118PHT03	ENGINEERING PHYSICS	L	T	P	C
		2	0	0	2

Course objectives:

1. To understand the concept of properties of matter.
2. To understand the properties of sound and principles of quantization of energy.
3. To understand the properties of coherent light and its importance.

UNIT-I PROPERTIES OF MATTER 9

Elasticity – Stress – Strain diagram – Factors affecting elasticity – Twisting couple on a wire – Torsion pendulum – Young's modulus - cantilever – Uniform and Non uniform bending (theory and experiment)–Viscosity-Poiseuille's method for Coefficient of Viscosity (Qualitative).

UNIT-II ACOUSTICS AND ULTRASONICS 9

Classification of sound, loudness, intensity – Decibel – Weber Fechner Law – Reverberation and Reverberation time – derivation of Sabine's formula for Reverberation time (Growth and Decay)– Absorption coefficient and its determination.

Introduction of Ultrasonics – Production – magnetostriction effect – magnetostriction generator – piezoelectric effect – piezoelectric generator – Detection of ultrasonic waves, properties – Cavitation – Applications – Depth of sea – Non Destructive Testing.

UNIT-III QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh–jeans' Law from Planck's theory – Compton Effect–derivation– Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box – Degeneracy and Non-degeneracy.

UNIT-IV LASER 9

Introduction – Principle of Spontaneous emission and stimulated emission – Population inversion – pumping – Einstein's A and B coefficients – derivation – Types of lasers – He-Ne, CO_2, Nd-YAG, Semiconductor lasers – homojunction – Applications of Laser.

UNIT-V WAVE OPTICS & FIBRE OPTICS 9

Interference – Air wedge (theory & experiment) – Polarization– Methods of polarizing light-Theory of plane circularly and elliptically polarized light.

Principle and propagation of light in optical fibers – Numerical aperture and Acceptance angle – Types of optical fibers (material, refractive index, and mode) – Fiber optical communication system (Block diagram) – Fiber optic sensors – Temperature & Displacement sensors (Qualitative).

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

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

CO1: To understand properties of solids with different types of moduli and to gain knowledge about absorption coefficients of solids and different surfaces.

CO2: To understand basic concepts of high frequency sound waves and its applications.

CO3: To understand basic concepts of quantum mechanical behavior of wave and particle along with applications.

CO4: To understand the concepts of production of laser and its behavior with diffraction principle of interference.

CO5: To apply the concept of polarization phenomenon and thereby its applications in fiber optic communication.

Text Books:

1. R.K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi (2003)
2. Jayaprakash R.N, 'Engineering Physics - I', Dhanam Publications, Chennai, (2007).

Books for reference:

1. R. Murugeshan , Kiruthiga Sivaprasath , Modern Physics S. Chand publications 2016,New Delhi.
2. A. Ghatak Optics The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY 10020.
3. Dr.M.N.Avadhanulu,Introduction to Lasers: theory and applications S.Chand publications 2012,New Delhi.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	To understand properties of solids with different types of moduli and to gain knowledge about absorption coefficients of solids and different surfaces.	3	2	1	3									3		1
CO2	To understand basic concepts of high frequency sound waves and its applications.	3	2	1	3									3		1
CO3	To understand basic concepts of quantum mechanical behavior of wave and particle along with applications.	3	2		1									3		3
CO4	To understand the concepts of production of laser and its behavior with diffraction principle of interference.	3	2	2	2									3		2
CO5	To apply the concept of polarization phenomenon and thereby its applications in fiber optic communication.	3	2	1	1									3		2

118PPT05	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

1. To know the basics of algorithmic problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditionals and loops.
4. To define Python functions and call them.
5. To use Python data structures — lists, tuples, dictionaries.
6. To do input/output with files in Python.

Prerequisite: Nil

UNIT I ALGORITHMIC PROBLEM SOLVING **9**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS **9**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS **9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES **9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V FILES, MODULES, PACKAGES **9**

Files and exception: text files, reading and writing files, format operator; command line arguments, date and time, errors and exceptions, handling exceptions, debugging, modules, packages; Illustrative programs: word count, copy file.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems
CO2: Read, write, execute by hand simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries and Read and write data from/to files in Python Programs.

