, Paul g. Sorenson, An Introduction to Data Structures with Applications, Tata Mc Graw hill Edition – Second Edition.
4. Seymour Lipschutz, Theory and Problems of Data Structures, Mc Graw hill Edition

Web References:

1.https://en.wikipedia.org/wiki/Data_structure
2.nptel.ac.in/courses/106103069/
3.www.tutorialspoint.com/cplusplus/cpp_data_structures.htm

CS 312*(D) (Elective-II)	Advanced Computer Architecture	L	T	P	C
		4	0	0	3

Course Objectives:

1. To learn about advanced computer and high performance computing architectures.
2. To learn about advanced concepts of memory and I/O
3. To study about performance issues and comparisons pertaining to parallel computation.
4. To learn about applications on modern and high performance computers.

Course Outcomes:

1. Understand the advanced concepts of computer architecture.
2. Analyze the Instruction Level Parallelism with software and Dynamic Approaches.
3. Understand the performance of advanced Memory and I/O concepts.
4. Analyze modern design structures of Pipelined and Multiprocessors systems.

Course Content:

UNIT I 12 periods

Introduction: Fundamentals of Computer Design – Measuring and reporting performance – Quantitative principles of computer design.

Introduction: Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multi cycle operations.

UNIT II 12 periods

Instruction Level Parallelism with Dynamic Approaches: Concepts – Dynamic Scheduling – Dynamic hardware prediction.

Instruction Level Parallelism with Dynamic Approaches : Multiple issue – Hardware based speculation – Limitations of ILP.

UNIT III 12 periods

Instruction Level Parallelism With Software Approaches: Compiler techniques for Exposing ILP – Static branch prediction – VLIW.

Instruction Level Parallelism With Software Approaches: Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms.

UNIT IV 12 periods

Memory and I/O: Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology.
Memory and I/O: Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures.

UNIT V 12 periods

Multiprocessors and Thread Level Parallelism:
Symmetric and distributed shared memory architectures – Performance issues.

Multiprocessors and Thread Level Parallelism: Synchronization – Models of memory consistency – Multithreading.

Learning Resources:

Text Book:

1. John L. Hennessey and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann, 2003, Third Edition.

Reference Books:

1. D.Sima, T.Fountain and P.Kacsuk, Advanced Computer Architectures: A Design Space Approach, Addison Wesley, 2000.
2. Kai Hwang and Zhi.WeiXu, Scalable Parallel Computing, Tata McGraw-Hill, New Delhi, 2003.

Web References:

1. www.eecg.toronto.edu/~moshovos/ACA05
2.www.eecg.toronto.edu/~moshovos/ACA06

CS 354	Network Programming Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To make the student learn the implementation of POSIX Threads
2. To make the student learn the implementation of client/server applications
3. To make the student learn the implementation of iterative and concurrent servers using processes and threads.

Course Outcomes:

1. An Ability to design a daytime server using TCP/UDP protocol.
2. An Ability to design a echo server and computation servers using TCP/UDP
3. Protocols.
4. An Ability to design a FTP server and Chat server using processes and threads
5. An Ability to design a Web server using processes and threads.
6. An Ability to design a concurrent server using UDP protocol.

List of Programs:

1. Implementation of multithreading mechanism in threads.
2. Implementation of producer-consumer problem using Threads
3. Implementation of daytime client/server using TCP/UDP protocols.
4. Implementation iterative Echo server using TCP/UDP protocols
5. Implementation of iterative Computational server using TCP/UDP protocols.
6. Implementation of concurrent FTP server using processes and threads.
7. Implementation of concurrent chat server using processes and threads.
8. Implementation of web server using TCP/UDP protocols.
9. Implementation TCP and UDP echo server using select.
10. Implementation of TCP Echo server using poll.
11. Demonstrate the use of mutex to protect a shared variable.
12. Implementation of daytime server as a deamon.

Note: A minimum of 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 355	Data Engineering Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To learn how to implement data cube aggregation and OLAP operations using SQL.
2. To gain the knowledge of modelling and implementing ETL solutions for a given problem using a data warehousing tool.
3. To learn how to implement data pre-processing operations using high level language programs.
4. To be aware of how to perform various data mining operations on given data sets using a data mining tool.

Course Outcomes:

1. Compute cuboids of a given data cube using SQL.
2. Implement OLAP operations using SQL.
3. Model ETL solutions using data warehousing tool.
4. Write high level language programs to implement data pre-processing and mining techniques.
5. Apply data mining techniques on data sets using a data mining tool.

List of Programs:

1. Creating Star Schema/snowflake Schema / Fact constellation Schema using any tool
   a) All Electronics sales application.
   b) Identify the facts and dimensions for banking environment.
2. Compute all the cuboids of 4D cube using group-bys.
3. Compute all the cuboids of 4D cube using Rollup and Cube operators of oracle SQL.
4. SQL queries for implementing different OLAP operations.
5. Deploy data cube using a software tool.
6. Design and develop different types of data transformations using a software tool.
7. Build ETL solutions using a software tool.
8. Write high level language programs to implement different data preprocessing techniques.
9. Implement various classification techniques on data sets using a data mining tool.
10. Estimate the values of numeric attributes, through prediction, using a data mining tool.
11. Mine strong association rules out of a given data set using a mining tool.
12. Cluster the given set of data objects by applying various clustering techniques using a data mining tool.
13. Write high level language programs to implement Association rule mining / classification / clustering techniques.

Note: A minimum of 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 356	OOAD Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To know on the importance of software component and functionality of each UML model element throughout the software process.
2. To learn to interpret the artifacts of requirements that are used as starting points for analysis and design.
3. To study about the analysis of interactions of analysis classes in identifies design model elements.
4. To create awareness on how to develop models or a software component for a particular application or software project.
5. To understand the UML elements in a Software model using UML.

Course Outcomes:

1. Posses knowledge on the importance of system analysis and design in solving computer based problems.
2. Ability to develop UML models using the phases of the Rational Unified Process CASE tool.
3. Demonstrate ability to analyze interactions among analysis classes for developing the class model and identify the dynamic behavior of the system.
4. Capability to identify the functionality of each UML model in developing and deploying object-oriented software.
5. Ability to work in Software team to construct Analysis and Design models for a given problem.

Lab Cycle - I

Analysis

1. Problem Statement
2. Requirements elicitation
3. System Requirements Specification

Use case View

4. Identification of Actors
5. Identification of Use cases
6. Flow of Events
7. Construction of Use case diagram
8. Building a Business Process model using UML activity diagram

Lab Cycle - II

Logical View

9. Identification of Analysis Classes.
10. Identification of Responsibilities of each class.
11. Construction of Use case realization diagram.
12. Construction of Sequence diagram.
13. Construction of Collaboration diagram.
14. Identification of attributes of each class.
15. Identification of relationships of classes.
16. Analyzing the object behavior by constructing the UML State Chart diagram.
17. Construction of UML static class diagram.

Lab Cycle - III

Design and Implementation

18. Design the class by applying design axioms and corollaries.
19. Refine attributes, methods and relationships among classes.
20. Construction of UML deployment diagrams.

Mini Project

The above three cycles are to be carried out in the context of a problem / system chosen by the Project batch and a report is to be submitted at the semester end by the batch.

IV/IV B.Tech - I Semester

CS/IT 401	Distributed Systems	L	T	P	C
		4	0	0	3

Course Objectives:

1. To learn the characteristics and internal organization of distributed systems.
2. To understand the design principles required for building a distributed system.
3. To understand the paradigms used to organize distributed systems.

Course Outcomes:

1. Understand basic principles and architectures of distributed systems.
2. Be aware of communication models and related issues in distributed systems.
3. Explain design issues for clients and servers in distributed systems
4. Describe the implementation of naming system in distributed systems.
5. Understand the need for synchronization, various consistency models and protocols required for distributed systems.
6. Summarize the techniques used for making distributed system fault tolerant.
7. Understand distributed file based and web based paradigms of distributed systems.

Course Content:

UNIT I 10 periods

Introduction: Definition of a Distributed System, Goals, types of distributed systems.

Architectures: Architectural Styles, System Architectures, Architectures Versus Middleware, Self-Management In Distributed Systems.

UNIT II 12 periods

Processes: Threads, Virtualization, Clients, Servers, Code Migration.

Communication: Fundamentals, Remote Procedure Call, Message-Oriented Communication, Stream-Oriented Communication, Multicast Communication.

UNIT III 12 periods

Naming: Names, Identifiers, And Addresses; Flat Naming, Structured Naming, Attribute-Based Naming.

Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning Of Nodes, Election Algorithms.

UNIT IV 14 periods

Consistency and Replication: Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols.

Fault Tolerance: Introduction To Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

UNIT V 12 periods

Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance.

Distributed Web-Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance.

Learning Resources:

Text Book:

1. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms, 2nd Edition, Pearson Education/PHI.

Reference Books:

1.George Coulouris, Jean Dollimore, Tim Kindberg, Distributed Systems Concepts and Design 3rd edition, Pearson Education.
2.Mukesh Singha l & NiranjanG.Shivaratri, Advanced Concepts in Operating Systems, Tata Mc-Graw Hill edition 2001.
3.Pradeep Kumar Sinha, Distributed Operating System - Concepts and Design, PHI.

Web References:

1.www.cis.upenn.edu/~lee/00cse380/lectures/
2.www.cs.uah.edu/~weisskop/Notes690/

CS/IT 402	Web Services	L	T	P	C
		4	1	0	3

Course Objectives:

1. To learn J2EE Multi-Tier architecture.
2. To understand server side scripting with Java Server Pages.
3. To know about XML parsers and Enterprise Java beans.
4. To use RMI, Java Mail and Corba.
5. To understand Web services and its related technologies.

Course Outcomes:

1. Design dynamic web pages with JSP.
2. Develop DOM and SAX parsers.
3. Create Enterprise Java Beans.
4. Use Java Mail, RMI and Corba in real time web applications.
5. Create and consume Web Services.

Course Content:

UNIT I 15 periods

J2EE Introduction, J2EE Multi-Tier Architecture.

Java Server Pages: JSP Scripting Elements and Directives, JSP implicit Objects, JSP Standard Actions, JSP Using Java Beans, JSP with cookies and sessions.

UNIT II 15 periods

JSP Tag Extensions: JSP Tag Lifecycle, creation of custom JSP tag libraries.

Java and XML: Generating an XML document, XML - DOM Parser, and SAX parser.

UNIT III 15 periods

Enterprise JavaBeans: Session Beans, Message Driven Beans, Entity Beans.

Java Mail API

UNIT IV 15 periods

Java Remote Method Invocation
Java Interface Definition Language and CORBA

Web Services

UNIT V 15 periods

Universal Description, Discovery

SOAP
Web Services Description Language (WSDL)

Learning Resources:

Text Books:

1. Jim Keogh, The complete Reference J2EE, Tata McGraw Hill.
2. James McGovern & Rahim Aditya, J2EE 1.4 Bible, Wiley publications.

Reference Books:

1. Subrahmanyam Allamraju et.al, Professional Java Server Programming, SPD/ APress.
2. Stephanie Bodoff, Eric Armstrong, Jennifer Ball, Debbie Bode Carson, Lan Evans, Dale Green, Kim Haase, Eric Jendrock, The J2EE Tutorial, Pearson Education.
3. Dreamtech Softwre Team, Java Server Programming, Dream tech Press.
4. James McGovern, et.al, J2EE Bible.
5. B.V.Kumar, S.Sangeetha, S.V.Subrahmanya, J2EE Architecture, Tata McGraw Hill.

