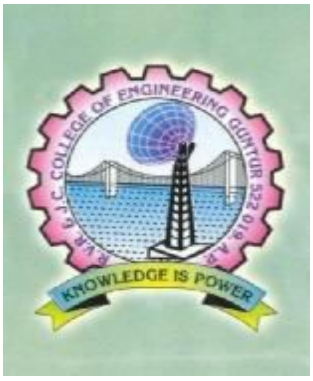
(R-20)

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

(Autonomous)

Regulations (R-20)
Scheme of Instruction, Examinations and Syllabi
for
Four yearB.Tech. Degree Programme

(w.e.f. 2020-2021)



Computer Science &Engineering

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

Accredited by NBA and NAAC with "A" Grade
Chowdavaram, Guntur- 522019

RVR & JC College of Engineering

Department of Computer Science & Engineering

R20 Regulations B.Tech.(CSE)

Semester - I (First Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			Category
			L	P	Internal Marks	Sem End Exam Marks	Credits	
1	CS/IT 111	Mathematics – I	3	0	30	70	3	BS
2	CS/IT 112	Engineering Physics	3	0	30	70	3	BS
3	CS/IT 113	Basic Electrical & Electronics Engineering	3	0	30	70	3	ES
4	CS/IT 114	Programming for Problem Solving	3	0	30	70	3	ES
5	CS/IT 151	Engineering Physics Lab	0	3	30	70	1.5	BS
6	CS/IT 152	Basic Electrical & Electronics Engineering Lab	0	3	30	70	1.5	ES
7	CS/IT 153	Engineering Graphics and Design Lab	1	4	30	70	3	ES
8	CS/IT 154	Programming for Problem Solving Lab	0	3	30	70	1.5	ES
9	CS/IT MC01	Constitution of India	2	0	100	-	-	MC
10		Three-weeks orientation program	-	-	-	-	-	
		TOTAL	**15**	**13**	**340**	**560**	**19.5**	

Semester - II (First Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			Category
			L	P	Internal Marks	Sem End Exam Marks	Credits	
1	CS/IT 121	Mathematics – II	3	0	30	70	3	BS
2	CS/IT 122	Engineering Chemistry	3	0	30	70	3	BS
3	CS/IT 123	Digital Electronics	3	0	30	70	3	ES
4	CS/IT 124	English for Communication Skills	3	0	30	70	3	HS
5	CS/IT 125	Programming in Python	2	0	30	70	2	ES
6	CS/IT 161	Engineering Chemistry Lab	0	3	30	70	1.5	BS
7	CS/IT 162	Programming in Python Lab	0	2	30	70	1	ES
8	CS/IT 163	Computer Engineering Workshop	0	3	30	70	1.5	ES
9	CS/IT 164	English Language Communication Skills Lab	0	3	30	70	1.5	HS
10	CS/IT MC02	Environmental Science	2	0	100	-	-	MC
		TOTAL	**16**	**11**	**370**	**630**	**19.5**	

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Semester - III (Second Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			Category
			L	P	Internal Marks	Sem End Exam Marks	Credits	
1	CS/IT 211	Probability and Statistics	3	0	30	70	3	BS
2	CS/IT 212	Discrete Mathematics	3	0	30	70	3	ES
3	CS/IT 213	Computer Organization	3	0	30	70	3	PC
4	CS/IT 214	Data Structures	3	0	30	70	3	PC
5	CS/IT 215	Object Oriented Programming	3	0	30	70	3	PC
6	CS/IT 251	Probability and Statistics Lab	0	3	30	70	1.5	PC
7	CS/IT 252	Data Structures Lab	0	3	30	70	1.5	PC
8	CS/IT 253	Object Oriented Programming Lab	0	3	30	70	1.5	PC
9	CSSL1	Skill Oriented Course-1	1	2	100	-	2	SC
10	CS/IT MC03	Design Thinking & Product Innovation	2	0	100	-	-	MC
		TOTAL	**18**	**11**	**440**	**560**	**21.5**	

Semester - IV (Second Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			Category
			L	P	Internal Marks	Sem End Exam Marks	Credits	
1	CS/IT 221	Computational Statistics	3	0	30	70	3	BS
2	CS/IT 222	Database Management Systems	3	0	30	70	3	PC
3	CS/IT 223	Operating Systems	3	0	30	70	3	PC
4	CS/IT 224	Software Engineering	3	0	30	70	3	PC
5	CS/IT 225	Web Technologies	3	0	30	70	3	PC
6	CS/IT 261	Computational Statistics Lab	0	3	30	70	1.5	PC
7	CS/IT 262	Database Management Systems Lab	0	3	30	70	1.5	PC
8	CS/IT 263	Web Technologies Lab	0	3	30	70	1.5	PC
9	CSSL2	Skill Oriented Course-2	1	2	100	-	2	SC
10	CS/IT MC04	Ethics & Human Values	2	0	100	-	-	MC
		TOTAL	**18**	**11**	**440**	**560**	**21.5**	
Internship of Minimum 6 Weeks is mandatory during Summer Vacation (Will be evaluated in fifth Semester)								
Registration for Honors/Minor degree permitted in this semester (Maximum Two additional courses per semester are permitted for Honors/Minor								

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Semester- V (Third Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			Category
			L	P	Internal Marks	Sem End Exam Marks	Credits	
1	CS/IT 311	Automata Theory & Formal Languages	3	0	30	70	3	PC
2	CS/IT 312	Computer Networks	3	0	30	70	3	PC
3	CS/IT 313	Design & Analysis of Algorithms	3	0	30	70	3	PC
4	CS 314	Professional Elective - I	3	0	30	70	3	PE
5	CS 315	Open Elective - I	3	0	30	70	3	OE
6	CS/IT 351	Design & Analysis of Algorithms Lab	0	3	30	70	1.5	PC
7	CS/IT 352	Data Analysis & Visualization Lab	0	3	30	70	1.5	PC
8	CS/IT 353	Summer Internship	-	-	100	-	1.5	PR
9	CSSL3	Soft Skills	1	2	100	-	2	SC
		TOTAL	**16**	**8**	**410**	**490**	**21.5**	

Semester- VI (Third Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			**Category**
			L	P	Internal Marks	Sem End Exam Marks	Credits	
1	CS/IT 321	Artificial Intelligence	3	0	30	70	3	PC
2	CS/IT 322	Cryptography & Network Security	3	0	30	70	3	PC
3	CS/IT 323	Machine Learning	3	0	30	70	3	PC
4	CS 324	Professional Elective -II	3	0	30	70	3	PE
5	CS 325	Open Elective/Job Oriented Course - II	3	0	30	70	3	OE
6	CS/IT 361	Artificial Intelligence lab	0	3	30	70	1.5	PC
7	CS/IT 362	Machine Learning Lab	0	3	30	70	1.5	PC
8	CS/IT 363	Term Paper	0	3	100	-	1.5	PR
9	CSSL4	Skill Oriented Course-4	1	2	100	-	2	SC
		TOTAL	**16**	**11**	**410**	**490**	**21.5**	
Internship minimum of 6 weeks is mandatory during summer vacation. (Will be evaluated in Seventh Semester)								

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Semester -VII (Fourth Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			Category
			L	P	Internal Marks	Sem End Exam Marks	Credits	
1	CS/IT 411	Humanities and Social Sciences (Elective – I)	3	0	30	70	3	HS
2	CS 412	Professional Elective - III	3	0	30	70	3	PE
3	CS 413	Professional Elective - IV	3	0	30	70	3	PE
4	CS 414	Professional Elective – V(**MOOCS**)	0	0	-	100	3	PE
5	CS 415	Open Elective / Job Oriented Course - III	3	0	30	70	3	OE
6	CS 416	Open Elective – IV(**MOOCS**)	0	0	-	100	3	HS
7	CS/IT 451	Summer Internship	-	-	100	-	3	PR
8	CS 452	Skill Oriented Advanced Course-2	1	2	100	-	2	SC
TOTAL			**13**	**2**	**320**	**480**	**23**	

Semester - VIII (Fourth Year)

S.No	Course Code	Course Title	Hours Per Week		Scheme of Examination			Category Code
			L	P	Internal Marks	SEE marks	Credits	
1	CS/IT 461	Project Work (Project Work and internship)	0	12	30	70	12	PR
TOTAL			**0**	**12**	**30**	**70**	**12**	

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Professional Elective Courses					
S.NO	**COURSE CODE**	**COURSE NAME**	**L-T-P**	**CR**	**PRE-REQ.**
III/IV B.Tech.					
CS314					
1.	CSEL01	Digital Image Processing	3-0-0	3	Calculus, P&S
2.	CSEL02	Information Retrieval	3-0-0	3	DS, P&S
3.	CSEL03	Advanced Computer Architecture	3-0-0	3	CO
CS324					
4.	CSEL05	Compiler Design	3-0-0	3	AFL
5.	CSEL06	Multimedia Computing	3-0-0	3	PPS
6.	CSEL07	Principles of Cloud Computing	3-0-0	3	CN
7.	*CSEL08	Industry Recommended Course(IRC)*	3-0-0	3	
IV/IV B.Tech.					
CS412					
1.	CSEL08	Devops (LBD)	3-0-0	3	SE
2.	CSEL09	Cyber Security(LBD)	3-0-0	3	CNS
3.	CSEL10	Web and Micro Services(LBD)	3-0-0	3	WT
IV/IV B.Tech.					
CS413					
4.	CSEL11	Internet of Things(LBD)	3-0-0	3	CN
5.	CSEL12	Visual Programming(LBD)	3-0-0	3	PPS
6.	CSEL13	Natural Language Processing(LBD)	3-0-0	3	
7.	*CSEL14	Industry Recommended Course(IRC)*	3-0-0	3	

Open Elective courses offered by CSE					
S.NO	**COURSE CODE**	**COURSE NAME**	**L-T-P**	**CR**	**PRE-REQ.**
1.	CSOL01	Programming with Java	3-0-0	3	PPS
2.	CSOL02	Relational Database Management System	3-0-0	3	-

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Job Oriented courses offered by CSE					
S.NO	**COURSE CODE**	**COURSE NAME**	**L-T-P**	**CR**	**PRE-REQ.**
1.	CSJL1	Big Data Processing	3-0-0	3	(R)DBMS
2.	CSJL2	Full Stack Development	3-0-0	3	WT, Java

Skill Oriented Courses

S.NO	COURSE NAME	L-T-P	CR	PRE-REQ.
	Basic Skill Oriented Courses			
CSSL1	**Skill Oriented Course-I**			
a.	2D-Computer Animation	1-0-2	2	EGD
b.	Programming with C++	1-0-2	2	PPS
c.	PHP Programming	1-0-2	2	
CSSL2	**Skill Oriented Course-II**			
a.	3D-Computer Animation	1-0-2	2	2D- Computer Animation
b.	Linux Programming	1-0-2	2	PPS
c.	Mobile App Development	1-0-2	2	OOP
CSSL3	**Soft Skills**	1-0-2	2	
	Skill oriented advanced Courses			
CSSL4	**Skill Oriented Course-III**			
a.	Automation Testing	1-0-2	2	SE
b.	Data Warehousing	1-0-2	2	DBMS
c.	OpenMP & MPI	1-0-2	2	PPS & CN
CSSL5	**Skill Oriented Course-IV**			
a.	AWS cloud	1-0-2	2	PPS
b.	Object Oriented Modelling and Design	1-0-2	2	SE, OOP
c.	Ethical Hacking	1-0-2	2	CNS
d.	IRC*	1-0-2	2	

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B.Tech. (Hons.) CSE Courses					
S.NO.	COURSE CODE	COURSE NAME	L-T-P	CR	PRE-REQ.
POOL1					
1	CSHR1	Advanced Data Structures	3-0-2	4	DS
2	CSHR2	Functional Programming	3-0-2	4	DM, PPS
3	CSHR3	Fuzzy Logic	3-0-2	4	DM
4	CSHR4	Computer Graphics	3-0-2	4	EGD
POOL2					
1	CSHR5	Advanced Data Bases	3-0-2	4	DBMS
2	CSHR6	Concurrent Programming	3-0-2	4	OS,DS
3	CSHR7	Game Theory	3-0-2	4	P&S
4	CSHR8	ARM programming	3-0-2	4	CO
POOL3					
1	CSHR9	Advanced Python Programming	3-0-2	4	PP, CN, WT
2	CSHR10	Search Engine Internals	3-0-2	4	DS,IR
3	CSHR11	Sensor Networks	3-0-2	4	CN
4	CSHR12	Parallel Algorithms	3-0-2	4	DAA
POOL4					
1	CSHR13	Semantic Web Technologies	3-0-2	4	DS
2	CSHR14	Computer Vision	3-0-2	4	ML
3	CSHR15	Social Network Analysis	3-0-2	4	P&S, ML
4	CSHR16	Virtual Reality	3-0-2	4	CG
MOOCS					
• 2 Advanced courses to be done with the acceptance of CSE BoS					

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Courses offered for Minor in Computer Science & Engineering					
S.NO	**COURSE CODE**	**COURSE NAME**	**L-T-P**	**CR**	**PRE-REQ.**
1.	CSMR1	Fundamentals of Data Structures	3-0-2	4	Programming for Problem Solving
2.	CSMR2	Computer Organization and Architecture	3-1-0	4	-
3.	CSMR3	Operating System Concepts	3-1-0	4	-
4.	CSMR4	Relational DataBase Management System	3-0-2	4	-
5.	CSMR5	Programming with JAVA	3-0-2	4	Programming for Problem Solving
6.	CSMR6	Introduction to Algorithms	3-0-2	4	CSMR1 – Fundamentals of Data Structures
7.	CSMR7	Principles of Software Engineering	3-1-0	4	-
8.	CSMR8	Computer Networking Concepts	3-1-0	4	CSMR1 – Fundamentals of Data Structures
• 2 courses to be done through MOOCs with the acceptance of CSE BoS					

Semester I (First year)

CS/IT 111	**Mathematics-I**	**L**	**P**	**C**
		3	**0**	**3**

Course Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more a level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes:

The students will able to:

1. Evaluate certain improper integrals apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. Apply Role's theorem which is fundamental application of analysis to Engineering problems.
3. Solve problems related to linear algebra including linear transformations in a Comprehensive manner
4. Find Matrix Eigen values and know diagonalization and orthogonalization.