TEXT BOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. John V Guttag, —Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-Disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 01	PS 02	PS 03
CO1	Develop algorithmic solutions to simple computational problems		3													
CO2	Read, write, execute by hand simple Python programs.					2							2	2		
CO3	Structure simple Python programs for solving problems.			3											3	
CO4	Decompose a Python program into functions.		2			3					2		1			
CO5	Represent compound data using Python lists, tuples, dictionaries and Read and write data from/to files in Python Programs.		1	3		2										3

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118PHP07	ENGINEERING PHYSICS LABORATORY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To understand the practical concepts of Interference and diffraction.
- To understand the concept of velocities of sound in different liquids.
- To get better knowledge of modulus of elasticity.
- To understand the concepts of thermal conductivity.
- To understand the concepts of viscosities of liquid.

LIST OF EXPERIMENTS

1. (a) Determination of laser parameters – Wavelength.
   (b) Particle size determination using Diode Laser.
2. Determination of thickness of a thin wire-Air wedge method.
3. Determination of velocity of sound and compressibility of liquid- Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum-Spectrometer grating.
5. Determination of thermal conductivity of a bad conductor-Lee's disc method.
6. Determination of Young's modulus of the material –Non uniform bending.
7. Determination of viscosity of liquid – Poiseuille's method.
8. Spectrometer- Dispersive power of prism.
9. Determination of Young's modulus of the material - Uniform bending.
10. Tensional pendulum- Determination of Rigidity modulus.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understanding the moduli of elasticity by determining Young's modulus and Rigidity modulus of a beam and cylinder respectively.

CO2: Understanding the phenomenon of diffraction, dispersion and interference of light using optical component

CO3: Acquiring knowledge of viscosity by determining coefficient of viscosity of a liquid and measuring the parameters of ultrasound propagating through a liquid

CO4: Understanding the phenomenon of heat transfer through conductors and bad conductors by determining thermal conductivity.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understanding the moduli of elasticity by determining Young's modulus and Rigidity modulus of a beam and cylinder respectively.	3	3	3	3	3								3		3
CO2	Understanding the phenomenon of diffraction, dispersion and interference of light using optical component	3	3	3	3	3								3		3
CO3	Acquiring knowledge of viscosity by determining coefficient of viscosity of a liquid and measuring the parameters of ultrasound propagating through a liquid	3	3	3	3	3								3		3
CO4	Understanding the phenomenon of heat transfer through conductors and bad conductors by determining thermal conductivity.	3	3	3	3	3								3		3

118PPP08	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE(S):

1. To write, test, and debug simple Python programs.
2. To implement Python programs with conditionals and loops.
3. Use functions for structuring Python programs.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python.

LIST OF PROGRAMS:

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Checks the given number is prime or not using while loop
6. Compute the GCD of Numbers using functions
7. Finding factorial of a given number using recursive function.
8. Takes a list of words and returns the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Finding most frequent words in a text read from a file
15. Programs that take command line arguments (word count)

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Write, test, and debug simple Python programs.

CO2: Implement Python programs with conditionals and loops.

CO3: Develop Python programs step-wise by defining functions and calling them.

CO4: Use Python lists, tuples, dictionaries for representing compound data.

CO5: Read and write data from/to files in Python.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Write, test, and debug simple Python programs.		2													
CO2	Implement Python programs with conditionals and loops.			2		2							1	2		
CO3	Develop Python programs step-wise by defining functions and calling them.			3	2										3	
CO4	Use Python lists, tuples, dictionaries for representing compound data.		2			3					2		1			
CO5	Read and write data from/to files in Python.		1	3		2										1

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118ESE06	BASIC ELECTRICAL ELECTRONICS AND INSTRUMENTATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To learn the basics of electrical elements.
2. To introduce the fundamental concepts of DC and AC circuits.
3. To interpret the principle and characteristics of semiconductor devices.
4. To analyze the various logic gates and switching theory.
5. To understand the principles of measurement systems and transducers.