Web References:

1. https://msdn.microsoft.com/en-us/library/bb628649.aspx
2. www.aspsnippets.com/

CS / IT 403	MOOCs*	L	T	P	C
		0	0	0	0

ChE 404(A) (Open Elective)	Energy Engineering	L	T	P	C
		4	0	0	3

Course Objectives:

1. To provide the knowledge about formation, classification, ranking, analysis, testing, carbonization, gasification and liquefaction of coal, manufacture of cock.
2. To provide the knowledge about design, occurrence, composition, classification, exploration and production of petroleum, refining, testing and analysis of petroleum products.
3. To provide knowledge about the non -conventional energy resources sun and wind.
4. To provide knowledge about the non -conventional energy resources like ocean thermal, geothermal energy, biomass and fuel cells.
5. To provide knowledge about the energy storage and related problems in the world and its solutions.

Course Outcomes:

1. Ability to understand the importance of environment and conservation of natural resources.
2. Ability to succeed in the competitive exams of energy industry.
3. An ability to utilize the non-conventional energies in place of conventional energies and its manufacture.
4. Ability to utilize the non- conventional energies in place of conventional energies and its manufacture.
5. Ability to maintain the sustainability in the environment.

Course Content:

UNIT I 12 periods

Conventional energy resources, the present scenario, scope for future development.

Coal: Origin, occurrence and reserves, classification, ranking, analysis and testing, coal carbonization, manufacture of coke, coal gasification, coal liquefaction.

UNIT II 12 periods

Petroleum: Origin, occurrence and reserves, composition, classification, characteristics, exploration and production.

Petroleum Refining:, petroleum products, testing and analysis of petroleum products, Refinery processes- Distillation, cracking, reforming and alkylation, polymerization& isomerization.

UNIT III 12 periods

Non- conventional energy sources:
Solar energy**:** Solar energy, solar radiation, solar collectors-flat plate, concentrating (focusing and non- focusing) collectors, principles of heating and cooling, photo voltaic cells.

Wind energy**:** Basic principles, basic components, classification of WECS, types of wind machines (horizontal, vertical axis machines) Wind energy conversion systems- horizontal and vertical systems, Applications.

UNIT IV 12 periods

Non- conventional energy sources:
Ocean thermal energy - introduction, OTEC (Closed and open OTEC cycles), applications. Geothermal energy - introduction, sources, hydrothermal resources (Liquid and vapor dominated systems), applications.

Bio-mass energy- Introduction, conversion techniques, classification and Types of biogas plants, Hydrogen energy-Introduction, hydrogen production, storage and applications. Fuel cells-introduction, classification, types, advantages and applications.

UNIT V 12 periods

Energy storage: introduction, storage systems. Mechanical energy storage- pumped hydroelectric, compressed air, fly wheel storage. Electrical storage- lead acid battery. Chemical storage- via hydrogen, ammonia, chemical reactions. Thermal energy storage- latent, sensible heat storage. Solar pond

Energy Conservation: Conservation methods in process industries, Theoretical analysis, practical limitations, equipment for energy saving / recovery- recuperators, regenerators, pipes and pumps.

Learning Resources:

Text Books:

1. G. D. Rai, Non-conventional energy resources, Khanna Publishers(2004)
2. Jain & Jain, Engineering chemistry 15th Edition

Reference Books:

1. S.B.Pandy, Conventional Energy technology, Tata McGraw Hill (1987)
2. O.P.Gupta, Elements of Fuels, furnaces and refractories, Khanna publishers (2000)

ChE 404(B) (Open Elective)	Bio - Fuels	L	T	P	C
		4	0	0	3

Course Objectives:

1. To provide the knowledge about properties, composition, features of bio fuels and uses of biomass and their environmental impacts.
2. To provide the students a substantial knowledge of bio fuel production technologies.
3. To provide knowledge about the process of biogas production and methods of production of biodiesel and comparison of the standards to the conventional diesel.
4. To provide knowledge about the production of lipids, bio hydrogen from different bacteria and algae.
5. To provide knowledge about the fuel cell technology.

Course Outcomes:

1. Ability to describe the functional principle of biofuel technologies in small and large scale.
2. Ability to describe the main steps and components in bioethanol, biodiesel and biogas production.
3. Ability to Participate actively in teamwork and work with case related problem solving.
4. Ability to work with professional problem solving in an industrial environment.
5. Ability to work in other fields of engineering.

Course Content:

UNIT I 12 periods

Types of biomass (e.g. wood waste, forestry residues, agricultural residues, perennial annual crops, organic municipal solid waste). Composition of lignocellulose (lignin, hemi cellulose, cellulose); energy crops; chemical pretreatment; enzymatic pretreatment; degradation of cellulose; trichoderma cellulases; bacterial cellulases; and comparison with degradation of high starch crops.

Sources of energy, introduction of biofuels, availability of bio mass, composition of biomass, terrestrial biomass, aquatic biomass. Physical and chemical properties of biomass. Useful and undesirable features of biofuels.

UNIT II 12 periods

Biogas: The substrate, the digester, the microorganisms, the process of bio gas production, factors affecting bio gas yields, advantages, disadvantages.

Bioethanol: Bioethanol vs. Petrol, production of bio ethanol, ethanol recovery. Bio butanol. Properties and standards of bioethanol. Lignocellulosic biomass composition and characterizations.

UNIT III 12 periods

Sources and processing of biodiesel (fatty acid methyl ester); nature of lipids, especially fatty acids and triglycerides. Sources and characteristics of lipids for use as biodiesel feedstock; and conversion of feedstock into biodiesel (transesterification). Use of vegetable oil (SVO) and waste vegetable oil (WVO).

Engineering, economics and environmental issues of biodiesel; major policies and regulations pertaining to the production, distribution, and use of biodiesel. Comparison of bio diesel with conventional diesel. Standards of bio diesel, current technologies and challenges.

UNIT IV 12 periods

Hydrogen Production: Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production - Storage of Hydrogen - Gaseous, Cryogenic and Metal hydride –

Biohydrogen: Production of bio hydrogen from anaerobic bacteria, photosynthetic algae, photosynthetic–hydrogenase system. Pyrolysis, bio-oil upgradation

UNIT V 12 periods

Fuel cells: Enzymatic fuel cells, microbial fuel cells. Fuel Cell – Principle of working, construction and applications.

Fuels for Fuel Cells: Hydrogen, Hydrocarbon fuels, effect of impurities such as CO, S and others.

Learning Resources:

Text Books:

1. Robert C. Brown, Biorenewable Resources: Engineering, New Products from Agriculture, Wiley-Blackwell Publishing, 2003

References Books:

1. Samir K. Khanal, Anaerobic Biotechnology for Bioenergy Production: Principles and Applications, Wiley-Blackwell Publishing 2008
2. Martin Kaltschmitt, Hermann Hofbauer, Biomass Conversion and Biorefinery, Springer Publishing, 2008.

CE 404(A) (Open Elective)	Basic Surveying	L	T	P	C
		4	0	0	3

Course Objectives:

1. To study about the various surveying instruments.
2. To study the basics of chain survey in linear measurements.
3. To determine the relative positions of the existing features on the ground.
4. To obtain basic knowledge on Total Station.
5. To acquaint with procedures of leveling by dump level & auto level.

Course Outcomes:

1. Know about the various surveying instruments.
2. Determine the relative positions of a point on the existing ground by conducting the survey.
3. Use all basic surveying instruments.
4. Operate Total Station instrument.
5. Take the levels of existing ground and to determine the reduced levels.

Course Content:

UNIT I Text Book 1 12 periods

Surveying & Measurements: Definitions; Classification; Principles of Surveying; Basic measurements in surveying; Instruments used for different measurements; Units of measurement (linear & Angular); Plan and map; Scales used for Maps and plans; Phases of survey work and Duties of a surveyor. Procedures for distance measurement - Ranging, Chaining/taping a line.

UNIT II Text Book 1 12 periods

Chain Surveying: Principle of Chain surveying; Basic definitions; Well-Conditioned & Ill-Conditioned triangles; Selection of stations and survey lines; Procedure of Field Work in Chain Surveying; Off-sets; Booking the survey (Field Book); Conventional Symbols; Problems encountered in chaining; Obstacles in chain Surveying.

UNIT III Text Book 1 12 periods

Compass Surveying: Angles and Bearings; Instruments used to measure angles and bearings; Designation of Bearings; Fore and Back Bearings; Calculation of Included Angles from Bearings and Bearings from Included Angles; Prismatic & Surveyor's Compass; Magnetic Dip & Declination; Local Attraction and Corrections.

UNIT IV Text Book 1, 2 12 periods

Theodolite Surveying: Types of Theodolites; Vernier Theodolite - Essential Parts; Basic definitions; Temporary adjustments; Field operations - Measurement of horizontal angles(Repetition & Reiteration), vertical angles.

Total Station: Introduction; components of Total Station; Types of Prisms and targets used in total station; various advantages of Total Stations.

UNIT V Text Book 1 12 periods

Simple Leveling: Basic definitions; Curvature and Refraction; Different methods of leveling; Levels - Dumpy level, Tilting level, Auto level; Leveling staff; Level field book; Booking and reducing levels; Classification of direct differential leveling methods -Fly leveling, Check leveling, Profile leveling and Cross sectioning, Reciprocal leveling and Precise leveling; Sources of errors & Difficulties in leveling.

Learning Resources:

Text Books:

1. Dr. K. R. Arora, Surveying Vol. I, 11th Edition, Standard Book House, 2012.
2. Dr. K. R. Arora, Surveying Vol. II, 11th Edition, Standard Book House, 2012.
3. S K Duggal, Surveying Vol. I & II, 4thEdition, McGraw Hill Education (India) Private Limited, 2013.

Reference Books:

1. B.C. Punmia, Surveying Vol. I & II, Laxmi Publications, 2005.
2. N.N Basak, Surveying and Levelling, McGraw Hill Education (India) Private Limited, 2014.
3. AM Chandra, Plane Surveying, 2nd Edition, New Age International (P) Ltd., 2006.

Web References:

1. http://nptel.ac.in/courses/105104101/
2. http://nptel.ac.in/courses/105107121/
3. http://nptel.ac.in/courses/105107122/

CE 404(B) (Open Elective)	Building Materials & Estimation	L	T	P	C
		4	0	0	3

Course Objectives:

1. To teach the basics involved in selection of good quality building materials for construction.
2. To give knowledge about various building elements and their specifications.
3. Presents the basics of planning strategies, building bye laws and acoustics of building.
4. preparing tender notice and various approvals needed for a project.
5. Valuation of building and rent fixation.

Course Outcomes:

1. Students are familiar with various building materials.
2. Students knows about various building elements and their specifications.
3. Students are familiar with types of masonry works and bonds used in construction.
4. Students are capable of understanding building plan and have knowledge about building rules, bye-laws and building elements.
5. Students will have knowledge about Valuation of building and rent fixation.

Course Content:

UNIT I 12 periods

Clay bricks: Brick clay, Preparation of bricks, Types of bricks, Dimensions of bricks, Weight of bricks, Storing of bricks, Brick substitutes, Classification of bricks, Tests for bricks.

Timber: Classification of trees, Structure of wood, seasoning and con-version of timber, Market forms of timber, Defects of timber, Treatment of timber, Classification of timber.

Glass: Manufacture and Classification, Treatment of glass, Uses of glass, testing for quality, Characteristics and Performance of glass, Glass fibre.

Plastics: Classification of plastics, Properties of plastics, Fabrication of plastic articles, some plastics in common use, Reinforced plastics.

UNI II 12 periods

Cement: General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, Hydration of cement, heat of hydration, structure of hydrated cement.

Types of Cements: Ordinary Portland cement, low alkali cement, Rapid hardening cement, Sulphate resisting cement, Portland blast furnace slag cement, Portland pozzolana cement, air entraining cement, white cement, hydro phobic cement, oil well cement, low heat Portland cement.