Course Content:

UNIT I Text Book-1 15 Periods

Evolutes and Involutes, Evaluation of improper integrals: Integrals without infinite limits of integration, Beta function, Gamma function, Relation between beta and gammafunctions (without proof) Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT II Text Book-1 15 Periods

Rolle's theorem (without proof), Lagrange's mean value theorem (without proof), Taylor's and Maclaurin series, Sequences, Series, Series of positive terms, Convergence tests: Comparison test (limit form) D'Alembert's ratio test, Raabe's test for convergence.

UNITIII Text Book-2 15 Periods

Vectors: addition and scalar multiplication, linear dependence and independence of vectors.
Vector space, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

UNIT IV Text Book-2 15 Periods

Characteristic equation, Eigen values and eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, Eigen basis, Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Learning Resources:

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd edition.
2. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson, 2002.
2. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
3. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2006.

CS/IT 112	Engineering Physics	L	P	C
		3	0	3

Course Objectives:

1. Introducing the concept of electron motion in periodic potentials and classification of solids, band formation by learning the prerequisite quantum physics.
2. Explaining the diode equation and formation of P-N junction from the basics of semiconductors.
3. Understanding the interaction of radiation with bulk semiconductors and the relevant Optoelectronic devices with energy band diagrams.
4. Exploring the applications of devices in low dimensional materials by understanding the density of states and experimental techniques to be used for measurement of transport properties.

Course Outcomes:

After successful completion of the course, the student will be able to understand:

1. Demonstrate the necessity of periodical potentials and conditions for explaining the properties and band formation with the help of quantum physics.
2. Understand the theory of P-N junction diode from the basics of semiconductor concepts.
3. Know the theory and application of Optoelectronic devices.
4. Describe measuring techniques employed in transport phenomena and variation of properties in low dimensions.

Course Content:

UNIT I CO1 15 Periods

Principles of Quantum Mechanics:Wave nature of particles, de Broglie's hypothesis, Davisson and Germer's experiment, Time dependent and Time independent Schrodinger wave equations, Physical significance of wave function, Uncertainty principle, single slit experiment. Particle in a box and extension to 3D box (qualitative treatment only).

Electron Theory of Metals: Salient features of Free electron theory, Fermi - Dirac distribution function, Fermi level, Density of States, Bloch wave function, Kronig-Penney model, E-k curves, Brillouin zones, Effective mass, Degrees of freedom, Distinction of metals, semiconductors and insulators. Concept of hole, Energy band formation insolids.

UNIT II CO2 15 Periods

Semiconductor Physics: Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, drift and diffusion equations, Einstein's relation, P-N junction formation, diode equation, Hall effect and applications.

UNIT III CO3 15 Periods

Lasers and Optoelectronic Devices: Direct and Indirect band gap semiconductors, Light-semiconductor interaction: Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission, Optical loss and gain; Density of states for photons, Semiconducting laser, Homo and Hetero structure lasers with band diagrams, characteristics of laser and LED,PIN diode, Solar cell , working principle andcharacteristics.

UNIT IV CO4 15 Periods

Low Dimensional Structures and Measuring Techniques: Density of states in 2D, 1D and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots. Four-point probe and Van der Pauw measurements for carrier density, resistivity and Hall mobility, Hot-point probe measurement, capacitance-voltage measurements, Parameter extraction from Diode I-V characteristics.

Learning Resources:

Text Book:

1. M.N. Avadhanulu, P.G. Kshirasagar - A Text book of Engineering Physics, S. Chand & Company Ltd., 2018.

Reference Book(s):

1. Donald A.Neeman - Semiconductor Physics and Device : Basic Principle (Fourth edition), TMH, 2012.
2. J.Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
3. B.E.A.Saleh and M.C.Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
4. S.M.Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
5. A.Yariv and P.Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
6. P.Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).

Web Resources:

1. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL.
2. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL.

CS/IT 113	Basic Electrical & Electronics Engineering	L	P	C
		3	0	3

Course Objectives:

The main objectives of this course are
1. To introduce fundamental laws, basic electrical elements, sources and their characteristics.
2. To develop the ability to apply circuit analysis to AC circuits.
3. To know the principle of operation and characteristics of Diode and transistors.
4. To acquire knowledge on feedback topologies and oscillators.

Course Outcomes:

Upon successful completion of the course, the student will be able to:
1. Analyse concepts of basic electrical circuits and batteries.
2. Solve problems on AC circuits.
3. Describe the principle of operation and characteristics of Diode and transistors.
4. Summarize feedback topologies and oscillators.

Course Content:

UNIT – I Text Books – 1&2 CO1 16 Periods

DC Circuits: Batteries: Lead-acid, Nickel-iron, Nickel-Cadmium batteries (Operation only). Elementary calculations for energy consumption. DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

UNIT-II Text Books – 1&2CO216 Periods

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), real power, reactive power, apparent power, power factor. Three phase balanced circuits, voltage and current relations in star and delta connections (balanced loads only).

UNIT - III Text Book - 2 CO3 16 Periods

Semiconductor Diodes: Semiconductor diode, Zener diode, Half-Wave Rectifier, Full-Wave rectifier, Clippers and Clampers.
Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitter configuration, Common collector configuration.

UNIT – IV Text Book – 2, Reference Book-4 CO4 16 Periods

Amplifiers: Need of biasing, Thermal runaway, Types of biasing-fixed bias, collector base bias, self-bias. Feedback and Oscillator Circuits: Feedback concepts, feedback connection types, Barkhausen criteria, Phase-Shift oscillator, Wien bridge oscillator, Hartley oscillator, Colpitts oscillator.

Learning Resources:

Text Books:

1.A. Sudhakar and Shyam Mohan SP, "Circuits and Networks: Analysis and Synthesis", 5th Edition, TMH, 2017.
2. M.S. Sukhija, T.K. Nagasarkar, "Basic Electrical & Electronics Engineering", Oxford press, 2012.

Reference Books:

1. V.K. Mehta, "Principles of Electrical Engineering and Electronics", S. Chand, 2010.
2. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 5th Edition, Schaum's outline series, TMH, 2017.
3. S. Salivahanan, A. Vallavaraj, "Electronic Devices and Circuits", TMH, 2011.
4. Robert Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson, 2010.

CS/IT 114	Programming for Problem Solving	L	P	C
		3	0	3

Course Objectives:

The objectives of the course are, to make the students understand:

1. Basic problem solving process using Flow Charts and algorithms.
2. Basic concepts of control structures in C.
3. Concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. Concepts of structures, unions, files and command line arguments in C.

Course Outcomes:

After successful completion of the course, the students will be able to

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 pointers.
4. Develop code for complex applications using structures and file handling features.

Course Content:

UNIT I 15 Periods

Introductory Concepts: Block Diagram of Computer, Computer Characteristics, Hardware vs Software, how to Develop a Program, Software Development Life Cycle, Structured Programming, Types of Programming Languages, Introduction to C program, Program Characteristics.
Introduction to C Programming: Character set, Identifiers and Keywords, Data types, Constants, type qualifiers, Declaration and Initialization of variables.
Operators & Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, Conditional Operator, Input/ Output functions.

UNIT II 15 Periods

Control Statements: Branching, Looping, Nested Control Structures, Switch Statement, Break Statement, continue Statement, and Goto Statement
Arrays: Defining an Array, Processing an Array, Multidimensional Arrays & Strings.

15 Periods

UNIT III

Functions: Defining a Function, Accessing a Function, Function prototypes, Passing Arguments to a Function, Passing Arrays to Functions, Recursion, Storage Classes
Pointers: Fundamentals, Pointer Declarations, Passing Pointers to a Function, Pointers and Arrays, Dynamic memory allocation, Operations on Pointers, Arrays of Pointers.

15 Periods

UNIT IV

Structures and Unions: Defining a Structure, Processing a Structure, User-Defined Data Types, Structures and Pointers, Passing Structures to Functions, Self-Referential Structures, Unions.
Files Handling: Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data Files, Accessing the File Randomly.
Command line arguments, C-preprocessor directives.

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.
5. A Structured Programming Approach Using C by Behrouz A. Forouzan, Richard F. Gilberg, Third Edition, Cengage 2007.

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 151	Engineering Physics Lab	L	P	C
		0	3	1.5

Course Objectives:

The aim and objective of the Lab course on Physics is to introduce the students of B.Tech. class to the formal structure of Physics so that they can use these in Engineering as per their requirement.

1. To familiarize the students with electronic measuring instruments.
2. To measure various parameters of the optical components.
3. Design/problem solving skills, practical experience are developed through laboratory assignments which provide opportunities for developing team in multidisciplinary environments.
4. To understand the general, scientific concepts and a wide idea on various components &instruments required for technology.

Course Outcomes:

At the end of the course, the student will be to draw:

1. Use CRO, Function generator, Spectrometer for making measurements.
2. Test the optical instruments using principles of interference and diffraction.
3. Carrying out precise measurements and handling sensitive equipment.
4. Draw conclusions from data and develop skills in experimental design.

List of Experiments:

1. Measurements using Vernier Calipers, Screw Gauge and Spherometer.
2. Newton's rings - Measurement of radius of curvature of plano-convex lens.
3. Determination of Energy band gap of a Semiconductor.
4. Optical fibers – Determination of Numerical Aperture.
5. Diffraction grating - Measurement of wavelengths using Spectrometer.
6. Magnetic field in Helmholtz coil.
7. PhotoVoltaic Cell – Determination of fill factor.
8. Series LCR resonance circuit –Determination of Q – factor.
9. Four probe method apparatus for measurements of resistivity and conductivity
10. Determination of wavelengths using diffraction grating
11. Variation of magnetic field along the axis of a circular current carrying coil
12. Carey Foster's bridge – Determination of Specific Resistance

Reference Book:

Physics Lab Manual: RVR & JCCE, 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/IT 152	Basic Electrical & Electronics Engineering Lab	L	P	C
		0	3	1.5

Course Objectives:

The main objectives of this lab course are
1. To conduct experiments on electrical circuits.
2. To design experimental setups for theorems.
3. To learn Diode characteristics, and basic diode applications as rectifiers and regulators.
4. To learn BJT characteristics and Oscillators.

Course Outcomes:

Upon completion of this laboratory, the student will be able to:
1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Use common electrical measuring instruments.
4. Verify the network theorems.
5. Design Zener voltage regulator to meet the specifications.
6. Verify popular BJT applications experimentally.

