

**R V R & J C COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-19**  
**(Autonomous)**  
**(w.e.f. the academic year 2018-2019)**  
**B.Tech., Computer Science & Engineering**

**Semester I (First Year)**

S.No.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 111	Mathematics – I	3	1	-	40	60	4	BS
2	CS/IT 112	Engineering Physics	3	1	-	40	60	4	BS
3	CS/IT/EC 113	Basic Electrical Engineering	3	1	-	40	60	4	ES
4	CS V002	Introduction to Computing	2	-	2	100	-	-	VC
5	CS/IT 151	Physics Lab	-	-	3	40	60	1.5	BS
6	CS/IT/EC 152	Basic Electrical Engineering Lab	-	-	2	40	60	1	ES
7	CS/IT/CH/EC 153	Engineering Graphics and Design Lab	1	-	4	40	60	3	ES
Total			12	3	11	340	360	17.5	TPW-26

**Semester II (First Year)**

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 121	Mathematics – II	3	1	-	40	60	4	BS
2	CS/CE/IT 122	Engineering Chemistry	3	1	-	40	60	4	BS
3	CS/CE/CH/IT/EE/EC/ME 123	Programming for Problem Solving	3	-	-	40	60	3	ES
4	CS/CH/IT/EC 124	English for Communication Skills	2	-	-	40	60	2	HS
5	MC 002	Environmental Science	2	-	-	100	-	-	MC
6	CS V001	English Competency Development Program	2	-	-	100	-	-	VC
7	CS/CE/IT 161	Chemistry Lab	-	-	3	40	60	1.5	BS
8	CS/CE/CH/IT/EE/EC/ME 162	Programming for Problem Solving Lab	-	-	4	40	60	2	ES
9	CS/CH/IT/EC 163	Workshop Practice Lab	1	-	4	40	60	3	ES
10	CS/CH/IT/EC 164	English Language Communication Skills Lab	-	-	2	40	60	1	HS
Total			16	2	13	520	480	20.5	TPW-31

## Semester III (Second Year)

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 211	Mathematics – III	3	1	-	40	60	4	BS
2	CS/IT 212	Life Sciences For Engineers	2	-	-	40	60	2	ES
3	CS/IT 213	Digital Electronics	3	-	-	40	60	3	PC
4	CS/IT 214	Discrete Mathematics	3	-	-	40	60	3	PC
5	CS/IT 215	Data Structures	3	-	-	40	60	3	PC
6	CS/IT 216	Object Oriented Programming	3	-	-	40	60	3	PC
7	MC 001	Constitution of India	2	-	-	100	-	-	MC
8	MC 004	Design Thinking and Product Innovation	2	-	-	100	-	-	MC
9	CS/IT 251	Digital Electronics Lab	-	-	2	40	60	1	ES
10	CS/IT 252	Data Structures Lab	-	-	4	40	60	2	PC
11	CS/IT 253	Object Oriented Programming Lab	-	-	2	40	60	1	PC
Total			21	1	8	560	540	22	TPW-30

## Semester IV (Second year)

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 221	Humanities (Elective-I)	3	-	-	40	60	3	HE
2	CS/IT 222	Computer Organization	3	-	-	40	60	3	PC
3	CS/IT 223	Operating Systems	3	-	-	40	60	3	PC
4	CS/IT 224	Database Management Systems	3	-	-	40	60	3	PC
5	CS/IT 225	Formal Languages & Automata Theory	3	-	-	40	60	3	PC
6	CS/IT 226	Open Elective - I	3	-	-	40	60	3	OE
7	CS V004	Programming with Python	3	-	2	100	-	-	VC
8	MC 003	Essence of Indian Traditional Knowledge	2	-	-	100	-	-	MC
9	CS/IT 261	Operating Systems Lab	-	-	4	40	60	2	PC
10	CS/IT 262	Database Management Systems Lab	-	-	4	40	60	2	PC
Total			23	0	10	520	480	22	TPW-33

## Semester V (Third year)

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 311	Computer Networks	3	-	-	40	60	3	HS
2	CS/IT 312	Design & Analysis of Algorithms	3	1	-	40	60	4	PC
3	CS/IT 313	Web Technologies	3	-	-	40	60	3	pc
4	CS/IT 314	Software Engineering	3	-	-	40	60	3	pc
5	CS/IT 315	Professional Elective-I	3	-	-	40	60	3	PE
6.	CS/IT 316	Open Elective - II	3	-	-	40	60	3	OE
7.	CS/IT 351	Design & Analysis of Algorithms Lab	-	-	4	40	60	2	PC
8	CS/IT 352	Web Technologies Lab	-	-	4	40	60	2	PC
9.	CS/IT 353	Professional Communication Skills Lab	-	-	2	40	60	1	HS
Total			18	1	10	360	540	24	TPW-29

## Semester VI (Third year)

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 321	Compiler Design	3	-	-	40	60	3	PC
2	CS/IT 322	Data Engineering	3	-	-	40	60	3	PC
3	CS/IT 323	Artificial Intelligence	3	-	-	40	60	3	PC
4	CS/IT 324	Cryptography & Network Security	3	-	-	40	60	3	PC
5	CS/IT 325	Professional Elective-II	3	-	-	40	60	3	PE
6	CS/IT 326	Open Elective – III	3	-	-	40	60	3	OE
7	CS/IT 361	Artificial Intelligence Lab	-	-	4	40	60	2	PC
8	CS/IT 362	SE/ Mini Project Lab	-	-	4	40	60	2	PC
9	CS/IT 363	Term Paper	-	-	4	40	60	2	PR
Total			18	0	12	360	540	24	TPW-30

## Semester VII (Final year)

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 411	Humanities (Elective-II)	3	-	-	40	60	3	HE
4	CS/IT 412	Machine Learning	3	-	-	40	60	3	PC
2	CS/IT 413	Neural Networks	3	-	-	40	60	3	PC
3	CS/IT 414	Professional Elective-III	3	-	-	40	60	3	PE
5	CS/IT 415	Professional Elective- IV	3	-	-	40	60	3	PE
6	CS/IT 451	Machine Learning Lab	-	-	2	40	60	1	PC
7	CS/IT 452	Project-I	-	-	4	40	60	2	pR
Total			15	0	6	280	420	18	TPW-21

## Semester VIII (Final year)

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 421	Professional Elective-V(MOOCs)	3	0	-	40	60	3	PE
2	CS/IT 422	Open Elective-IV(MOOCs)	3	0	-	40	60	3	OE
3	CS/IT 461	Project-II	-	-	12	40	60	6	pR
Total			6	0	12	120	180	12	TPW-18

**Program Elective Courses:**

CODE NO.	SUBJECT NAME	CODE NO.	SUBJECT NAME
Professional Elective Courses for III/IV B.Tech. Students		Professional Elective Courses for IV/IV B.Tech. Students	
CSEL01	Unix Programming	CSEL13	Advanced Computer Architecture
CSEL02	Interactive Computer Graphics	CSEL14	Design and Analysis of Parallel Algorithms
CSEL03	Big Data Analytics	CSEL15	Principles of Programming Languages
CSEL04	Embedded Systems	CSEL16	Wireless Networks
CSEL05	Open Source Systems	CSEL17	Cloud Computing
CSEL06	Digital Image Processing	CSEL18	Quantum Computing
CSEL07	Network Programming	CSEL19	Natural Language Processing
CSEL08	Mobile App Development	CSEL20	Virtual Reality
CSEL09	Internet of Things	CSEL21	Cyber Security
CSEL010	.Net Technologies	CSEL22	Block Chain Technology
CSEL011	Distributed Computing	CSEL23	Multicore Technologies
CSEL012	* Industry Related Subject	CSEL24	* Industry Related Subject
NOTE: Students are allowed to take Professional Electives from 1 to 12 during III/IV B.Tech and 13 to 24 during IV/IV B.Tech Course* To be decided based on Industry Requirements			

**Open Elective Courses (Offered by CSEDepartment):**

CODE NO.	SUBJECT NAME	CODE NO.	SUBJECT NAME
CSOL01	Object Oriented Programming In Java	CSOL02	RDBMS
CSOL03	Programming In Python	CSOL04	Internet Of Things
CSOL05	Machine Learning		

## Semester I (First year)

CS/IT 111

Mathematics-I  
(Calculus & Linear Algebra)

L	T	P	C
3	1	0	4

### 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. know fallouts of Rolle's theorem that is fundamental to application of analysis to Engineering problems.
3. Understand linear algebra including linear transformations in a comprehensive manner.
4. Find matrix eigen values and know diagonalization and orthogonalization.

### UNIT I

15 Periods

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

### UNIT II

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.

### UNIT III

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

15 Periods

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

**Learning Resources:****Text Books:**

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42<sup>nd</sup> 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.

**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. Necessity of periodical potentials and conditions for explaining the properties and band formation with the help of quantum physics.
2. The theory of P-N junction diode from the basics of semiconductor concepts.
3. The theory and application of Optoelectronic devices.
4. Measurement techniques employed in transport phenomena and variation of properties in low dimensions.

**UNIT I**

15 Periods

Introduction to Quantum mechanics: Wave nature of particles, deBroglie hypothesis, Davisson – Germer experiment, Time dependent and Time independent Schrodinger wave equations, Physical significance of wave function, Uncertainty principle, Single slit experiment. Solution to stationary state problem: particle in a box, and extension to 3-D box (qualitative treatment only).

Electronic materials: Salient features of Free electronic theory, Fermi – Dirac distribution function, Fermi level, Density of States, Bloch wave function, Kronig-Penney model, E-K curves, Brillouin zones, Effective mass, Degree of freedom of electron - Distinction of metals and insulators. Concept of hole, Energy band formation in solids.

**UNIT II**

15 Periods

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**

15 Periods

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 Hetro structure lasers with band diagrams, characteristics of laser and LED, PIN diode, Solar cell, working principle and characteristics.

#### **UNIT IV**

15 Periods

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 vanderPauw measurements for carrier density, resistivity, and Hallmobility, Hot-point probe measurement, capacitance-voltage measurements, Parameter extraction from Diode I-V characteristics.

#### **Learning Resources:**

#### **Reference Books:**

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

**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 provide students with fundamental concepts on the construction and operation of transformers and electrical machines.

**Course Outcomes:**

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

1. Understand the basic electrical circuits and batteries.
2. Gain the knowledge on the concept of AC circuits.
3. Get the knowledge on the principle and operation of single phase transformer
4. Understand the operation of electrical machines.

**UNIT I**

15 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, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

**UNIT II**

15 Periods

**AC Circuits:**

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

**UNIT III**

15 Periods

**Transformers:**

Magnetic materials, BH characteristics, working principle of single phase transformer, ideal and practical transformer, equivalent circuit from O.C and S.C tests. Losses in transformers, regulation and efficiency. Auto-transformer-Working principle, comparison with two winding transformer.

## **UNIT- IV**

15 Periods

### **Electrical Machines:**

Construction, working principle of DC generator and motor (Elementary treatment only), torque-speed characteristic of separately excited dc motor. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency. Construction and working of synchronous generators.

### **Learning Resources:**

#### **Text Books:**

1. J.B Gupta "Basic Electrical Engineering" S.K.Kataria& Sons, 6<sup>th</sup> Edition 2015.
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

#### **Reference Books:**

1. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
4. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

#### **Web References:**

1. <http://www.egate.ws/>
2. <http://cosmolearning.org/courses/circuit-theory/>
3. <http://www.nptelvideos.in/2012/11/circuit-theory.html>
4. <http://elearning.vtu.ac.in/P9/notes/06ES34/Unit1-KCV.pdf>
5. <http://pbtstudies.blogspot.in/>

**CS V002**

**Introduction to Computing  
Mandatory Course**

L	T	P	C
2	0	0	0

**Course Objectives:**

1. Students will be able to gain in – depth understanding of problem.
2. Students will be able to evaluate different concepts and methods in a computer language.
3. Students will be able to analyze and develop an algorithm for a given problem.
4. Students will be able to apply their knowledge to design and develop Computer solution to real world problems.

**Course Outcomes:**

1. The student will learn the algorithm and flowchart.
2. The student will learn to formulate fundamental algorithms for logical problems.
3. The student will be able to develop an algorithm using Factoring Methods.
4. The student will be able to design an algorithm using array related problems.

**UNIT I**

4 Periods

**Introduction:** Computer & its Components, Algorithm, Characteristics of algorithm, Flowchart, Symbols are used in flowchart.

**UNIT II**

8 Periods

**Fundamentals of Algorithms:** Introduction, Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial computation, Sine function computation, Generation of the Fibonacci sequence, Reversing the digits of an integer, Base conversion, Character to number conversion.

**UNIT III**

8 Periods

**Factoring Methods:** Introduction, Finding the square root of a number, the smallest divisor of number, the greatest common divisor of two numbers, generating prime numbers, computing the prime factors of an integer, Generation of pseudo-random numbers, raising a number to large power, computing the  $n^{\text{th}}$  Fibonacci number.

**UNIT IV**

5 Periods

**Array Techniques:** Array order reversal, Array counting or histogramming, Finding the maximum number in a set, Removal of duplicates from an ordered array, Partitioning an array.

**Learning Resources:**

**Text Book:**

1. R G *Dromey*, How to Solve it by Computer, PHI. C.A.R.HOARE SERIES EDITOR (Chapters 2 - 4)

**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.

**Course Outcomes:**

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

1. Able to use CRO, Function generator, Spectrometer for making measurements
2. Able to test the optical instruments using principles of interference and diffraction
3. Able to understand the concepts learned in the Physics theory
4. Trained in carrying out precise measurements and handling sensitive equipment
5. Learn to draw conclusions from data and develop skills in experimental design

**(Any 10 out of the following 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.

**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 know the response of electrical circuits for different excitations

**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. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of resonance.
5. Verify the network theorems.

**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 & KCL.
4. Verification of Thevenin's Theorem.
5. Verification of Superposition Theorem.
6. Verification of Maximum power transfer theorem
7. Verification of reciprocity theorem.
8. Verification of Norton's Theorem.
9. Measurement of active power in single phase circuit by using single wattmeter.
10. Series resonance characteristics.
11. Parallel resonance characteristics.
12. Parameters of choke coil.
13. To study R-L series circuits (AC)
14. To study R-C series circuits (AC)
15. To study R-L-C series circuits (AC)
16. To study R-L-C parallel circuits (AC).

**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.

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

**UNIT I**

**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/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. (Corresponding set of) CAD Software Theory and User Manuals

## Semester II (First year)

CS/IT 121

Mathematics-II

L	T	P	C
3	0	0	4

### Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and differential equations. 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 advanced level of mathematics and applications that they would find useful in their disciplines.

### Course Outcomes:

The students will be able to:

1. Deal with functions of several variables that are essential in most branches of engineering.
2. Evaluate multiple integrals.
3. Understand concepts like divergence, curl and integration of vector function.
4. Solve differential equations which model physical processes.

### 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's theorem(without proof), Gauss divergence theorem(without proof)

### UNIT IV

15 Periods

First order ordinary differential equations: Linear, Bernouli 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

### Text Book:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42<sup>nd</sup> 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.

**Course Objectives:**

1. It imparts concepts involved in molecular structure and intermolecular forces.
2. Understands the chemistry behind electrochemical energy systems.
3. Students understand the chemical concepts involved in Water treatment and Corrosion.
4. Student shall know about the major organic reactions and end products like conducting polymers.
5. Learn analytical methods useful in characterization of compounds.

**Course outcomes:**

1. Student can identify stable complexes and suitable electrochemical energy systems for end usage.
2. Student can apply his knowledge for effective water treatment and corrosion prevention.
3. Able to 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.

**UNIT I**

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<sub>2</sub>, 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<sub>2</sub>)- advantages, Fuel cell (H<sub>2</sub>-O<sub>2</sub> cell).