UNIT III 12 periods

Building Rules and Bye-Laws: Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index.

Building Elements: Conventional signs; Guidelines for staircase planning; Guidelines for selecting doors and windows; Terms used in the construction of door and window; Specifications for the drawing of door and window.

UNITIV

12 periods

Analysis of Rates: Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work:
i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

PWD Accounts and Procedure of Works: Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

UNIT V 12 periods

Valuation: Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for Estimating cost depreciation; Valuation of building.

Miscellaneous Topics: Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

Learning Resources:

Text Books:

1 B.N. Dutta, Estimating & Costing in Civil Engineering; UBS Publishers & Distributors, 2010.
2 P.C. Vergese, Building Materials, 1st Edition,PHI,2009.
3 P.C. Vergese, Building construction, 1st Edition ,PHI, 2009.

Reference Books:

1 Rangawala, Engineering Materials, Charotar Publications, Fortieth Edition: 2013
2 BC Punmia et al., Building construction, 10th Edition,Laxmi Publications, 2008.
3 Gurucharan Singh, Building planning, designing and scheduling, Standard book House, 2006.

Web References:

1 http://nptel.iitm.ac.in/courses.php
2 http://freevideolectures.com/Course/86/Building-Materials-and-Construction
3 http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv053-Page1.htm
4 http://bookmoving.com/register.php?ref=Building%20materials%20rangwala
5 http://bookmoving.com/book/building-materials_654.html

EC 404(A) (Open Elective)	Applied Electronics	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand about various modern electronic systems.
2. To provide clear explanation of the operation of all the important electronic devices and systems available.
3. To know about modern audio and video systems.
4. To know about various Telecommunication Systems.

Course Outcomes:

1. Able to understand the working, types and applications of microphones and loudspeakers.
2. Able to understand the features of commercial, theatre sound recording and color TV standards.
3. Able to understand the working of various electronic systems, telecommunication and switching systems.
4. Able to understand the working of various applications like digital clocks, fiber optics, microprocessor and mobile radio systems.
5. Able to understand consumer electronic equipment and systems like washing machines.

Course Content:

UNIT I 12 periods

Microphones: Characteristics of microphones, Types: Carbon microphones, moving coil microphones, ribbon microphones, electret microphones and wireless microphones.

Headphones: Headphones and Headsets, Types of headphones.

Loud Speakers: Ideal loudspeaker

Types: Crystal loudspeaker, electrostatic loudspeaker, permanent magnet loudspeaker,

High frequency loudspeakers: Horn type tweeters

Equalizers and Mixers.

UNIT II 12 periods

Commercial Sound: Recording, manual synthesizer, programmed synthesizer, public address systems, speaker matching systems, PA-system characteristics.

Theatre Sound System, **Color TV standards and Systems:** Primary and secondary colors, Luminance signal, Chrominance signal, color TV camera tube, color TV picture tube, NTSC system PAL system SECAM system.

UNIT III 12 periods

Audio systems, Video Systems, Remote Controls, Modulation Techniques, Carrier Systems, Telecommunication Systems: Telephone receivers and handsets, signaling-CCITT NO7, modes of operation, **Switching Systems:** principle, Read relay and cross bar switching, PBX switching, stored program control.

UNIT IV 12 periods

Fiber Optics, Data Services, digital clocks, microprocessor, microcontroller, Mobile radio systems: wireless local loop (WLL), role of WLL, radio paging service, digital cellular block diagram, establishing a call, **Fascimile (FAX).**

UNIT V 12 periods

IN-CAR Computers: Electronic ignition, electronic ignition lock system, ABS, Electronically controlled suspension (ECS), instrument pannel display, air-bag system.

Washing machines: Electronic controller for washing machine, washing machine hardware, washing cycle, software and hardware development
Refrigeration systems.

Learning Resources:

Text Books:

1. S.P.Bali, Consumer Electronics-Pearson Education, ISBN: 9788131717592, first impression-2008.

Reference Books:

1. Philip Herbert Hoff, Consumer Electronics for Engineers -Cambridge University Press (July 28, 1998), ISBN-10: 0521582075
2. Ronald K.Jurgen, Digital Consumer Electronics Handbook-(Editor) by McGraw Hill Professional Publishing, 1997. ISBN-10: 0070341435

Web References:

1.http://www.newagepublishers.com/samplechapter/000969.pdf
2.http://www.bits-pilani.ac.in:12354/qp1-9-10/EEE_C414_851_C_2009_1.pdf
3.http://nptel.iitm.ac.in

EC 404(B) (Open Elective)	Basic Communication	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand an overview of communication systems.
2. To understand the modulation technique, need of modulation, Amplitude modulation.
3. To understand fundamentals of digital communications.
4. To understand broadband communication systems and Television fundamentals.

Course Outcomes:

1. Able to understand transmission of analog signals using amplitude modulation.
2. Able to understand transmission of digital signals through PCM, PAM, PPM and DELTA Modulation techniques.
3. Able to know about various Broad band communication systems.
4. Able to know about the monochrome and colour Television fundamentals.
5. Able to know about Optical communication systems.

UNIT I Text Book 1 12 periods

Communications: Communications systems, Information, Transmitter, Channel, noise, Receiver, Modulation, Description, Need for modulation, Bandwidth Requirements.

Amplitude Modulation: Amplitude Modulation Theory, Frequency spectrum of the AM wave, Representation of AM, Power relations in the AM wave, **Generation of AM,** Basic requirements, comparison of levels, Grid modulated class C amplifier, Plat modulated class C amplifier, Modulated transistor amplifiers.

UNIT II Text Book 2 12 periods

Digital Communications: Digital Technology, Digital fundamentals, sampling theorem, aliasing effect, pulse amplitude modulation (PAM), synchronization in PAM systems, pulse time modulation, spectra of PDM and PPM systems, Elements of pulse code modulation (PCM), sampling and quantization, encoding, regeneration, decoding, DPCM, delta modulation.

UNIT III Text Book 1 12 periods

Broadband Communications Systems: Multiplexing, Frequency division multiplex, Time – division multiplex, **Short and Medium Haul Systems**: Co-axial Cables, Fiber optic links, Microwave links, **Long Haul Systems**: Satellite Communications, **Elements of Long-Distance Telephony**, Routing codes and signaling systems, Telephone exchanges (switches) and routing.

UNIT IV Text Book 3 12 periods

Television Fundamentals: TV transmitter and receivers, synchronization, image continuity, interlaced scanning, flicker, picture resolution, horizontal and vertical sync details, number of scanning lines, scanning sequence details.

Essentials of colour Television: colour perception, three colour theory, luminance, hue, saturation, colour difference signals.

UNIT V Text Book 1 12 periods

Optical Communications: History and development, **nature of light:** reflection, refraction, dispersion, diffraction, absorption, scattering, Optical fiber losses, fiber cables, types of fibers.

Learning Resources:

Text Books:

1. George Kennedy, Electronic Communication Systems, Tata McGraw-Hill Publishing, 5th Edition, 2011
2. Simon HykinS, Communication Systems, 2nd Edition-reprint 2010
3. R.R. Gulati, Modern Television Practice – Principles, Technology and Service- New Age International Publication, 2009.

References Books:

1. Simon HykinS, Introduction to Analog and Digital Communication. 2007
2. John M Senior, Optical Fiber Communications – An imprint of Pearson Education- 3rd Edition-2009

Web References:

1. http://web.engr.oregonstate.edu/~magana/ECE461-561/index.htm
2. http://www.ensc.sfu.ca/~jiel/courses/327/index.html
3. http://www.ece.utah.edu/~npatwari/ece5520/lectureAll.pdf
4. http://nptel.iitm.ac.in/syllabus/syllabus.php?subjectId=117105077

EE 404(A) (Open Elective)	Non-Conventional Energy Sources	L	T	P	C
		4	0	0	3

Course Objectives:

1. To know the depletion rate of conventional energy resources and importance of renewable energy resources.
2. To know the importance of Energy Storage Devices.
3. To know alternate viable energy sources to meet the energy requirements.
4. To discuss about solar energy, wind energy, tidal energy and geothermal energy as alternate resources.

Course Outcomes:

1. Know the national scene of energy production, utilization, consumption and energy storage systems.
2. Understand about the basics of solar energy, collectors & generation of electricity from solar energy &photovoltaic's.
3. Understand the assessment of wind energy potential, wind turbines and wind generators.
4. Know about ocean energy, temperature differences & principles, extraction of energy from waves.
5. Understand about geothermal, types & how biogas is produced & digester for power generation.

Course Content:

UNIT I Text Book 1, 2 12 periods

Principle of Renewable Energy: Comparison of renewable and conventional energy sources - Ultimate energy sources - natural energy currents on earth - primary supply to end use - Spaghetti & Pie diagrams - energy planning - energy efficiency and management.
Energy Storage Systems: Pumped Hydro- Compressed air storage-Energy storage by fly wheels-Electrical battery storage-Thermal sensible energy storage-Latent heat energy storage.

UNIT II Text Book 2, Ref Book 1 12 periods

Solar Energy: Extra terrestrial solar radiation - terrestrial solar radiation - solar thermal conversion-solar thermal central receiver systems, Solar pond, Distributed systems.
Photovoltaic's: Photovoltaic energy conversion - solar cell- Construction- conversion efficiency & output-VI characteristics.

UNIT III Text Book 2 12 periods

Wind energy: Planetary and local winds - vertical axis and horizontal axis wind mills.
Principles of wind power: maximum power – actual power - wind turbine operation - electrical generator.

UNIT IV Ref Book 1 12 periods

Energy from Oceans: Ocean temperature differences - principles of OTEC plant operations.
Wave energy: devices for energy extraction - tides - simple single pool tidal system, two pool tidal system.

UNIT V Ref Book 1, Text Book 1 12 periods

Geothermal Energy: Origin and types: Hydrothermal, Geo-pressurized & Petro thermal.
Bio fuels: Classification – direct combustion for heat and electricity generator - anaerobic digestion for biogas - biogas digester - power generation.

Learning Resources:

Text Books:

1. John Twidell & Toney Weir, Renewable Energy Sources E & F.N. Spon
2. EL-Wakil, Power Plant Technology, McGraw-Hill Publications.

Reference Books:

1. G.D.Rai, Non-Conventional Energy Sources, Khanna Publishers.
2. Abbasi & Abbasi, Renewable Energy Sources, Their impact on global warming and pollution, PHI.

Web References:

1. http://www.tn.gov.in/spc/tenthplan/CH_11_2.PD
2. http://bieap.gov.in/Nonconventionalenergysources
3. http://www.em-ea.org/Guide%20Books/book4/4.12App%20of%20Non%20conventional

EE 404(B) (Open Elective)	Utilization of Electrical Energy	L	T	P	C
		4	0	0	3

Course Objectives:

1. To know about the different types of lamps & lighting schemes.
2. To know about the different types electric heating methods.
3. To know the design heating elements such as furnaces and ovens.
4. To know to utilize the electrical energy for production of heat and welding process.
5. To provide specific knowledge on Principles and characteristics of storage batteries.

Course Outcomes:

1. Have an overall idea of different types of lamps & lighting schemes.
2. Know about the different types electric heating methods.
3. Know the designing of heat elements such as furnaces and ovens.
4. Know how to utilize the electrical energy for production of heat and welding process.
5. Gain knowledge on principles and characteristics of storage batteries.

Course Content:

UNIT I Text Book 1 12 periods

Illumination: Introduction- terms used in illumination-laws of illumination-Square law methods of calculation. Gas discharge lamps - Fluorescent lamps - Arc lamps - Filament lamps - Comparison between filament and fluorescent lamps.