UNIT – I INTRODUCTION TO BASIC ELECTRICAL ELEMENTS **9**

Electrical circuit: passive elements - Resistor, Inductor and Capacitor; active elements- Current, Voltage, Power and Energy – Ohm's Law and limitations - Kirchhoff's Laws – relationship between current, voltage and power – Resistors in series, parallel and series -parallel circuits.

UNIT - II FUNDAMENTALS OF DC AND AC CIRCUITS **9**

DC Circuits: Sources of Electrical Energy - Independent and Dependent Source, Source Conversion - Star –Delta conversion- Mesh and Nodal Analysis.

AC Circuits: Generation of sinusoidal - voltage, average - RMS value, form factor and peak factor- Phasor diagrams of R, L, C, combination of R-L, R-C and R-L-C circuits.

UNIT – III SEMICONDUCTOR DEVICES AND APPLICATIONS **9**

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT – IV DIGITAL ELECTRONICS **9**

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts).

UNIT – V MEASUREMENT SYSTEMS AND TRANSDUCERS **9**

Measurements-Significance of Measurements-Methods of Measurement-Direct methods, indirect methods-Instrument and measurement systems-Mechanical, Electrical and Electronic instruments-Classification of instruments- characteristics of instruments and measurement systems-Errors-Type of Errors –Units and Standards. Moving coil and moving iron meters, Energy meter and watt meter. Transducers- RTD, Strain gauge, LVDT.

TOTAL HOURS: 45 PERIODS

COURSE OUTCOMES:

Upon Completion of this course, students will be able to:

CO1: Recognize the different combinations of circuit elements and solving the circuit by applying basic circuital laws.

CO2: Acquire a good understanding of DC and AC circuits.

CO3: Demonstrate the characteristics of semiconductor devices.

CO4: Design the various logic gates for switching applications.

CO5: Understand the principles of measurement systems and transducers.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Learn the concept of manufacturing methods encountered in engineering practice such as foundry and welding processes													2		
CO2	Know the working of internal combustion engines and the concept of sources of energy, working principle of refrigeration and air conditioning		2							1	2				2	
CO3	Recognize the different combinations of circuit elements and solving the circuit by applying basic circuital laws.	2										3			3	
CO4	Acquire a good understanding of DC and AC circuits.		3					2		1				2		
CO5	Understand the principles of measurement systems and transducers.		2											1	3	1

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218EGT04	ENGINEERING GRAPHICS	L	T	P	C
		2	0	4	3

OBJECTIVES:

1. To understand the graphical skills for drawing the object and the principle of free-hand sketchingtechniques.
2. To understand the principle of orthographic projection of points, lines and plane surfaces.
3. To study the principle of simple solids.
4. To understand the principle of section and development of solids.
5. To understand the principle of Isometric and Perspective projections.

Concepts and conventions (Not for Examination) **03**

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

UNIT I PLANE CURVES AND FREE HAND SKETCHING 15

Curves used in engineering practices:

Conics – Construction of ellipse, Parabola and hyperbola by Eccentricity method – Construction of cycloid – Construction of involutes of square and circle – Drawing of tangents and normal to the above curves. **Free hand sketching:**

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 15

Projection of points and straight lines located in the first quadrant – Determination of true lengths andtrue inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS 15

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to onereference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 15

Sectioning of simple solids like prisms, pyramids, cylinders and cones in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones

– Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 12

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncatedprisms, pyramids, cylinders and cones.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL HOURS:45 PERIODS

Course Outcome		PSO1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Environmental Pollution or problems cannot be solved by mere laws. Public participationis an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.	3			2	2		3			1			3	2	
CO2	Public awareness of environmental is at infant stage.	3				2		3						3	2	
CO3	Ignorance and incomplete knowledge has led to misconceptions	3	1					3						3	2	
CO4	Development and improvement in std. of living has led to serious environmentaldisasters	3		1	1			3						3	2	

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218CPT05	PROGRAMMING IN C	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions, pointers and structures
- To do input/output and file handling in C

UNIT-I BASICS OF C LANGUAGE 9

Introduction to C Programming – Fundamentals – Structure of a C Program – Compilation and Linking Processes – Constants, Variables – Data Types – Expressions Using Operators in C – Managing Input and Output Operations – Decision Making and Branching – Looping Statements – Solving Simple Scientific and Statistical Problems.