**UNIT II**

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, Dechlorination, 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**

15 Periods

**Organic reactions and Polymers:**

Types of organic reactions-Substitution (S<sub>N</sub>1 and S<sub>N</sub>2), Elimination (E<sub>1</sub> and E<sub>2</sub>), 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 ( $T_g$ )), Factors affecting  $T_g$ .

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

#### **UNIT IV**

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, 16<sup>th</sup> edition, Dhanpat Rai Publishing Company.
2. Wiley Engineering chemistry, 2<sup>nd</sup> edition, Wiley India Private Limited.

###### **Reference Books:**

1. University Chemistry, Bruce H. Mahan, 3<sup>rd</sup> edition, Narosa Publishing House.
2. A text book of Engineering chemistry, Shashi Chawla, 3<sup>rd</sup> 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://freevidelectures.com/Course/3029/Modern-Instrumental-Methods-of-Analysis>.

**Course Objectives:**

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

**Course Outcomes:**

1. Develop algorithm and flowchart for simple problems.
2. Use suitable control structures and arrays for developing code in C.
3. Design modular structured programs using functions and recursion.
4. Develop code for complex applications using structures, pointers and file handling features.

**UNIT I**

10 Periods

**Introduction to Programming:** Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

**Idea of Algorithm:** Steps to solve logical and numerical problems, Representation of Algorithm: Flowchart/Pseudocode with examples, from algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence.

**UNIT II**

11 Periods

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching, Iteration and loops.

**Arrays:** Arrays (1-D, 2-D), Character arrays and Strings.

**Basic Algorithms:** Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations.

**UNIT III**

9 Periods

**Function:** Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

**Recursion:** Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series.

**UNIT IV**

10 Periods

**Structure:** Structures, Defining structures and Array of Structures

**Pointers:** Idea of pointers, Defining pointers, Use of Pointers in self-referential structures.

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

**Learning Resources:****Text Book:**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

**Reference Books:**

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

**Web References:**

1. <http://cprogramminglanguage.net/>
2. <http://lectures-c.blogspot.com/>
3. [http://www.coronadoenterprises.com/tutorials/c/c\\_intro.htm](http://www.coronadoenterprises.com/tutorials/c/c_intro.htm)
4. [http://vfu.bg/en/e-Learning/Computer-Basics--computer\\_basics2.pdf](http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf)

**Course Objectives:**

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

**Course Outcomes:**

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

1. Use vocabulary contextually.
2. Compose effectively the various forms of professional communication.
3. Apply grammar rules efficiently in spoken and written forms.

**UNIT I**

10 Periods

**Vocabulary Building**

- 1.1 - Root words from foreign languages and their use in English.
- 1.2 - Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
- 1.3 - Synonyms, antonyms, and standard abbreviations.
- 1.4 - One word substitutes.

**UNIT II**

10 Periods

**Writing Skills**

- 2.1- Proposal writing.
- 2.2- Letter-writing.
- 2.3- Techniques for writing precisely (précis writing).
- 2.4- E-mail writing.

**UNIT III**

10 Periods

**Identifying Common Errors in Writing**

- 3.1- Subject-verb agreement.
- 3.2- Noun-pronoun agreement.
- 3.3- Articles.
- 3.4- Prepositions.
- 3.5- Tenses.
- 3.6- Redundancies.

**UNIT IV**

10 Periods

**Nature and Style of sensible Writing**

- 4.1- Describing
- 4.2- Narration
- 4.3- Classifying
- 4.4- Coherence and cohesion in paragraph writing

**Learning Resources:****Text Book:**

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

**References:**

1. *Remedial English Grammar*. F.T. Wood. macmillan.2007
2. *On Writing Well*. William Zinsser. Harper ResourceBook. 2001
3. *Study Writing*. Liz Hamp-Lyons and Ben Heasley.Cambridge University Press.2006.
4. *Exercises in Spoken English*. Parts.I-III. CIEFL, Hyderabad. Oxford University.
5. *Practical English Usage*.Michael Swan. OUP. 1995Press

**Course Objectives:**

To enable the students to

1. Understand that humans are an integral part of environment and hence their activities reflect on the environment.
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 Objectives:**

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.

**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 atleast leafy vegetables and creepers like cucumber etc. for use in college canteen/hostels etc.
4. Adoption of "NO PLASTICS" on campus.
5. Field trip to gain knowledge of biodiversity, water shed, mining, pollution and other local issues.
6. 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.

### 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.

**Note: Weightages for a, b & c will be taken as per the assessment guidelines of the R-18 curriculum and projected to 100 marks.**

**CS V001**

**English Competency Development Programme**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Lecture Plan**

**Session Topic**

1. Self Introduction
2. Self Introduction
3. Introducing Others
4. Mind Mapping -Small Talk
5. Random Operation
6. JAM &Extempore
7. Starting a Conversation-Rapid Fire
8. Story Telling
9. Narrating Life Stories
10. Tense Buster
11. Describing people
12. Picture Perception & Description
13. Movie Reviews
14. News Articles-Open Discussion & Debate
15. Everyday Life-Communicative Activities
16. Role Plays
17. Short Versions
18. Contemporary Novels-Critical Appreciation Round

**Course Objectives:**

1. To learn concepts of equivalent weight, molecular weight, normality, molarity, weight and volume percent.
2. To know the methods of determining hardness and chloride ion content of water sample.
3. To learn the redox methods to determine  $\text{Fe}^{2+}$  ions present in solution.
4. To know principles and methods involved in using instruments like conductivity bridge and potentiometer
5. To know the molecular properties like surface tension, viscosity.
6. To know synthetic methods for preparation of drugs and polymer

**Course outcomes:**

1. Estimate the Fe(II) content of a given solution and chloride/hardness content of water.
2. Measure molecular properties such as surface tension, viscosity.
3. Measure conductance of solutions, redox potentials of a cell.
4. Synthesize a small drug molecule and polymer.

**List of Experiments:**

1. Estimation of Mohr's salt using  $\text{KMnO}_4$ .
2. Estimation of Mohr's salt using  $\text{K}_2\text{Cr}_2\text{O}_7$ .
3. Determination of chloride ion content of water.
4. Determination of Hardness of water using EDTA method.
5. Determination of Fe(II) strength using  $\text{K}_2\text{Cr}_2\text{O}_7$  potentiometrically.
6. Determination on strength of NaOH using HCl conductometrically.
7. Determination of surface tension.
8. Determination of Viscosity.
9. Determination of Saponification / acid value of oil.
10. Preparation of p-bromo acetanilide.
11. Preparation of Phenol Formaldehyde resin.
12. Determination of partition co-efficient of  $\text{I}_2$  in water.
13. Determination of  $R_f$  value using TLC.
14. Verification of Freundlich isotherm using adsorption of acetic acid on activated charcoal.

**Course Objectives:**

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

**Course Outcomes:**

1. Develop algorithm and flowchart for simple problems.
2. Use suitable control structures and arrays for developing code in C.
3. Design modular structured programs using functions and recursion.
4. Develop code for complex applications using structures, pointers and file handling features.

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

**Tutorial 1:** Problem solving using computers:

**Lab1:** Familiarization with programming environment

**Tutorial 2:** Variable types and type conversions:

**Lab 2:** Simple computational problems using arithmetic expressions

**Tutorial 3:** Branching and logical expressions:

**Lab 3:** Problems involving if-then-else structures

**Tutorial 4:** Loops, while and for loops:

**Lab 4:** Iterative problems e.g., sum of series

**Tutorial 5:** 1D Arrays: searching, sorting:

**Lab 5:** 1D Array manipulation

**Tutorial 6:** 2D arrays and Strings

**Lab 6:** Matrix problems, String operations

**Tutorial 7:** Functions, call by value:

**Lab 7:** Simple functions

**Tutorial 8 & 9:** Numerical methods (Root finding, numerical differentiation, numerical integration):

**Lab 8 and 9:** Programming for solving Numerical methods problems

**Tutorial 10:** Recursion, structure of recursive calls

**Lab 10:** Recursive functions

**Tutorial 11:** Pointers, structures and dynamic memory allocation

**Lab 11:** Pointers and structures

**Tutorial 12:** File handling:

**Lab 12:** File operations

**Course Objectives:**

Engineers, whatever be their line of activity, must be proficient with all aspects of manufacturing, however it should not be forgotten that practice without theory is blind and the theory without practice is lame.

- Students involved in acquiring manufacturing skills must have balanced knowledge of theory as well as practice.
- Imparts basic knowledge of various tools and their use in different sections of manufacture such as fitting, carpentry, tin smithy, moulding, casting, welding, electrical wiring, PCB work on electronic circuits and practice with machine shop tools & equipment's.

**Learning Out Comes:**

- Students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials.

**Manufacturing Methods:**

10 Periods

1. Introduction to various types of manufacturing methods –casting - forming - various machining operations such as turning, milling, shaping, drilling, slotting etc. - various joining methods such as welding, brazing, soldering etc.,- Advanced manufacturing methods (3 Lectures)
2. CNC machining and Additive manufacturing (1 Lecture)
3. Fitting operations and power tools (power hack saw, table mounted circular saw, wood turning lathe, bench grinder, concrete mixer, concrete vibrator etc.,) (1 Lecture)
4. Basic principles involved in electrical circuits and electronic PCB circuits(1 Lecture)
5. Carpentry (1 Lecture)
6. Welding(arc welding & gas welding) (1 Lecture)
7. Metal casting (1 Lecture)
8. Plastic moulding, glass cutting (1 Lecture)

**Text books:**

1. Hajra Choudhury S, K., Hajra Choudhury A.K and Nirjhar Roy S.K., "Elements of Workshop Technology", Volume I and Volume II, 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S and Steven S.Schmid., "Manufacturing Engineering and Technology" 4<sup>th</sup> edition, Pearson Education, India, 2002.
3. Rao P.N., "Manufacturing Technology", Volume I & II, Tata McGrawHill House, 2017

**Work shop Practice:****[60]****Objectives:**

Students acquiring practical knowledge on various manufacturing techniques and will be able to fabricate components with their own hands.

**Outcomes:**

Up on completion of laboratory, students will be able to gain the manufacturing skills and get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

## **Section wise Experiments:**

### **1. Machine Shop(10 hours)**

Practice of machining operations on Lathe, Milling, Shapping, Drilling and Slotting Machines.

- Plain, step turning
- Plain, groove and thread cutting

### **2. Fitting Shop(8 hours)**

- Inclined fit
- Half round fit

### **3. Moulding and Casting(8 hours)**

- Hand wheel
- Stepped cone pulley

### **4. Practice on electrical wiring and Electronic circuit boards(8 hours)**

- One bulb controlled by one switch & two bulbs in series controlled by one switch
- Measurement of resistance, voltage and current with the help of a multimeter & soldering an electronic PCB circuit

### **5. Welding shop(both arc & gas welding) (8 hours)**

- Square butt joint
- Lap joint

### **6. Carpentry(6 hours)**

- Half lap cross joint
- T-Lap joint

### **7. Tin Smithy(6 hours)**

- Rectangular tray
- Funnel

### **8. Plastic moulding and glass cutting(6 hours)**

- Practice on glass cutting

## **Text Book:**

1. P.Kannaiah, K.L.Narayana., Workshop Manual, Second Edition, Scitech Publications (INDIA) Pvt.Ltd.

**Course Objectives:**

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. Acquaint the students with the Standard English pronunciation, i.e., Receive Pronunciation (RP), with the knowledge of stress and intonation. Develop production and process of language useful for social and professional life. To develop in them communication and social graces necessary for functioning. Improve the dynamics of professional presentations. To develop critical reading and comprehension skills at different levels.

**Course Outcomes:**

At the end of the course, the student 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. The students are capable of using language effectively to face interviews with success.
6. Develop effective communication and presentation skills.
7. Students will be able to use higher order skills.

**Oral Communication**

(This unit involves interactive practice sessions in Language Lab)

- 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 Books:**

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

## II/IV B.TECH III-Semester

<b>CS/IT 211</b>	<b>Mathematics – III (Probability &amp; Statistics)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### UNIT I

10 Periods

#### Basic Probability:

Discrete random variables and their properties, Expectation of Discrete Random Variables, Continuous random variables and their properties, Expectation of Continuous Random Variables, Distribution functions and densities, Moments, Chebyshev's Inequality.

### UNIT II

16 Periods

#### Discrete and Continuous Probability Distributions:

Binomial distribution, infinite sequences of Bernoulli trials, Poisson approximation to the Binomial distribution- Evaluation of statistical parameters for these distributions.

Normal, Exponential and Gamma densities-. Evaluation of statistical parameters for these distributions.

### UNIT III

14 Periods

Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

### UNIT IV

14 Periods

Test for single mean, difference of means, test for ratio of variances, Chi-square test for goodness of fit for Binomial and Poisson Distributions, and independence of attributes.

Tests of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

#### Text Book:

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

#### Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.
8. S.C.Gupta and V.K.Kapoor., Fundamentals of Mathematical Statistics, Sultan Chand & Co.

**Course Objectives:**

1. Recall the basics of biology viz. cellular organization, function and classification.
2. Provide an understanding of the basic structure and functions of major biomolecules.
3. Describe the transfer of genetic information and introduce the techniques used for modification of living organisms
4. Describe the applications of rDNA technology and biomaterials

**Course Outcomes:**

1. Understand and appreciate the cellular organization and its diversity
2. Recognize and understand the molecular basis of different forms of life and their applications
3. Identify the complementarity in the structure and functions of biomolecules
4. Differentiate the genetic phenomena and demonstrate the genetic engineering of organisms

**UNIT I : Living Organisms (CO1)**

6 Periods

Comparison of biological organisms with manmade systems, Classification of living organisms, Cellular basis of life.

Differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy.

**UNIT II : Proteins and Enzymes (CO2)**

6 Periods

Water, Biomolecules – carbohydrates, proteins and lipids, structure and functions of proteins and nucleic acids, hemoglobin, antibodies.

Enzymes: Basic Structure and Classification of Enzymes; Enzymes in Fermentation and industrial applications

**UNIT III : Cell Physiology (CO3)**

6 Periods

Bioenergetics, Respiration: Glycolysis and TCA cycle, Electron transport chain and oxidative phosphorylation.

Mechanism of photosynthesis; Neurons, synaptic and neuromuscular junctions

**UNIT IV: Genes and genetic material (DNA and RNA) (CO4)**

10 Periods

Mendel's laws, gene mapping, Mitosis and Meiosis, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, animal cloning, biosensors, biochips.

**Learning Resources:****Text Books:**

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
2. Arthur T Johnson, Biology for Engineers, CRC press, 2011

**Reference Books:**

1. Alberts et al. The molecular biology of the cell, 6<sup>th</sup> edition, Garland Science, 2014.
2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
3. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3<sup>rd</sup> edition, 2012.

**UNIT I**

14 Periods

**Fundamentals of Digital systems:** Introduction, Digital Signals, Basic Digital circuits, NAND and NOR Operations, Exclusive-OR and Exclusive-NOR Operations, Boolean Algebra, codes: BCD, excess – 3, Gray.

Number Systems and Codes: Number systems, Binary Number system, Signed Binary Numbers Binary Arithmetic, 2's Complement Arithmetic, Octal Number system, Hexadecimal Number System.

**UNIT II**

12 Periods

**Combinational digital Circuits:** Standard Representations for Logic Functions, Karnaugh Map Representation of Logic Functions, Simplification of Logic Functions using K-Map, Minimization of Logic Functions Specified in Minterms / Maxterms or Truth Table, Minimization of Logic Functions Not Specified in Minterms / Maxterms, Don't –Care conditions, Design Examples, EX-OR and EX-NOR Simplification of K-Maps, Five and Six-Variable K-Maps, Quine-Mc Cluskey Minimization Technique.