List of experiments/demonstrations:

1. Familiarization of Electrical Installations and Electrical Testing Equipment: Miniature circuit breakers (MCBs), Moulded Case Circuit Breakers (MCCBs), Earth-leakage circuit breakers (ELCBs), Fuses, Types of Wires, Wire Gauges, continuity test, megger, Cables and Earthing.
2. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, wattmeter, multi-meter, oscilloscope, measurement of basic parameters.
3. Verification of KVL and KCL.
4. Verification of Superposition Theorem.
5. Verification of Thevenin's Theorem.
6. Verification of Norton's Theorem.
7. Determination of choke coil parameters.
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 have to be Performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS/IT 153	Engineering Graphics & Design Lab	L	P	C
		1	4	3

Course Objectives:

The course will enable the students to

1. Expose the students to standards and conventions followed in preparation of engineering drawings.
2. Make them understand the concepts of orthographic and isometric projections
3. Develop the ability of conveying the engineering information through drawings.
4. Make them understand the relevance of engineering drawing to different engineering domains.
5. Develop the ability of producing engineering drawings using drawing instruments.
6. Enable them to use computer aided drafting packages for the generation of drawings.

Course Outcomes:

Upon completion of this course, students will be able to

1. Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
2. Produce computer generated drawings using CAD software.
3. Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.
4. Develop isometric drawings of simple objects reading the orthographic projections of those objects.
5. Convert pictorial and isometric views of simple objects to orthographic views.

(**UNIT I to IV** shall be taught in conventional drawing method and Unit V shall be taught with the aid of computer)

UNITI

General: Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering.
Conic sections: Construction of Ellipse, Parabola, Hyperbola and Rectangular Hyperbola. (General method only)
Curves: Cycloid, Epicycloid, Hypocycloid and Involute; and Scales

UNIT II

Method of Projections: Principles of projection - First angle and third angle projection of points, Projection of straight lines inclined to both planes. Traces of lines.
Projections of planes: Projections of planes inclined to both the planes, projections on auxiliary planes.

UNIT III

Projections of Regular Solids: Projections of solids (Prism, Pyramid, Cylinder and Cone) with varying positions.

Sections of Solids: Sections of Prisms, Pyramids, cylinders and Cones. True shapes of sections. (Limited to the cutting plane perpendicular to one of the principal plane).

Development of surfaces: Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT IV

Isometric Projections: Principles of Isometric Projection-Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids.
Orthographic Projections: Conversion of pictorial views into Orthographic views and Vice-versa. (Treatment is limited to simple castings).
Perspective Projections: Introduction to Perspective Projection.

UNIT V

Over view of Computer Aided drafting (AutoCAD): Introduction, starting and customizing AutoCAD screen, usage of different menus, toolbars (drawing, editing, dimension, text, object properties.etc), tabs (Object, snap, grid, polar, ortho, otrack.etc.) and command prompt. Setting units, limits, layers and viewports (Isometric, Top, Front, back, etc.). 2D drawings of various mechanical and structural components, electrical and electronic circuits. Orthographic and Isometric views of mechanical castings and simple structures.

Learning Resources:

Text Book:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.

Reference Books:

1. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
4. (Corresponding set of) CAD Software Theory and User Manuals

CS/IT 154	Programming for Problem Solving Lab	L	P	C
		0	3	1.5

Course Objectives:

The objectives of the course are, to make the student understand:

1. Basic problem solving process using Flow Charts and algorithms.
2. Basic concepts of control structures in C.
3. Concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. Concepts of structures, unions, files and command line arguments in C.

Course Outcomes:

After successful completion of the course, the students are able to

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 recursion.
4. Develop code for complex applications using structures, pointers and file handling features.

List of Exercises / Activities:

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Lab1 Simple computational problems using arithmetic expressions.
Lab2 Problems involving if-then-else & switch.
Lab3 Iterative problems.
Lab4 1D Array manipulation.
Lab5 Problems on 2D arrays and Strings.
Lab6 Function calling mechanisms (Call by value).
Lab7 Function calling mechanisms (Call by reference).
Lab8 Recursive functions.
Lab9 Dynamic memory allocation.
Lab10 Structures and unions.
Lab11 File operations.
Lab12 Command line arguments.

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/IT MC1	**Constitution of India**	**L**	**P**	**C**
		2	**0**	**0**

Course Objective:

To provide basic information about Indian Constitution.

Course Outcomes:

After completion of the course, the students will be able to:

1. Understand the significance of many provisions of the Constitution as well as to gain insight into their back ground. They will also understand number of fundamental rights subject to limitations in the light of leading cases.
2. Study guidelines for the State as well as for the Citizens to be followed by the State in the matter of administration as well as in making the laws. It also includes fundamental duties of the Indian Citizens in Part IV A (Article 51A).
3. Understand administration of a State, the doctrine of Separation of Powers.
4. Know how the State is administered at the State level and also the powers and functions of High Court.
5. Understand special provisions relating to Women empowerment and also children. For the stability and security of the Nation, Emergency Provision are Justified.
6. Understand election commission as an independent body with enormous powers and functions to be followed both at the Union and State level. Amendments are necessary, only major few amendments have been included.

Course Content:

UNIT I 10 Periods

Preamble to the Constitution of India Domicile and Citizenship. Fundamental rights under Part III,Leading Cases. Relevance of Directive Principles of State Policy under Part-IV, IV-A Fundamental duties.

UNIT II 10 Periods

Union Executive - President, Vice-President, Prime Minister, Union Legislature - Parliament and Union Judiciary - Supreme Court of India. State Executive - Governors, Chief Minister, State Legislature and High Court.

UNIT III 10 Periods

Special Constitutional Provisions for Scheduled Casters and Tribes, Women and Children and Backward Classes, Emergency Provisions.

UNIT IV 10 Periods

Electoral process, Centre State Relations (Amendment Procedure, 42nd, 44th, 74th, 76th, 86th and 91st Constitutional amendments).

Learning Resources:

Text Book:

1. Durga Das Basu, Introduction to the Constitution of India" (student edition) Prentice - Hall EEE,19th/20th Edition, 2001.

Reference Books:

1. M.V. Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.

2. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI, Learning Pvt.Ltd., New Delhi,2011.

Semester II (First year)

CS/IT 121	Mathematics-II	L	P	C
		3	0	3

Course Objectives:

The objective of this course is to extend concepts developed in Calculus to functions of several variables of multivariable calculus and ordinary differential equations and to develop student understanding and skills in the topic necessary for its applications to science and engineering.

Course Outcomes:

The students will be able to:
1. Optimize functions of several variables essential in many engineering problems'.
2. Evaluate double and triple integrals and find areas and volumes.
3. Concepts like divergence, curl in integration of vector functions.
4. Solve differential equations which model physical processes.

Course Content:

UNIT I 15 Periods

Multivariable Calculus: Limit, continuity and partial derivatives, total derivative
Maxima, minima and saddle points of two variables, Method of Lagrange multipliers

UNIT II 15 Periods

Multiple Integrals: Double integrals (Cartesian and polar), change of order of integration, change of variables (Cartesian to polar), area by double integration, triple integrals, volume by triple integrals.

UNIT III 15 Periods

Scalar and vector point functions, Gradient, directional derivative, divergence and curl, del applied twice to point and product of point functions (without proofs) Vector integration: line integral, surface and volume integrals, Green's theorem (without proof), Stoke'stheorem (without proof), Gauss divergence theorem (without proof)

UNIT IV 15 Periods

First order ordinary differential equations: Linear, Bernoulli and exact equations Second order ordinary linear equations: Solution by method of variation of parameters,Cauchy's equation, Power series solutions; Legendre polynomials, Besselfunctions of the first kind and their properties

Learning Resources:

Text Book:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42nd edition.

Reference Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2010.
2. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2006.

CS/IT 122	**Engineering Chemistry**	**L**	**P**	**C**
		3	**0**	**3**

Course Objectives:

1. To develop concepts involved in molecular structure, intermolecular forces and make them understand the chemistry behind electrochemical energy systems.
2. To acquire knowledge on the chemical concepts involved in Water treatment and Corrosion.
3. Student shall know about the major organic reactions and end products like conducting polymers.
4. Learn analytical methods useful in characterization of compounds.

Course outcomes:

After successful completion of the course student shall be able to:

1. Identify stable complexes and suitable electrochemical energy systems for end usage.
2. Apply his knowledge for effective water treatment and corrosion prevention.
3. Identify chemical reactions that are used in the synthesis of molecules and polymers
4. Distinguish the ranges of the electromagnetic spectrum and characterize a given compound using analytical techniques.

Course Content:

UNIT I **CO1** 15 Periods

Molecular structure, Intermolecular forces and Energy systems:
Crystal field theory-salient features, energy level diagrams-tetrahedral and octahedral complexes, crystal field stabilization energies and magnetic properties.

Ionic, dipolar, Vander Waal's interaction and Hydrogen bonding, critical Phenomena-Andrew's isotherms of CO_2, derivation of critical constants from Vander Waal's equation.

Electrode potential, electrochemical series, Nernst equation and its applications. Batteries-Primary (Dry cell) and secondary (Lead acid), Lithium battery (Li-MnO_2)- advantages, Fuel cell (H_2-O_2 cell).

UNIT II **CO2** 15 Periods

Water Chemistry and Corrosion:
Water Chemistry-WHO standards, Municipal water Treatment-Removal of suspended Impurities-Sedimentation, Co-agulation and Filtration-Disinfection of water by chlorine, Break point chlorination, DE chlorination, Purification by ion-exchange method and reverse osmosis.

Corrosion-Introduction, Electrochemical theory of corrosion, galvanic corrosion, differential aeration corrosion, Factors-temperature, pH, overvoltage. Cathodicprotection by sacrificial anodic method and impressed current method. Electroplating (Cu), Electrolessplating (Ni).

UNIT III **CO3** 15 Periods

Organic Reactions and Polymers:
Types of organic Reactions-Substitution (SN_1 and SN_2), Elimination (E_1 and E_2), Addition-Markownikoff's rule and anti-Markownikoff's rule, Cyclisation (Diel's Alder reaction), Synthesis of aspirin.

Polymers-Functionality, Degree of Polymerization, Tacticity-Addition and condensation polymerization, Relationship between Structure and Properties of polymers (Strength, Crystallinity, Elasticity, Plastic Deformation, Glass transition temperature (T_o)), Factors affecting T_o.

Conducting polymers: Introduction, Examples, General applications, Mechanism of conduction in polyacetylene.

UNIT IV **CO4** 15 Periods

Spectroscopic techniques and its applications:
Beer-Lambert's law, limitations, colorimetric determination of Fe(III)
UV-VIS spectroscopy – electronic transitions, shifts-blue and red, Block diagram - brief introduction of components, Applications – purity and differentiation of conjugated and non-conjugated dienes.

IR Spectroscopy–condition to be IR active, vibrational modes of–AB_2, Block diagram-brief introduction of components, IR spectrum of CO_2 and H_2O molecules, General applications. Fluorescence and its applications in medicine.

Learning Resources:

Text Books:

1. Engineering chemistry, P.C. Jain and Monica Jain, 16th edition, Dhanpat Rai Publishing Company.
2. Wiley Engineering chemistry, 2nd edition, Wiley India Private Limited.

Reference Books:
1. University Chemistry, Bruce H. Mahan, 3rd edition, Narosa Publishing House.
2. A text book of Engineering chemistry, Shashi Chawla, 3rd edition, Dhanpat Rai Publishing Company.

Web References:
1. Engineering Chemistry (NPTEL Web Book by B.L. Tembe, Kamaluddin&M.S. Krishnan).
2. http://www.powerstream.com/BatteryFAQ.html#lec.
3. http://freevideolectures.com/Course/3029/Modern-Instrumental-Methods-ofAnalysis.

CS/IT 123	Digital Electronics	L	P	C
		3	0	3

Course Objectives:

1. Know the concepts of different number systems, conversions and functionality of logic gates.
2. To analyse and design combinational logic circuits.
3. To analyse and design sequential logic circuits.
4. Understand programmable logic devices.

Course Outcomes:

On successful completion of the course, students will be able to

1. Demonstrate the knowledge in number systems, Boolean algebra, Combinational, sequential circuits, Programmable logic devices and Logic families.
2. Analyse and Design various combinational Circuits.
3. Analyse and Design various sequential Circuits.
4. Implement combinational circuit functionality with Programmable logic devices.

Course Content:

UNIT I CO1, CO2, CO3, CO4 12 Periods

Digital Systems: Digital Systems, Binary Numbers, Number-Base Conversions, Octal and Hexadecimal Numbers, complements, signed binary Numbers.
Codes:BCD, excess – 3, Gray.
Boolean Algebra & Logic Gates: 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: The Map Method, Four-Variable K-Map, Five-Variable K-Map, Product of sums simplification, Don't-Care conditions, NAND and NOR implementation.