UNIT-II ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration - One Dimensional and Two Dimensional Arrays - Strings- String Operations – String Arrays. Simple Programs - Sorting- Searching - Matrix Operations-Preprocessor Directives.

UNIT-III FUNCTIONS, STRUCTURES & UNIONS 9

Functions: Definition of function - Declaration of function - Pass by value - Pass by reference – Recursion. Structures and Unions: Introduction - Need for structure data type - Structure definition – Structure declaration - Structure within a structure - Union - Programs using Structures and Unions.

UNIT-IV POINTERS 9

Pointers: Definition – Initialization – Pointer Constant - Pointer Operators - Pointers Arithmetic - Pointer to an array: Pointers and one dimensional array -Pointers and Multi-Dimensional array - Pointer to Pointer - Void Pointer – Null Pointer - Pointer to Function - Pointer and Strings - Dynamic memory allocation.

UNIT-V STORAGE CLASSES AND FILES 9

Storage classes – auto, static, extern, and register- scope rules - Files: Introduction – Using files in C - Operations on files - Types of file processing: Sequential access, Random access - Sequential access file working with text files - File Handling Functions - Error handling - Command Line Arguments.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Develop simple applications in C basics

CO2: Design and implement applications using arrays and strings

CO3: Develop and implement applications in C using functions and structures.

CO4: Develop applications in C using pointers.

CO5: Design applications using sequential and random access file processing.

TEXT BOOKS:

1. Ashok.N.Kamthane,- "Computer Programming" , Pearson Education, Second edition (India), 2012.
2. E.Balagurusamy, - "Computing fundamentals and C Programming", Tata McGraw-Hill Publishing Company Limited, 2008.

COURSE OUTCOMES:

The student will be able to

CO1: Recognize the conventions and apply dimensioning concepts while drafting simple objects.

CO2: Draw the orthographic projection of points, line, and plane surfaces.

CO3: Draw the orthographic projection of simple solids.

CO4: Draw the section of solid drawings and development of surfaces of the given objects.

CO5: apply the concepts of isometric and perspective projection in engineering practice.

TEXT BOOKS:

1. Ranganath G, Channankaiah and Halesh Koti, "Engineering Graphics", Second Edition, Sahana Publishers, 2015.
2. Bhatt. N.D., "Engineering Drawing" Charotar Publishing House, 53th Edition, 2014.

REFERENCE BOOKS:

1. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw HillPublishing Company Limited, 2017.
2. Gopalakrishnana. K. R, "Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.
3. Basant Agarwal and C.M.Agarwal, "Engineering Drawing", Tata McGraw Hill, 2013.
4. Natrajan K. V, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai,2012.
5. M.B.Shaw and B.C.Rana, "Engineering Drawing", Pearson Education India, 2011.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Recognize the conventions and apply dimensioning concepts while drafting simple objects.		2		1								1	1		1
CO2	Draw the orthographic projection of points, line, and plane surfaces.	2	1		1								1		2	
CO3	Draw the orthographic projection of simple solids.	2	2		2								1		3	
CO4	Draw the section of solid drawings and development of surfaces of the given objects.		1		2								2			2
CO5	Apply the concepts of isometric and perspective projection in engineering practice.	1	1	1							2					1

218EPP08 **ENGINEERING PRACTICE LABORATORY** L T P C
0 0 2 1

OBJECTIVES:

1. To get the knowledge on welding techniques and its types.
2. To do the fitting operation on a given material. (Specimen)
3. To carry out sheet metal operation.
4. To know the principle involved in plumbing work.
5. To do the carpentry work on a given work piece.

LIST OF EXPERIMENTSWELDING:

Study of Electric Arc welding and Gas welding tools and equipment's.

Preparation of Arc welding and Gas welding models:

i) Butt joint ii) Lap joint iii) T - joint.

FITTING:

Study of fitting tools and operations.

Preparation of fitting models: i) V-fitting ii) Square fitting

SHEET METAL WORK:

Study of sheet metal tools and operations

Preparation of sheet metal models: i) Rectangular Tray ii) Funnel

PLUMBING WORKS:

Study of pipeline joints and house hold fittings.