**Combinational Logic Design Using MSI Circuits:** Multiplexers and their use in Combinational Logic Design, DE multiplexer / Decoders and their use in Combinational Logic Design, Adders and their use as Sub tractors, BCD Arithmetic, Arithmetic Logic Unit(ALU), Digital Comparators, Code Converters.

**UNIT III**

12 Periods

**Sequential Circuits and Systems:** A 1-Bit Memory Cell, Clocked S-R FLIP-FLOP, J-K FLIP FLOP, D-TYPE FLIP-FLOP, T-TYPE FLIP-FLOP, Excitation Table of FLIP-FLOP, Clocked FLIP-FLOP Design, Edge-Triggered FLIP-FLOPs.

Sequential Logic Design: Registers, Applications of Shift Registers, Ripple or Asynchronous counters, Synchronous Counters,

**UNIT IV**

12 Periods

**Programmable Logic Devices:** Introduction, ROM as a PLD, Programmable Logic Array: Input Buffer, AND matrix, OR matrix, Invert / Non-invert matrix, Programmable Array Logic

**A/D and D/A Converters:** Introduction, Digital to Analog Converters: Weighted – Resistor D/A converter, R-2R Ladder D/A convertor, Analog to digital Converter: Quantization and Encoding, Parallel – Comparator A/D Converter, Successive Approximation A/D converters.

**Learning Resources:****Text Book:**

1. R.P.Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

**UNIT I**

12 Periods

**The Foundations:** Logic and Proofs, Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy

**Basic Structures:** Sets, Set Operations, Functions, Sequences and Summations, Cardinality of Sets.

**UNIT II**

13 Periods

**Induction and Recursion:** Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms.

**Counting:** The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Generalized Permutations and Combinations, Generating Permutations and Combinations.

**UNIT III**

12 Periods

**Advanced Counting Techniques:** Applications of Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion–Exclusion, Applications of Inclusion–Exclusion.

**Relations :** Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations.

**UNIT IV**

13 Periods

**Relations:** Equivalence Relations, Partial Orderings.

**Graphs :** Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Planar Graphs, Graph Coloring.

**Learning Resources:****Text Book:**

1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7<sup>th</sup> Edition, Tata McGraw – Hill.

**Reference Books:**

1. Discrete Mathematics for Computer Scientists, Abraham Kandel, Joe L. Mott, and Theodore P. Baker
2. Susanna S.Epp, Discrete Mathematics with Applications, 4<sup>th</sup> edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3<sup>rd</sup> Edition by, Tata McGraw – Hill.
4. J.P. Tremblay and R.Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, Tata McGraw-Hill
5. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.
6. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson, Discrete Mathematics, Tata McGraw – Hill.

**UNIT I**

14 Periods

Introduction: Analysis of an Algorithm, Asymptotic Notations, Time and Space trade-off.

Searching: Linear search and binary search techniques and their Complexity analysis.

Singly Linked lists: Representation in Memory, Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —singly linked lists.

**UNIT II**

14 Periods

Circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

Stacks: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of stacks: Expression conversion and evaluation- corresponding algorithms and complexity and analysis.

**UNIT III**

16 Periods

Queues: ADT Queue, types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithm and their analysis.

Trees: Basic Tree Terminologies, Different types of trees: Binary Tree, Binary Search Tree, AVL Tree, Tree operations on each of the trees and their algorithms. Applications of Binary Trees, B-Tree definitions and algorithms.

**UNIT IV**

14 Periods

Sorting Algorithms: Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. , Heap – Applications of heap. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

**Learning Resources:****Text Books:**

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997.

**Reference Books:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2002.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
3. Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008
5. Reema Thareja, "Data Structures Using C", Second Edition, Oxford University Press, 2011

**UNIT I**

12 Periods

**Introduction:** Introduction to java, features of object-oriented programming, data types, dynamic initialization, scope and life time, operators, control statements, arrays, type conversion and casting, finals & blank finals.

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

**Inheritance:** Basic concepts, access specifiers, usage of super key word, method overriding, final methods and classes, abstract classes, dynamic method dispatch, Object class.

**Interfaces:** Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.

**UNIT II**

13 Periods

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

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

**Exception Handling:** Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.

**Multithreading: Concepts** of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiple threads, Synchronization.

**UNIT III**

12 Periods

**I/O Streams:** Streams, Byte streams, Character streams, File class, File streams.

**Generic Types:** Generic Method, Generic Class

**Collections:** List, Queue, Set

**Applets:** Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets, accessing remote applet, Color class and Graphics.

**UNIT IV**

13 Periods

**Event Handling:** Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.

**AWT:** AWT Components, windows, canvas, panel, 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.

**Learning Resources:****Text Book:**

1. Herbert Schildt, The Complete Reference Java J2SE 9<sup>th</sup> Edition, , TMH Publishing Company Ltd, NewDelhi.

**Reference Books:**

1. Herbert Schildt, The Complete Reference - C++ - 4/e, Tata McGraw Hill.
2. Cay.S.Horstmann and Gary Cornell, Core Java 2, Vol 1, Fundamentals 7<sup>th</sup> Edition, Pearson Education.
- 3.H.M.Dietel and P.J.Dietel, Java How to Program, Sixth Edition, Pearson Education/PHI.
4. Barbara Liskov, *Program Development in Java*, Addison-Wesley, 2001.
5. Cay Horstmann, John Wiley and Sons ,Big Java 2<sup>nd</sup> Edition, ,Pearson Education.

**MC 001**

**Constitution of India**

L	T	P	C
2	0	0	0

**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 91<sup>st</sup> 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.  
*B.Tech.(EC)/R-18/2018-2019* Printed through web on 30-04-2019 14:19:43 Page 1/ 2
2. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI, Learning Pvt.Ltd., New Delhi, 2011.

**MC 004**

**Design Thinking and Product innovation**

L	T	P	C
2	0	0	0

**Course Objectives:**

1. Identify the design thinking processes and methods.
2. Plan research activities to gather and empathize from a user's viewpoint.
3. Ideate techniques to help arrive at the best solution and evaluation.
4. Identify design thinking approaches for business challenges.

**Course Outcomes:**

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

1. Interpret the concepts of Design thinking.
2. Investigate a problem to determine its root cause.
3. Take part in group thinking and experiment with different solutions.
4. Develop innovative thinking and creative problem solving.

**UNIT I**

8 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**

8 Periods

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

**UNIT III**

8 Periods

Modules of Design Thinking– Ideation & Implementation – methods &tools used in Experiment, Engage and Evolve phases of Design Thinking, Case study-activity.

**UNIT IV**

8 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 Books:**

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 I]
3. "Design Thinking- The Guide Book" – Facilitated by the Royal Civil service Commission, Bhutan.[UNIT II & III]
4. Idris Mootee, "Design Thinking for Strategic Innovation", John Wiley & Sons (2013).[UNIT IV]

**Reference Books:**

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

**Web References:**

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)

**Course Objectives:**

1. To design Combinational logic circuits such as adders and subtractors.
2. To design comparators, decoders multiplexers and demultiplexers.
3. To design Sequential logic circuits such as flip-flops and shift registers.
4. To design synchronous and asynchronous counters.

**Course Outcomes:**

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

1. Design Combinational logic circuits such as adders, subtractors, comparators, Code converters, decoders.
2. Design Sequential logic circuits such as flip-flops, shift registers, synchronous and asynchronous counters.

**List of Experiments:**

1. Verification of logic gates using discrete components.
2. Realization of Gates using Universal Building Blocks (NAND only ).
3. Design of Combinational Logic Circuits like Half-adder, Full-adder, Half-Sub tractor.
4. Verification of 4-bit Magnitude Comparator.
5. Design of Decoders (BCD - Decimal decoder).
6. Design of Code Converters (Binary to Gray & Gray to binary).
7. Design of Multiplexers/De Multiplexers.
8. Verification of Flip-Flops.
9. Design of Shift register (To Verify Serial to parallel, Serial to Serial and parallel to parallel Converters ) using Flip-Flops.
10. Design of Ring & Johnson Counters using Flip-Flops.
11. Conversion of Flip-Flops ( JK-T, JK - D ).
12. Design of Binary/Decade Counter.
13. Design of Asynchronous Counter, Up Counter, Down Counter.
14. Design of Synchronous Counter, Mod Counter, Up Counter, Down Counter & Up/Down Counter.

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

List of Experiments:

1. Solving Problems Using Arrays
2. Implementation of Linked Lists: Singly linked, Doubly linked and Circular lists.
3. Applications of Linked List
4. Implementation of Stack
5. Applications of Stack
6. Implementation of Queue
7. Operations on Binary Search Trees.
8. Problems related Balanced Trees
9. Hashing and Collision Resolution
10. Problems related to sorting and searching algorithms
11. Problems related B-Trees

- Not limited to these programs only, if necessary the teacher can include some more applications based on his/her perception.

**List of Programs:**

1. Demonstrate Static Member, Static Method And Static Block.
2. Demonstrate Method Overloading And Method Overriding.
3. Demonstrate Finals, Blank Finals, Final Methods, And Final Classes.
4. Demonstrate Synchronous Keyword.
5. Implement Multiple Inheritance.
6. Demonstrate Packages.
7. Create User Defined Exception Class And Test This Class.
8. Write an Applet Program to Demonstrate Graphics Class.
9. Write GUI Application Which Uses AWT Components Like Label, Button, Text Filed, Text Area, Choice, Checkbox, Checkbox Group.
10. Write a program to Demonstrate Mouselistener, Mousemotionlistener, Keyboardlistener, ActionListener, Itemlistener.
11. Develop Swing Application Which Uses Jtree, Jtable, Jcombobox.

**CS/IT 221**

**Humanities Elective-I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**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**

13 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.

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

**UNIT III**

12 Periods

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

**The Memory System:** Basic Concepts, Semiconductor RAM Memories, Read-only Memories, Direct Memory Access, Memory Hierarchy, Cache Memories, Performance Considerations, Virtual Memory, Secondary Storage.

**UNIT IV**

13 Periods

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

**Pipelining:** Basic Concept-The Ideal Case, Pipeline Organization, Pipelining Issues, Data Dependencies, Memory Delays, Branch Delays, Resource Limitations, Performance Evaluation.

## **Learning Resources:**

### **Text Book:**

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

### **Reference Text Books:**

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
3. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
4. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

**UNIT I**

12 Periods

**Introduction:** What Operating Systems Do, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Kernel Data Structures.

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

**Process Concept:** Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.

**UNIT II**

14 Periods

**Multithreaded Programming:** Overview of Multithreading, Multicore Programming, Multithreading Models, Implicit Threading, Threading Issues.

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

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

**UNIT III**

14 Periods

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

**Memory-Management Strategies:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table.

**Virtual-Memory Management:** Background, Demand Paging, Page Replacement, allocation of frames, Thrashing.

**UNIT IV**

10 Periods

**Files System:** File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File sharing, Protection.

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

**Mass-Storage Structure:** Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling.

**Learning Resources:****Text Books:**

1. Operating System Concepts-Abraham Silberchatz, Peter B, Galvin, Greg Gange 9<sup>th</sup> Edition, John Wiley.

**Reference Books:**

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

**Web References:**

1. <http://www.cs.kent.edu/~farrell/osf03/oldnotes/index.html>: Lecture Notes
2. <http://www.computerhope.com/os.htm>: Different Types of Operating Systems
3. <http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/>

4. [Operating%20Systems/New\\_index1.html](#): Question Bank and Test Problems
5. <http://www.personal.kent.edu/~rmuhamma/OpSystems/os.html>: OS Lecture Notes

**UNIT I**

12 Periods

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

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

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

**UNIT II**

14 Periods

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

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

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

**UNIT III**

12 Periods

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

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

**File Structures and Indexing:** Secondary Storage Devices, Buffering of Blocks, Files of Unordered Records (Heap Files), Files of Ordered Records (Sorted Files), Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B+-Trees

**UNIT IV**

12 Periods

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

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

**Learning Resources:****Text Books:**

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

**References:**

1. Introduction to Database Systems, C.J.Date, Pearson Education, Fifth edition.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.
3. Data base System Concepts, Abraham Silberschatz, Henry F. Korth, S.Sudarsan, McGraw hill, 6<sup>th</sup> edition.

**UNIT I**

12 Periods

**Automata:** Introduction to Automata, The central concepts of automata theory - Alphabets, Strings, Languages.

**Finite Automata:** An Informal picture of finite automata, Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Extended transition function, the language of DFA, Non deterministic finite automata (NFA) – Definition of NFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA Finite

**Automata with  $\epsilon$  transitions:** Use of  $\epsilon$  - transition, notation for an  $\epsilon$  - NFA, Epsilon closures, extended transitions and languages, Applications.

**UNIT II**

12 Periods

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

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

**UNIT III**

14 Periods

*(Construction based treatment & proofs are excluded)*

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

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

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

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

**UNIT IV**

12 Periods

**Context-sensitive languages:** Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

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

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

**Learning Resources:****Text Book:**

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

**Reference Books:**

1. Daniel I.A.Cohen, 'Computer Theory', Wiley Publications
2. KLP Mishra &N.Chandrasekharan, 'Theory of Computation', PHI.
3. MichealSipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

4. R. K. Ragade, "Automata and Theoretical Computer Science", First Edition, Pearson Education, 2004.
5. John E Hopcroft & Jeffery D Ullman' 'Introduction to Automata Theory & Languages and Computation', Narosa Publishing House.
6. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
7. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
8. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

**CS/IT 226**

**Open Elective-I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I****8 Periods**

**Data and Expressions-** Literals, Variables and Identifiers, Operators, Expressions and Data Types.

**Control Structures** - What Is a Control Structure? Boolean Expressions (Conditions), Selection Control, Iterative Control.

**UNIT II****8 Periods**

**Lists** - List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python, More on Python Lists.

**Functions-** Program Routines, More on Functions.

**Objects and Their Use** - Software Objects, Turtle Graphics,

**UNIT III****8 Periods**

**Modular Design** – Modules, Python Modules.

**Text Files** - What Is a Text File? Using Text Files, String Processing, Exception Handling.

**Dictionaries and Sets** - Dictionary Type in Python, Set Data Type.

**UNIT IV****8 Periods**

**Object-Oriented Programming** - What Is Object-Oriented Programming? Encapsulation, Inheritance, Polymorphism.

**Recursion** - Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion.

**Learning Resources:****Text Book:**

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus by Charles Dierbach, Wiley.

**Reference Books:**

1. Beginning python from novice to professional by Magnus Lie Hedland, 2<sup>nd</sup> Edition, Apress
2. Programming in Python 3 – A complete introduction to the Python Language by Mark Summerfield, Pearson,
3. Learning Python by Mark Lutz, 5<sup>th</sup> Edition, O'Reilly
4. Programming Python by Mark Lutz, 4<sup>th</sup> Edition, O'Reilly .

**MC 003**

**Essence of Indian Traditional Knowledge**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

1. Simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.
  - a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
2. Simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.
3. Simulate the following file allocation strategies.
  - a) Sequential b) Indexed c) Linked
4. Simulate the MVT and MFT memory management techniques.
5. Simulate the following contiguous memory allocation techniques
  - a) Worst-fit b) Best-fit c) First-fit
6. Simulate paging technique of memory management.
7. Simulate Bankers algorithm for the purpose of deadlock avoidance.
8. Simulate disk scheduling algorithms
  - a) FCFS b) SCAN c) C-SCAN
9. Simulate page replacement algorithms
  - a) FIFO b) LRU c) Optimal d) LFU
10. Simulate producer-consumer problem using semaphores.
11. Simulate the concept of Dining-Philosophers problem.

**NOTE:**

- 1) Two Lab cycles on various databases to be prepared in advance before the commencement of the semester and students are required to create and maintain a database by using concepts from 1 to 2. Each lab cycle must include more than 30 queries in order to satisfy all possible user requests may a database expect during usage by covering the concepts from 3 to 7.
- 2) Third lab cycle is to be prepared and given in advance to the students in order to write PL/SQL programs by covering concepts from 8 to 12.