UNIT II CO1, CO2, CO3 12 Periods

Combinational Logic: Combinational Circuits, Analysis Procedure, Design procedure, Half adder, Full adder, Half subtractor, Full subtractor, Carry look ahead adder, Magnitude comparator, Encoders, Decoders, Multiplexers, Demultiplexers.

UNIT IIICO1, CO2, CO312 Periods

Synchronous and sequential Logic: Sequential circuits, Latches, Flip-Fops, Analysis of clocked Sequential circuits, State Reduction and Assignment, Design Procedure.

UNIT IV CO1, CO4 12Periods

Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters.
Programmable Logic Devices: Programmable Read-Only Memory, Programmable Logic Array, Programmable Array Logic.

Learning Resources:

Text Book:

1. M. Morris Mano, Digital Design, 3rdEdition, Pearson Education, 2009

Reference Books:

1. Z. Kohavi - Switching and Finite Automata Theory,2nd Edition Tata McGraw Hill.
2. R.P. Jain - Modern digital electronics, 4thEdition, McGraw Hill.

WEB RESOURCES:

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

CS/IT 124 **English for Communication Skills** **L P C**

3 0 3

Course Objectives:

The objectives of the course are:

1. To enable students, improve their lexical and communicative competence and to equip Students with oral and written communication skills.
2. To help students understand and learn the correct usage and application of Grammar Principles.
3. To get them acquainted with the features of successful professional communication.
4. To enable students, acquire various specific features of effective written communication.

Course Outcomes:

After successful completion of the course, the students will be able to:

1. Use vocabulary contextually.
2. Compose effectively the various forms of professional communication.
3. Apply grammar rules efficiently in spoken and written forms.
4. Improve clarity to locate and learn the required information.

Course Content:

No. of Units	Name of the Topic	COs
UNIT I	**Vocabulary Building:**	
1.1	Root words from foreign languages and their use in English	CO 1
1.2	Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives	CO 1
1.3	Synonyms, Antonyms, and Standard abbreviations.	CO 1
1.4	One word substitutes	CO 1
UNIT II	**Writing Skills**	
2.1	Proposal writing	CO 1,CO 2,CO 3
2.2	Letter-writing	CO 1,CO 2,CO 3
2.3	Techniques for writing precisely (Précis writing)	CO 1,CO 2,CO 3
2.4	E-mail writing	CO1,CO 2,CO 3
UNIT III	**Identifying Common Errors in Writing**	
3.1	Subject-verb agreement	CO 3
3.2	Noun-pronoun agreement	CO 3
3.3	Articles	CO 3

3.4	Prepositions	CO 3
3.5	Tenses	CO 3
3.6	Redundancies	CO 3
UNIT IV	**Nature and Style of sensible writing**	
4.1	Description & Narration. (Paragraph writing)	CO 1,CO2,CO 3
4.2	Essay Writing. (Expository Essay)	CO1,CO 2,CO 3
4.3	Note-Making and Note-Taking	CO1,CO 2, CO 4
4.4	Methods of preparing notes.	CO1,CO 2, CO 4

Learning Resources:

Text Book:

1.Communication Skills, Sanjay Kumar and PushpaLata, Oxford University Press.

Reference Book(S):

1. Remedial English Grammar. F.T. Wood, macmillan,2007
2. On WritingWell, William Zinsser, Harper Resource Book, 2001
3. Study Writing, Liz Hamp-Lyons and Ben Heasly, Cambridge University Press, 2006
4. Practical English Usage, Michael Swan, OUP, 1995 Press.

CS/IT 125	Programming in Python	L	P	C
		2	0	2

Course Objectives:

The objectives of the course are to:

1. Introduce the fundamentals of Python Programming language.
2. Teach students processing of files, mutable and immutable data types.
3. Impart knowledge of Object – Oriented Programming using Python

Course Outcomes:

After successful completion of the course, the students will be able to:

1. Explain the fundamentals of Python programming language.
2. Create user defined functions to solve problems
3. Manipulate the data structures lists, tuples, sets and dictionaries
4. Use Exception handling and Object – Oriented programming features of Python in solving real world problems

Course Content:

UNIT I

The way of the program: What is a program? Running Python, The first program, Arithmetic operators, Values and types
Variables, expressions and statements: Assignment statements, Variable names, Expressions and statements, Script mode, Order of operations, String operations.
Functions: Function calls, Math functions, Composition, Adding new functions, Definitions and uses, Flow of execution, Parameters and arguments, Variables and parameters are local, Stack diagrams, Fruitful functions and void functions, Why functions.
Conditionals and recursion: Floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Stack diagrams for recursive functions, Infinite recursion, Keyboard input.

UNIT II

Fruitful functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Checking types.
Iteration: Reassignment, Updating variables, The while statement, break, Square roots.
Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and counting, String methods, The in operator, String comparison.
Files: Persistence, Reading and writing, Format operator, Filenames and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules,.

UNIT III

Lists: A list is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map, filter and reduce, Deleting elements, Lists and strings, Objects and values, Aliasing, List arguments.
Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters. Looping and dictionaries, Reverse lookup, Dictionaries and lists, Memos, Global variables.
Tuples: Tuples are immutable, Tuple assignment, Tuples as return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples.

UNIT IV

Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying.
Classes and methods: Object-Oriented features, Printing objects, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation.
Inheritance: Card objects, Class attributes, Comparing cards, Decks, Printing the deck, Add, remove, shuffle and sort, Inheritance, Data encapsulation.

Learning Resources:

Text Book:

1. Think Python: How to Think Like a Computer Scientist, Allen Downey, Green Tea Press, Version 2.0.17

Reference Books:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus by Dierbach, Wiley
2. Fundamentals of Python Programming : Richard L. Halterman by Southern Adventist University

CS/IT 161	**Engineering Chemistry Lab**	**L**	**P**	**C**
		0	**3**	**1.5**

Course Objectives:

1. To know the methods of determining hardness and chloride ion content of water sample.
2. To learn the redox methods to determine Fe2+ ions present in solution.
3. To know principles and methods involved in using instruments like conductivity bridge and potentiometer.
4. To know the molecular properties like surface tension, viscosity.
5. To know synthetic methods for preparation of drugs and polymer.

Course outcomes:

After successful completion of the course student shall be able to:

1. Estimate the Fe(II) content of a given solution and chloride/hardness content of water.
2. Measure conductance of solutions, redox potentials of a cell.
3. Synthesize a small drug molecule and polymer.
4. Measure molecular properties such as surface tension, viscosity and determine physical parameters like saponification value, partition co-efficient and Rf value.

List of Experiments:

1.	Estimation of Mohr's salt using KMnO4.	CO1
2.	Estimation of Mohr's salt using K2Cr2O7.	CO1
3.	Determination of chloride ion content of water.	CO1
4.	Determination of Hardness of water using EDTA method.	CO1
5.	Determination of Fe(II) strength using K2Cr2O7 potentiometrically.	CO1& CO2
6.	Determination on strength of NaOH using HCI conduct metrically.	CO2
7.	Preparation of p-bromo acetanilide.	CO3
8.	Preparation of Phenol Formaldehyde resin.	CO3
9.	Determination of surface tension.	CO4
10.	Determination of Viscosity.	CO4
11.	Determination of Saponification / acid value of oil.	CO4
12.	Determination of partition co-efficient of I2 in water.	CO4
13.	Determination of Rf value using TLC.	CO4
14.	Verification of Freundlich isotherm using adsorption of acetic acid on activated charcoal.	CO4

CS/IT 162	Programming in Python Lab	L	P	C
		0	2	1

Course Objectives:

The objectives of the course are:

1. To introduce the fundamentals of Python Programming language.
2. To make the students process files, mutable and immutable data.
3. To impart knowledge of Object – Oriented Programming using Python

Course Outcomes:

After successful completion of the course, the students will be able to:

1. Illustrate the fundamentals of Python programming language.
2. Create user defined functions to solve problems
3. Write programs to manipulate the data structures lists, tuples, sets and dictionaries
4. Use Exception handling and Object – Oriented programming features of Python in solving real-world problems.

List of Exercises / Activities:

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Lab1	Simple Programs to demonstrate Input - Output operations.
Lab2	Programs to demonstrate the behavior and use of various operators.
Lab3	Programs to emphasize the usage of Conditional Control Statements.
Lab4	Programs to emphasize the usage of Iterative control statements.
Lab5	Programs on the usage of Built-in functions.
Lab6	Programs to demonstrate the creation and usage of User Defined Functions.
Lab7	Programs to demonstrate Recursion.
Lab8	Programs on creation and importing of modules.
Lab9	Programs on Lists and its operations
Lab10	Programs on List Processing. (Sortings, Searchings, Permutations...)
Lab11	Programs to demonstrate Exception Handling.
Lab12	Programs to demonstrate OOP concepts.

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/IT 163	Computer Engineering Workshop	L	P	C
		0	3	1.5

Course Objectives:

The objectives of the course are:

1. To make the students aware of the basic hardware components of a computer and installation of operating system.
2. To introduce Raptor Tool for flowchart creation.
3. To get awareness of cyber hygiene to protect the personal computer from getting infected with the viruses, worms and other cyber-attacks.
4. To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools.

Course Outcomes:

After successful completion of the course, the students will be able to:

1. Apply knowledge for computer assembling and software installation.
2. Draw flowcharts for the given problems
3. Troubleshoot hardware and software level problems.
4. Prepare professional word documents using the Microsoft office.

Apply the tools for preparation of PPT, and budget sheet etc.

TASK 1: PC Hardware: PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition, hardware and software level troubleshooting process, tips and tricks would be covered.

Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

TASK 2: Software Installation: Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

TASK 3: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

TASK 4: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate how to access the websites and email.

TASK 5: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured. Search Engines & Netiquette:

Students should know what search engines are and how to use the search engines. Usage of search engines like Google, Yahoo, ask.com and others should be demonstrated by student.

TASK 6: Cyber Hygiene: Students should learn about viruses on the internet and install antivirus software. Student should learn to customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

TASK 7: Drawing flowcharts (Raptor Tool): Students should draw flowcharts for the problems

validating an email id entered by user, printing first fifty numbers and preparing electricity bill.

TASK 8: Productivity tool: Microsoft (MS) office: Importance of MS office, Details of the three tasks and features that should be covered in each, MS word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter. Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Using MS Word to create project certificate: Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Using Date and Time option in Word.

TASK 9: Spread sheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler: - Gridlines, Format Cells, Summation, auto fill, Formatting Text

TASK 10: Creating Power Point: Student should work on basic power point utilities and tools in Ms Office which help them create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and Charts.

** Minimum 8 tasks should be done by the student to get eligibility to appear for the exam
** Tasks 1 to 7 are mandatory

Text Books:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
3. Computer Fundamentals, l e, Anita Goel, Person Education.

Reference Books:

1. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

CS/IT 164	Communication Skills Lab	L	P	C
		0	3	1.5

Course Objectives:
The objectives of the course are:

1. To identify speaker's purpose and tone; make inferences and predictions about spoken discourse, discuss and respond to content of a lecture or listening passage orally and/or in writing.
2. To acquaint the students with the Standard English pronunciation, i.e., Receive Pronunciation (RP), with the knowledge of stress and intonation.
3. To develop production and process of language useful for social and professional life.
4. To develop in them communication and social graces necessary for functioning. Improve the dynamics of professional presentations.
5. To develop critical reading and comprehension skills at different levels.

Course Outcomes:

After successful completion of the course, the students will be able to:

1. Comprehend relationships between ideas and make inferences and predictions about spoken discourse.
2. Speak English with a reasonable degree of accuracy in pronunciation.
3. Develop appropriate speech dynamics in professional situations.
4. Use effective strategies and social graces to enhance the value of communication.
5. Develop effective communication and presentation skills and using language effectively to face interviews with success.

List of Exercises / Activities:

1. Listening Comprehension.
2. Pronunciation, Intonation, Stress and Rhythm.
3. Common Everyday Situations: Conversations and Dialogues.
4. Interviews.
5. Formal Presentations.
6. Reading Comprehension.

Reference Book(S):

1. Communication Skills. Sanjay Kumar and PushpaLata. Oxford University Press.
2. Practical English Usage. Michael Swan. OUP. 1995 Press.
3. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University.
4. Technical English M. Sambaiah, Wiley Publications, New Delhi.

CS/IT MC2	**Environmental Science**	**L**	**P**	**C**
		2	**0**	**-**

Course Objectives:

To enable the students to

1. Understand that humans are an integral part of environment and hence their activities reflect on theenvironment.
2. realize and appreciate the importance of ancient practices and their importance in the present times
3. appreciate the contribution of individuals for the upkeep of environmental standards, in turn help the humans live better.