Preparation of plumbing models: Basic pipe connections with PVC and GI pipe fittings.

CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture.

Preparation of carpentry models:

i) Lap joint ii) Dovetail joint iii) T-JointDEMONSTRATION ON:

ELECTRICAL ENGINEERING PRACTICE

Study of Electrical components and equipment's
Residential house wiring using switches, fuse, indicator, lamp and energy meter.**ELECTRONICS ENGINEERING PRACTICE**
Study of Electronic components –Resistor, color coding, capacitors etc
Soldering practice –components soldering in simple electric circuit & testing continuity**COMPUTER HARDWARE AND SOFTWARE PRACTICE**
Study of PC Hardware, Internet & World Wide Web and Productivity tools including Word,Excel, Power Point and Publisher.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

The students will be able to

CO1: Prepare simple Lap, Butt and T- joints using arc welding equipment's.
CO2: Prepare the rectangular trays and funnels by conducting sheet metal operation.
CO3: Prepare the pipe connections and identify the various components used in plumbing.
CO4: Prepare simple wooden joints using wood working tools.
CO5: Demonstrate basic electrical, electronic and computer components based on their physicalparameters and dimensions.

Course Outcome		PS O1	PS O2	PS O3	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	Carry out the volumetric experiments and improve the analytical skills.		3	3	3								3	3		3
CO2	Understand the maintenance and usage of analytical instruments and thereby develop their skills in the field of engineering.		2	3	2	2							2	3	3	3
CO3	Understand the principle and handling of electrochemical instruments and Spectrophotometer.		2	3	2								2	3	3	3
CO4	Apply their knowledge for protection of different metals from corrosion by using different inhibitors		2	3	2	3					2		2	3		3

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218CPP08

PROGRAMMING IN C LABORATORY

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- To develop C programs using conditional and looping statements
- To expertise in arrays and strings
- To build modular programs

Prerequisite: Programming in C

LIST OF EXPERIMENTS:

1. Programs using I/O statements and expressions.
2. Programs using decision-making statements.
3. Programs using looping statements
4. Programs using 1-D and 2-D array.
5. Programs for scientific and statistical problem.
6. Programs using string functions
7. Programs using user defined functions.
8. Programs using Recursion and call by value and call by reference
9. Program to sort the list of numbers using pass by reference.
10. Programs using structures and Union.
11. Program using structures and pointers.
12. Program using i) Sequential access file.
    ii) Random access file.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Write and compile programs using C- Language.

CO2: Develop programs in C for any computing problems

CO3: Implement program using control statements.

CO4: Handle arrays and strings.

CO5: Develop C programs involving functions, recursion, pointers, and structures.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Write and compile programs using C-Language.	3	3							3	3			3	3	3
CO2	Develop programs in C for any computing problems	3	3							3	3			3	3	3
CO3	Implement program using control statements.	3	3							3				3	2	
CO4	Handle arrays and strings.	3	3					2		3				2	1	
CO5	Develop C programs involving functions, recursion, pointers, and structures.	3	2							3	3			2	3	3

TEXT BOOKS:

1. Ranganath. G & Channankaiah, "Engineering Practices Laboratory Manual", S.S. Publishers, 2014.
2. Jeyapoovan.T & Gowri S "Engineering Practice Lab Manual", Vikas publishing house pvt.ltd, 2016.

REFERENCE BOOKS:

1. Kannaiah.P & Narayana.K.L, "Manual on Workshop Practice", Scitech Publications, 2015.
2. Ramesh BabuV, "Engineering Practices Laboratory Manual", VRB Publishers Private Limited, Chennai, Revised Edition, 2014.
3. Peter Norton, "Introduction to Computers", 7th Edition, Mc Graw Hill, 2010.
4. Bawa. H.S, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, 2009.
5. David Anfinson and Ken Quamme, "IT Essentials PC Hardware and Software Companion Guide", CISCO Press, Pearson Education, Third Edition, 2008.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Prepare simple Lap, Butt and T- joints using arc welding equipment.	3								3	3			3	3	3
CO2	Prepare the rectangular trays and funnels by conducting sheet metal operation.	2	2							2	3	3		2	3	3
CO3	Prepare the pipe connections and identify the various components used in plumbing.	2								2	3	3		2	3	3
CO4	Prepare simple wooden joints using wood working tools.	2	3					2		2	3			2	3	3
CO5	Demonstrate basic electrical, electronic and computer components based on their physical parameters and dimensions.	3	2							3	3	2		1	3	3