1. DDL Commands.
  - a. Creating objects: tables and views.
  - b. Altering the Schema of objects
  - c. Dropping the objects
2. DML Commands
  - a. Inserting data into a database.
  - b. Modifying data in a database
  - c. Deleting data from a database
3. Simple queries: selection, projection, sorting on a simple table
  - a. Small-large number of attributes.
  - b. Distinct output values
  - c. Renaming attributes.
  - d. Computed attributes
  - e. Simple-complex conditions (AND, OR, NOT)
  - f. Partial Matching operators (LIKE, %, \_, \*, ?) . ASC-DESC ordering combinations
  - h. Checking for Nulls
4. Multi-table queries (JOIN OPERATIONS) Simple joins
  - a. Aliasing tables - Full/Partial name qualification Inner-joins (two and more (different) tables)
  - b. Inner-recursive-joins (joining to itself)
  - c. Outer-joins (restrictions as part of the WHERE and ON clauses)
  - d. Using where & having clauses
5. Nested queries
  - a. In, Not In
  - b. Exists, Not Exists
  - c. Dynamic relations (as part of SELECT, FROM, and WHERE clauses)
6. Set Oriented Operations
  - a. Union
  - b. Difference
  - c. Intersection
  - d. Division
7. TCL Commands
  - a. Privilege management through the Grant/Revoke commands
  - b. Transaction processing using Commit/Rollback
  - c. Save points.
8. PL/SQL named and unnamed blocks
9. PL/SQL Implicit and Explicit Cursors
10. PL/SQL pre-defined and user defined exceptions
11. PL/SQL stored procedures, functions and packages
12. PL/SQL database triggers

### III/IV B.Tech - V Semester

CS/IT 311

Computer Networks

L	T	P	C
3	0	0	3

#### UNIT I

14 Periods

**Introduction:** Network Hardware, Network Software, Reference Models.

**Physical Layer:** The theoretical basis for data communication, Guided media, digital modulation and multiplexing, switching.

#### UNIT II

12 Periods

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

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

#### UNIT III

12 Periods

**The Network Layer:** Network Layer Design Issues, Routing Algorithms-Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast routing, multicast routing, Congestion control algorithms, Quality of Service-Application Requirements, Traffic Shaping, Packet Scheduling, Admission Control, Internetworking, The Network Layer in the Internet-The IP version 4.0 protocol, IP Addresses, IP Version 6.0, Internet Control Protocols, Label Switching and MPLS

#### UNIT IV

12 Periods

**The Transport Layer:** The Transport Service-Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols –Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Congestion control-Desirable Bandwidth allocation, Regulating the sending rate, The Internet Transport Protocols: Introduction to UDP, Remote procedure call, Real-Time transport protocols, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release.

**The Application Layer:** DNS- The Domain Name System, Electronic mail, world wide web.

#### Learning Resources:

##### Text Book:

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

##### Reference Books:

1. James F.Kurose, Keith W.Ross, Computer Networking, Third Edition, Pearson Education
2. Behrouz A Forouzan, Data Communications and Networking, Fourth Edition, TMH (2007).
3. Kurose & Ross, *COMPUTER NETWORKS*, A Top-down approach featuring the Internet, Pearson Education, Alberto Leon, Garciak.

**UNIT I****12 Periods**

**Introduction:** Algorithm Design paradigms – motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations.

**Divide and Conquer:** General Method, Merge Sort, Quick sort, Strassen Multiplication Analysis of divide and conquer run time recurrence relations.

**UNIT II****12 Periods**

**Greedy Programming:** General Method, Knapsack problem, Tree Vertex Splitting, Job Sequencing with Dead Lines, Minimum Spanning Tree – Prim's and Kruskal's algorithms, Single Source Shortest-Paths-Dijkstra's.

**Basic search and Traversal Techniques:** Techniques for graphs, connected components and spanning trees, bi connected components.

**UNIT III****14 Periods**

**Dynamic Programming:** General Method, Multi Stage Graph, All Pairs Shortest Paths, Single Source Shortest Paths-general Weights, Optimal Binary Search Trees, String Editing, 0/1 Knapsack, Reliability Design, Traveling Salesman Problem, flow shop scheduling.

**UNIT IV****12 Periods**

**Back tracking:** General Method, 8-queen problem, Sum of Subsets, Graph Coloring, Hamiltonian cycles, 0/1 Knapsack.

**Branch and Bound:** Least Cost, 15 puzzle problem, Control Abstraction for LC Search, Bounding, FIFO branch and bound, LC branch and bound, 0/1 Knapsack problem, Travelling Salesman Problem.

NP-Hard and NP – Complete problems: basic concepts, Cook's theorem

**Learning Resources:****Text Book:**

1. E. Horowitz, S. Sahni and S.Rajsekaran, "Fundamentals of Computer Algorithms", Galgotia Publication.

**Reference Books:**

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer Algorithm", PHI.
2. Sara Basse, A.V. Gelder, "Computer Algorithms", Addison Wesley.

**UNIT I****12 Periods**

Introduction to HTML5 Part - I &amp; II.

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

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

**UNIT II****14 Periods**

JavaScript: Functions, Arrays, Objects.

DOM Objects and Collections

JavaScript Event Handling

**UNIT III****12 Periods**

XML: XML Basics, XML Namespaces, DTD, XML Schema, MathML, XSL &amp; 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 Servlet Context, 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:getProperty, jsp:setProperty, jsp:include, jsp:forward, jsp:plugin, jsp:param, Java Server Pages Standard Tag Library(JSTL).

**Learning Resources:****Text Book:**

1. Harvey M. Deitel and Paul J. Deitel, "Internet & World Wide Web How to Program", 4/e, Pearson Education.
2. Subrahmanyam Allamaraju 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, "Pearson Education".
2. Tom Nerino Doli Smith "JavaScript & AJAX for the Web" Pearson Education, 2007.
3. Bill Dudley, Johathan Lehr, Bill Willies, Lery Mattingly "Mastering Java Server Faces" Wiley India, 2006.
4. Web Technology - Uttam K. Roy, Oxford University Press, 2010.

**Web References:**

1. [www.deitel.com](http://www.deitel.com)
2. [www.w3schools.com](http://www.w3schools.com)
3. [www.tutorialspot.com](http://www.tutorialspot.com)

**UNIT I****12 Periods**

**Software and Software Engineering:** The nature of Software, Software Engineering, The Software Process, Software Engineering Practice. **The software Process:** Process models, Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models

**Specialized Process models:** Component based Development, The Formal Methods Model, Aspect Oriented Software Development.

**The Unified Process:** Phases of the Unified Process.

**UNIT II****13 Periods**

**Agile Development:** What Is Agility? What Is an Agile Process? Agile process models: Adaptive Software Development, Extreme Programming, Scrum, Dynamic Systems Development Method, Crystal, Feature driven Development, Lean Software Development and Agile Modeling. Agile Project Management Philosophy.

**Understanding Requirements:** Requirements Engineering, Establishing the Groundwork, eliciting requirements, Developing Use Cases, Building the requirements Model, Negotiating Requirements, Validating Requirements.

**UNIT III****12 Periods**

**Requirements Modelling: Scenarios, Information, and Analysis Classes:** Requirement Analysis, Scenario-based Modelling, UML Models That Supplement the Use Case, Data Modelling Concepts, Class Based Modelling.

**Design Concepts:** Design within the Context of Software Engineering, The Design Process, Design Concepts, **The Design Model:** Data Design Elements, Architectural Design Elements, Interface Design Elements, Component-Level Design Elements.

**UNIT IV****13 Periods**

**Quality Management:** What is Quality?, Achieving Software Quality, Cost Impact of Software Reviews, Defect amplification and removal, Informal and Formal Reviews, Elements of SQA, Software Reliability.

**Software Testing Strategies:** A Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging.

**Testing Conventional Applications:** Software testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model-Based Testing.

**Learning Resources:****Text Book:**

1. Roger S. Pressman, Software Engineering - A Practitioner's Approach, Seventh Edition, McGraw Hill Publications.

**Reference Books:**

1. Ugrasen Suman, Software Engineering, Concepts and Practices, Cengage Publications,
2. Ian Sommerville, Software Engineering, Sixth Edition, Pearson Education.
3. Agile Project Management: Best Practices and Methodologies - <https://www.altexsoft.com/whitepapers/agile-project-management-best-practices-and-methodologies/>
4. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, Second Edition, PHI.

5. Rajib Mall, Fundamentals of Software Engineering, Second Edition, PHI.
6. Software Engineering Resources : - [www.rspa.com/spi/](http://www.rspa.com/spi/)
7. Carnegie Mellon University, Software Engineering Institute, [www.sei.cmu.edu/](http://www.sei.cmu.edu/)

**CS/IT 315**

**Professional Elective-I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**CS/IT 316**

**Open Elective-II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Design, implement and test the programs for the following problems in any programming language:**

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

**List of Experiments**

1. Develop a simple static website using XHTML.
2. Develop a simple static web page using different types of styles in CSS.
3. Write java scripts covering Function, recursive functions, Arrays and Objects.
4. Write a program on collection objects.
5. Write a program on event bubbling and mouse event model.
6. Write well-formed and valid XML documents.
7. Write code for displaying XML using XSL.
8. Write a program on simple servlets.
9. Write programs on cookie and session.
10. Write a program on simple JSP.
11. Write a program on JSP action tags.

**Web References:**

- [www.deitel.com](http://www.deitel.com)
- [www.w3schools.com](http://www.w3schools.com)
- [www.tutorialspot.com](http://www.tutorialspot.com)

**CS/IT 353**

**Professional Communication Skills Lab**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**UNIT I****15 Periods**

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

**Lexical Analysis:** Role of Lexical Analyzer - Input Buffering - Specification of Tokens-Recognition of tokens- a language for specifying lexical analyzers- Finite Automata-From Regular expressions to NFA- Design of a lexical analyzer generator.

**Syntax Analysis:** Role of the parser - Top Down parsing - Recursive Descent Parsing, Predictive Parsing, LL(1) Parser.

**UNIT II****15 Periods**

**Syntax Analysis - Bottom-up parsing** - Shift Reduce Parsing, Operator Precedent Parser – Operator precedence parsing, Operator Precedence functions, Error recovery in operator precedence parsing, LR Parsers - SLR Parser, Canonical LR Parser, and LALR Parser- Parser Generators.

**Symbol Tables:** Symbol table entries, Data structures for symbol table implementation, representing scope information.

**UNIT III****15 Periods**

**Syntax Directed Translation:** Syntax Directed definition- construction of syntax trees, Bottom-up evaluation of S-attribute Definitions-L-attribute Definitions.

**Intermediate Code Generation:** Intermediate languages – SDT scheme for Assignment Statements - SDT scheme for Case Statements-SDT scheme for Boolean Expressions, SDT scheme for Flow of control constructs - SDT scheme for Procedure calls.

**UNIT IV****15 Periods**

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

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

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

**Learning Resources:****Text Book:**

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

**Reference Books:**

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

**UNIT I**

15 Periods

**Data Warehousing and Online Analytical Processing:** Data Warehouse: Basic Concepts- Data Warehouse

Modeling: Data Cube and OLAP-Data Warehouse Design and Usage- Data Warehouse Implementation.

**Getting to know Your Data:** Data Objects and Attribute Types- Basic Statistical Descriptions of Data- Measuring Data Similarity and Dissimilarity.**Data Preprocessing:** An overview of Data Preprocessing- Data cleaning- Data Integration- Data Reduction- Data Transformation and Data Discretization.**UNIT II**

15 Periods

**Introduction - Data Mining:** Why Data Mining- What is Data Mining? -What Kinds of Data can be mined? - What Kinds of Patterns can be mined? - Which Technologies are used? - Major Issues in Data Mining.**Mining Frequent Patterns, Associations, and Correlations:** Basic Concepts- Frequent Item set Mining Methods: Apriori Algorithm, Generating Association Rules, Improving the efficiency of Apriori, FP Growth Approach for Mining

Frequent Item Sets, Mining Frequent Item Sets using Vertical Data Format Method.

**Advanced Pattern Mining:** Mining Multilevel Associations- Mining Multidimensional Associations- Mining

Quantitative Association Rules-Mining Rare Patterns and Negative Patterns- Constrained based Frequent Pattern Mining.

**UNIT III**

15 Periods

**Classification:** Basic Concepts- Decision tree induction- Bayes Classification Methods- Rule-Based Classification-

Model Evaluation and Selection- Techniques to Improve Classification Accuracy.

**Advanced Methods in Classification:** Bayesian Belief Networks-Classification by Backpropagation-Classification by Support Vector Machines-Lazy Learners-Other Classification Methods.**UNIT IV**

15 Periods

**Cluster Analysis:** Introduction to cluster analysis- partitioning methods- Hierarchical methods- Density-Based

Methods:DBSCAN-Grid-based Method:STING, Outliers and Outlier Analysis- Outlier Detection Methods.

**Data Mining Trends:** Mining Sequence Data- Mining Graphs and Networks- Mining Other Kinds of Data- Data Mining Applications.**Learning Resources****Text Book:**

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

**Reference Books:**

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison Wesley.
2. Data Warehouse Toolkit, Ralph Kimball, John Wiley Publishers.

**UNIT I**

12 Periods

Problems, Problem Spaces and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, and Issues in the Design of Search Programs. Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

**UNIT II**

14 Periods

Knowledge Representation Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution. Representing Knowledge Using Rules: Procedural versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge.

**UNIT III**

14 Periods

Slot – And – Filler Structures: Semantic Nets, Conceptual Dependency, Scripts. Planning: Overview - An Example Domain: The Blocks World, Component of Planning Systems, Goal Stack Planning, Non-linear Planning using constraint posting, Hierarchical planning, Reactive systems.

**UNIT IV**

12 Periods

Expert Systems: Representing and using domain knowledge, Expert system shells, Explanation, Knowledge Acquisition.

**Learning Resources:****Text Book:**

1. Elaine Rich & Kevin Knight, 'Artificial Intelligence', 2nd Edition, (TMH).

**Reference Book:**

1. Patrick Henry Winston, 'Artificial Intelligence', Pearson Education.

**UNIT I****13 Periods**

Introduction: Services, Mechanisms and attacks-the OSI security architecture-Network security model.

Classical Encryption techniques: (Symmetric cipher model, substitution techniques, transposition techniques, steganography).

Number Theory: Prime numbers-Fermat's and Euler's theorem- Testing for primality -The Chinese remainder theorem- Discrete logarithms.

**UNIT II****13 Periods****BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY**

Traditional Block Cipher structure-Data Encryption Standard-Strength of DES- Block Cipher design principles-Advanced Encryption Standard (AES) structure-AES transformation function-AES key expansion - Block Cipher Modes of Operation.

Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management

Other Public Key Crypto Systems: Diffie Hellman Key exchange -ElGamal Crypto System.

**UNIT III****12 Periods****HASH FUNCTIONS AND DIGITAL SIGNATURES**

Cryptographic Hash Functions: Applications of cryptographic hash functions- Hash function based on CBC mode – SHA512

Message Authentication codes: MAC requirements - MAC functions- HMAC.

Digital signatures- Digital Signatures- ELGamalDSS .

Key management and Distribution: Symmetric key distribution using Symmetric and asymmetric encryption- Distribution of public keys- X.509 Certificates.

**UNIT IV****12 Periods****WEB SECURITY PRACTICE**

User authentication: Kerberos.

Transport Level Security: SSL-TLS.

E-Mail Security: PGP.

IP Security: Overview- IP Security Policy -Encapsulating Security Payload.

**Learning Resources:****Text Book:**

1. William Stallings, Cryptography and Network Security, 4th Edition, Pearson Education. (UNIT I).
2. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education. (UNIT II, III, IV)

**Reference Books:**

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
3. Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.
6. Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson "Cryptography – Theory and practice", First Edition, CRC Press, 1995.
8. <http://nptel.ac.in/>.