Course Outcomes:

After successful completion of the course, the students are able to

1. Evaluate the implications of human activities and thereby promote ecofriendly technologies.
2. Promote awareness among the members of the society for a sustainable environment.
3. Include and give priority to environmental protection in all developmental projects.

Course Content:

A. AWARENESS ACTIVITIES - SMALL GROUP MEETINGS

I. Source of water for human consumption/activities:

a. collection of information pertaining to water resources and consumption in Andhra Pradesh

b. Water resource on campus: General / Laboratory use and

c. Drinking water - understand the background and adopt judicious management.

d. Recycled water for Gardening - Particularly Lawns.

e. Cut down wastage of electricity in class rooms / labs / hostels etc. by avoiding misuse.

II. After the group meetings and exposure to the local issues and healthy practices, students motivated to make:

a. Posters

b. Slogans/One liners for promoting awareness

III. Lectures from Experts (at least 2 in the course duration)

IV. A walk in the neighborhood to promote a chosen theme on environmental consciousness.

B. ACTUAL ACTIVITIES

1. Plantation on Campus and on the sides of approach road.
2. Distribution of saplings to the local colony dwellers and encourage plantation.
3. Development of Kitchen garden on campus - Cultivation of at least leafy vegetables
4. and creepers like cucumber etc. for use in college canteen/hostels etc.
5. Adoption of "NO PLASTICS" on campus.
6. Field trip to gain knowledge of biodiversity, water shed, mining, pollution and other
7. local issues.

8. Preparation of working models for energy generation/transformation etc.

C. THEORY SYLLABUS FOR ASSESSMENT

Part-I

1. Introduction to Environmental Studies, Scope and Importance.
2. Natural resources Renewable and Non-Renewable; Definition and importance of the following resources in detail: a. Forest b. Water c. Land d. Energy
3. Sustainable development - Concept and Measures.
4. Biodiversity - Definition, Types of Biodiversity, Values and threats to Biodiversity, Conservation of biodiversity, IUCN classification: Endangered, Threatened, Vulnerable, Rare species; Endemic and Exotic species.
5. Climate change - Global warming, Ozone depletion and Acid rain.

Part-II

6. Water shed, water shed management in detail.
7. Solid wastes and Solid waste management.
8. Environmental Legislation, Environmental acts - Wild life protection act, Water act, Forest conservation act, Air act and Environmental protection act.
9. Case studies: Chernobyl nuclear disaster, Bhopal gas tragedy, Narmada bachaoandolan, Silent valley, Story of Tuvalu, Story of Ganga.
10.Earth summit and Kyoto protocol; Measures at individual level for conservation of natural resources and sustainable development.

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.

Assessment

1. Two assessments each of 40 marks will be done in the semester. The split up of each assessment is as follows:
a. Two internal theory examinations will be conducted for 18 marks each.
b. Evaluation of the prepared activity sheets and working models will be done for 12M (continual evaluation) twice in the semester in line with the theory examination.
c. 5 Marks for attendance and 5 marks for oral test.

Semester - III (Second Year)

CS/IT 211 **Probability and Statistics** **L P C**
2 0 3

Course Objectives:

The student who successfully completes this course will have:

1. The ability to understand the basic principles of various probability distributions.
2. The ability to know the sample distributions of the data
3. The basic concepts of testing of hypothesis and their applications for the data.
4. The skill to predict the future behaviour based on time series data.

Course Outcomes:

On completion of this course, students will be able to:

1. CO1: Apply various formulae to analyze and interpret the data.
2. CO2: Apply the knowledge of distribution theory to both software and hardware design problems.
3. CO3: Apply the basic concepts of testing of hypothesis and derive the conclusions for the data.
4. CO4: Forecast the behavior of the data by various models in time series.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2								3
CO2	3	3	2	2								2
CO3	3	3	3	2								2
CO4	3	2	3	2								3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3
CO4	2	3	3

Course Content

UNIT I **14 periods**

Probability distributions: Random Variables, Binomial distribution, Poisson distribution, and Geometric distribution.

Probability densities: Continuous random variables, Normal distribution, Normal approximation to the Binomial distribution, Uniform distribution, Log-normal distribution, Gamma distribution, Beta distribution, Weibull distribution.

UNIT II **14 periods**

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

Testing of Hypotheses (Parametric Tests):
Inferences Concerning Means: Point estimation, Interval estimation, tests of hypothesis, null hypothesis and tests of hypothesis, hypothesis concerning one mean, inferences concerning two means

UNIT III **14 periods**

Testing of Hypotheses (Parametric Tests) (Contd…):
Inferences Concerning Variances*:* The estimation of variances, hypothesis concerning one variance, hypothesis concerning two variances.

Inferences Concerning Proportions:The estimation of proportions, hypothesis concerning one proportion, hypothesis concerning several proportions, The analysis of r×c tables, Goodness of fit.

UNIT IV **14 periods**

Testing of Hypotheses (Non-Parametric Tests): Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test. Tolerance region.

Basics of Time Series Analysis & Forecasting: Stationary, ARIMA Models: Identification, Estimation and Forecasting.

Learning Resources:

Text Book:

1. Miller &Freund's Probability and Statistics for Engineers – Richard A. Johnson

Reference Books:

1. U. Dinesh Kumar, Business Analytics: The science of data- driven decision making.
2. S.M Ross, Introduction to Probability and Statistics for Engineers and Scientists.
3. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley.
5. S.C. Gupta and V.K. Kapoor., Fundamentals of Mathematical Statistics, Sultan Chand &Co.

CS/IT 212 **Discrete Mathematics** **L P C**
2 0 3

Course Objectives:

At the end of the course, the student will

1. Introduce the concepts of mathematical logic.
2. Understand the combinatorial problems using counting principles,
3. Create generating functions and solve recurrence relations.
4. Use Directed & Un-Directed Graphs concepts and its applications.

Course Outcomes:

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

1. Apply formal methods of proof and propositional & First order logic to validate the propositional statements.
2. Apply techniques for counting the occurrences of discrete events including permutations, combinations with or without repetitions.
3. solve generating function and recurrence relations.
4. Solve the real-world problems using directed and undirected graphs.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2						2		3
CO2	3	3	2	2						2		2
CO3	3	3	3	2						2		2
CO4	3	3	3	2						2		3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		2
CO2	3		2
CO3	3		2
CO4	3		2

Course Content

UNIT I **13 periods**

Foundations: Sets, Relations and Functions, Fundamentals of Logic, Logical Inferences, Methods of Proof of an implication, First order Logic & Other methods of proof, Rules of Inference for Quantified propositions, Mathematical Induction.

UNIT II **10 periods**

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with repetitions, Enumerating Combinations and Permutations with Constrained Repetitions.

UNIT III **13 periods**

Recurrence Relations: Generating functions of sequences, Calculating Coefficients of Generating Functions, solving recurrence relations by Substitution and generating functions. The methods of characteristic roots, solutions of inhomogeneous recurrence relations.

UNIT IV **14 periods**

Relations & Digraphs: Properties & Equivalence relations, Operations on relation, Directed Graphs and Adjacency Matrices, Ordering relations, Lattices and Enumerations.

Graphs: Isomorphism's and Sub graphs, Planar Graphs, Euler's Formula, Multi-graphs 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 A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.
2. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition– Ralph. P. Grimaldi.Pearson Education
3. Discrete Mathematical Structures with applications to computer science Trembly J.P. &Manohar. P, TMH
4. Discrete Mathematics and its Applications, Kenneth H. Rosen, FifthEdition.TMH.

CS/IT 213 **Computer Organization** **L P C**
3 0 3

Course Objectives:

The objectives of the course are:

1. To introduce the functional units of computer system, architecture and its operations.
2. To discuss the basic processing unit and I/O devices.
3. To impart the knowledge on memory system.
4. To demonstrate the arithmetic operations in a computer system.
5. To instruct the instruction level parallelism

Course Outcomes:

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

1. Describe components, architecture of a computer system and its working.
2. Analyze instruction execution and control system.
3. Develop a pipeline system for the execution of instruction.
4. Explain various I/O handling mechanisms and its interfaces.
5. **Analyze** computer arithmetic algorithms.
6. Construct various memory systems.

C0-Po Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2											
CO2	2	3	2	2								2
CO3	2	3	3	2								2
CO4	2	2	2	2								2
CO5	2	3	3	2								2
CO6	2	2	2	2								2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		
CO2	3		
CO3	3		
CO4	2		3
CO5	3		3
CO6	2		

Course Content:

UNIT I **12 Periods**

Basic structure of computers: Computer types, Functional Units, Basic Operational Concepts, Number Representation and Arithmetic, Character Representation, Performance.

Instruction Set Architecture: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Stacks, Subroutines, Additional Instructions, Encoding of Machine Instructions.

UNIT II **14 Periods**

Basic Processing Unit: Some Fundamental Concepts, Instruction Execution, Hardware Components, Instruction Fetch and Execution Steps, Control Signals, Hardwired Control.

Pipelining: Basic Concept-The Ideal Case, Pipeline Organization, Pipelining Issues, Data Dependencies, Memory Delays, Branch Delays, Resourcelimitations.

UNIT III **10 Periods**

Basic Input/ Output: Accessing I/O Devices: I/O Device Interface, Program-Controlled I/O; Interrupts: Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling I/O Device Behavior, Processor Control Registers.

Input/output Organization: Bus Structure, Bus Operation: Synchronous Bus, Asynchronous Bus; Arbitration, Interface Circuits; PCI Bus, SCSI Bus.

UNIT IV **14 Periods**

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-only Memories, Direct Memory Access, Cache Memories, Performance Considerations.

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Unsigned Numbers, Multiplication of Signed Numbers, Fast Multiplication-Bit-Pair recoding of Multipliers, Integer Division, Floating-Point Numbers and Operations.

Learning Resources:

Text Book(s):

1. Computer Organization and Embedded Systems, 6th Edition by CarlHamacher, McGraw Hill Higher Education.

Reference Books:

1. Computer Architecture and Organization, 3rd Edition by John P. Hayes, WCB/McGraw-Hill.
2. Computer Organization and Architecture: Designing for Performance, 10th Edition by William Stallings, Pearson Education.

CS/IT 214 **Data Structures** **L P C**
3 0 3

Course Objectives:

The objectives of this course are:

1. To illustrate operations of linear and non-linear data structure
2. To demonstrate computational problems using suitable data structures
3. To familiarize searching and sorting techniques

Course Outcomes:

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

1. Analyze computation complexity of algorithms
2. Implement searching, sorting and hashing techniques
3. Apply operations on linear and non-linear data structures
4. Develop solutions for computational problems using appropriate data structures

CO-PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3		3								2
CO2	3			3								2
CO3	3	2										2
CO4	3	3	3	3								2

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			

Course Content:

UNIT I **10 Periods**

Introduction: Basic Concepts-Algorithm Specification, Data Abstraction, Performance Analysis-Time complexity, Space complexity, Asymptotic Notations

Searching and Sorting: Linear Search, Binary Search, insertion sort, selection sort.

14 Periods

UNIT II

Lists: Pointers, Singly Linked Lists, Polynomials, Circular Linked Lists: Operations & their algorithms, Polynomials: Addition, Multiplication

Hashing: Static Hashing - Hash Tables, Hashing Functions, Overflow Handling

UNIT III **12 Periods**

Stacks and Queues: Stack ADT, Queue ADT, Evaluation of Expressions, Multiple Stacks and Queues, Dynamically Linked Stacks and Queues

UNIT IV **14 Periods**

Trees: Introduction, binary trees, Binary Tree Traversals, Binary Search Trees, AVL Trees, Heaps, Heap sort, B-Trees and B+ Trees

Graphs: The Graph Abstract Data Type, representations of graphs, Elementary Graph Operations - Depth First Search, Breadth First Search, Connected Components

Learning Resources:

Text Book:

1. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008.