218BSE09	PHYSICS FOR INFORMATION SCIENCE	L	T	P	C
		2	0	0	2

OBJECTIVES:

1. To study the basic theory of structure of crystalline materials.
2. To understand the essential principles of electrical properties of materials.
3. To get the better knowledge of Physics of semiconductor materials.
4. Become proficient in optical properties of materials.
5. To understand the essential concepts of quantum structures and their applications

UNIT I CRYSTALLOGRAPHY **9**

Crystal structures- Parameters- Bravais lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing factor for SC, BCC, FCC, HCP and Diamond cubic structure - NaCl, ZnS structures (qualitative). Miller indices- unit cell approach.

UNIT II ELECTRICAL PROPERTIES OF MATERIALS **9**

Classical free electron theory-Expression for electrical conductivity-Thermal conductivity, Expression-Wiedemann-Franz law-Success and failures-Quantum free electron theory-Particle ina finite potential well-Tunneling-Particle in a three dimensional box-degenerate States-Fermi-Dirac statistics-Density of energy states-Energy bands in solids.

UNIT III SEMICONDUCTORS AND TRANSPORT PHYSICS **9**

Intrinsic Semiconductors-Energy band diagram-direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors-extrinsic semiconductors-Carrier concentration in N-type & P-type semiconductors (qualitative) -Variation of carrier concentration with temperature -Hall effect and devices-Ohmic contacts-Schottky diode.

UNIT IV OPTICAL PROPERTIES OF MATERIALS **9**

Classification of optical materials - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) – photo current in a P-N diode – solar cell – LED –Organic LED – Laser diodes – Optical data storage techniques.

UNIT V QUANTUM DEVICES **9**

Particle in a rectangular box and sphere: wave function and energy- quantum confinement-quantum structures- tunneling – single electron phenomena- single electron translator states-classical bits- multiple quits-block sphere- quantum gates-advantage of quantum computation.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Have the necessary understanding on the functioning of crystalline in solids of materials.

CO2: Gain knowledge on classical and quantum electron theories, and energy band structures,

CO3: Acquire knowledge on basics of semiconductor physics and its applications in various devices,

CO4: Have the necessary understanding on the functioning of optical materials for optoelectronics,

CO5: Understand the basics of quantum structures and their applications.

REFERENCE BOOKS:

1. Pradip Dey, Manas Ghoush, -"Programming in C", Oxford University Press, 2012.
2. Byron Gottfried, - "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH Publications, 2010.
3. Stephen G.Kochan, - "Programming in C", 4th Edition, Pearson Education India, 2015.
4. Brian W.Kernighan and Dennis M.Ritchie, -"The C Programming Language", Pearson Education Inc., 2005.
5. Behrouz A.Forouzan and Richard.F.Gilberg, - "Computer Science A Structured Programming Approach using C" 3rd Edition, Cengage Publications, 2013

Course Outcome		PSO1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Co1	Develop simple applications in C basics		3	3	3								3	3		3
Co2	Design and implement applications using arrays and strings		2	3	2	2							2	3	3	3
Co3	Develop and implement applications in C using functions and structures.		2	3	2								2	3	3	3
Co4	Develop applications in C using pointers.		2	3	2	3					2		2	3		3
Co5	Design applications using sequential and random access file processing.		1	3	3	2							3	3	2	3

318CIT02	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- Outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- Discuss the concept of memories and programmable logic devices.
- Illustrate the concept of synchronous and asynchronous sequential circuits.
- Interpolate the concept of Programming in VHDL.

PREREQUISITES: Nil

UNIT-I BOOLEAN ALGEBRA AND LOGIC GATES **9**

Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Logic gates

UNIT-II COMBINATIONAL LOGIC **9**

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations – Code conversion -Decoders and encoders - Multiplexers and demultiplexers – Comparator.