**CS/IT 325**

**Professional Elective-II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**CS/IT 326**

**Open Elective-III**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**CS/IT 361**

**Artificial Intelligence Lab**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**LIST OF EXPERIMENTS:**

1. Basic Python Programs
2. Water Jug Problem
3. Uninformed Search Strategies(BFS & DFS)
4. Heuristic Search Techniques(Best First Search)
5. A\* Algorithm
6. AO\* Algorithm
7. Min-Max Search Trees and Alpha Beta Pruning
8. Reasoning: Resolution and Probabilistic
9. Planning
10. Perceptron Learning
11. .Back propagation Learning
12. Simple AI Application

**LAB CYCLE 01****ANALYSIS**

1. Problem Statement
2. Requirements elicitation
3. System Requirements Specification

**USECASE VIEW**

4. Identification of Actors.
5. Identification of Use cases.
6. Flow of Events.
7. Construction of Use case diagram.
8. Building a Business Process model using UML activity diagram Lab.

**LAB CYCLE 02****LOGICAL VIEW**

9. Identification of Analysis Classes.
10. Identification of Responsibilities of each class.
11. Construction of Use case realization diagram.
12. Construction of Sequence diagram.
13. Construction of Collaboration diagram.
14. Identification of attributes of each class.
15. Identification of relationships of classes.
16. Analyzing the object behavior by constructing the UML State Chart diagram.
17. Construction of UML static class diagram. Lab Cycle - III

**LAB CYCLE 03****DESIGN AND IMPLEMENTATION**

18. Refine attributes, methods and relationships among classes.
19. Construction of UML component diagrams.
20. Construction of UML deployment diagrams.

**MINI PROJECT**

The above three cycles are to be carried out in the context of a problem / information system chosen by the Project batch and a report is to be submitted to the department by the end of the semester.

**CS/IT 363**

**Term Paper**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**IV/IV B.Tech - I Semester**

**CS/IT 411**

**Humanities Elective-II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I****13 Periods**

Introduction: Need - Relevant Disciplines - Learning Problem - Designing a Learning System - Perspectives and Issues -Evaluating Hypothesis.

Concept Learning: Concept Learning: Task - Finding a Maximally Specific Hypothesis - Version Spaces and Candidate Elimination Algorithm - Inductive Bias. Bayesian Learning: Bayes Theorem - Maximum Likelihood - Least Square Error Hypotheses - Bayes Optimal Classifier - Bayesian Belief Network.

**UNIT II****14 Periods**

Decision Trees and Ann:Decision Tree Learning: Representation - Applications - Algorithm - Inductive Bias – Issues. Artificial Neural Networks: Motivation - Representation - Application - Perceptron's - Multilayer Networks - Back Propagation Algorithm.

Instance Based Learning: Instance Based Learning: KNN Learning - Locally Weighted Regression - Radial Bias Functions- Case-Based Reasoning.

**UNIT III****13 Periods**

Inductive and Analytical Learning:Learning Sets of Rules: Sequential Covering Algorithm - Learning Rule Sets -Learning First Order Rules - Induction as Inverted Deduction - Inverting Resolution. Analytical Learning: Learning with Perfect Domain Theories. Explanation Based Learning: Combining Inductive and Analytical Learning.

**UNIT IV****10 Periods**

Reinforcement Learning: Learning Task - Q Learning - Non Deterministic Rewards and Actions - Temporal Difference Learning - Generalizing from Examples - Relationship to Dynamic Programming.

**Learning Resources:****Text Book:**

1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

**Reference Books:**

1. EthemAlpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning)), The MIT Press 2004.
2. Stephen Marsland, —Machine learning: An Algorithmic Perspective]], CRC Press, 2009

**Course Objectives:**

1. To introduce some of the fundamental techniques and principles of neural computation.
2. To investigate some common models and their applications.

**Course Outcomes:**

On completion of this course, a student should be able to:

1. Understand the learning and generalization issue in neural computation.
2. Understand the basic ideas behind most common learning algorithms for multilayer perceptron's, radial-basis function networks.
3. Implement common learning algorithms using an existing package.
4. Apply neural networks to classification and recognition problems.

**UNIT I**

13 Periods

Introduction, Simple Neural Networks for Pattern Classification: General Discussion, Hebb Net, Perceptron, Adaline.

**UNIT II**

13 Periods

Discrete Hopfield Net, Hamming Net, Kohonen Self-Organizing Maps, Learning Vector Quantization.

**UNIT III**

10Periods

Adaptive Resonance Theory: Introduction, ART1, ART2.

**UNIT IV**

14 Periods

Standard Back Propagation Neural Net, Gaussian Machine, Cauchy Machine, Boltzmann Machine with Learning, Simple Recurrent Net.

**Learning Resources:****Text Book:**

1. Fundamentals of Neural Networks – Laurence Fausett, Pearson Education.2004
2. Introduction to Neural Networks Using Matlab 6.0- S.N. Sivanandam, S. Sumathi, S.N. Deepa.

**Reference Books:**

1. Neural Networks – James A.Freeman/ David A.Skapura,Pearson Education.
2. Neural Networks – Simon Haykin – 2nd edition, Pearson Education.

**CS/IT 414**

**Professional Elective-III**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**CS/IT 415**

**Professional Elective-IV**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## List of Experiments:

1. Implement and demonstrate the FIND-S algorithm to finding the most specific hypothesis based on a given set of data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian classifier model to perform this task. Built-in Java classes /API can be used to write the program. Calculate the accuracy precision and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis the of heart patients using standard heart disease data set. You can use Java or Python ML Library classes /API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using K-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java / Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set your experiment and draw graphs.

<b>CS/IT 421</b>	<b>PROFESSIONAL ELECTIVE-V(MOOCs)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>CS/IT 422</b>	<b>OPEN ELECTIVE-VI(MOOCs)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>CS/IT 461</b>	<b>Project-II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>12</b>	<b>6</b>

## Elective courses

**CSEL01**

**Unix programming**

**L T P C**

**3 0 0 3**

### **Course Content:**

15 Periods

#### **UNIT I**

**Introduction:** UNIX architecture, Features of UNIX.

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

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

#### **UNIT II**

15 Periods

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

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

#### **UNIT III**

16 Periods

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

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

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

## **UNIT IV**

15 Periods

**Inter process communication:** Pipes, Sockets, shared memory and semaphores.

**UNIX Internals:** Kernel Basics, the File System, Process Management, Memory Management, Input/Output.

### **Learning Resources:**

#### **Text Book:**

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

#### **Reference Books:**

1. Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming- Cengage Learning – India Edition. 2009.
2. W. Richard Stevens, Advanced programming in the unix environment, 3<sup>rd</sup> Edition Pearson education.
3. Kernighan W. Brian and Pike Rob, Unix programming environment, Pearson education.
4. Sumitabha Das, Your Unix the ultimate guide, TMH 2<sup>nd</sup> edition.
5. Marc J. Rochkind, Advanced UNIX programming, 2<sup>nd</sup> edition Pearson Education.
6. Meeta Gandhi, Rajiv Shah, TilakShetty, The "C" Odyssey UNIX - The Open, Boundless C, BPB Publications.

#### **Web References:**

1. [www.webreference.com](http://www.webreference.com) > Programming
2. [www.iu.hio.no/~mark/unix/unix.html](http://www.iu.hio.no/~mark/unix/unix.html)

CSEL02

Interactive Computer Graphics

L T P C

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## UNIT I

17 Periods

**Introduction:** Basic concepts, Application areas of Computer Graphics, overview of graphics systems - video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations, input devices and their logical classifications, Hard copy devices and Graphics software.

**Output primitives:** Points and lines, line drawing algorithms - DDA, Bresenham's, mid-point circle and ellipse algorithms, Filled area primitives - Scan line polygon fill algorithm, inside-outside tests, boundary-fill and flood-fill algorithms, character generation and Antialiasing.

## UNIT II

17 Periods

**2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

**2-D viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Liang-Barsky line clipping algorithms, Sutherland - Hodgeman polygon clipping algorithm.

## UNIT III

15 Periods

**Three Dimensional Concepts:** 3-D Display method, 3-D object representation: Polygon surfaces, Curved lines and surfaces, quadric surfaces, spline representation, Bezier curve and surfaces.

**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations.

## UNIT IV

15 Periods

**3-D viewing:** Viewing pipeline, viewing coordinates, projections, view volume and general projection transforms and clipping.

**Computer animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

### Learning Resources:

#### Text Book:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education 2nd Edition.

### Reference Books:

1. "Computer Graphics Principles & Practice", Second Edition in C, James D. Foley, Andries Van Dam, Steven K. Feiner and Hughes, Pearson Education.
2. "Computer Graphics", Steven Harrington, TMH.

3. "Computer Graphics Second edition", Zhigang Xiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw Hill edition.
4. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw Hill, 2nd edition.
5. "Principles of Interactive Computer Graphics", William.M.Neuman and Robert.F.Sproul, TMH.
6. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

**Web References:**

1. [http://kat.ph/hearn-baker-computer-graphics-c-version-2nd\\_5ed3295235.html](http://kat.ph/hearn-baker-computer-graphics-c-version-2nd_5ed3295235.html)
2. <http://users.abo.fi/jawester/compgraph/>
3. <http://research.cs.wisc.edu/graphics/Courses/559-s2002/cs559.html>
4. <http://www.cs.umd.edu/~mount/427/Lects/427lects.pdf>

**Course Objectives:** At the end of the course the students will understand

1. Big data analytics techniques
2. Techniques required to manage and analyse big data problems.
3. principles in achieving big data analytics with scalability and streaming capability.
4. techniques to solve complex real-world analytics problems.

**Course Outcomes:** At the end of this course a student will be able to:

1. know key issues in big data management and its associated applications.
2. apply fundamental enabling techniques and scalable algorithms in big data analytics.
3. Interpret models for similarity and distance measures.
4. familiarize with mining data stream models and apply analytics principles.

### UNIT I

**10 Periods**

**Overview of Big Data:** What is Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics.

**Understanding Hadoop Eco-system:** Hadoop EcoSystem, Hadoop Distributed File System, Hadoop YARN, Introducing HBase, Combining HBase and HDFS, Hive, Pig, Sqoop, ZooKeeper, Flume.

**NoSQL Data Management:** Introduction to NoSQL, Types of NoSQL data models, Key Value Data Model, Column Oriented Data Model, Document Data Model, Graph Databases, Schema-Less Databases, Materialized Views, Distribution Models, Sharding.

### UNIT II

**15 Periods**

**Data Mining:** What is Data Mining?, Statistical Limits on Data Mining. Things useful to know.

**Map Reduce Software Stack:** Distributed File Systems, MapReduce, Algorithms Using Map Reduce, Extensions to MapReduce, The Communication Cost Model.

**Finding Similar Items:** Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Locality-Sensitive Hashing for Documents, Distance Measures.

### UNIT III

**15 Periods**

**Mining Data Streams:** The Stream Data Model, Sampling Data in a Stream, Filtering Streams. Mining, Counting Distinct Elements in a Stream.

**Link Analysis:** Page Rank, Efficient Computation of Page Rank, Topic-Sensitive Page Rank, Link Spam.

**Social-Network Graphs:** Social Networks as Graphs, Clustering of Social-Network Graphs, Direct Discovery of Communities, Partitioning of Graphs.

## **UNIT IV**

**10 Periods**

**Understanding Analytics and Big Data:** Comparing Reporting and Analysis, Types of Analytics, Points to consider during Analysis, Developing an Analytic Team, Understanding Text Analytics.

**Exploring R:** Variables in R, Working with Vectors, Storing and Calculating values in R, Creating and using objects, Executing Scripts,, Creating Plots.

**Reading Dataset and Exporting Data from R:** c() command, scan() Command, Reading multiple data values from large files, exporting data from R, creating subsets in dataframes.

### **Learning Resources:**

#### **Text Books:**

1. BIG DATA Black Book, Dreamtech Press, 2015(**UNIT I and UNIT IV**).
2. Jure Leskovec, AnandRajaraman, Jeffrey David Ullman, Mining of Massive Datasets, 2nd Edition, 2014. (Unit- II and UNIT-III).

#### **Reference Books:**

1. Taming the Big Data Tidal Wave: Finding Opportunities in huge data streams with advanced analytics, Bill Franks, Wiley Publishers, 2010.
2. Understanding Big data: Analytics for enterprise class Hadoop and streaming data, Paul Zikopoulos, Chiris Eaton, McGraw Hill Education.

#### **Web-References:**

1. Big Data computing course of Dr. Rajiv Misra is available @ <https://nptel.ac.in/courses/106104189/>
2. Yahoo! Hadoop Tutorial available @ <https://developer.yahoo.com/hadoop/tutorial/>
3. Google Apache tools Tutorials available @ <https://cloud.google.com/dataproc/docs/tutorials>
4. IBM Hadoop Dev Tutorials available @ <https://developer.ibm.com/hadoop/docs/biginsights-ibm-open-platform/getting-started/tutorials/>

**Course content:****UNIT I****15 periods**

**A First Look at the Embedded Systems:** Examples of Embedded Systems (Telegraph, cordless Bar-code scanner, Laser Printer, underground tank monitor, Nuclear Reactor Monitor), Typical Hardware. **Hardware Fundamentals:** Terminology, Gates, A few other basic considerations, Timing Diagrams, Memory. **Advanced Hardware Fundamentals:** Micro Processors, Buses, Direct Memory Access, interrupts, other common parts, Built-ins on the Micro Processor, conventions used on the Schematics.

**UNIT II****15 periods**

**Interrupts:** Micro Processor Architecture, Interrupt Basics, The shared data problem, Interrupt Latency. **Survey of Software Architectures:** Round-Robin, Round-Robin with Interrupts, Function Queue-Scheduling Architecture, Real Time Operating System Architecture, Selecting an Architecture.

**UNIT III****10 periods**

**Introduction to Real Time Operating Systems :** Tasks and Task states, Tasks and data, Clear-cut distinction between functions, Semaphores and shared data.

**More Operating System Services:** Message Queues, Mail boxes and pipes, Signal function, Semaphore functions, Message Queue functions, Mailbox functions, Pipe functions,

Socket functions, RPC functions, Events, Memory Management, Interrupt Routines in an RTOS environment.

**UNIT IV****10 periods**

**Desktop Operating Systems versus RTOS** – need for Board Support Packages – task management – race conditions – priority inversion – scheduling. **Basic Design Using a Real Time Operating System:** Overview, Principles, An Example, Encapsulating Semaphores and Queues, Hard Real Time Considerations, Saving Memory Space, Saving Power.

**Embedded Software Development Tools:** Host and Target Machines, Linker/Locators for Embedded Software, Getting Embedded Software into the target System. **Debugging Techniques:** Testing on Host Machine, Instruction Set Simulators, the assert macro, using Laboratory Tools.

**Learning Resources:****Text Book:**

1. David E.Simon, An Embedded Software Primer, Pearson Education Asia., 2000. (Units I, II, III and V and 2nd chapter in IV).
2. SriramV.Iyer, Pankaj Gupta, Embedded Real-time Systems Programming, Tata McGraw Hill publishers, 2004. (First chapter in IV unit)
3. Raj Kamal, Embedded Systems Architecture & Programming, Tata McGraw-Hill.(2<sup>nd</sup> chapter in Unit III).

**Web References:**

1. <https://spin.atomicobject.com/.../learn-embedded-systems-programming/>
2. <http://esd.cs.ucr.edu/>
3. [www.montefiore.ulg.ac.be/~boigelot/cours/embedded/slides/embedded.pdf](http://www.montefiore.ulg.ac.be/~boigelot/cours/embedded/slides/embedded.pdf)

**UNIT I****15 Periods**

**Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc.,

**File Handling in PHP:** File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

**UNIT II****15 Periods**

**PHP Authentication and Methodologies:** Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package.

**UNIT III****15 Periods**

**AJAX:** What is Ajax? , Ajax Architecture ,Overview of Important Concepts of JavaScript ,XMLHttpRequest, Onreadystatechange, Ajax using HTML, JavaScript & DOM, Ajax using PHP & MySQL.