Reference Book(S):

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997.
2. Y. Langsam, M.J.Augeustein and A.M. Tenenbaum, Data Structures Using C, Pearson Education Asia, 2004.
3. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
4. Jean Paul Trembly and P.G.Sorenson, An Introduction of Data Structures with Applications

CS/IT 215 **Object Oriented Programming** **L P C**
3 0 3

Course Objectives:

The learning objectives of this course are:

1. To make the students understand Java fundamental concepts
2. To elucidate the fundamentals of object-oriented programming in Java
3. To create awareness on exception handling and multithreading
4. To familiarize students with the concepts of Event Handling, Generics and Collections

Course Outcomes:

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

1. Comprehend the concepts of OOP and fundamentals of Java Programming.
2. Develop reusable and efficient programs using Inheritance & Polymorphism.
3. Demonstrate the importance of packages and interfaces.
4. Use the concept of exception handling to create error free codes and avoid abnormal program terminations.
5. Design multi-tasking applications using Multithreading.
6. Develop Event Driven applications and generic programs

CO-PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2											
CO2		3	3									
CO3		3	3									
CO4		3	3									
CO5		3	3									
CO6		3	3									

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1		2	
CO2		3	2
CO3		3	3
CO4		3	3
CO5		3	3
CO6		3	3

Course Content:

UNIT I **12 Periods**

Introduction: The history and evolution of Java, Java Buzz words, object-oriented programming, Data Types, Variables and Arrays, Operators, Control Statements.

Classes and Objects: Concepts, methods, constructors, types of constructors, constructor overloading, usage of static, access control, this keyword, garbage collection, finalize()method, overloading, parameter passing mechanisms, final keyword, nested classes and inner classes.

Utility Classes: Date, Calendar, Scanner, Random

UNIT II **12 Periods**

Inheritance: Basic concepts, access specifiers, usage of super key word, method overriding, using final with Inheritance, abstract classes, dynamic method dispatch, Object class.
Interfaces: Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.

Packages: Creating a Package, setting CLASSPATH, Access control protection, importing packages.

Strings: Exploring the String class, String buffer class, Command-line arguments

UNIT III **12 Periods**

Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, multiple catch clauses, nested try, Built-in exceptions, creating own exception sub classes.
Multithreading: The Java Thread model, thread life cycle, Thread class, Runnable interface, creating multiple threads, Synchronization, Inter Thread Communication, Deadlock.
Applets: Concepts of Applets, life cycle of an applet, creating applets
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.

UNIT IV **12 Periods**

AWT: AWT Components, , File Dialog boxes, Layout Managers, Event handling model of AWT, Adapter classes, Menu, Menu bar.

GUI with Swing– Swings introduction, JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons. Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables

Generics: Basics of Generic Methods, Generic Classes

Collections: Collection Interfaces, Collection Classes**,** Accessing a Collection via an Iterator

Learning Resources:

Text Book:

1. Java The Complete Reference - Herbert Schildt 11th Edition, Mc Graw Hill Education.

Reference Books:

1. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson
2. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.

3. Cay.S.Horstmann and Gary Cornell, Core Java 2, Vol 1, Fundamentals 7th Edition, Pearson Education.
4. H.M.Dietel and P.J.Dietel, Java How to Program, Sixth Edition, Pearson Education/PHI.
5. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001.
6. Cay Horstmann, John Wiley and Sons ,Big Java 2nd Edition, ,Pearson Education.

CS/IT 251 **Probability & Statistics with R Lab** **L P C**

0 3 1.5

Course Objectives:

The student who successfully completes this course will have:

1. The knowledge to use R for statistical programming, computation, modelling and graphics.
2. The skill to write functions and use R in an efficient way.
3. The ability to fit some basic types of statistical models using R.
4. The idea to expand the knowledge of R on their own.

Course Outcomes

On completion of this course, students will be able to:

1. Write the programs in R to solve the statistical problems.
2. Apply various built in functions in R to solve the computational and modelling problems.
3. Interpret the statistical data by various functions of graphical representation.
4. Understand- reading, writing, working and manipulating the data in various data frames.

CO-PO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3										3
CO2	2	2										2
CO3	3	3										2
CO4	3	2										3

CO-PSO Mapping

	PSO1	**POS2**	**PSO3**
CO1	3	3	1
CO2	2	2	3
CO3	3	3	2
CO4	3	2	2

Lab – Course Content

Introduction to R

Functions

Control flow and Loops

Working with Vectors and Matrices

Reading in Data

Writing Data

Working with Data

Manipulating Data

Simulation

Linear model

Data Frame

Graphics in R

Pre – Requisites

CS/IT-151– C Programming.

Lab – Course Plan&Delivery:

LIST OF EXPERIMENTS	PERIODS
1. Graphical representation of data a) Bar plot b)Frequency polygon	**3**
2. Graphical representation of data a) Histogram b)Pie chart c) Scatter plot	**3**
3. Measures of central tendency a) Mean b)Median c)Mode	**3**
4. Measures of central tendency a)Geometric Mean e)Harmonic Mean	**3**
5. Measures of dispersion a)Range b)Quartile deviation	**3**
6. Measures of dispersion a)Mean deviation b)Standard deviation	**3**
7. Goodness of fit a) Binomial b)Poisson	**3**
8. Goodness of fit a)Normal b)Contingency table	**3**
9. Parametric tests a) t-test for one-mean b) t-test for two means	**3**
10.Parametric tests a) paired t-test b) F-test	**3**
11. Non-parametric tests a) Sign test b) Wilcoxon-Signed rank test	**3**
12. Non-parametric tests a) Mann-Whitney test b)Kolmogorov-Smirnov test	**3**
13. Time series a) Trend line b)Non-linear trend line	**3**
14. Time series a)Moving averages b)ARIMA	**3**

Evaluation Methods:

Internal Lab Exam : 40 Marks

Final Lab Exam : 60 Marks

Topics Covered Beyond The Curriculum:

Statistical concepts regarding testing of hypothesis

Differences between C and R Programming

Semester End Observations for Future Guidance:

Case studies to be explained are revised.

Identified new problems to be assigned for the next academic year students.

Learning Resources:

Text Books:

1.Hands-on Programming with R, Garrett Grolemund, O'Reilly.

2.R for Everyone: Advanced Analytics and Graphics, Jared P. Lander, Addison-Wesley

(R-20)

CS/IT 252	Data Structures Lab	L	P	C
		0	3	1.5

Course Objectives:

1. To illustrate operations of linear and non-linear data structure
2. To demonstrate computational problems using suitable data structures
3. To familiarize searching and sorting techniques

Course Outcomes:
After completion of course, the student will be able to

1. Implement linear and non-linear ADTs
2. Develop solutions for the given problems using appropriate data structures
3. Solve real world problems using searching and sorting algorithms

Co-Po Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		3								2
CO2	3			3								2
CO3	3	2										2

CO-PSO Mapping

	PSO1	POS2	PSO3
CO1			
CO2			
CO3			
CO4			

List of Experiments to implement

week 1: List ADT
week 2: Applications of List
week 3: Single Circular List ADT
week 4: Doubly Linked List ADT
week 5: Stack ADT
week 6: Applications on Stack
week 7: Queue ADT
week 8: Applications of Queue
week 9: Double Ended Queue ADT
week 10: BST ADT
week 11: Priority Queue ADT
week 12: Searching and Sorting Techniques
week 13: Graph traversal techniques
week 14: Hashing Techniques

CS/IT 253	Object Oriented Programming Lab	L	P	C
		0	3	1.5

Course Objectives:

1. To introduce java compiler, interpreter
2. To make the students learn an object oriented way of solving problems using java
3. To make the students write programs using multithreading concepts and exception handling
4. To make the students understand the usage of Event handling, generics, collections

Course Outcomes:

By the end of this course the students will be able to

1. Write simple java programs using java fundamentals and basic OOP concepts.
2. Design programs using inheritance and polymorphism.
3. Demonstrate inter process communication using multithreading.
4. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
5. Develop Event driven applications and Generic programs

List of Experiments:

The programming concepts to be implemented in the Lab are

Week 1: Fundamentals of classes and objects

Week 2: static keyword, this keyword, variable length arguments

Week 3: inner classes, constructor overloading

Week 4: Types of inheritances

Week 5: Method overloading, Method Overriding, usage of final and super

Week 6: Abstract classes, interfaces, Dynamic method dispatch.

Week 7: String class and its methods

Week 8: Packages

Week 9: Exception Handling Techniques

Week 10: Multithreading concepts

Week 11: Applets and event handling

Week 12: Awt components and delegation event model

Week 13: MVC architecture in Swing

Week 14: Generics and collections

CS/IT MC03 **Design Thinking & Product Innovation** **L P C**

2 0 -

Course Objectives:

1. Identify the design thinking principles and practices in today's industry.
2. Learn the Planning of research activities to gather and empathize from a user's viewpoint.
3. Study the Ideate techniques to help arrive at the best solution and evaluation.
4. Knowledge to Identify design thinking approaches for business challenges.

Course Outcomes:

1. Interpret the concepts of Design thinking to real-world activities.
2. Investigate a problem to determine its root cause in terms of Design Thinking perspective.
3. Apply group thinking methods and experiment with different solutions to a given problem.
4. Develop innovative thinking and creative problem solving abilities.

Co – Po Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2								2
CO2		3	3	2				2				2
CO3		3	3	2				2				2
CO4				3	3	3	3					2

CO-PSO Mapping:

	PSO1	PSO2
CO1	**3**	**3**
CO2	**3**	**3**
CO3	**3**	**3**
CO4	**3**	**3**

Course Content:

UNIT I [T1,T2] **12 Periods**

Introduction to Design Thinking – Origin of Design Thinking, Features & Principles of Design Thinking, Applications of Design Thinking, Role of Research in Design Thinking.

UNIT II[T3] **12 Periods**

Modules of Design Thinking – Inspiration – methods & tools used in Explore and Empathize phases of Design Thinking, Case study-activity.

UNIT III [T3] **12 Periods**

Modules of Design Thinking – Ideation & Implementation – methods & tools used in

Experiment, Engage and Evolve phases of Design Thinking, Case study-activity.

UNIT IV [T4] **12 Periods**

Design Thinking applied in Business & Strategic Innovation – Ten Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization, Creative Culture, Strategy & Organization – Design Thinking approaches.

Learning Resources:

Text Book(S):

1. "Design Thinking for Entrepreneurs and Small Businesses" by Beverly Rudkin Ingle, Apress. [UNIT -1]
2. "Change by design", Tim Brown, Harper Collins, 2009 [UNIT -1]
3. "Design Thinking- The Guide Book" – Facilitated by the Royal Civil Service Commission, Bhutan. [UNIT –II & III]
4. IdrisMootee, "Design Thinking for Strategic Innovation", John Wiley & Sons (2013). [UNIT -IV]

Reference Book(S):

1. "Design Thinking Business Innovation", Rio de Janeiro – 2012 1st edition, MJV press.
2. "Design Thinking- Understanding How Designers Think and Work" by Nigel Cross, Berg publishers.

Web Reference:

1. IDEO: Design Thinking for Educators toolkit https://designthinkingforeducators.com/.
2. https://dschool.stanford.edu/resources/a-virtual-crash-course-in-design-thinking
3. https://dschool-old.stanford.edu/groups/designresources/wiki/4dbb2/ (wallet Project)

Semester - IV (Second Year)

CS/IT 221	Computational Statistics	L	P	C
		2	0	3

Course Objectives:

On completion of this course, students will have:

1. The knowledge to understand the concepts of linear statistical and ANOVA models and draw the conclusions.
2. The idea to develop a sound understanding of current, modern computational statistical approaches and their application to a variety of datasets.
3. To understand the key technologies in data science and business analytics such as data mining, machine learning, visualization techniques and predictive modelling.
4. The knowledge to apply principles of data science to analyze and to effectively visualize the data.

Course Outcomes:

On completion of this course, students will be able to:

1. CO1: Remember the basic concepts of linear statistical models
2. CO2: Interpret the results of Multivariate Regression models
3. CO3: Estimate the discriminate function to segregate and allot the item to the subgroup.
4. CO4: Data reduction and visualize the data for interpretation.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	1	1	2	2	2	1
CO2	3	3	3	3	3	3	1	1	2	2	2	1
CO3	3	3	3	3	3	3	1	1	2	2	2	1
CO4	2	3	3	3	3	3	1	1	2	2	2	1

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3
CO4	2	3	3

Course Content:

UNIT I **14 periods**

Linear Statistical Models: Scatter diagram, linear regression and correlation, least squares methods, rank correlation, multiple correlation.

Analysis of Variance (ANOVA): Analysis of Variance (one-way classification), Analysis of Variance (two-way classification)

UNIT II **14 periods**

Multivariate Normal Distribution: Multivariate Normal Distribution Functions, Conditional Distribution and its relation to regression model, Estimation of parameters.

Multiple Linear Regression Model: Standard multiple regression models with emphasis on collinearity, outliers, non-normality and auto correlation, validation of model assumptions.

UNIT III **14 periods**

Multivariate Regression: Assumptions of multivariate regression models, Parameter estimation, multivariate analysis of variance and co-variance.