UNIT II Text book1 12 periods

Lighting schemes & Introduction to Electric heating: Factory lighting - flood lighting and street lighting-design of lighting schemes-introduction to Compact Fluorescent Lamps.
Introduction-Modes of heat transfer - Stefan's law-Classification of electric heating methods.

UNIT III Text Book 1 12 periods

Electric Heating element Design and types of furnaces: Design of heating element - Construction and working of different types of induction furnaces -resistance furnace - arc furnaces.
Dielectric heating, Dipole formation, generation of dielectric heat and applications.

UNIT IV Text Book 1 12 periods

Welding: Introduction- Types of welding - resistance and arc welding -Characteristics of Carbon and metallic arc welding – comparison, welding equipment.
Requirements of good weld, comparisons of A.C and D.C weld(Excluding electronic controls)

UNIT V Text Book 2 12 periods

Storage batteries: Types of cells. Lead acid cell, Nickel Iron cell, Chemical changes during charging and discharging. Applications-rating-classification-dry cell and wet cells.

Methods of charging & common troubles: Charging and discharging of lead acid cells,-methods of charging lead acid batteries-over discharging common troubles with lead acid batteries and remedies-Nickel cadmium batteries.

Learning Resources:

Text Books:

1. J.B. Gupta, Utilization Electric Power and Electric Traction, Katson books publishers, Tenth Edition, 2012.
2. Sunil S Rao, Utilization, generation & conservation of electrical energy, Khanna publishers, Sixth Edition, 2005.

Reference Books:

1. Partab H, Art and Science of Utilization of Electrical Energy, Dhanpat Rai and Sons, New Delhi, Second Edition,2009.
2. R.K.Rajput, Utilization of Electric Power, Laxmi publications Private Limited, Second Edition, 2013.
3. G.C.Garg, Utilization of Electric Power and Traction, Kanna publishers, Ninth Edition, 2014.

Web References:

1. http://nptel.iitm.ac.in/video.php?subjectId=108105060.
2. http://web.mit.edu/lien hard/www/ahttv201.pdf..
3. http://www.comp-as.com/pdf/Article03.pdf.
4. www.srmuniv.ac.in/downloads/welding.doc.
5. http://www.freesunpower.com/batteries.php.
6. http://www.trifield.com/content/fixing-common-static-problems/

ME 404(A) (Open Elective)	Robotics	L	T	P	C
		4	0	0	3

Course Objectives:

1. To provide an introduction to Robotics and Automation including robot classification, design and selection, analysis and applications in industry.
2. To provide information on various types of end effectors, their design, interfacing and selection.
3. To provide the details of operations for a variety of sensory devices that are used on robot , the meaning of sensing, classification of sensor, that measure position, velocity & acceleration of robot joint.
4. The goal of the course is to familiarize the students with the basic concepts of transformations performed by robot.
5. Familiarize students to perform kinematics and to gain knowledge on programming of robots.

Course Outcomes:

1. Familiarize in basic components of robotics, classification of robots and their applications.
2. Acquire knowledge on types of robot grippers, their usage and design considerations.
3. Attain knowledge on various types of sensory devices, their working and applications.
4. Apply basic transformations related to the movement of manipulator.
5. Ability to design a robot mechanism to meet kinematics requirements and to write simple programs.

Course Content:

UNIT I 12 periods

Basics of Robot: Introduction to Robotics, major component of a robot, robotic like devices, classification of robots - Classification by coordinate system and by control method, Specifications of robots, fixed versus flexible automation.

Applications of robot: Economic analysis, Robot applications in Material Handling, Processing and assembly.

UNIT II 12 periods

Robot End Effectors: Introduction, end effectors, interfacing, types of end effectors, grippers and tools.

Selection: Selection and Design Considerations of End effectors, Remote Centre Compliance device.

UNIT III 12 periods

Robotic Sensory Devices:
Position Sensors: Objective, Non-optical position sensors - potentiometers, synchros, induction, optical position sensors –opto interrupters, optical encoders (absolute & incremental).

Proximity Sensors: Contact type, non-contact type – inductive, capacitive proximity sensors, optical proximity sensor, and scanning laser proximity sensor.

UNIT IV 12 periods

Touch and Slip Sensors: Proximity rod & photo detector tactile sensor, slip sensors - Forced oscillation slip sensor, interrupted type slip sensors.

Transformations: Objectives, homogenous coordinates, basic transformation operations, fixed angle representation, Euler angle representation.

UNIT V 12 periods

Forward Kinematics: Forward solution – Denavit Hartenberg procedure. Simple problems involving 2 and 3 DOF manipulators, SCARA manipulator.

Robot Programming: Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effecter commands, and Simple programs.

Learning Resources:

Text Books:

1. Richard D.Klafter, Robotic Engineering, Prentice-Hall of India Pvt Ltd, 2010.
2. Mikell P. Groover, Industrial Robotics, Tata McGraw-Hill Int. Edition 2, 2012.
3. Robotics and Control, R.K. Mittal and I.J. Nagarath, TMH, 2005 (UNIT IV – chapter 1).

Reference Books:

1. John J.Craig , Introduction to Robotics: Mechanics and Control, 3rd Edition, Pearson, 2008.
2. K. S. Fu, R. C. Gonzales, and C. S. G. Lee, Robotics: Control, Sensing, Vision, and Intelligence, Tata McGraw-Hill, NY, 2008.
3. Saeed B. Niku, Introduction to Robotics: Analysis, Systems, Applications, Prentice Hall, NJ, 2010.

Web References:

1. http://nptel.iitm.ac.in/courses.php?branch=Mechanical
2. http://academicearth.org/courses/introduction-to-roboticsVideo references:-

ME 404(B) (Open Elective)	Operations Research	L	T	P	C
		4	0	0	3

Course Objectives:

1. Grasp the methodology of OR problem solving and formulate linear programming problem.
2. Develop formulation skills in transportation models and finding solutions.
3. Understand the basics in the field of game theory and assignment problems.
4. Be able to know how project management techniques help in planning and scheduling a project.
5. Be able to know the basics of dynamic programming and simulation.

Course Outcomes:

1. Recognize the importance and value of Operations Research and linear programming in solving practical problems in industry.
2. Interpret the transportation models' solutions and infer solutions to the real-world problems.
3. Recognize and solve game theory and assignment problems.
4. Gain knowledge of drawing project networks for quantitative analysis of projects.
5. Know when simulation and dynamic programming can be applied in real world problems.

Course Content:

UNIT I 12 periods

Linear Programming : Definition and Scope of Operations Research, Mathematical formulation of the problem, graphical method, Simplex method, artificial basis technique, dual Simplex method. Degeneracy, alternative optima, unbounded solution, infeasible solution.

UNIT II 12 periods

Transportation Problem: Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation problem and Maximization in transportation model.

UNIT III 12 periods

Assignment Problem: One to one assignment problem, optimal solutions, unbalanced assignment matrix, travelling sales man problem, maximization in A.P.

Theory of Games: Introduction, rectangular two person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, concept of dominance to reduce the given matrix, Graphical method for 2xn and nx2 games.

UNIT IV 12 periods

Project Planning through Networks: Introduction, Basic steps in PERT/CPM techniques, Network diagram representation, Rules of drawing network diagram, Fulkerson's rule, Time estimates and Critical path in network analysis, floats, Project evaluation and review technique, Application areas of PERT/CPM techniques.

UNIT V 12 periods

Dynamic Programming: Introduction, Characteristics of D.P. model, the recursive equation approach, Computational Procedure in dynamic Programming, solution of an L.P. by D.P

Simulation: Introduction, Monte-Carlo Simulation, Application to Inventory Control, Application to Queuing Problems

Learning Resources:

Text Books:

1. S.D. Sharma, Kedarnath, Operations Research - Ram Nath & Co, 2008.
2. J.K Sharma, Operations Research - Theory and Applications , Macmillan Publications India Ltd, 2013

Reference Books:

1. H.A. Taha, Operations Research, Pearson, 7th Edition, June 2002.
2. Hiller and Liberman, Introduction to Operations Research - MGH, 7th Edition, 2002.

Web References:

1. http://www2.informs.org/Resources/
2. http://www.mit.edu/~orc/
3. http://www.ieor.columbia.edu/
4. http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
5. http://www.wolfram.com/solutions/OperationsResearch/

CS 405*	Wireless Networks	L	T	P	C
		4	0	0	3

Course Objectives:

1. To study about simplified reference model, MAC control and applications in mobile communications.
2. To know about the predominant communication Systems in wireless domain.
3. To understand wireless LAN technologies
4. To learn about the protocols used in wireless networks

Course Outcomes:

1. Understand the basics of wireless transmission technology.
2. Understand the media access technologies
3. Know about wireless Communication systems GSM, UMTS and IMT-2000
4. Know about satellite and digital broadcast systems
5. Acquire knowledge of wireless LAN technologies
6. Be aware of mobile IP, the extension of IP protocol for mobile users
7. Understand approaches of adapting TCP for wireless networks
8. Know the architecture of WAP, the Wireless Application Protocol used for wireless and mobile access using different transport systems.

Course Content:

UNIT I 12 periods

Introduction – Applications, A Short History of Wireless Communications, A Market for Mobile Communications, A Simplified Reference Model. **Wireless Transmission –** Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum.

Medium Access Control – Motivation for a Specialized MAC, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA.

UNIT II 12 periods

Telecommunication Systems – GSM, UMTS and IMT 2000.

Satellite Systems -– History, Applications, Basics (GEO, LEO, MEO), Routing, Localization, Handover. **Broadcast Systems**– Overview, Cyclic Repetition of Data, Digital Audio Broadcasting, Digital Video Broadcasting.

UNIT III 12 periods

Wireless LAN – Infrared Vs. Radio Transmission, Infrastructure and Ad Hoc Networks, IEEE 802.11-System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management.
Wireless LAN – IEEE 802.11b,IEEE 802.11a, Bluetooth.

UNIT IV 12 periods

Mobile Network Layer – Mobile IP, Dynamic Host Configuration, Mobile ad-hoc networks.

Mobile Transport Layer – Traditional TCP, Classical TCP improvements- Indirect TCP, Snooping TCP , Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission / Time Out Freezing , Selective Retransmission ,Transaction Oriented TCP.

UNIT V 12 periods

Wireless Application Protocol – Architecture, Wireless Datagram Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol.
Wireless Application Protocol – Wireless Session protocol, Wireless Application Environment, Wireless Markup Language, WML Script , Wireless Telephony Application, Example Stacks with WAP.

Learning Resources:

Text Book:

1. J.Schiller, Mobile communications, Addison Wesley, 2003.

Reference Books:

1. William Stallings, Wireless Communication Networks.
2. UWE Hansmann, LotherMerk, Martin S.Nicklous, Thomas Stober, Principles of Mobile Computing, 2nd Edition.
3. Raj Kamal, Mobile Computing, Oxford University Press, 2nd Edition.

Web Reference:

1.https://en.wikipedia.org/wiki/Wireless_network

CS/IT 406*(A) (Elective-IV)	Open Source Systems	L	T	P	C
		4	1	0	3

Course Objectives:

1. To understand basic concepts of PHP language and developing web applications.
2. To learn PHP Browser Handling and form data access.
3. To create database driven web applications.
4. To use Ajax for partial rendering.
5. To use XML and RSS with PHP.

Course Outcomes:

1. Develop web applications using Apache, PHP, and MySQL and apply the OOP concepts.
2. Create database driven web applications.
3. Create powerful web applications using Ajax.
4. Create images at the web server.
5. Manipulate XML documents using PHP and Create RSS.

Course Content:

UNIT I 15 periods

Essential PHP.
Operators and Flow Control.

Strings and Arrays.