UNIT-III SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL LOGIC **9**

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Hazards-Hazard free realizations.

UNIT-IV PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES **9**

Memories: ROM, PROM, EPROM, PLA, PLD, FPGA, Introduction to Flash Memory. Digital Logic Families: TTL, ECL, CMOS.

UNIT-V PROGRAMMING WITH VHDL **9**

VHDL program structure-operators-Data flow modeling-Design of combinational and sequential circuits-Examples: Adders, subtractors, multiplexers / Demultiplexers, Encoder / Decoder,FF's, Counters).

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Solve the Postulates of Boolean algebra using different techniques

CO2: Design the Combinational and sequential circuits

CO3: Apply the concept of synchronous and asynchronous circuit

CO4: Summarize the concept of memories and programmable logic devices.

CO5: Knowledge in VHDL for VLSI Design.

TEXT BOOK:

1. M.Morris Mano, "Digital Design", 3rd Edition, Pearson Education, 2007.

REFERENCE BOOKS:

1. Charles H.Roth, Jr. "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, Latest Edition.
2. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007
3 .Charles H.Roth,Lizy Kurian John,"Digital System Design using VHDL"2nd Edition PWS Publishing Company,2008

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Solve the Postulates of Boolean algebra using different techniques	3		2										1		
CO2	Design the Combinational and sequential circuits		2	3											2	
CO3	Apply the concept of synchronous and asynchronous circuit	3	3			3									3	
CO4	Summarize the concept of memories and programmable logic devices.		2				2									
CO5	Knowledge in VHDL for VLSI Design.	3		2	3											

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318ITT03	COMMUNICATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Understand the various modulation and demodulation schemes for Amplitude and Angle Modulation.
- Infer the basic concepts of Digital Communication systems in baseband signals.
- Summarize the design concepts and performance of sampling and pulse modulation techniques.
- Acquire knowledge about spread spectrum and multiple access techniques.
- Learn about the fundamental concepts in Satellite and Optical communication.

PREREQUISITES: Nil

UNIT-I FUNDAMENTALS OF ANALOG COMMUNICATION 9

Need for Modulation-Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percentage modulation , AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation.

UNIT-II DIGITAL COMMUNICATION 9

Introduction- sampling theorem- digital modulation schemes-ASK-FSK-BPSK-QPSK-DPSK,bit rate and baud rate calculations, Quadrature Amplitude Modulation.

UNIT-III DIGITAL TRANSMISSION 9

Introduction- Pulse modulation schemes- PAM-PWM-PPM-PCM –delta modulation, adaptive delta modulation, differential pulse code modulation- pulse transmission – Inter symbol interference, eye patterns.

UNIT-IV SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

Introduction, PN sequences – properties – m-sequence –DSSS –Processing gain, jamming – FHSS – Multiple Access – FDMA, TDMA, CDMA.

UNIT-V SATELLITE AND OPTICAL COMMUNICATION 9

Introduction-Satellite Communication Systems-Kepler's Law, LEO and GEO Orbits, Link model-Optical Communication Systems-Elements of Optical Fiber Transmission link, Fiber Types, Losses, Optical Sources and Detectors.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Analyze the different modulation and demodulation schemes

CO2: Apply the basic concepts of different Digital Communication Techniques.

CO3: Channelize the design concepts and performance of sampling and pulse modulation techniques.

CO4: Interpret the knowledge about spread spectrum and multiple access techniques

CO5: Gain knowledge on Satellite and Optical communication.

TEXT BOOK:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6/e, Pearson Education,2007.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons., 2001.

REFERENCE BOOKS:

1. H.Taub,D L Schilling ,G Saha ,"Principles of Communication"3/e,2007.
2. B.P.Lathi,"Modern Analog And Digital Communication systems", 3/e, Oxford University Press, 2007
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
4. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, PHI, 2002.
5. Gerd Keiser, "Optical Fiber Communications", Tata McGraw-Hill Education, 4th Edition, 2008

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Analyze the different modulation and demodulation schemes	3	3												2	
CO2	Apply the basic concepts of different Digital communication Techniques.	2	3											3		
CO3	Channelize the design concepts and performance of sampling and pulse modulation techniques.			3												
CO4	Interpret the knowledge about spread spectrum and multiple access techniques	3			3											
CO5	Gain knowledge on Satellite and Optical communication.		2				1								2	2

318CIT04	OBJECT ORIENTED PROGRAMMING IN C++	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Demonstrate a thorough understanding of the object-oriented programming paradigms.
- Build C++ classes using appropriate encapsulation and design principles.
- Learn to use several oops concepts to create, debug and run simple C++ programs.
- To impart hands on experience to solve different problems using C++.