**Classes & Objects (OOP's):**

Class ,What is an Object, Features of OOP's ,Abstraction, Encapsulation, Inheritance ,Polymorphism, new keyword, Scope-resolution operator, Access Specifiers (public/private/protected),Method Overriding, Why PHP does not support Method Overloading, Constructor, Destructor ,autoload(), Functions, calling a function, Abstract Class , Interface .

**UNIT IV****15 Periods**

**Generating Images with PHP:** Creating Image, Manipulating Image, Using text in Image.

**Database Connectivity with MySql:** Introduction to RDBMS, Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select) ,Setting query parameter ,Executing query ,Join (Cross joins, Inner joins, Outer Joins, Self joins.)

**Text Books:**

1. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill.

**Reference Books:**

1. Open Source Web Development with LAMP using Linux Apache,MySQL,Perl andPHP,J.Lee and B.Ware(Addison Wesley) Pearson Education.
2. Programming Python,M.Lutz,SPD.
3. PHP 6 Fast and Easy Web Development ,JulieMeloni and Matt Telles, Cengage Learning Publications.
- 4.PHP 5.1,I.Bayross and S.Shah,The X Team,SPD. Advanced PHP for Web Professionals By Christopher Cosentino Published Oct 29, 2002 by Prentice Hall.
5. Beginning PHP and MySQL , 3rd Edition , Jason Gilmore,Apress Publications (Dreamtech.).

**UNIT I**

12 Periods

**Introduction:** Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels.

**Image Enhancement in the Spatial Domain:** Some Basic Gray Level Transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing spatial Filters, Sharpening spatial Filters.

**UNIT II**

14 Periods

**Image Enhancement in the Frequency Domain:** Introduction to the Fourier Transform and the Frequency Domain, Smoothing frequency domain Filters, Sharpening frequency-domain Filters, Holomorphic Filtering, Implementation.

**Image Segmentation:** Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.

**UNIT III**

14 Periods

**Image Restoration:** A Model of the Image Degradation/Restoration Process, Linear, Position-Invariant Degradations, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.

**Image Compression:** Image Compression Models, Error-free Compression, Lossy Compression, Image Compression Standards.

**UNIT IV**

12 Periods

**Morphological Image Processing:** Dilation and Erosion, The Hit-or-Miss Transformation, Some basic Morphological Algorithms, Extension to Gray-Scale Images.

**Representation and Description:** Representation, Boundary Descriptors, Regional Descriptors.

**Learning Resources:**

Text Book:

1. Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing' Addison Wesley Pubs (Second Edition).

Reference Books:

1. " Image Processing. Analysis, and Machine Vision ", Milan Sonka, Vaclav Hlavac, Roger Boyle (Second Edition).

2. A.K.Jain, 'Fundamentals of Digital Image Processing' PHI.

**UNIT I****15 Periods****Introduction:**

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

**The Transport Layer:**

Introduction, User datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP Connection Establishment and Termination, TIME\_WAIT State, Port Numbers, TCP Port Numbers and Concurrent Servers, Buffer Sizes and Limitations, Standard Internet Services, Protocol Usage

**Sockets Introduction:**

Introduction, Socket Address structures, Value-Result Arguments, Byte Ordering Functions, inet\_aton, inet\_addr, and inet\_ntoa Functions, inet\_pton and inet\_ntop Functions.

**UNIT II****15 Periods****Elementary TCP Sockets:**

Introduction, socket Function, connect Function, bind function, listen function, accept Function, fork and exec Functions, Concurrent Servers, close Function, getsockname and getpeername Functions

**TCP Client-Server Example:**

Introduction, TCP Echo Server: main Function, TCP Echo Server: str\_echo Function, TCP Echo Client: main Function, TCP Echo Client: str\_cli Function, Normal Startup, Normal Termination, POSIX Signal Handling, Handling SIGCHLD Signals, wait and waitpid Functions, Connection Abort before accept Returns, Termination of Server Process, SIGPIPE Signal, Crashing of Server Host, Crashing and rebooting of Server Host

**I/O Multiplexing: The select and poll Functions:**

Introduction, I/O Models, select Function, str\_cli Function, Batch Input and Buffering, shutdown Function, str\_cliFunction, TCP Echo Server, pselectFunction, pollFunction, TCP Echo Server

**UNIT III****15 Periods****Elementary UDP Sockets:**

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

**Daemon Processes and the inetdSuperserver:**

Introduction, syslogd Daemon, syslog Function, daemon\_init Function, inetd Daemon, daemon\_inetd Function

**UNIT IV****15 Periods****Threads:**

Introduction, Basic Thread Functions: Creation and Termination, str\_cli Function Using Threads, TCP Echo Server Using Threads, Web Client and Simultaneous Connections, Multexes: Mutual Exclusion, Condition Variables, Web Client and Simultaneous Connections .

**Client/Server Design Alternatives:**

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

**Learning Resources:****Text Book:**

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

**Reference Books:**

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

**Web References:**

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

**Course Objectives:**

1. To provide knowledge on tools required for Mobile Application Development using Android.
2. To provide knowledge on Android User Interface using Views.
3. To provide knowledge on Data Persistence.
4. To make the student to learn Messaging in Android.

**Course Outcomes:**

1. Develop the basic Android App using Activity Lifecycle methods.
2. Design Android User Interfaces & Event Handling mechanisms.
3. Design and Implement back end Android App using SQLite database.
4. Develop messaging services in Android Apps.

**Course Content:****UNIT I****15 Periods**

**Android Programming:** What Is Android? Obtaining the Required Tools, Creating Your First Android Application.

**Android studio for Application development:** Exploring IDE, Using code completion, debugging your Application, Generating a signed APK.

**Activities, Fragments, and Intents:** Understanding Activities, Linking Activities Using Intents, Fragments, Displaying Notifications.

**UNIT II****15 Periods**

**Android User Interface:** Components of a Screen, Adapting To Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Creating the User Interface Programmatically.

**User Interface with Views:** Using Basic Views, Using Picker Views, Using List Views To Display Long Lists, Understanding Specialized Fragments.

**UNIT III****15 Periods**

**Pictures and Menus with Views:** Using Image Views to Display Pictures, Using Menus with Views, Using Web View.

**Notifications** – Creating and Displaying notifications, Displaying Toasts.

**Data Persistence:** Saving and Loading User Preferences, Persisting Data to Files, Creating and Using Databases.

**UNIT IV****15 Periods**

**Content Providers:** Using a Content Provider, Creating Your Own Content Providers.

**Messaging:** SMS Messaging, Sending E-Mail.

**Learning Resources:****Text Book:**

1. Beginning Android Programming with Android Studio, J.F.DiMarzio, Wiley India (Wrox), 2017.

**Reference Books:**

1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley India (Wrox), 2012.
2. Reto Meier, Professional Android 4 Application Development, Wiley India, (Wrox), 2012.
3. James C Sheusi, Android Application Development for Java Programmers, Cengage Learning, 2013.

**Course Objectives:**

1. To introduce the terminology, technology and applications of IoT.
2. To introduce the concept of M2M with necessary protocols.
3. To introduce the Raspberry PI platform.
4. To introduce the implementation of web based services on IoT devices.

**Course Outcomes**

1. Get familiarized to the terminology, technology and applications of IoT.
2. Understand the concept and protocols of M2M.
3. Develop IoT solutions using Raspberry PI platform.
4. Implement web based services on IoT devices.

**Course Content:****UNIT I****9 Periods**

**INTRODUCTION:** Internet of Things Promises–Definition– Scope–Sensors for IoT Applications– Structure of IoT– IoT Map Device

**SEVEN GENERATIONS OF IOT SENSORS TO APPEAR :** Industrial sensors – Description & Characteristics–First Generation – Description & Characteristics–Advanced Generation – Description & Characteristics–Integrated IoT Sensors – Description & Characteristics– Polytronics Systems – Description & Characteristics–Sensors' Swarm – Description & Characteristics–Printed Electronics – Description & Characteristics–IoT Generation Roadmap

**UNIT II****12 Periods**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

**UNIT III****12 Periods**

**Python on the Pi :** Hello, Python, A Bit More Python, Objects and Modules, Even More Modules, Launching Other Programs from Python, Troubleshooting Errors, Basic Input and Output - Using Inputs and Outputs.

**Programming Inputs and Outputs with Python:** Installing and Testing GPIO in Python, Blinking an LED, Reading a Button.

**UNIT IV****12 Periods**

**PREPARING IOT PROJECTS:** Creating the sensor project - Preparing Raspberry Pi - Clayster libraries - Hardware- Interacting with the hardware - Interfacing the hardware- Internal representation of sensor values - Persisting data - External representation of sensor values - Exporting sensor data - Creating the actuator projectHardware - Interfacing the hardware - Creating a controller - Representing sensor values - Parsing sensor data - Calculating control states - Creating a camera - Hardware -Accessing the serial port on Raspberry Pi - Interfacing the hardware - Creating persistent default settings - Adding configurable properties - Persisting the settings - Working with the current settings - Initializing the camera

## **Learning Resources:**

### **Text Books:**

1. Dr. Guillaume Girardin, Antoine Bonnabel, Dr. Eric Mounier, 'Technologies & Sensors for the Internet of Things Businesses & Market Trends 2014 – 2024.
2. Arshdeep Bahga and Vijay Madisetti, Internet of Things A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547.

### **Reference Books:**

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015
3. Editors Ovidiu Vermesan
2. Peter Friess, 'Internet of Things – From Research and Innovation to Market 4. Deployment', River Publishers, 2014
5. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

### **Web References:**

1. <http://postscapes.com/>.
2. <http://www.theinternetofthings.eu/what-is-the-internet-of-things>.
3. <https://www.youtube.com/channel/UCfY8sl5Q6VKndz0nLaGygPw>.
4. <https://www.codeproject.com/Learn/IoT/>.

**CSEL10**

**.NET Technologies**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I**

13 Periods

Introducing C#, Writing a C# Program, Variables and Expressions.

Flow Control, More About Variables, Functions.

**UNIT II**

13 Periods

Debugging and Error Handling, Introduction to Object-Oriented Programming, Defining Classes, Defining Class Members.

Collections, Comparisons and Conversions.

**UNIT III**

17 Periods

Generics, Additional C# Techniques, Basic Desktop Programming.

Advanced Desktop Programming.

Advanced Cloud Programming

**UNIT IV**

17 Periods

Files, XML and JSON, LINQ, DATABASES

**Learning Resources:**

**Text Book:**

Karli Watson, Christian Nagel, Jacob Hammer Pedersen, Jon Reid, and Morgan Skinner, BEGINNING VISUAL C# 2015, Wiley Publishing, Inc.

**Reference Books:**

1. Stephen C. Perry, Core C# and .NET, Pearson Education, 2006.
2. Herbert Scheldt, C#: The Complete Reference, TATA McGraw Hill Publishing.
3. Andrew Troelsen, Pro C# and the .NET Platform, A! Press.
4. Kevin Hoffman, Microsoft Visual C# 2005 Unleashed, Sams Pearson India.

**Web References:**

1. [https://en.wikipedia.org/wiki/.NET\\_Framework](https://en.wikipedia.org/wiki/.NET_Framework)
2. [www.dotnetjalps.com/.../Dynamic-URL-of-asp-net-web-service](http://www.dotnetjalps.com/.../Dynamic-URL-of-asp-net-web-service)

**Course Content:****UNIT I**

12 Periods

**Introduction:** Definitions, Motivation, Relation to parallel multiprocessor/multicomputer systems, Message passing systems versus shared memory systems, Primitives for distributed communication, synchronous versus asynchronous execution, design issues and challenges.

**A Model of Distributed Computations:** A Model of distributed executions, Models of communication networks, Global state of a distributed system, Cuts of a distributed computation, Past and future cones of an event, Models of process communication.

**Logical Time:** A framework for a system of Logical clocks, scalar time, vector time, efficient implementation of vector clocks, Matrix time, Physical clock synchronization: NTP.

**UNIT II**

12 Periods

**Global State and Snapshot Recording Algorithms:** System model, Snapshot algorithms for FIFO channels, Variations of Chandy-Lamport algorithm, Snapshot algorithms for non-FIFO channels, Snapshots in a causal delivery system, Monitoring global state, Necessary and sufficient conditions for consistent global snapshots.

**Message Ordering and Group Communication:** Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order, A nomenclature for multicast, Propagation trees for multicast, Classification of application-level multicast algorithms, Semantics of fault-tolerant group communication, Distributed multicast algorithms at the network layer.

**UNIT III**

12 Periods

**Termination Detection:** System model of a distributed computation, Termination detection using distributed snapshots, Termination detection by weight throwing, A spanning-tree-based termination detection algorithm, Message-optimal termination detection, Termination detection in a very general distributed computing model, Termination detection in the atomic computation model.

**Distributed Mutual Exclusion Algorithms:** Preliminaries, Lamport's algorithm, Ricart-Agrawala algorithm, Singhal's dynamic information-structure algorithm, Lodha and Kshemkalyani's fair mutual exclusion algorithm, Quorum-based mutual exclusion algorithms, Maekawa's algorithm.

**Deadlock Detection in Distributed Systems:** System model, Preliminaries, Models of deadlocks, Knapp's classification of distributed deadlock detection algorithms, Mitchell and

Merritt's algorithm for the single resource model, Chandy–Misra–Haas algorithm for the AND model, Chandy–Misra– Haas algorithm for the OR model.

#### **UNIT IV**

15 Periods

**Distributed Shared Memory:** Abstraction and advantages, Memory consistency models, Shared memory mutual exclusion.

**Check Pointing and Rollback Recovery:** Issues in failure recovery, Checkpoint based recovery, Log-based rollback recovery, Koo–Toueg coordinated check pointing algorithm, Juang–Venkatesan algorithm for asynchronous check pointing and recovery, Manivannan–Singhal quasi-synchronous checkpointing algorithm.

**Consensus and agreement algorithms:** Problem definition, Overview of Results, Agreement in (message-passing) synchronous systems with failures.

#### **Learning Resources:**

##### **Text Book:**

1. Ajay D. Kshemakalyani, MukeshSinghal, Distributed Computing, Cambridge University Press, 2008.

##### **Reference Book:**

1. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems Principles and Paradigms, Prentice Hall India, 2004.

**CSEL12**

**\*INDUSTRY RELATED SUBJECT**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I****12 Periods**

**Parallel Computer Models:** The state of computing, Classification of parallel computers, Multiprocessors and Multicomputers, Multivector and SIMD computers.

**Program and network properties:** Conditions of parallelism, Data and resource Dependences, Hardware and Software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms.

**System Interconnect Architectures:** Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multi-port memory, Multistage and combining network.

**UNIT II****14 Periods**

**Principles of Scalable Performance:** Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws - Amdahl's law for fixed load, Gustafson's law for scaled problems, Memory Bounded Speedup Model.

**Pipelining:** Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer Arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines.

**UNIT III****12 Periods**

**MULTI Processors:** Multiprocessor System Interconnect, Cache Coherence and Synchronization Mechanisms, Message-passing Mechanisms.

**Scalable, Multi-Threaded and Dataflow Architectures:** Latency-Hiding Techniques, Principles of Multithreading, Scalable and Multithreaded Architectures.

**UNIT-IV****12 Periods**

**Parallel Models, Languages and Compilers:** Parallel Programming Models, Parallel Languages and Compilers, Dependence analysis of Data Arrays.