UNIT II 15 periods

Reading Data in Web Pages.

PHP Browser-HANDLING Power.

UNIT III 15 periods

Object Oriented Programming.
Advanced Object Oriented Programming.

File Handling.

UNIT IV 15 periods

Working with Databases.

Sessions, Cookies, and FTP.
Ajax

UNIT V 15 periods

Advanced Ajax.
Drawing Images on the Server.

XML and RSS.

Learning Resources:

Text Book:

1. PHP: The Complete Reference, Steven Holzner, TATA McGraw Hill, 2013.

Reference Books:

1. Beginning PHP and MySQL: From Novice to Professional, By by W. Jason Gilmore, Apress.
2. PHP 6 and MySQL 6 Bible, By Steve Suehring, Tim Converse, Joyce Park, Wiley Publishing, Inc.

CS/IT 406*(B) (Elective-IV)	.NET Technologies	L	T	P	C
		4	1	0	3

Course Objectives:

1. To learn the C# language and the .NET Framework.
2. To know working of Microsoft Visual Studio Development Environment.
3. To use windows Forms applications with rich, highly responsive user interfaces.
4. To develop web applications and Services using ASP.NET.
5. To know the use of Language Integrated Query (LINQ).

Course Outcomes:

1. Apply basic concepts of C# programming.
2. Apply advanced concepts of C# programming.
3. Develop and deploy windows applications.
4. Develop and deploy web applications and web services using ASP.NET.
5. Develop database driven applications using XML and LINQ.

Course Content:

UNIT I 15 periods

Introducing C#, Writing a C# Program, Variables and Expressions.

Flow Control, More About Variables, Functions.

UNIT II 15 periods

Debugging and Error Handling , Introduction to Object-Oriented Programming, Defining Classes, Defining Class Members.

Collections, Comparisons and Conversions.

UNIT III 15 periods

Generics, Additional OOP Techniques, Basic Windows Programming.

Advanced Windows Forms Features, Deploying Windows Applications.

UNIT IV 15 periods

ASP.NET Web Programming

Web Services, Deploying Web Applications.

UNIT V 15 periods

File System Data, XML.

Introduction to LINQ, Applying LINQ.

Learning Resources:

Text Book:

1. Karli Watson, Christian Nagel, Jacob Hammer Pedersen, Jon Reid, and Morgan Skinner, BEGINNING VISUAL C# 2010, Wiley Publishing, Inc**.**

Reference Books:

1. Stephen C. Perry, Core C# and .NET, Pearson Education, 2006.
2. Herbert Scheldt, C#: The Complete Reference, TATA McGraw Hill Publishing.
3. Andrew Troelsen, Pro C# and the .NET Platform, A! Press.
4. Kevin Hoffman, Microsoft Visual C# 2005 Unleashed, Sams Pearson India.

Web References:

1. https://en.wikipedia.org/wiki/.NET_Framework
2. www.dotnetjalps.com/.../Dynamic-URL-of-asp-net-web-service

CS 406*(C) (Elective-IV)	Cyber Security	L	T	P	C
		4	1	0	3

Course Objectives:

1. To learn Fundamentals of information security and threats, data leakage & prevention.
2. To know Cyber security policies and Evolutions.
3. To know Cyber security objectives and decision makers.
4. To understand Cyber governance issues.
5. To understand Cyber management issues.

Course Outcomes:

1. Identify common security vulnerabilities/attacks, principles and concepts, Data protection and content analysis techniques.
2. Know polices, laws & regulations and counter measures.
3. Know the concepts of security frameworks, security policy objectives and security documentation.
4. Analyze copyright & Trademarks, cyber user issues and conflict issues.
5. Analyze risk management in various sectors and data backup procedures.

Course Content:

UNIT I 12 periods

Information Security and Threats: Information Security, Information Assets, Threats to Information Assets. **Fundamentals of Information Security:** Elements of information security, Principles and concepts – data security, Types of controls.

Data Leakage: Introduction – Data Leakage, Organizational Data Classification, Location and Pathways, Content Awareness, Content Analysis Techniques, Data Protection, DLP Limitations, DRM-DLP Conundrum.

UNIT II 12 periods

Cyber Security Introduction: Cyber Security, Cyber Security policy, Domains of Cyber Security Policy: Laws and Regulations, Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus Policy.

Cyber Security Evolution: Productivity, Internet, e-commerce, Counter Measures, Challenges.

UNIT III 12 periods

Cyber Security Objectives: Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, Security Policy Objectives.

Guidance for Decision Makers: Tone at the Top, Policy as a Project, Cyber Security Management: Arriving at Goals, Cyber Security Documentation.

UNIT IV 12 periods

Cyber Governance Issues: Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging.

Cyber User Issues: Malvertising, Impersonation, Appropriate Use, Cyber Crime, Geo location, Privacy. **Cyber Conflict Issues:** Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

UNIT V 12 periods

Cyber Management Issues: Fiduciary Responsibility, Risk Management, Professional Certification, Supply Chain, Security Principles, Research and Development.

Cyber Infrastructure Issue: Banking and finance, Health care, Industrial Control systems.
Data Backup: Data Backup, Types of Backup, Backup Procedures, Types of Storage.

Learning Resources:

Text Books:

1. NASSCOM, Handbook of Security Analyst, SSC/Q0901, 2015. (For Unit I & Unit V)
2. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss Cyber Security Policy Guidebook, John Wiley & Sons 2012. (For Unit II, Unit III, Unit IV & Unit V)

Reference Books:

1. Rick Howard, Cyber Security Essentials, Auerbach Publications 2011.
2. Richard A. Clarke, Robert Knake, Cyberwar: The Next Threat to National Security & What to Do About It, Ecco 2010.
3. Dan Shoemaker Cyber security The Essential Body of Knowledge, 1st ed. Cengage Learning 2011.
4. Augastine, Paul T., Cyber Crimes and Legal Issues", Crecent Publishing Corporation, 2007.

CS 406*(D) (Elective-IV)	Data Analytics	L	T	P	C
		4	1	0	3

Course Objectives:

1. Understand the fundamentals of 'R' programming.
2. Apply various Data Importing techniques in R.
3. Perform exploratory Data Analysis.
4. Apply Data Visualization to create fancy plots.
5. Understand the concept of Regression.

Course Outcomes:

1. Understand R.
2. Use functions of R.
3. Summarize Data.
4. Work on Probability.
5. Understand NOSQL.
6. Solve Engineering Issues and Create Business Models.

Course Content:

UNIT I 15 periods

Introduction to Analytics and R Programming:
Introduction to Big data and Data Analytics, Knowing language R, Using R as calculator, understanding components of R, Reading database using R.

Importing & Exporting CSV, Working on Variables, Outliers and Missing Data treatment, Combining Data sets in R, Discuss Functions and Loops.

UNIT II 14 periods

Summarizing Data & Revisiting Probability:
Summary Statistics-Summarizing data with R, Probability, Expected Value, Random & Bivariate Random Variables.

Probability Distribution, Normal Distribution, Central Limit Theorem, Random Walk.

UNIT III 14 periods

SQL using R, NO SQL, The Benefits of NOSQL, NOSQL Vs SQL Summary Excel.

Integration with R Connector :Read Excel Spreadsheet I R.

UNIT IV 14 periods

Correlation and Regression Analysis:
Basic Regression Analysis, Regression residuals, Correlation, Heteroscedasticity, Autocorrelation & Multicollinearity.

Introduction to Multiple Regression, Dummy Variables.

UNIT V 14 periods

Understanding Verticals and Requirements Gathering:
Understanding the business problem related to engineering, identify the critical issues. Set business objectives.

Requirement gathering: Gather All the Data related to Business Object.

Learning Resources:

Text Books:

1. Learn R by Steven Murray
2. The Art of R Programming by Norman Matloff

Reference Books:

1. Beginning R: The Statistical Programming Language by Mark Gardener
2. R for Beginners by Emmanuel Paradis
3. https://bigdatauniversity.com/courses/introduction-to-data-analysis-using-r/
4. http://www.r-tutor.com/elementary-statistics

Web References:

1. http://www.tutorialspoint.com/hadoop/
2. http://www.cloudera.com/products/apache-hadoop.html
3. http://www.r-tutor.com/elementary-statistics

CS 451	Term Paper	L	T	P	C
		0	0	4	2

Course Objectives:

1. To be able to select a problem in the chosen area of interest.
2. To acquire the knowledge on state of the art of the chosen topic.
3. To interpret and analyze the selected problem.
4. To improve communication and presentation skills.
5. To Develop lifelong learning ability through in depth study of selected area.

Course Outcomes:

1. Able to select a problem in the chosen area of interest.
2. Able to understand and analyze the selected problem
3. Demonstrate the knowledge gained in the relevant subject /domain
4. Able to improve communication and presentation skills
5. Able to engage in lifelong learning.
6. Able to function effectively as a member or leader in a team.

Guide Lines:

It is aimed as a precursor to the project work in the second semester of the B.Tech final year. It will help the students to identify their interested area / problem and forms the groundwork and preliminary research required for implementation of the problem during their project work.

The batches formed for pursuing the Project Work in the Final Year should select a research article published in the latest referred journals. The batch must gain an understanding of the technologies & tools used and the related issues, available both in printed and digital format. Each individual of the project batch must give two rounds of Seminar/Presentation on the same research article about their understanding and if possible propose the extensions for the work.

At the end of the Semester, the batch must submit a report, containing introduction of the concepts used in the article chosen, problem statement and its significance, literature survey, methodology, algorithms to be implemented during their project work.

CS 452	Web Services Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To understand J2EE Multi-Tier architecture.
2. To learn server side scripting with Java Server Pages.
3. To use XML parsers and Enterprise Java beans.
4. To learn RMI, Java Mail and Corba.
5. To understand web services and its related technologies.

Course Outcomes:

1. Design dynamic web pages with JSP.
2. Develop DOM and SAX parsers.
3. Create Enterprise Java Beans.
4. Use Java Mail, RMI and Corba in real time web applications.
5. Create and consume Web Services.

List of Programs:

1. Write a program to Integrate JSP & Servlets
2. Write an application using JSP Technology.
3. Write a program to demonstrate Java Bean using JSP Implicit objects.
4. Write a program to demonstrate cookie & Sessions using JSP.
5. Write a program to demonstrate Statefull/Stateless Session Bean.
6. Write a program to demonstrate XML SAX Parser.
7. Write a program to demonstrate XML DOM Parser.
8. Write a program to demonstrate Java Mail.
9. Write a program to demonstrate Remote Method Invocation.
10. Write a program to demonstrate CORBA using Java IDL
11. Develop an application for Client Request / Responses using SOAP.
12. Demonstrate how to describe web services

Note: A minimum of 10(Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 453 (Elective-IV Lab)	Open Source Systems Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To know the basic concepts of PHP language and developing web applications.
2. To learn PHP Browser Handling and form data access.
3. To create database driven web applications.
4. To use Ajax for partial rendering.
5. To use XML and RSS with PHP.

Course Outcomes:

1. Develop web applications using Apache, PHP, and MySQL and apply the OOP concepts.
2. Create database driven web applications.
3. Create powerful web applications using Ajax.
4. Create images at the web server.
5. Manipulate XML documents using PHP and Create RSS.