Discriminant Analysis: Statistical background, linear discriminant function analysis, Estimating linear discriminant functions and their properties.

UNIT IV **14 periods**

Principal Component Analysis: Principal components, Algorithm for conducting principal component analysis, deciding on how many principal components to retain, H-plot.

Factor Analysis: Factor analysis model, extracting common factors, determining number of factors, Transformation of factor analysis solutions, Factor scores.

Learning Resources:

Text Book:

1. Richard. A. Johnson and Dean.W. Wichern "Applied Multivariate Statistical Analysis" Pearson Prentice Hall, 6th Edition, 2007

Reference Books:

1. ALVIN C. RENCHER, "Methods of Multivariate Analysis", John Wiley & Sons Publication, 3rd Edition
2. T.W. Anderson, "An Introduction to Multivariate Statistical Analysis", Wiley, 3rd Edition, 2003.

CS/IT 222 Database Management Systems **L P C**

3 0 3

Course Objectives

At the end of the course the students will understand

1. Fundamental concepts and architectures of database system
2. Features and design of conceptual and relational data models
3. Formal relational Languages and SQL to query, update, and manage a database
4. The concepts and protocols related to transaction processing, concurrency control and recovery

Course Outcomes

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

1. Discuss the fundamental concepts and architecture of database systems.
2. Query the database using relational algebra and SQL.
3. Explain the concepts of relational data model and design database using normalization process.
4. Develop conceptual database schema for a given specification.
5. Describe the role of transaction processing, concurrency control and recovery in a multi user database system.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1					1			2
CO2	3	2	2	2					1			2
CO3	3	2	2	2					2			2
CO4	2	2	1	1					1			2
CO5	3	3	3	2					2			3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	3	3	3
CO3	3	3	3
CO4	2	3	3

Course Content:

UNITI **11 Periods**

Introduction to Databases and Database Management System: Database system Applications, Advantages of DBMS over File System, Data Models, Instances and schema, View of Data, Database Languages –DDL, DML, DCL, Database Users and Administrator, Database System Architecture

Introduction to the Relational Model: Structure of RDBMS, Database Schema, Keys, Relational Query Languages, Relational Operations

UNITII **15 Periods**

Formal Relational Query Languages - The Relational Algebra and Relational Calculus

SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database, Join Expressions, Views, Transaction, Integrity Constraints, SQL Data Types and Schemas, Authorization

UNITIII **12 Periods**

Database Design and the E-R Model - Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas.

Relational Database Design - Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms, Database-Design Process.

UNIT-IV **12 Periods**

Transactions: Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes, Snapshot Isolation

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management

Learning Resources:

Text Book:

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Sixth Edition, McGraw Hill Publishers

(R-20)

CS/IT 223	**Operating Systems**	**L**	**P**	**C**
		3	**0**	**3**

Course Objectives:

At the end of this course the students will understand

1. To introduce the structure and functions of the operating system
2. To provide the knowledge of how the operating system manages the resources
3. To expose the students to the issues related to executing multiple process in the system.

Course Outcomes:

1. Describe the fundamental concepts of an operating system functionality, and processes.
2. Apply the concepts of multithreading and IPC mechanisms.
3. Analyze the performance of CPU scheduling algorithms, page replacement algorithms, and disk scheduling algorithms.
4. Demonstrate the methods to solve critical section problem and deadlock handling in a system.
5. Differentiate the effectiveness and the hardware support required for contiguous, non-contiguous, and virtual memory management schemes.
6. Differentiate the file systems for applying different allocation and access techniques.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3	2									
CO3	3	3	2									
CO4	3	3	3									
CO5	3											
CO6	3											

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1	3		
CO2	3	2	
CO3	2	3	3
CO4	3	2	3
CO5	3		
CO6	2		3

Course Content:

UNIT I **12 Periods**

Introduction: What Operating Systems Do, Operating-System Operations, Resource Management, Security and Protection, Virtualization, Distributed Systems, Kernel Data Structures.

Operating System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Operating-System Structure.

Processes: Process Concept, Process Scheduling, Operations on Processes, inter process Communication, IPC in shared-memory Systems, IPC in Message-passing Systems.

UNIT II **14 Periods**

Threads and Concurrency: Overview, Multicore Programming, Multithreading Models, Implicit Threading, Threading Issues.

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling.

Synchronization: Background, The Critical-Section Problem, Peterson 'solution, Hardware support for Synchronization, Mutex Locks, Semaphores, Monitors. Classic Problems of Synchronization.

UNIT III **14 Periods**

Dead Locks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Main Memory: Background, Contiguous Memory Allocation, Paging, Structure of the Page Table, Swapping.
Virtual-Memory: Background, Demand Paging, Page Replacement, allocation of frames, Thrashing - Memory Compression, Other considerations.

UNIT IV **10 Periods**

Mass-Storage Structure: Overview of Mass-Storage Structure, HDD Scheduling.

Files System Interface: File Concept, Access Methods, Directory Structure, Protection, Memory –mapped files.

File-Systems Implementation: File-System Structure, File-System operations, Directory Implementation, Allocation Methods, and Free-Space Management.

Learning Resources:

Text Book(s):

1. Operating System Concepts-Abraham Silberchatz, Peter B Galvin, Greg Gange Tenth Edition, WILEY.

Reference Books:

1. Operating Systems, Internal and Design Principles, Stallings, 8th Edition-2015, Pearson education/PHI.
2. Operating system, A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tenenbaum 4th Edition Pearson/PHI.
4. An Introduction to Operating Systems, Concepts and Practice, 4th Edition, PHI, 2013-Pramod Chandra P. Bhatt.
5. Operating Systems- A concept based approach –DM Dhamdhere -3rd Edition TMH.

CS/IT 224 Software Engineering **L P C**

3 0 3

Course Objectives:

At the end of the course, the student will understand and

1. Acquire knowledge on the principles and process models for software development.
2. Explain the specific requirements for a given software project
3. Acquire knowledge on design concepts and user interface principles for Software development
4. Examine various testing techniques and metrics applicable to a Software project

Course Outcomes:

After successful completion of the course, students will be able to:

1. Describe the software engineering process model required to create a software system.
2. Discuss the software requirements and analyze a model for a software project.
3. Design and specify software components for real-world problems.
4. Evaluate various software testing techniques and metrics.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	3	2									2
CO3	2	3	3			3					2	3
CO4	3	3	3			3					3	3

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			2
CO2			2
CO3		2	3
CO4		3	3

Course Content:

UNIT I **12 Periods**

Software and Software engineering: The Nature of Software, Defining Software, Software Application Domains, Legacy Software, The software Process.

The Software Process: Process Models: A Generic Process Model, defining a Framework Activity, identifying a task set, Process Assessment and Improvement, Prescriptive Process Models: The waterfall model, Prototyping Process model, Evolutionary process model, The Unified Process.

Agile Development: What Is Agility? What Is an Agile Process? Scrum Other Agile Process Models, Scrum, Other Agile Frameworks- The XP Framework.

UNIT II **13 Periods**

Understanding Requirements: Requirements Engineering, Establishing the Groundwork, Requirements gathering, developing use cases, Building the Analysis Model, Negotiating Requirements, Requirements monitoring, Validating Requirements.

Requirements Modelling: Requirements Analysis, Scenario-Based Modeling, Class-Based Modeling, Functional Modelling, Behavioural Modelling.

Design Concepts: Design within the Context of Software Engineering, the Design Process, Design Concepts, the Design Model.

UNIT III **13 Periods**

Architectural Design: Software Architecture, Agility and Architecture, Architectural Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Reviews.

Modeling Component-Level Design: What Is a Component? Designing Class-Based Components, Conducting Component Level Design.

User Experience Design: User Experience Design Elements, The Golden Rules, User Interface Analysis and Design, Interface Analysis and Design Models, The process.

UNIT IV **12 Periods**

Software Testing –Component Level: A Strategic Approach to Software Testing, Planning and Record keeping, Test case design, White box testing, Black-Box-Testing.

Software-Testing Integration level: Software Testing Fundamentals, Integration testing, Validation Testing, Testing Patterns.

Software Metrics and Analytics: Software Measurement, Software Analytics, Product Metrics, Metrics for Testing, Metrics for maintenance, Process and Project Metrics, Metrics for Quality.

Learning Resources:

Textbook(s):

1. Roger Pressman and Bruce Maxim "Software Engineering- A Practitioner's Approach", 9th edition, Tata McGraw-Hill International.

Reference Books:

1. Ian Somerville, Software Engineering. 6 ed, Pearson Education.
2. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandrioli, Fundamentals of Software Engineering.2 ed, PHI.
3. RajibMall, Fundamentals of Software Engineering. 2 ed, PHI.

Web Resources:

1. http://nptel.ac.in/courses/106101061/2
2. http://nptel.ac.in/courses/106101061/5

CS/IT 225 **Web Technologies** **L P C**
3 0 3

Course Objectives:

1. Explain the basic properties of web documents.
2. Demonstrate HTML Pages and Event handling mechanism.
3. Discuss XML documents and Web Servers.
4. Demonstrate Server side Technologies.

Course Outcomes:

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

1. Create static web pages with HTML and CSS.
2. Design dynamic webpages using client side scripting.
3. Create XML documents
4. Develop Server side web applications.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

1.

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			

UNIT I **12 Periods**

Introduction to HTML5 Part - I & II.

Cascading Style Sheets (CSS) Part - I & II.

JavaScript: Introduction to Scripting, Control Statements Part - I & II.

UNIT II **12 Periods**

JavaScript: Functions, Arrays, Objects.

DOM Objects and Collections

JavaScript Event Handling

UNIT III **14 Periods**

XML: XML Basics, XML Namespaces, DTD, XML Schema, MathML, XSL & XSLT.

Web Servers (IIS and Apache).

Introduction to Java Servlets, Static and Dynamic contents, Servlet life Cycle and Life cycle methods, Servlet Request and Response Model, Deploying a Servlet, Servlet State Transitions, Servlet Config and ServletContext, Servlet Redirection and Request Dispatch, Servlet Synchronization and Thread Model. Maintaining Client State: Cookies, URL rewriting, Hidden form fields, Session Tracking.

UNIT IV **12 Periods**

Introduction to JSP, JSP & Servlet as Web Components, Servlets vs. JSP, JSP Lifecycle, JSP Page Lifecycle Phases, General Rules of Syntax, JSP syntactic elements, JSP element syntax, Template content. JSP elements-directives, declarations, expressions, scriptlets, actions. JSP Standard Actions: jsp:useBean, jsp:getPreoperty, jsp:setProperty, jsp:include, jsp:forward, jsp:plugin, jsp:param,java Server Pages Standard Tag Library(JSTL).

Text Book:

1. Harvey M. Deitel and Paul J.Deitel, "Internet & World Wide Web How to Program", 4/3, Pearson Education.(UNIT I, UNIT II and UNIT III).
2. SubrahmanyamAllamaraju and Cedric Buest, "Professional Java Server Programming: J2EE" (UNIT III and UNIT IV (Servlets and JSP)).

Reference Books:

1. Jason Cranford Teague "Visual Quick Start Guide CSS, DHTML & AJAX", 4/ e, "Perason Education".
2. Tom NerinoDoli Smith "JavaScript & AJAX for the Web" Pearson Education, 2007.
3. Bill Dudney, Johathan Lehr, Bill Willies, Lery Mattingly "Mastering Java Server Faces" Wiely India, 2006.
4. Web Technology - UttamK.Roy, Oxford University Press, 2010.

WEB REFERENCE:

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

CS/IT 261	Computational Statistics Lab	L	P	C
		0	3	1.5

Course Objectives:

The student who successfully completes this course will have:

1. The knowledge to understand the concepts of linear statistical and ANOVA models and draw the conclusions.
2. The idea to develop a sound understanding of current, modern computational statistical approaches and their application to a variety of datasets.
3. To understand the key technologies in data science and business analytics such as data mining, machine learning, visualization techniques and predictive modelling.
4. The knowledge to apply principles of data science to analyse and to effectively visualize the data.

Course Outcomes:

On completion of this course, students will be able to:

1. Explain the basic concepts of linear statistical models
2. Interpret the results of Multivariate Regression models
3. Estimate the discriminate function to segregate and allot the item to the subgroup.
4. Implement Multi-Variate Statistical Analysis techniques using Python.
5. Apply data reduction and visualization techniques.