**Parallel Models, Languages and Compilers:** code optimization and Scheduling, Loop parallelization and pipelining.

**Text Book:**

1. Kai Hwang, "Advanced Computer Architecture"; TMH.

**Reference Books:**

1. D.A. Patterson and J.L.Hennessey, "Computer organization and Design", Morgan Kaufmann, 2nd Edition.
2. V.Rajaram&C.S.R.Murthy, "Parallel Computer", PHI.
3. Barry Wilkinson and Michael Allen, "Parallel Programming" Pearson Education.

**CSEL14**

**Design and Analysis of Parallel Algorithms**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I**

**12 Periods**

**Introduction to Parallel Algorithms:** Models of Computation – Analyzing Algorithms, Selection-The Problem and a lower Bound, A Sequential algorithm, Desirable Properties of Parallel algorithm, An algorithm for parallel Selection.

**Merging:** A Network for Merging, Merging on the CREW and EREW Models – A better Algorithm for the EREW model,

**UNIT II**

**12 Periods**

**Sorting:** A network for Sorting, Sorting on a Linear Array, Sorting on CRCW, CREW, EREW Models

**Searching:** Searching a Sorted Sequence – Searching a Random Sequence, Searching on a tree, searching on Mesh.

**UNIT III**

**12 Periods**

**Generating Permutations and Combinations:** Sequential Algorithms, generating permutations in Parallel, generating combinations in Parallel.

**Matrix Operations:** Transpositions, Matrix by Matrix Multiplications, Matrix by Vector multiplication.

**UNIT IV**

**12 Periods**

**Graph Theory:** Computing the Connectivity Matrix, Finding Connected Components, All Pairs Shortest Paths, Computing Minimum Spanning Trees.

**Applications:** Job Sequencing with Deadlines, Knapsack Problem.

**Learning Resources:**

**Text Books:**

1. Selim G. Akl, The Design and Analysis of Parallel Algorithms, Prentice Hall, New Jersey, 1989

**Reference Books:**

1. Michael J. Quinn, Parallel Computing: Theory & Practice, Tata McGraw Hill Edition, 2003.
2. Justin R. Smith, the Design and Analysis of Parallel Algorithms, Oxford University Press, USA, 1993.
3. Joseph JaJa, Introduction to Parallel Algorithms, Addison-Wesley, 1992.

**UNIT I**

15 Periods

**Introduction**

The Art of Language Design, Why Study Programming Languages, The Programming Language Spectrum, Compilation and Interpretation, Programming Environments, An Overview of Compilation.

**Programming Language Syntax**

Specifying Syntax: Regular Expressions and Context-Free Grammars, Scanning, Parsing, Theoretical Foundations

**Names, Scopes, and Bindings**

The Notion of Binding Time, Object Lifetime and Storage Management, Scope Rules, Implementing Scope, The Meaning of Names within a Scope, The Binding of Referencing Environments, Macro Expansion.

**UNIT II**

15 Periods

**Semantic Analysis**

The Role of the Semantic Analyzer, Attribute Grammars, Evaluating Attributes, Action Routines, Space Management for Attributes, Decorating a Syntax Tree.

**Control Flow**

Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Nondeterminacy.

**Data Types**

Type Systems, Type Checking, Records (Structures) and Variants (Unions), Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and Input/Output, Equality Testing and Assignment.

**UNIT III**

15 Periods

**Subroutines and Control Abstraction**

Review of Stack Layout, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Coroutines, Events.

**Data Abstraction and Object Orientation**

Object-Oriented Programming, Encapsulation and Inheritance, Initialization and Finalization, Dynamic Method Binding.

**Functional Languages**

Historical Origins, Functional Programming Concepts, A Review/Overview of Scheme, Evaluation Order Revisited, Higher-Order Functions, Theoretical Foundations, Functional Programming in Perspective

**UNIT IV**

15 Periods

**Logic Languages**

Logic Programming Concepts, Prolog, Theoretical Foundations, Logic Programming in Perspective.

**Concurrency**

Background and Motivation, Concurrent Programming Fundamentals, Implementing Synchronization, Language-Level Mechanisms, Message Passing.

**Scripting Languages**

What Is a Scripting Language, Problem Domains, Scripting the World Wide Web, Innovative Features.

## **Learning Resources:**

### **Text Book:**

1. **"Programming Language Pragmatics"** Third Edition, **Michael L. Scott**, Morgan Kaufmann Publications, 2009.

### **Reference Books:**

1. Robert W. Sebesta, **"Concepts of Programming Languages"**, Eight Edition, Addison Wesley.
2. **"Programming Languages, Principles & Paradigms"**, 2ed, Allen B Tucker, Robert E Noonan, TMH
3. R. Kent Dybvig, **"The Scheme programming language"**, Fourth Edition, MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, **"Programming in Prolog: Using the ISO Standard"**, Fifth Edition, Springer, 2003

**UNIT I****10 Periods**

**Introduction** – Applications, A Short History of Wireless Communications , A Market for Mobile Communications , A Simplified Reference Model.

**Wireless Transmission** – Frequencies , Signals , Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum.

**Medium Access Control** - Motivation for a Specialized MAC , SDMA, FDMA, TDMA ,CDMA , Comparison.

**UNIT II****12 Periods**

**Telecommunication Systems:** GSM, UMTS and IMT-2000.

**Satellite Systems** – History, Applications, Basics (GEO, LEO, MEO), Routing, Localization, Handover.

**Broadcast Systems** – Overview, Cyclic Repetition of Data, Digital Audio Broadcasting – Digital Video Broadcasting.

**UNIT III****12 Periods**

**Wireless LAN** – Infrared Vs. Radio Transmission – Infrastructure and Ad Hoc Networks – IEEE, 802.11– Bluetooth.

**Mobile Network Layer** –Mobile IP – Dynamic Host Configuration – Ad Hoc Networks.

**UNIT IV****10 Periods**

**Mobile Transport Layer** – Traditional TCP – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission / Time-Out Freezing – Selective Retransmission – Transaction Oriented TCP.

**Wireless Application Protocol** – Architecture – Wireless Datagram Protocol – Wireless Transport Layer Security – Wireless Transaction Protocol – Wireless Session protocol – Wireless Application Environment – Wireless Markup Language – WML Script – Wireless Telephony Application – Example Stacks with WAP.

**Text Books:**

1. J.Schiller, "Mobile communications", 2<sup>nd</sup> edition, 2003, Pearson.

**Reference Books:**

1. William Stallings, "Wireless Communication Networks", 2<sup>nd</sup> edition, 2005, Pearson.
2. UWE Hansmann, LotharMerk, Martin S.Nicklous, Thomas Stober, "Principles of Mobile Computing", 2nd Edition.

**WEB REFERENCES:**

1. <http://www.wireshark.org/> % Wireshark Packet Analyzer
2. <http://www.cisco.com/en/US/docs/wireless/antenna/installation/guide/ant2506.html#wp44332> % Air-Ant 2506 Omni Directional Antenna
3. <http://www.cisco.com/en/US/docs/wireless/antenna/installation/guide/ant2460.html#wp43294> % Air-Ant2460P-R Patch Antenna
4. <http://www.cisco.com/en/US/docs/wireless/antenna/installation/guide/ant545r.html#wp43294> % Air-Ant5145V-R Omnidirectional Antenna
5. <http://getitnew.com/air-lap1242ag-a-k9ciscoaironet1242agwirelessaccesspoint.aspx>
6. % AIR-AP 1242AG-A-K9 Wi-Fi Access Point ,.
7. <http://www.wlanmall.com/aironet-1131-80211ag-lwapp-access-point-integrated-antennas-cnfg-p-509.html> % AIR-LAP1131AG-A-K9 Wi-Fi Lightweight Access Point

8. [http://grouper.ieee.org/groups/802/11/Reports/802.11\\_Timelines.htm](http://grouper.ieee.org/groups/802/11/Reports/802.11_Timelines.htm) % IEEE  
802.11 Working Group Timeline
9. <http://www.etsi.org/WebSite/homepage.aspx> % European Telecommunications Standard  
Institute (ETSI)

**Course Objectives:** At the end of the course student will be able to understand:

1. Different Cloud Deploy Models & Service Models in enterprise cloud environment.
2. Cloud Virtual Machines Migration and cloud enhancing service.
3. Cloud Data security issues, work flow engines and SLA management for clouds.

**Course Outcomes: At the end of course the students will**

1. get different Cloud Deployment & Service Models skills.
2. Analyze the Integrate Enterprise cloud environments.
3. analyze and use Cloud Virtual Machines and cloud enhancing service.
4. Analyze Secure Distributed Data Storage and work flow engines for clouds.
5. Describe the Data security and SLA Management.

## UNIT I

**14 Periods**

**Introduction to cloud computing:** Cloud Computing in a Nutshell, roots of Cloud Computing, Layers and Types of Clouds, Desired Features of Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers.

**Migration into a Cloud:** Introduction, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud.

**Enriching the 'Integration as a Service' Paradigm for the Cloud Era:** An Introduction, The Onset of Knowledge Era, The Evolution of SaaS, The challenges of SaaS paradigm, New integration scenarios, The integration methodologies, SaaS integration products and platforms, SaaS Integration Services, Business to Business Integration(B2Bi) Services, A Framework of Sensor-Cloud Integration.

## UNIT II

**12 Periods**

**The Enterprise Cloud Computing Paradigm:** Relevant deployment models for enterprise cloud computing, Issues for Enterprise Applications on the Cloud, Transition Challenges, Business Drivers toward a Marketplace for Enterprise Cloud Computing, The Cloud Supply Chain.

**Virtual Machines Provisioning and Migration Services:** Virtualization Technology overview, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action, Provisioning in the Cloud Context.

**Enhancing Cloud Computing Environments Using a Cluster as a Service:** Introduction, Related Work, RVWS Design, Cluster as a Service: The Logical Design, Proof of Concept.

### **UNIT III**

**12 Periods**

**Secure Distributed Data Storage in Cloud Computing:** Introduction, Cloud Storage: from LANs TO WANs, Technologies for Data Security in Cloud Computing Open Questions and Challenges.

**Workflow Engine for Clouds:** Introduction, Workflow Management Systems and Clouds, Architecture of Workflow Management Systems, Utilizing Clouds for Workflow Execution.

### **UNIT IV**

**12 Periods**

**SLA Management in Cloud Computing:** Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud, Automated Policy-based Management.

**Data Security in the Cloud:** An Introduction to the Idea of Data Security , The Current State of Data Security in the Cloud, Homo Sapiens and Digital Information, Cloud Computing and Data Security Risk, Cloud Computing and Identity, The Cloud, Digital Identity, and Data Security, Content Level Security—Pros and Cons.

#### **Learning Resources:**

##### **Text Book:**

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing Principles and Paradigms, Wiley Publications.

##### **Reference Books:**

1. Michael Miller, Cloud Computing – Web-Based Application That Change the Way You Work and Collaborate Online, Pearson Publications.
2. Thomas Erl, Zaigham Mahmood, & Ricardo Puttini, Cloud Computing- Concepts, Technology & Architecture Pearson Publications.
3. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
4. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
5. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, R
6. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed and Cloud Computing – From Parallel Processing to the Internet of Things, ELSEVIER Publications.

##### **Web Resources:**

1. Cloud computing course by Prof. Soumya K. Ghosh is available @ <https://nptel.ac.in/courses/106105167/>
2. Cloud computing and Distributed Systems course by Dr. Rajiv Misra is available @ <https://nptel.ac.in/courses/106104182/>
3. <https://technet.microsoft.com/en-us/magazine/hh509051.aspx>

**UNIT I****12 Periods**

**Introduction** – From Bits to Qubits – Power of Quantum Computing – How Quantum Physics Differs from – Obstacles and Research – Future Outlook.  
Qubits, Quantum Mechanics and Computer Science Perspectives

**UNIT- II****12 Periods**

Quantum Gates – Single & Multiple Qubit Gates – Matrix Representation of Quantum Gates and Circuits – Bell States – Quantum Measurement – Quantum Half-Adder and Subtractor.

Applications of Quantum Computing – Quantum Teleportation – Parallelism – Superdense Coding – Quantum Communication.

**UNIT III****14 Periods**

Shor's Algorithm and Quantum Fourier Transform

Grover's Algorithm (Quantum Search Algorithms)

**UNIT IV****12 Periods**

Physical Realization of Quantum Computers

Quantum Computing Software

**Text Book:**

1. Vishal Sahni. "Quantum Computing", TMH, 2007.

**Reference Books:**

1. Dan C. Marinescu, Gabriela M. Marinescu, "Approaching Quantum Computing" Prentice Hall, 2004.
2. Mika Hirvensalo "Quantum Computing" ,2<sup>nd</sup> Edition, Springer,2004
3. Giuliano Beneti, Giulio Casati, GuilianoStrini "Principles of Quantum Computation and Information" Vol.1 Basic Concepts, World Scientific Publishing Company; New Ed edition (October 2004)

**UNIT I****9 Periods**

Introduction to Natural Language Understanding: Linguistic Background-An Outline of English Syntax-Grammars and Parsing-Features and Augmented Grammars.

**UNIT II****14 Periods**

Grammars for Natural Language: Toward Efficient Parsing, Ambiguity Resolution: Statistical Methods.

**UNIT III****14 Periods**

Semantics and Logical Form: Linking Syntax and Semantics-Ambiguity Resolution-other Strategies for Semantic Interpretation-Scoping and the Interpretation of Noun Phrases.

**UNIT IV****12 Periods**

Knowledge Representation and Reasoning-Local Discourse Context and Reference-Using World Knowledge-Discourse Structure-Defining a Conversational Agent.

**Text Books:**

1. Allen, James. Natural Language Understanding. The Benjamin/Cummings Publishing Company, Inc., Redwood City, CA. 1995.

**Reference Books:**

1. Charniak, Eugene: Introduction to Artificial intelligence, Addison-Wesley, 1984.
2. Bates, M. (1995). Models of Natural language understanding. Proceedings of the National Academy of Sciences of the United States of America, Vol. 92, No. 22 (Oct. 24, 1995), pp. 9977-9982.

**CSEL20**

**Virtual Reality**

L	T	P	C
3	0	0	3

**UNIT I**

**12 Periods**

**Introduction:** The Three I's Virtual Reality, A short History of Early Virtual Reality, Early commercial VR Technology, VR Becomes an Industry, The five classic Components of a VR system.

**Input Devices: Trackers, Navigation and Gesture Interfaces:** Three- Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture Interfaces.

**Output Devices: Graphics, Three-Dimensional Sound and Haptic Displays:** Graphics Displays Sound Displays, Haptic Feedback.

**UNIT II**

**14 Periods**

**Computing Architectures for VR:** The Rendering Pipeline Rendering, PC Graphics Architecture Workstation-Based Architectures, Distributed VR Architectures.

**Modeling:** Geometric modeling, Kinematics Modeling, Physical Modeling, Behavior Modeling, Model Management.

**UNIT III**

**12 Periods**

**VR Programming:** Toolkits and Scene Graphs, World Toolkit, JAVA3D, General Haptics Open Software Toolkit,, People shop.

**Human Factors in VR:** Methodology and Terminology, User Performance Studies, VR Health and Safety Issues, VR and Society.

**UNIT IV**

**12 Periods**

**Traditional VR Applications:** Medical Applications of VR, Education, Arts and Entertainment, Military VR Applications

**Emerging Applications of VR :** VR Applications in Manufacturing, Applications of VR in Robotics, Information Visualization.