List of Programs:

1. Demonstrate the configuration of Apache, MySQL and PHP.
2. Write PHP Script to demonstrate String processing and regular Expressions in PHP.
3. Program to demonstrate Reading Data in Web Pages.
4. Program to demonstrate PHP Browser-Handling power.
5. Program to demonstrate File Uploading.
6. Program to demonstrate Object Oriented features of PHP.
7. Program to demonstrate Advanced Object Oriented features of PHP.
8. Program to demonstrate File Handling.
9. Write Script that takes user input data and validates it and write the data into the database.
10. Program to demonstrate DML commands in MySQL.
11. Program to demonstrate Passing of Information between Web pages using Sessions.
12. Program to demonstrate the use of Cookies.
13. Program to demonstrate FTP.
14. Program to demonstrate Ajax.
15. Program to demonstrate Advanced Ajax.
16. Program to demonstrate Drawing Images on the Server.
17. Program to create RSS feeds using PHP.
18. Program to manipulate XML documents using PHP.
19. Program to demonstrate user management and authentication.

Note: A minimum of 15(Fifteen) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 453 (Elective-IV Lab)	.NET Technologies Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To learn the C# language and the .NET Framework.
2. To know working of Microsoft Visual Studio Development Environment.
3. To use windows Forms applications with rich, highly responsive user interfaces.
4. To develop web applications and Services using ASP.NET.
5. To know the use of Language Integrated Query (LINQ).

Course Outcomes:

1. Apply basic concepts of C# programming.
2. Apply advanced concepts of C# programming.
3. Develop and deploy windows applications.
4. Develop and deploy web applications and web services using ASP.NET.
5. Develop database driven applications using XML and LINQ.

List of Programs:

1. Write a program to demonstrate OOPs concepts in C#.
2. Write a program to demonstrate Exception handling in C#.
3. Write a program to illustrate the concepts of events & delegates in C#.
4. Write a program to demonstrate multi-threaded programming in C#.
5. Write a program to demonstrate generics.
6. Write a program to demonstrate StreamWriters and StreamReaders.
7. Write a program to demonstrate Building and consuming a multi file assembly.
8. Write a program to demonstrate DML and DDL Commands using ADO.NET.
9. Write a program to build a data driven ASP.NET Web application.
10. Write a program to demonstrate ASP.NET controls.
11. Write a program to demonstrate Windows Forms Controls.
12. Write a program to demonstrate the building of a simple Windows Forms Application.

Note: A minimum of 10(Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 453 (Elective-IV Lab)	Cyber Security Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To implement cryptographic techniques.
2. To learn and use tools used for security.
3. To study and analyze different vulnerabilities & attacks.

Course Outcomes:

1. Implement symmetric and asymmetric key cryptographic techniques.
2. Implement the Message digest and Digital Signatures.
3. Study and use any packet capturing tool.
4. Study and use tools used for security like snort, NMAP etc.
5. Implement attacks spoofing, sniffing etc.

List of Programs:

1. Implement encryption and decryption using the following algorithms:

   A) Caesar Cipher b) Substitution Cipher c) Hill Cipher d)
2. Implement Row/Column transposition cipher.
3. Implement the Stream cipher using One – Time Pad (OTP) technique.
4. Implement 8 – bit S-DES block cipher algorithm
5. Implement RSA algorithm to achieve confidentiality & to create digital signatures.
6. Calculate the message digest of a text using the MD5/SHA-1 algorithm.
7. Implement encryption & decryption user's passwords
8. Implement buffer over flow / buffer overrun attack.
9. Study and implement the following using NMAP/ZENMAP
   a. Find Open ports on a system
   b. Find machines which are active
   c. Find the version of remote OS on other systems
10. Sniff network traffic using tool Cain and Abel / Wireshark / tcpdump
11. Perform an experiment on Active and Passive finger printing using xprobe2 /netcat tool
12. Generate minimum 10 passwords of length 12 characters using openssl command.
13. Study and use Snort IDS.
14. Setup a honey pot and monitor the honey pot on network using honeybot tool.

Note: A minimum of 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 453 (Elective-IV Lab)	Data Analytics Lab	L	T	P	C
		0	0	3	2

Course Objectives:

6. Understand the fundamentals of 'R' programming.
7. Apply various Data Importing techniques in R.
8. Perform exploratory Data Analysis.
9. Apply Data Visualization to create fancy plots.
10. Understand the concept of Regression.

Course Outcomes:

7. Understand R.
8. Use functions of R.
9. Summarize Data.
10. Work on Probability.
11. Understand NOSQL.
12. Solve Engineering Issues and Create Business Models.

List of programs:

1. Demonstrate calculator operations using ‘R’.
2. Write ‘R’ code which demonstrate the following
   a) Vector Operations
   b) Matrix Operations
3. Write ‘R’ code which demonstrate the following
   a) List Operations
   b) Data Frames
4. Write ‘R’ code which demonstrate functions and Control Statements.
5. Write ‘R’ code which demonstrate import and export of the .csv file.
6. Write ‘R’ codes which demonstrate the statistical functions.
7. Write ‘R’ code which demonstrate Graphs.
8. Write ‘R’ code which demonstrate Normal Distribution.
9. Write ‘R’ code which demonstrates SQl Operations using ‘R’.
10. Demonstrate Linear Regression using ‘R’.
11. Demonstrate T-test, F-test using ‘R’.

Note: A minimum of 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

IV/IV B.Tech - II Semester

CS/IT 407	Industrial Engineering & Management	L	T	P	C
		4	0	0	3

Course Objectives:

1. To acquire knowledge in management of organizations.
2. To understand different forms of business organizations and their impact towards society.
3. To understand the time value of money for evaluation of several project alternatives.
4. To get knowledge about accounting, depreciation and providing the funds for replacement of necessary machinery and equipment.
5. To know about changing environment and its implication for managing the human resources to achieve the corporate excellence in a changing environment.
6. To acquire knowledge about avoiding delays in production processes due to unavailability of material by effectively managing the function of materials management.
7. To know about business organization which produces very good quality products but it must satisfy the needs, wants and desires of the consumer.

Course Outcomes:

1. Aware of the inference of organization structure and performance of people working in organizations and to develop themselves as individual entrepreneurs for the society.
2. Knowledge about time value of money in the changing society and to get awareness about the calculation of several assets for tax purpose.
3. Link corporate vision, mission, strategies, and policies to human resource management to acquire competitive advantage and to frame strategies to develop talent and to retaining talent.
4. Use right sort of material at a right time for delivering the right product.
5. Uunderstand the customer perception, making him to buy the products and retaining the customer in a business.

Course Content:

UNIT I Text Book 1 10 periods

General Management:

Management Concept, Managerial Roles, Managerial Skills, Brief treatment of managerial functions, Scientific Principles of Management, Administrative Principles of Management.

Forms of Business Organization:

Salient features of sole proprietorship. Partnership, Joint Stock Company, Private limited and public limited companies.

UNIT II Text Book 1, 2 10 periods

Financial Management:

Objectives of Financial Management, Concept of interest, compound interest, and equivalent cash flow diagram

Economic Evaluation of Alternatives:

Basic methods, the annual equivalent method, present worth method, future worth method.

Depreciation:
Purpose, types of depreciation, common methods of depreciation. The straight line method, declining balance method, the sum of the years digits method.

UNIT III Text Book 1 14 periods

Human Resource Management:
Functions of Human Resource Management – Job Analysis, Human Resources Planning, Brief treatment of Recruitment, Selection, Placement, Induction & Orientation, Training and Development, Performance Appraisal, Job Evaluation, Career Planning and Development, Stress Management, Compensation
Directing: Motivation and Leadership, Theories of motivation and styles of Leadership.

UNIT IV Text Book 1 14 periods

Material Management:
Functions of Materials Management, Material Requirement Planning, Purchasing, Objectives of Purchasing, Source Selection, Procurement Methods, Vendor Rating, Inventory Management – EOQ, EPQ, ABC Analysis, FSN Analysis, VED Analysis.

UNIT V Text Book 1 12 periods

Marketing Management:
Functions of Marketing, Marketing Mix, Product life cycle, Channels of distribution, Marketing Segmentation, Advertising & Sales promotion, Market Research.

Learning Resources:

Text Books:

1. KK Ahuja, Industrial Management, Vol. I & II, Dhanpat Rai, 1978.
2. E.Paul Degarmo, John R Chanda, William G Sullivan, Engineering Economy, Mac Millan Publishing Co, 1979.

Reference Books:

1. Philip Kotler, Marketing Management, 11th Edition, Pearson Education, 2004.
2. P. Gopalakrishnan, Hand Book of Materials Management, PHI, 1999.
3. Gary Dessler, Human Resource Management, 11th Edition,2008.
4. Heinz Weirich and Harold Koontz, Management, 10th Edition, TMH, 2004.

Web References:

1. www.managementstudyguide.com*:* Describes the Concepts of Management & Its Operational Functions.
2. www.1000ventures.com : Describes about Management Gurus, Business Gurus.
3. www.citehr.com : Describes the Human Resource Management Topics.

CS 408	Internet Of Things	L	T	P	C
		4	0	0	3

Course Objectives:

1. Explore the interconnection and integration of the physical world and the cyber space.
2. Understand the design concepts in setting up IOT Devices.
3. Study about the setup, configuration and installation of equip met for IOT.

Course Outcomes:

1. Understand the application areas of IOT.
2. Realize the revolution of internet in Mobile Devices, Cloud & Sensor Networks.
3. Understand building blocks of Internet of Things and characteristics.
4. Have real time experience with Raspberry Pi kit to interface various devices.
5. Learn Programming techniques for IOT Devices.

Course Content:

UNIT I 12 periods

Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT.

Design of IOT: Logical Design of IOT, IOT Enabling Technologies, IOT Levels.

UNIT II 12 periods

Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail.

Applications: Logistics, Agriculture, Industry, Health & Life Style.

UNIT III 12 periods

M2M & System Management: M2M, Difference between IOT & M2M, SDN & NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management.

NETCONF-YANG: Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems, management with NETCONF-YANG

UNIT IV 12 periods

Developing Internet of Things:
Introduction, IOT Design Methodology. Installing Python, Python Data Types & Data Structures.

Logical Design using Python:
Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes, Python Packages

UNIT V 12 periods

IOT Physical Devices: What is IOT Device, Exemplary Device, Board, Linux on Raspberry Pi.

Endpoints: Interfaces, and Programming & IOT Devices.

Learning Resources:

Text Book:

1. Vijay Madisetti, Arshdeep Bahga, Internet of Things A Hands-On-Approach, 2014, ISBN: 9780996025515

Reference Books:

1. Adrian McEwen, Designing the Internet of Things, Wiley Publishers, 2013, ISBN: 978-1-118-43062-0
2. Daniel Kellmereit, The Silent Intelligence: The Internet of Things, 2013, ISBN: 0989973700
3. Internet of Things: Design Principles and Applications

Web References:

1. https://en.wikipedia.org/wiki/Internet_of Things
2. www.iot-a.eu/

CS/IT 409*(A) (Elective-V)	Parallel Algorithms	L	T	P	C
		4	0	0	3

Course Objectives:

1. To learn parallel and distributed algorithms development techniques for shared memory and message passing models.
2. To know about various models of parallel algorithms.
3. To understand the complexity and correctness models for parallel algorithms.

Course Outcomes:

1. Know massive parallelism on large-scale and model parallel programs for Selection and merging.
2. Analyze and model parallel programs sorting and searching.
3. Analyze and model parallel programs for permutation, Combination and Matrix.
4. Analyze and model parallel programs for Graph algorithms and applications.
5. Analyze and model parallel programs for Computing Prefix Sums and Applications.

Course Content:

UNIT I 12 periods

Introduction to Parallel Algorithms: Models of Computation – Analyzing Algorithms, Selection-The Problem and a lower Bound, A Sequential algorithm, Desirable Properties of Parallel algorithm, An algorithm for parallel Selection.

Merging: A Network for Merging, Merging on the CREW and EREW Models – A better Algorithm for the EREW model.

UNIT II 12 periods

Sorting: A network for Sorting, Sorting on a Linear Array, Sorting on CRCW, CREW, EREW Models

Searching: Searching a Sorted Sequence – Searching a Random Sequence, Searching on a tree, searching on Mesh.