Lab Programs to implement

WEEK 1	Simple Linear Regression
WEEK 2	Correlation methods
WEEK 3	Multiple Regression
WEEK 4	Multivariate Regression
WEEK 5	Multivariate analysis of variance and co-variance
WEEK 6	Analysis of Variance (one-way classification),
WEEK 7	Analysis of Variance (two-way classification)
WEEK 8	Multivariate Normal Distribution
WEEK 9	Linear discriminant analysis for multivariate data
WEEK 10	Principle component analysis for multivariate data
WEEK 11	Factor Analysis for multivariate data
WEEK 12	Cluster analysis for multivariate data

Learning Resources:

Text Books:

1. Richard. A. Johnson and Dean. Wichern "Applied Multivariate Statistical Analysis" Pearson/Prentice Hall, 6th Edition, 2007
2. Daniel J. Denis "Applied Univariate, Bivariate, and Multivariate Statistics Using Python: A Beginner's Guide to Advanced Data Analysis", Daniel J. Wiley.
3. Alejandro Garcia, "Applied Multivariate Analysis with Python"

Reference Books:

1. Regression Diagnostics , Identifying Influential Data and Sources of Collinearity, D.A. Belsey, E. Kuh and R.E. Welsch
2. Applied Linear Regression Models, J. Neter, W. Wasserman and M.H. Kutner.
3. The Foundations of Factor Analysis, A.S. Mulaik.
4. Introduction to Linear Regression Analysis, D.C. Montgomery and E.A. Peck.
5. Cluster Analysis for Applications, M.R. Anderberg.
6. Multivariate Statistical Analysis, D.F. Morrison.

CS/IT 262 **Database Management Systems Lab** **L P C**

0 3 1.5

Course Objectives:

At the end of the course the students will understand

1. Syntax and usage of DDL, DML, DCL, and TCL statements, asserting database integrity constraints during database creation.
2. Semantics of SQL for implementing the user queries on a relational database.
3. Block structured PL / SQL programming concepts.

Course Outcomes:

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

1. Define, manipulate and control data using Structured Query Language (SQL).
2. Identify various database integrity constraints during database creation.
3. Construct SQL statements for satisfying end user queries by utilizing functions, set operations, joins, and subqueries.
4. Develop various applications using various PL/SQL data object like Database cursors, Functions, Stored Procedures, Packages, and Triggers.

COs - POs MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1	2				2			2
CO2	2	2	2	2	2				2			2
CO3	3	3	3	3					2			2
CO4	3	3	3	3					2			2

Week 1

Practice DDL and DML statements for creating a sample database without integrity constraints.

Week 2

Practice DDL and DML statements for refining a sample database including integrity constraints.

Week 3

Query the sample database using simple select statements retrieving:

1. Small-large number of attributes
2. Distinct output values
3. By Renaming attributes
4. Computed attributes
5. By using Simple-complex conditions (AND, OR, NOT)
6. By using Partial Matching operators (LIKE, %, _, *,?)
7. Sorted records
8. By checking for Nulls

Week 4-6

Query the sample database using joins, nested queries, aggregate functions and set oriented operations

Week 7 Query the sample database using built-in single row functions

Week 8 Implement PL/SQL named and unnamed blocks

Week 9 Implement PL/SQL Implicit and Explicit Cursors

Week 10 Implement PL/SQL pre-defined and user defined exceptions

Week 11 Implement PL/SQL stored procedures, functions and packages

Week 12 Implement PL/SQL database triggers

CS/IT 263	Web Technologies Lab	L	P	C
		0	3	1.5

Course Objectives:

1. Explain the basic properties of web documents.
2. Demonstrate HTML Pages and Event handling mechanism.
3. Discuss XML documents and Web Servers.
4. Demonstrate Server side Technologies.

Course Outcomes:

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

1. Create static web pages with HTML and CSS.
2. Design dynamic webpages using client side scripting.
3. Create XML documents
4. Develop Server side web applications.

List of Experiments

Week 1. Develop a simple static website using XHTML.

Week 2. Develop a simple static web page using different types of styles in CSS.

Week 3. Java script covering Function, recursive functions

Week 4. Java script with Arrays and Objects.

Week 5. Java script on collection objects.

Week 6. Develop event bubbling and mouse event applications.

Week 7. Program on well-formed and valid XML documents.

Week 8. Program for displaying XML data using XSLT.

Week 9. Develop server side application using servlets.

Week 10. Server programs on cookies and session.

Week 11. Develop server side application with JSP.

Week 12. Server program on JSP with action tags.

Reference Books:

1. Harvey M. Deitel and Paul J.Deitel, "Internet & World Wide Web How to Program", 4/3, Pearson Education.
2. SubrahmanyamAllamaraju and Cedric Buest, "Professional Java Server Programming: J2EE" (UNIT III and UNIT IV (Servlets and JSP)).
3. Jason Cranford Teague "Visual Quick Start Guide CSS, DHTML & AJAX", 4/ e, "Perason Education".
4. Tom NerinoDoli Smith "JavaScript & AJAX for the Web" Pearson Education, 2007.
5. Bill Dudney, Johathan Lehr, Bill Willies, Lery Mattingly "Mastering Java Server Faces" Wiely India, 2006.
6. Web Technology - UttamK.Roy, Oxford University Press, 2010.

Web Reference:

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

CSSL1 (a)	Skill Oriented Course-1	L	P	C
	2D- Computer Animation	1	2	2

Course objectives:

At the end of the course the students will understand the

1. To familiarize the students with various approaches, methods and techniques ofAnimation Technology.
2. To develop competencies and skills needed for becoming an effective Animator.
3. Mastering traditional & digital tools to produce stills and moving images.
4. Exploring different approaches in computer animation.

Course Outcomes:

The student will be able to

1. Make use of software to develop storyboards and 2-dimensional animation including creating, importing and sequencing media elements to create multi-media presentations.
2. Explain conceptualization, creativity, and visual aesthetics.
3. Organize various aspects of animation using a variety of 2 dimensional software.
4. Develop concepts, storyboarding and production of several 2 dimensional animations will be accomplished.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			

Course Content

UNITI **14 periods**

Understanding the Interface, Editors and Workspaces, Navigate and Save, Objects in the 3D View Editor, Editing Objects, Editing Tools

UNITII **14 periods**

Modifiers, Editing with Generate Modifiers, Editing with Deform Modifiers, Editing Using Curves, Editing Techniques and Examples

UNITIII **14 periods**

The Outliner and Collections, Text, Viewport Shading, Scene Lighting and Cameras

UNITIV **14 periods**

Nodes – Materials and Textures, Rendering, Animation, Constraints, Shape Keys and Action Editors Particle Systems

Learning Resources:

Text Book:

1. The Complete Guide to Blender Graphics Computer Modeling & Animation By John M. Blain 6th Edition

CSSL1 (b)	Skill Oriented Course-1	L	P	C
	Programming with C++	1	2	2

Course Objectives:

1. Introduce to the student the fundamentals of C++ language.
2. To make the students understand the principles of data abstraction, inheritance and polymorphism
3. To create awareness about generic programming and exception handling
4. To make the students familiar with IO streams, STL.

Course Outcomes:

After the completion of the course, students will be able to

1. Differentiate POP and OOP and then use C++ fundamentals and various function modifiers to create and manipulate classes and objects.
2. Make use of the advantages of Compile time polymorphism and also develop reusable programs by applying inheritance.
3. Use runtime polymorphism, generic programming and exception handling techniques for developing efficient programs.
4. Demonstrate C++ streams, Name Spaces and STL.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			

Course Content:

UNIT I **12 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 of objects.

UNIT II **12 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

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

UNIT III **12 periods**

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

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.

UNIT IV **12 periods**

The C++ I/O System Basics: Old Vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O, Overloading << and >>, Creating Manipulators.
C++ File I/O: File Classes, Opening and Closing a File, Text Files, Unformatted Binary I/O, get(), Getline() functions, Detecting EOF ,Random Access

Namespaces, Conversion Functions and other Advanced Topics: Namespaces, Thestd Namespace, Creating Conversion Functions, const Member Functions and mutable, Volatile Member Functions, Explicit Constructors, Differences between C and C++.

Introducing Standard Template Library: An Overview of STL

Learning Resources:

Text Book:

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

Reference Books:

1. Bjarne Stroustrup, "The C++ Programming Language", Special Edition, Pearson Education.
2. C++ - How to Program – Dietel&Dietel
3. Programming in C++ - Barkakati
4. Mastering C++ by Venugopal

CSSL1(c)	Skill Oriented Course-1	L	P	C
	PHP Programming	1	2	2

Course Objectives:

At the end of the course, the students will understand

1. usage of PHP for developing web applications.
2. PHP Browser Handling Power.
3. accessing web form data at the server
4. creation of database driven web applications.
5. usage of Ajax for partial rendering.
6. XML and RSS with PHP.

Course Outcomes:

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

1. Apply basic concepts of PHP programming. (Apply)
2. Design and Develop server side programs using PHP Technologies. (Create)
3. Assess the principles of object oriented development using PHP. (Evaluate)
4. Develop Database Connectivity using MYSQL. (Apply)
5. Design powerful web applications using Ajax. (Create)
6. Develop XML, RSS applications using PHP. (Apply)

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

1.

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			

Course Content

UNIT I **14 periods**

Essential PHP, Operators and Flow Control, String Arrays, CreatingFunctions

UNIT II **14 periods**

Reading Data in Web Pages, PHP Browser- HANDLING Power, ObjectOriented Programming,

Advanced Object Oriented Programming

UNIT III **14 periods**

File Handling, Working with Databases, Sessions, Cookies, and FTP,Ajax

UNIT IV **14 periods**

Advanced Ajax, Drawing Images on the Server, XML and RSS

Learning Resources:

Text Book:

1. PHP: The Complete Reference By Steven Holzner, TATA McGraw Hill.

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 MC04 **Ethics & Human Values** **L P C**
2 0 -

Course Objectives:

1. To create awareness to specific set of morals, values and ethics the professional must know and abide by, including work ethics, integrity and commitment etc.
2. To realize the importance of moral autonomy, professional ideals and Ethical theories
3. To study safety/risk aspects, welfare of the public and about employee rights
4. Know about the global issues and code of ethics of professional bodies

Course Outcomes

After completion of the course, the students will be able to

1. Have basic understanding of how a prospective engineer should behave in his chosen field and society.
2. Realize the importance of moral autonomy, professional ideals and Ethical theories.
3. Know about the safety/ risk, welfare of the public and employee rights
4. Gain exposure to global issues and codes of some professional bodies

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

1.

CO-PSO Mapping

	PSO1	PSO2	PSO3
CO1			
CO2			
CO3			
CO4			

Course Content:

UNIT I **15 Periods**

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

UNIT II **15 Periods**

Engineering Ethics: Senses of Engineering Ethics- Variety of Moral Issues - Types of Inquiry - Moral Dilemmas - Moral Autonomy - Kohlberg's Theory - Gillian-s Theory - Consensus and Controversy.

Professions and Professionalism: The nature and characteristics of Professions, Professionalism, the foundation and norms of Professional ethics, the need for separate code of conduct for Professionals, Professional Rights, Theories about Right Action, Uses of Ethical Theories. Case studies like The Space Shuttle Challenger, Bhopal gas tragedy, Chernobyl disaster etc.

UNIT III **15 Periods**

Engineering as Social Experimentation: Engineering as Experimentation - Engineers as Responsible Experimenters Safety.

Responsibilities and Rights: Safety and Risk - Assessment of Safety and Risk,Risk Benefit Analysis and Reducing Risk. Collegiality and Loyalty - Respect for Authority –Collective Bargaining - Confidentiality - Conflicts of Interest - Occupational Crime - Employee Rights – Intellectual Property Rights (IPR) - Discrimination.

UNIT IV **15 Periods**

Multinational Corporations - Environmental Ethics - Computer Ethics - Business ethics - Engineers As Managers - Consulting Engineers - Engineers As Expert Witnesses and Advisors - Codes Of Ethics -Sample Code Of Ethics Like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management Etc.,

Learning Resources:

Text Books:

1. Mike martin and Ronald Schinzinger, "Ethics in Engineering" McGraw-Hill, New York 1996
2. Govindarajan M, Natarajan S, Senthil Kumar V.S., "Engineering Ethics", PHI, New Delhi
3. Bayles.M. D, Professional ethics, California, Wards worth publishing company,1981
4. Koehn.D, The ground of Professional Ethics, Routledges, 1995

Reference Books:

1. Charles D,Fleddermann, "Engineering Ethics", Pearson / PHI, 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 now available)
3. John R Boatright, "Ethics and the conduct of business" Pearson, New Delhi, 2003.
4. Edmund G.Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2001.