**Text Book:**

1. GrigoreC.Burdea, Philippe Coiffet. "Virtual Reality" Second Edition, Wiley India.

**UNIT I****11 Periods**

**INTRODUCTION TO CYBER SECURITY:** Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication - Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks

**UNIT II****12 Periods**

**SECURITY IN OPERATING SYSTEM & NETWORKS :**Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

**UNIT III****12Periods**

**DEFENCES: SECURITY COUNTERMEASURES :** Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

**UNIT IV****15 Periods**

**PRIVACY, MANAGEMENT AND INCIDENTS IN CYBERSPACE:** Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed.

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare-

**Learning Resources:****Text Book:**

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition, Pearson Education , 2015

**Reference Books:**

1. George K.Kostopoulos, Cyber Space and Cyber Security, CRC Press, 2013.
2. MarttiLehto, PekkaNeittaanmäki, Cyber Security: Analytics, Technology and Automation edited, Springer International Publishing Switzerland 2015
3. Nelson Phillips and EnfingerSteuart, —Computer Forensics and Investigations||, Cengage Learning, New Delhi, 2009.

**UNIT I****15 Periods**

**BLOCKCHAIN 101**- Distributed Systems, History of blockchain, Introduction to blockchain, Types of block chain, CAP theorem and blockchain, benefits and limitations of blockchain,

**DECENTRALIZATION**-Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Blockchain and full eco system decentralization, Smart contract, Decentralized Organizations, Decentralized autonomous organizations, Decentralized autonomous corporations, Decentralized autonomous societies, Decentralized applications, Platforms for Decentralization

**UNIT II****15 Periods**

**CRYPTOGRAPHY AND TECHNICAL FOUNDATIONS**- Introduction, Cryptographic primitives, Asymmetric Cryptography, Public and Private-keys, Financial -market and trading, Summary.

**BITCOIN**- Bitcoin, Transactions, Blockchain, Bitcoin Payments,

**UNIT III****15 Periods**

**SMART CONTRACTS**-History, Definition, RecardianContracts,.

**ETHEREUM 101**-Introduction, Ethereumblockchain, Elements of the Ethereumblockchain, Precompiled contracts, Accounts, Block, Ether, Messages, Mining, Clients and Wallets, Trading and investment, The Yellow paper, The Ethereum Network, Applications developed on Ethereum, Scalability and security issues, .

**UNIT IV****15 Periods**

**HYPER LEDGER**- Projects, Hyperledger as a Protocol, Fabric, Hyperledger Fabric, Sawtooth lake, Corda,

**ALTERNATIVE BLOCKCHAIN**- Block chains, Platforms,.

**SCALABILITY AND OTHER CHALLENGES**- Scalability, Privacy, Security,

Text Book :

1. Blockchain Author : SeberriusJeffery, "Block Chain " 2<sup>nd</sup> Edition Publishers details 2015

**UNIT I**

15 Periods

Introduction to Multi-Core Architecture, Motivation for concurrency in Software, Parallel Computing Platforms, Parallel Computing in Multiprocessors, Differentiating Multi-Core Architectures From Hyper-Threading Technology, Multi-Threading on Single-Core Versus Multi-Core Platforms, Understanding Performance, Amdahl' Law, Growing Returns: Gustafson's Law. System Overview of Threading.

Defining Threads, System View of Threads, Threading above the Operating System, Threads Inside the OS, Threads Inside the Hardware, What Happens When a Thread is Created, Application Programming Models and Threading, Virtual Environment: VMs and Platforms, Runtime Virtualization, System Virtualization.

**UNIT II**

15 Periods

Fundamental Concepts of Parallel Programming Designing for Threads, Task decomposition, Data Decomposition, Data Flow Decomposition, Implication of Different Decomposition, Implications of Different Decompositions, Challenges You'll Face, Parallel Programming Patterns, A motivating Problem: Error Diffusion, Analysis of the Error Diffusion Algorithm, An alternate Approach: Parallel Error Diffusion, Other Alternatives.

Threading And Parallel Programming Constructs Synchronization, Critical Sections, Deadlock, Synchronization Primitives, Semaphores, Locks, Condition Variables, Messages, Flow Control-Based Concepts, Fence, Barrier, Implementation-Dependent Threading Features.

**UNIT III**

15 Periods

Threading APIs: Threading APIs For Microsoft Windows, Win32/MFC Thread APIs, Threading APIs For Microsoft .NET Framework, Creating Threads, Managing Threads, Thread Pools, Thread synchronization, POSIX Threads, Creating Threads, Mapping Threads, Thread Synchronization, Signaling, Compilation And Linking.

Open MP: A Portable Solution for Threading Challenges in Threading A Loop, Loop-Carried dependence, Data-race Conditions, Managing Shared And Private Data, Loop Scheduling And Portioning, Effective Use of Reductions, Minimizing Threading Overhead, Work-Sharing Sections, Performance-Oriented Programming, Using Barrier And No Wait, Interleaving single-Thread and Multi-Thread Execution ,Data Copy-In And Copy-Out, Protecting Updates of Shared Variables, Intel Task Queuing Extension to Openmp, Openmp Library Functions, Openmp Environment Variables, Compilation, Debugging Performance.

**UNIT IV**

15 Periods

Solutions to Common Parallel Programming Problems Too many threads, Data Races, Deadlocks And Live Locks, Deadlock, Heavily Contended Locks, Priority Inversion, Solutions For Heavily Contended Locks, Non-Blocking Algorithms, ABA Problem, Cache Line Ping-Ponging ,Memory Reclamation Problem, Recommendations , Thread-Safe functions and Libraries, Memory Issues, Bandwidth ,Working In the Cache, Memory Contention, Cache-Related issues, False Sharing, Memory consistency, Current IA-32 Architecture, Itanium Architecture, High-Level Languages, Avoiding Pipeline Stalls on IA-32 , Data Organization For High Performance.

**Learning Resources:****Text Book:**

1. Shameem Akhter and Jason Roberts, Multi-core Programming: Increasing Performance through software Multi-Threading, Intel Press, 2006.

**Reference Books:**

1. Peter S. Pacheco, An Introduction to Parallel Programming, Morgan-Kaufman/Elsevier, 2011.
2. Darryl Gove, Multi-core Application Programming for Windows, Linux, and Oracle Solaris, Pearson, 2011.
3. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata McGraw Hill, 2003.

**CSEL24**

**\*INDUSTRY RELATED SUBJECT**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Open Electives For Other Branches**

CODE NO.	SUBJECT NAME	CODE NO.	SUBJECT NAME
CSOL01	Object Oriented Programming In Java	CSOL02	RDBMS
CSOL03	Programming In Python	CSOL04	Internet Of Things

**Course Objectives:**

1. To understand the basic concepts and fundamentals of platform independent object oriented language.
2. To demonstrate skills in writing programs using exception handling techniques and multithreading.
3. To understand streams and efficient user interface design techniques.
4. To know about various Telecommunication Systems.

**Course Outcomes:**

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

1. use the syntax and semantics of java programming language and basic concepts of OOP.
2. develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
3. apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
4. demonstrate how the java program communicates with the console and disk files using the concept of streams.
5. design event driven GUI and web related applications which mimic the real word scenarios.

**Course Content:****UNIT I****15 Periods**

Introduction: introduction to java, data types, dynamic initialization, scope and lifetime, operator, control statements, arrays, type conversion and casting, finals & blank finals.

Classes and Objects: Concepts, methods, constructors, usage of static, access control, this keyword, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes.

Inheritance: Basic concepts, access specifiers, usage of super keyword, method overloading, final methods and final classes, 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 II****15 Periods**

Exception Handling: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, built-in exceptions, creating own exception subclass.

Multithreading: Concepts of Multithreading, differences between process and thread, thread lifecycle, Thread class, Runnable interface, creating multiple threads, synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

I/O Streams: Streams, Byte streams, Character streams, File class, File stream.

**UNIT III****18 Periods**

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.

AWT: AWT components, window, Frames, canvas, panel, File Dialog boxes, Layout managers, Event handling model of awt, Adapter classes, Menu and Menu Bar.

## **UNIT IV**

**12 Periods**

Applet: Concepts of Applet, lifecycle of an Applet, creating applets, passing parameters to applets, accessing remote applet, Color and Graphics classes.

Swing-I: Swing introduction, JApplet, JFrame, and JComponent, Icons and Labels, text fields, buttons, the JButton class, Check boxes, Radio buttons.

Swing II: Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

### **Text Books:**

1. The Complete Reference Java J2SE 7th Edition, Herbert Schildt, THM publishing Company Ltd., New Delhi. (Unit-I, Unit-II, and Unit-III).

### **Reference Books:**

1. Big Java 2nd Edition, Cay Horstmann, John Wiley and sons, Person Edu. (Unit-IV):
2. Java How to Program, 6th Edition, H.M. Dietel and P.J. Dietel, Pearson Education/PHI.
3. Core Java 2, Vol 1, Fundamentals, Cay. S. Horstmann and Gary Cornell, 7th Edition, Pearson Education.
4. Core Java 2, Vol 2, Fundamentals, Cay. S. Horstmann and Gary Cornell, 7th Edition, Pearson Education.
5. Beginning in Java 2, Iver Horton, Wrox Publications.
6. Java, Somasundaram, Jaico
7. Introduction to Java Programming, by Y. Daniel Liang, Pearson Publication

<b>CSOL02</b>	<b>Relational Database Management Systems(RDBMS)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>Open Elective</b>				
		<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

Course Objectives:

1. To understand the fundamental concepts, historical perspectives, current trends, structures, operations and functions of different components of Databases.
2. To understand the types of integrity constraints in a relational database system and the concepts of SQL to create and access the database.
3. To understand basic concepts of ER model and database design using normalization process.
4. To understand concurrency, Recovery techniques.

Course Outcomes: After successful completion of the course, the students are able to

1. understand basic concepts and use of various database systems.
2. enforce integrity constraints to maintain validity & accuracy.
3. write relational expressions for the queries.
4. design and develop a database using normalization theory.
5. use different concurrency control and Recovery techniques.

#### **UNIT I**

**12 Periods**

**Databases and Database Users:** Introduction - An Example - Characteristics of the Database Approach - Actors on the Scene - Workers behind the Scene - Advantages of Using the DBMS Approach.

**Database System Concepts and Architecture:** Data Models, Schemas, and Instances - Three-Schema Architecture and Data Independence - Database Languages and Interfaces - The Database System Environment - Centralized and Client/Server Architectures for DBMSs.

#### **UNIT II**

**12 Periods**

**Data Modeling Using the Entity-Relationship (ER) Model:** Using High- Level Conceptual Data Models for Database Design - An Example Database Application - Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets, Roles, and Structural Constraints - Weak Entity Types.

**The Relational Data Model and Relational Database Constraints:** Relational Model Concepts - Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations.

#### **UNIT III**

**12 Periods**

**SQL-99:** Schema Definition, Constraints, Queries, and Views: SQL Data Definition and Data Types - Specifying Constraints in SQL - Schema Change Statements in SQL - Basic Queries in SQL - More Complex SQL Queries - INSERT, DELETE, and UPDATE Statements in SQL - Views (Virtual Tables) in SQL.

#### **UNIT IV**

**12 Periods**

**Functional Dependencies and Normalization for Relational Databases:** Informal Design Guidelines for Relation Schemas - Functional Dependencies - Normal Forms Based on Primary Keys - General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.

**Introduction to Transaction Processing Concepts and Theory:** Introduction to Transaction Processing - Transaction and System Concepts - Desirable Properties of Transactions -

Characterizing Schedules Based on Recoverability -Characterizing Schedules Based on serializability.

**Learning Resources:**

**Text Book:** Fundamentals of Database Systems, Ramez Elmasri and SHamKanthB.Navate Pearson Education, 5th edition.

**Reference Book(s):**

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

**CSOL03**

**Programming in Python**  
**Open Elective**

L	T	P	C
4	0	0	3

**Course Objectives**

At the end of the course the students will understand

- Data types and control structures
- Procedural programming features of python
- file handling power of python
- object oriented programming in python

**Course Outcomes**

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

- manipulate various types of data in python
- apply procedure oriented features of python
- develop applications for manipulating files
- apply Object oriented programming features of python

**UNIT I**

**15 Periods**

**Data and Expressions-** Literals, Variables and Identifiers, Operators, Expressions and Data Types.

**Control Structures** - What Is a Control Structure? Boolean Expressions (Conditions), Selection Control, Iterative Control.

**UNIT II**

**15 Periods**

**Lists** - List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python, More on Python Lists.

**Functions-** Program Routines, More on Functions.

**Objects and Their Use** - Software Objects, Turtle Graphics,

**UNIT III**

**15 Periods**

**Modular Design** – Modules, Top-Down Design, Python Modules.

**Text Files** - What Is a Text File? Using Text Files, String Processing, Exception Handling.

**Dictionaries and Sets** - Dictionary Type in Python, Set Data Type.

**UNIT IV**

**15 Periods**

**Object-Oriented Programming** - What Is Object-Oriented Programming? Encapsulation, Inheritance, Polymorphism

**Recursion** - Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion.

**Learning Resources:**

**Text Book:**

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus by Charles Dierbach, Wiley.

**Reference Books:**

1. Beginning python from novice to professional by Magnus Lie Hedland, 2<sup>nd</sup> Edition, Apress
2. Learning Python by Mark Lutz, 5<sup>th</sup> Edition, O'reilly
3. Programming Python by Mark Lutz, 4<sup>th</sup> Edition, O'reilly

**Course Objectives:**

1. To introduce the terminology, technology and applications of IoT.
2. To introduce the concept of M2M with necessary protocols.
3. To introduce the Raspberry PI platform.
4. To introduce the implementation of web based services on IoT devices.

**Course Outcomes**

1. Get familiarized to the terminology, technology and applications of IoT.
2. Understand the concept and protocols of M2M.
3. Develop IoT solutions using Raspberry PI platform.
4. Implement web based services on IoT devices.

**Course Content:****UNIT I****9 Periods**

**Introduction:** Internet of Things Promises–Definition– Scope–Sensors for IoT Applications– Structure of IoT– IoT Map Device

**SEVEN GENERATIONS OF IOT SENSORS TO APPEAR :** Industrial sensors – Description & Characteristics–First Generation – Description & Characteristics–Advanced Generation – Description & Characteristics–Integrated IoT Sensors – Description & Characteristics– Polytronics Systems – Description & Characteristics–Sensors' Swarm – Description & Characteristics–Printed Electronics – Description & Characteristics–IoT Generation Roadmap

**UNIT II****12 Periods**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

**UNIT III****12 Periods**

**Python on the Pi :** Hello, Python, A Bit More Python, Objects and Modules, Even More Modules, Launching Other Programs from Python, Troubleshooting Errors, Basic Input and Output - Using Inputs and Outputs.

**Programming Inputs and Outputs with Python:** Installing and Testing GPIO in Python, Blinking an LED, Reading a Button.

**UNIT IV****12 Periods**

**PREPARING IOT PROJECTS:** Creating the sensor project - Preparing Raspberry Pi - Clayster libraries - Hardware- Interacting with the hardware - Interfacing the hardware- Internal representation of sensor values - Persisting data - External representation of sensor values - Exporting sensor data - Creating the actuator project Hardware - Interfacing the hardware - Creating a controller - Representing sensor values - Parsing sensor data - Calculating control states - Creating a camera - Hardware -Accessing the serial port on Raspberry Pi - Interfacing the hardware - Creating persistent default settings - Adding configurable properties - Persisting the settings - Working with the current settings - Initializing the camera

**Text Books:**

1. Dr. Guillaume Girardin, Antoine Bonnabel, Dr. Eric Mounier, 'Technologies & Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024',

2. Arshdeep Bahga and Vijay Madisetti, Internet of Things A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547.

**Reference Books:**

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015
3. Editors Ovidiu Vermesan
2. Peter Friess, 'Internet of Things – From Research and Innovation to Market 4. Deployment', River Publishers, 2014
5. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

**Web References:**

1. <http://postscapes.com/>.
2. <http://www.theinternetofthings.eu/what-is-the-internet-of-things>.
3. <https://www.youtube.com/channel/UCfY8sl5Q6VKndz0nLaGygPw>.
4. <https://www.codeproject.com/Learn/IoT/>.