UNIT III 12 periods

Generating Permutations and Combinations: Sequential Algorithms, generating permutations in Parallel, generating combinations in Parallel.

Matrix Operations: Transpositions, Matrix by Matrix Multiplications, Matrix by Vector multiplication.

UNIT IV 12 periods

Connectivity Matrix: Computing the Connectivity Matrix, Finding Connected Components.

All Pairs Shortest Paths: Computing Minimum Spanning Trees.

UNIT V 12 periods

Computing Prefix Sums: A Specialized Network, Using the un-shuffle Connection, Prefix Sums on a Tree, Prefix Sums on a Mesh.

Applications: Job Sequencing with Deadlines, Knapsack Problem, Mesh Solutions.

Learning Resources:

Text Books:

1. Selim G. Akl, The Design and Analysis of Parallel Algorithms, Prentice Hall, New Jersey, 1989.

Reference Books:

1. Michael J. Quinn, Parallel Computing: Theory & Practice, Tata McGraw Hill Edition, 2003.
2. Justin R. Smith, the Design and Analysis of Parallel Algorithms, Oxford University Press, USA, 1993.
3. Joseph JaJa, Introduction to Parallel Algorithms, Addison-Wesley, 1992.

CS/IT 409*(B) (Elective-V)	Digital Image Processing	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand the basics of digital image processing.
2. To know image enhancement techniques in spatial and frequency domains.
3. To understand the concepts of Image restoration.
4. To learn about mechanisms for advanced image analysis.

Course Outcomes:

1. Get familiarize with fundamentals of digital image processing.
2. Able to apply techniques of smoothening, sharpening, and filtering in spatial and frequency domain.
3. Can use restoration techniques.
4. Able to develop image compression techniques using standard algorithms to meet design specifications.
5. Can apply Morphological processing and Image segmentation techniques for practical applications.

Course Content:

UNIT I 12 periods

Introduction: Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of Image Processing.

Digital Image Fundamentals: Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels.

UNIT II 12 periods

Intensity Transformations and Spatial Filtering: Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing spatial Filters, Sharpening spatial Filters.

Filtering in the Frequency Domain: Properties of the 2-D Discrete Fourier Transform, The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.

UNIT III 12 periods

Image Restoration: A Model of the Image Degradation/Restoration Process, Noise models, Restoration in the presence of noise only- Spatial Filtering, Periodic Noise Reduction by Frequency Domain filtering.

Image Restoration: Linear, Position-Invariant Degradations, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.

UNIT IV 12 periods

Image Compression: Fundamentals:- Coding Redundancy, Spatial and Temporal Redundancy, Irrelavant Information, Measuring Image Information, Fidelity Criteria, Image Compression Models, Image Formats, Containers and Compression Standards.

Image Compression: Some Basic Compression Methods:- Huffman Coding, Arithmetic Coding, LZW Coding, Run-Length Coding, Bit-Plane Coding, Block Transform Coding, Predictive Coding.

UNIT V 12 periods

Morphological Image Processing: Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms, Gray-Scale Morphology.

Image Segmentation: Fundamentals, Point, Line and Edge Detection, Thresholding, Region-Based Segmentation.

Learning Resources:

Text Book:

1. Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing' Pearson Education, 3rd Edition.

Reference Books:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing, Analysis, and Machine Vision, 3rd Edition.
2. A.K.Jain, Fundamentals of Digital Image Processing, PHI.

Web References:

1. http://www.imageprocessingbasics.com/
2. www.imageprocessingplace.com/root_files_V3/tutorials.htm
3. www.library.cornell.edu/preservation/tutorial/intro/intro-01.html
4. www.olympusmicro.com/primer/digitalimaging/javaindex.html

CS 409*(C) (Elective-V)	ARM Processor	L	T	P	C
		4	0	0	3

Course Objectives:

1. To describe the programmer's model of ARM processor.
2. To understand the Simple Instruction set of ARM processor.
3. To understand the Thumb Instruction set of ARM processor.
4. To understand the Embedded c programming for ARM processor.
5. To become aware of the architecture of LPC214X Family.

Course Outcomes:

1. Understand the programming model of ARM processor.
2. Understand the Simple Instruction set of ARM processor.
3. Understand the Thumb Instruction set of ARM processor.
4. Understand the Embedded c programming for ARM processor.
5. Program the peripherals of ARM-MCU using C.

Course Content:

UNIT I 15 periods

ARM Embedded systems: The RISC design Philosophy, The ARM Design Philosophy, Embedded System Hardware: ARM bus Technology, AMBA Bus Protocol, Memory, Peripherals, Embedded system Software, Initialization (BOOT) code, Operating System.

ARM processor Fundamentals: Registers, current Program Status Register, Pipeline, Exceptions, Interrupts and the Vector Table, Architecture Revision, ARM Processor Families, Programming the ARM Processor, ARM Assembly Language, Starting assembly language program, General structure of an assembly language line, Writing assembly language programs.

UNIT II 10 periods

ARM Programming Model-I: Introduction, Instruction Set: Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instructions, Program Status Register Instructions, Loading Constants, Conditional Execution.

UNIT III 12 periods

ARM Programming Model-II: Thumb Instruction Set: Introduction, Thumb Register Usage, ARM Thumb Interworking Other Branch Instructions, Data Processing Instructions, Single Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions.

UNIT IV 12 periods

Efficient C Programming : Overview of C Compilers and Optimization, Basic C Data Types, C Looping Structures, Register Allocation, Function Calls, Pointer Aliasing, Structure Arrangement, Division .

UNIT V 11 periods

Peripheral Programming of ARM - MCU using C: Introduction, Internal block diagram of LPC2148, Features of LPC214X Family: Memory, Memory Map, System Functions, Internal Buses, Memory Accelerator Module, Peripherals: GPIO, The Timer Unit, Timer 0 in The Interrupt Mode, The Pulse Width Modulation Unit, The UART.

Learning Resources:

Text Books:

1. Andrew N. Sloss, Dominic Symes, Chris Wright, ARM Systems Developer's Guides: Designing & Optimizing System Software, Elsevier, 2004.
2. Lyla B .Das, Embedded Systems: an integrated approach, Pearson, 2013.

Reference Books:

1. Steve Furber, ARM system on chip architecture, Addison Wesley, second edition, 2000.
2. David Seal, ARM Architecture Reference Manual, 2nd edition, Addison Wesley, 2001.
3. Richard H. Barnett, Sarah Cox, Larry O'Cull - Embedded C Programming and the Atmel AVR, Delmar Learning, 2nd edition, 2007.
4. Warwick A. Smith, C Programming for Embedded Microcontrollers, Electronic International media BV, second edition, 2008.

Web Reference:

1. https://www.arm.com/

CS 409*(D) (Elective-V)	Big Data Analytics	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand physical architecture and ecosystem of Hadoop.
2. To understand and use MapReduce programming model for Big Data processing.
3. To learn and use tools and technologies used for providing Big Data solutions.

Course Outcomes:

1. Knowledge of characteristics of Big Data.
2. Understand distributed storage and distributed computation capabilities of Hadoop.
3. Understand how MapReduce works.
4. Ability to process Big Data using MapReduce jobs.
5. Ability to use the tool Hive for data warehousing on data stored in HDFS.
6. Ability to use the Column oriented database HBase to provide input to/ output from MapReduce jobs.

Course Content:

UNIT I 12 periods

Introduction to Big Data. What is Big Data. Why Big Data is Important. Meet Hadoop Data, Data Storage and Analysis. Comparison with other systems. Grid Computing.

A brief history of Hadoop. Apache hadoop and its Hadoop Ecosystem. Linux refresher. VMWare Installation of Hadoop.

UNIT II 12 periods

The design of HDFS. HDFS concepts. Command line interface to HDFS. Hadoop File systems. Interfaces. Java interface to Hadoop.

Anatomy of a file read and a file writes. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.

UNIT III 15 periods

Introduction, Analyzing data with UNIX tools, Analyzing data with hadoop. Java Map Reduce classes (New API). Data flow, combiner functions, Running a distributed Map Reduce Job.

Configuration API. Setting up the development environment. Managing configuration, Writing a UNIT test with MRUNIT, Running a job in local job runner, Running on a cluster, Launching a job, The Map Reduce WebUI.

UNIT IV 15 periods

Classic Mapreduce, Job submission, Job Initialization, Task Assignment, Task execution progress and status updates.

Job Completion, shuffle and sort on Map and reducer side, configuration tuning, Map Reduce Types, Input formats, Output formats, Sorting, Map Side and Reduce side joins.

UNIT V 15 periods

The Hive Shell, Hive Services, Hive Clients, The Meta store, comparison with traditional databases, Hive QL,

Hbasics, Concepts, Implementation, Java and Map reduce clients, Loading data, web queries.

Learning Resources:

Text Books:

1. Tom White, Hadoop, The Definitive Guide, 3rd Edition, O'Reilly Publications, 2012.
2. Drik deRoons, Chris Eaton, George Lapis, Pual Zikopolous, Tom Deutsch, Understanding Big Data Analytics for Enterprise class Hadoop and Streaming Data. 1st Edition, TMH, 2012.

Reference Books:

1. Vignesh Prajapati, Big Data Analytics with R and Hadoop
2. J Berman, published by Morgan Kaufmann Principles of Big Data Preparing, Sharing and Analyzing Complex Information, 1st Edition
3. David Loshin, Morgan Kaufmann, Big Data Analytics - From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph
4. Soumendra Mohanty, Big Data Imperatives: Enterprise 'big Data' Warehouse, 'BI' Implementations and Analytics, Apress
5. Peter Zadrozny, Raghu Kodali, Big Data Analytics Using Splunk, Apress 2013

Web References:

1. http://www.tutorialspoint.com/hadoop/
2. http://www.cloudera.com/products/apache-hadoop.html

CS/IT 410*(A) (Elective-VI)	Machine Learning	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand the basic concepts of learning and decision trees.
2. To know about the neural networks and genetic algorithms.
3. To learn the Bayesian techniques.
4. To understand the instant based learning.
5. To learn the analytical learning and reinforced learning.

Course Outcomes:

1. Choose the learning techniques with this basic knowledge.
2. Apply effectively neural networks and genetic algorithms for appropriate applications.
3. Apply Bayesian techniques and derive effectively learning rules.
4. Choose and differentiate reinforcement and analytical learning techniques.

Course Content:

UNIT I 12 periods

Introduction to Machine Learning: Well –Posed learning problem, Designing a Learning system, Perspectives and Issues in Machine Learning.

Concept Learning and the General –To-Specific Ordering: Introduction, A Concept Learning Task, Concept Learning as Search, FIND–S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination Algorithm, Remarks on Version Spaces and Candidate –Elimination, Inductive Bias.

UNIT II 12 periods

Decision Tree Learning: Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm.

Decision Tree Learning: Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT III 12 periods

Artificial Neural Networks: Introduction, Neural Network Representations, Appropriate Problems for Neural Network Learning, Perceptrons, Multi Layer Networks and Back Propagation Algorithm.

Artificial Neural Networks: Remarks on Back Propagation Algorithm, An Illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.

UNIT IV 12 periods

Evaluating Hypothesis: Motivation, Estimating Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals, Difference in Error of Two Hypothesis, Comparing Learning Algorithms.

Bayesian Learning: Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and Least –Squared Error hypothesis, Maximum Likelihood hypothesis for Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, The EM Algorithm.

UNIT V 12 periods

Computational Learning Theory: Introduction, Probably Learning an Approximately Correct Hypothesis, Sample Complexity for Infinite Hypothesis Spaces, The Mistake Bound Model of Learning.

Instance Based Learning: Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Learning Resources:

Text Book:

1. Tom Mitchel, Machine Learning, Mc Graw Hill Publications, 1997

Reference Books:

1. Christopher. M.Bishop, Pattern Recognition and Machine Learning, Springer Publications, October 2007
2. Ethen Alpaydin, Introduction to Machine Learning, Second Edition, MIT Publishers, 2010

Web Reference:

1. https://www.coursera.org/course/ml

CS/IT 410*(B) (Elective-VI)	Semantic Web	L	T	P	C
		4	0	0	3

Course Objectives:

1. To learn basic concepts of Traditional Web and Semantic Web.
2. To understand the structure of Resource Description Framework.
3. To know about the concepts of Web Ontology Language and Inference rules.
4. To use applications of Semantic Web and their services.
5. To understand the concepts and usage of Ontologies.

Course Outcomes:

1. Familiarize with Semantic Web technologies.
2. Write RDF for Semantic Web-systems.
3. Analyze Semantic web structures by using OWL and Inference rules.
4. Develop Semantic Web applications.
5. Use Ontologies in Semantic Web-system.

Course Content:

UNIT I 12 periods

The Semantic Web: Vision, Semantic Web Technologies, A Layered Approach.

Structured Web Documents: The XML Language, Structuring, Namespaces, Addressing and Querying XML Documents, Processing.

UNIT II 12 periods

Describing Web Resources: RDF, Basic Ideas, XML Based Syntax RDF Schema.

RDF and RDF Schema in RDF Schema: Basic Ideas, The Language, An Axiomatic Semantics for RDF and RDF Schema, A Direct Inference System for RDF and RDFS, Querying in RQL.

UNIT III 12 periods

Web Ontology Language OWL: The OWL Language, OWL in OWL, Future Extension.

Logic and Inference-Rules: Monotonic Rules- syntax, semantics, Rule Markup in XML, Non-monotonic Rules- syntax, semantics, Rule Markup in XML.

UNIT IV 12 periods

Applications: Horizontal Information products at Elsevier, Data Integration at Audi, Skill Finding at Swiss Life.

Applications: Think Tank Portal at EnerSearch, eLearning, Web Services, Other Scenarios.

UNIT V 12 periods

Ontology Engineering: Constructing Ontologies Manually, Reusing Existing Ontologies,

Using Semiautomatic Methods: On-To-Knowledge Semantic Web Architecture, Application project.

Learning Resources:

Text Book:

1. Antoniou Grigoris, Groth Paul, Harmelen Frank Van, Hoekstra Rinke, A Semantic Web Primer, 3rd Edition, PHI.

Reference Books:

1. Karin K Brietman, Marco Antonio Casanova, Walter Truszkowski, Semantic Web, Concepts, Technologies and Applications. Springer 2007.
2. Liyang Yu, Semantic Web and Semantic Web Services, CRC 2007.
3. PascalHitzler, Markus Krotzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies, CRC Press.

CS 410*(C) (Elective-VI)	Cloud Computing	L	T	P	C
		4	0	0	3

Course Objectives:

1. To understand the different Cloud Deploy Models & Service Models in enterprise cloud environment.
2. To understand the Cloud Virtual Machines Migration and cloud enhancing service.
3. To learn Data security, work flow engines and SLA management for clouds.

Course Outcomes:

1. Explain different Cloud Deploy & Service Models.
2. Analyze the Integrate Enterprise cloud environments.
3. Design the Cloud Virtual Machines Migration and cloud enhancing service.
4. Analyze Secure Distributed Data Storage and work flow engines for clouds.
5. Describe the Data security and SLA Management.
6. Create Enhancing Cloud Computing Environments such as Caas, WaaS, etc.

Course Content:

UNIT I 12 periods

Introduction to cloud computing:
Cloud Computing in a Nutshell, roots of Cloud Computing, Layers and Types of Clouds, Desired Features of Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenge and Risks.

Migration into a Cloud:
Introduction, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud.

UNIT II 12 periods

Enriching the 'Integration as a Service' Paradigm for the Cloud Era:
An Introduction, The Onset of Knowledge Era, The Evolution of SaaS, The challenges of SaaS paradigm, Approaching the SaaS integration enigma, New integration scenarios, The integration methodologies, Saas integration products and platforms, SaaS Integration Services, Business to Business Integration(B2Bi) Services, A Framework of Sensor-Cloud Integration, SaaS Integration Appliances

The Enterprise Cloud Computing Paradigm:
Introduction, Background, Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers toward a Marketplace for Enterprise Cloud Computing, The Cloud Supply Chain.

UNIT III 12 periods

Virtual Machines Provisioning and Migration Services: Introduction and Inspiration, Background and Related Work, Virtual Machines Provisioning and Manageability, Virtual Machine

Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context, Future Research Directions.

Enhancing Cloud Computing Environments Using a Cluster as a Service: Introduction, Related Work, RVWS Design, Cluster as a Service: The Logical Design, Proof of Concept, Future Research Directions.

UNIT IV 12 periods

Secure Distributed Data Storage in Cloud Computing:

Introduction, Cloud Storage: from LANs TO WANs, Technologies for Data Security in Cloud Computing Open Questions and Challenges.

Workflow Engine for Clouds:

Introduction, Workflow Management Systems and Clouds, Architecture of Workflow Management Systems , Utilizing Clouds for Workflow Execution , Case Study: Evolutionary Multi objective Optimizations, Visionary thoughts for Practitioners, Future Research Directions.

UNIT V 12 periods

SLA Management in Cloud Computing:

Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud, Automated Policy-based Management.

Data Security in the Cloud:

An Introduction to the Idea of Data Security , The Current State of Data Security in the Cloud, Homo Sapiens and Digital Information, Cloud Computing and Data Security Risk, Cloud Computing and Identity, The Cloud, Digital Identity, and Data Security, Content Level Security—Pros and Cons.

Learning Resources:

Text Book:

1. Rajkumar Buyya, James Broberg, AndrZej Goscinski**,** Cloud Computing Principles and Paradigms, Wiley Publications. (Chapters covered 1- 5,7,8,12,16,23)

Reference Books:

1. Michael Miller, Cloud Computing – Web-Based Application That Change the Way You Work and Collaborate Online, Pearson Publications.
2. Thomas Erl, Zaigham Mahmood, & Ricardo Puttini, Cloud Computing**-** Concepts, Technology & Architecture Pearson Publications.
3. Kai Hwang, Geoffrey C.Fox. Jack J. Dongarra, Distributed and Cloud Computing **–** From Parallel Processing to the Internet of Things, ELSEVIER Publications.

Web References:

1. https://webobjects.cdw.com/webobjects/.../cloud-computing/
2. www.webopedia.com
3. https://technet.microsoft.com/en-us/magazine/hh509051.aspx

CS 410*(D) (Elective-VI)	Secure Software Engineering	L	T	P	C
		4	0	0	3

Course Objectives:

1. To provide knowledge on software quality, security and related issues.
2. To impart learning concept on various aspects of security properties.
3. To understand the architecture and design principles in developing software.
4. To know the steps in developing a secure software code.
5. To understand the SDLC phases in secure software engineering.

Course outcomes:

1. Identify advantages and disadvantages in secure software code.
2. Implement a software program with in-built security code.
3. Understand and design a secure software component for a project.
4. Analyze and learn various security issues related to software program or code.
5. Possess knowledge on security threats coding practices and secure programming.

Course Content:

UNIT I 12 periods

Software assurance and software security, threats to software security, Sources of software insecurity.

Benefits of detecting software security, managing secure software development.

UNIT II 12 periods

Defining properties of secure software, how to influence the security.

Properties of software, how to assert and specify desired security properties.

UNIT III 12 periods

Secure software Architecture and Design: Software security practices for architecture and design: Architectural risk analysis.

Software security knowledge for Architecture and Design: security principles, security guidelines, and attack patterns, secure design through threat modeling.

UNIT IV 12 periods

Writing secure software code: Secure coding techniques, Secure Programming: Data validation.

Secure Programming: Using Cryptography Securely, Creating a Software Security Programs.

UNIT V 12 periods

Secure Coding and Testing: code analysis- source code review, coding practices.

Static analysis, software security testing, security testing consideration through SDLC.

Learning Resources:

Text Books:

1. Julia H Allen, Sean J Barnum, Robert J Ellison, Gary McGraw, Nancy R Mead, Software Security Engineering: A Guide for Project Managers, Addison Wesley, 2008
2. Ross J Anderson, Security Engineering: A Guide to Building Dependable Distributed Systems, 2nd Edition, Wiley, 2008.
3. Howard M. and LeBlanc D., Writing Secure Code, 2nd Edition, Microsoft Press, 2003

Web References::

1. https://www.enisa.europa.eu/.../secure-software-engineering.
2. https://w3.cs.jmu.edu/.../web/.../references/secure-software-engineering.php

CS 454	Internet Of Things Lab	L	T	P	C
		0	0	3	2

Course Objectives:

1. To give a comprehensive view of the "Internet of Things" (Applications/ Potentials/ Challenges)
2. To analyze enabling technologies to make it happen (Embedded Devices and communication protocols)
3. To conduct Hands on activities (Guidelines on how to operate "things" in the "Internet of Things")

Course Outcomes:

1. Able to understand the application areas of IOT.
2. Able to understand building blocks of Internet of Things and characteristics.
3. Understand enabling technologies Embedded Devices and communication protocols for Hands on activities.
4. Write programs using Python for processing Internet of Things

List of Experiments:

1. Write a program to Read a potentiometer, print its state out to the device.
2. Write a program Blink an LED without using the delay() function.
3. Write a program to Read an analog input pin, map the result, and then use that data to dim or brighten an LED.
4. Write a program to Turn a LED on and off by sending data to your Arduino from Processing or Max/MSP.
5. Write a program to Control multiple LEDs using for loop.
6. Write a program to Read an ADXL3xx accelerometer.
7. Write a program to Detect objects with an ultrasonic range finder.
8. Write a program to Make an LED bar graph.
9. Write a program to Allows you to convert a String to an integer number.
10. Write a program to Controls a computer's cursor movement with a Joystick when a button is pressed.

Note: A minimum of 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS 455	Project Work	L	T	P	C
		0	0	6	10

Course Objectives:

1. To design and develop solution to the problem studied during term paper
2. To apply the knowledge of domain, basic and engineering sciences to solve the problem.
3. To interpret and analyze the results for providing valid conclusions
4. To improve communication and presentation skills.
5. To Develop lifelong learning ability through in depth study of selected area.

Course Outcomes:

1. Design and develop solutions to the problem studied using software engineering principles.
2. Solve the problems by applying the knowledge of domain, basic and engineering sciences.
3. Able to identify required data structures and design suitable algorithms for solving a problem
4. Interpret and analyze the results for providing valid conclusions
5. Able to use latest tools and technologies for solving the problem
6. Able to improve communication, presentation, management and report writing skills
7. Able to engage in lifelong learning.
8. Able to function effectively as a member or leader in a team.
9. Know legal and ethical issues while providing solutions

Guide Lines:

The Project work should be carried out as a continuation of the term paper (CS 451) by the same batches. It helps the students to comprehend and apply different theoretical concepts and technologies they have learnt. The project work activity should lead to a substantial result such as a comparative study, a new application of the technologies available or extension to the works carried out by some researcher. Each batch must carry out analysis, design, implementation and testing of the entire project using Software Engineering principles.

There shall be a total of **three** reviews for each batch:

1. **0th review**: The presentation of the problem before a project panel for getting approval of the project work.
2. **1st review**: The analysis and the design carried out for the chosen problem.
3. **2nd review**: the implementation, the testing done and the results.

A comprehensive report should be submitted at the end of the semester.