Prerequisite: Programming in C

UNIT-I INTRODUCTION 9

Object-Oriented Paradigm - Merits and Demerits of OO Methodology – Object-Oriented Programming Concepts: Classes – Objects – Data abstraction and encapsulation – Inheritance – Polymorphism – Dynamic binding – Message Passing – C++ Fundamentals: Tokens – Expressions – Control Structures - Functions.

UNIT-II CLASSES AND OBJECTS 9

Classes and Objects – Passing objects as arguments – returning objects – Friend functions – Inline function – Static data and member functions - Constructors - Parameterized constructor – Copy constructor – Destructor - Array of Objects – pointer to object members.

UNIT-III POLYMORPHISM AND INHERITANCE 9

Polymorphism – Function overloading – Unary operator overloading – binary operator overloading – Data Conversion - Overloading with Friend Functions. Inheritance – Constructor in Derived class – Abstract Classes - Types of Inheritance.

UNIT-IV VIRTUAL FUNCTIONS, TEMPLATES AND STANDARD TEMPLATE LIBRARY 9

Virtual functions – Need - Pure Virtual Functions – Virtual Destructors. Template – Class template, Function Template. **STL: Introduction algorithms – Sequence Containers – Iterators – Specialized Iterators – Associative Containers – Strong user-defined object – Function objects.**

UNIT-V FILES AND EXCEPTION HANDLING 9

C++ streams – console streams – console stream classes - formatted and unformatted console I/O operations – Manipulators. File streams classes - File modes - File pointers and Manipulations - File I/O – Exception handling - Exception handling Model – List of Exceptions – catch all Exception –uncaught Exceptions – **User Defined Exceptions.**

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Describe the important concepts of Object Oriented Programming.

CO2: Identify the relationship between the classes and link them using appropriate concepts.

CO3: Develop solutions for given problems using Polymorphism and Inheritance concepts to solve real world problems.

CO4: Devise generic classes capable of manipulating primitive and user defined data types.

CO5: Develop and implement File I/O operations and Exception handling mechanisms.

TEXT BOOK:

1. Robert Lafore, "Object Oriented programming in C++", 4th Edition, Techmedia Publication, 2013.

REFERENCE BOOKS:

1. Bjarne Stroustrup, "The C++ programming language", Addison Wesley, fourth edition, 2013.
2. K R Venugopal, Rajkumar Buyya, "Mastering C++", 2nd Edition, McGraw Hill Education (India) Pvt. Ltd., 2013.
3. Herbert Schildt, "The Complete Reference,C++"4th Edition, 2011.
4. Paul J Deitel, Harvey M Deitel: "C++ for Programmers", Pearson Education, 2009.
5. Stanley B.Lippmann, Josee Lajoie: "C++ Primer", 4th Edition, Addison Wesley, 2012.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Describe the important concepts of Object Oriented Programming.	3	3		3									3		
CO2	Identify the relationship between the classes and link them using appropriate concepts.	3	3	3	3									2	3	
CO3	Develop solutions for given problems using Polymorphism and Inheritance concepts to	2		3											3	1
CO4	solve real world problems.		2		3			2								
CO5	Devise generic classes capable of manipulating primitive and user defined data types.	2	3		3	3								2		

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318CIT05	DATA STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Understand the need and fundamental concepts of List ADT.
- Acquire knowledge in Stack and Queue data structures.
- Explore Comprehensive knowledge of Trees and their implementations.
- Learn graph data structure to solve problems.
- Familiar with Sorting, Searching and Hashing algorithms.

PREREQUISITES: Programming in C

UNIT I LINEAR DATA STRUCTURES – LIST **6**

Abstract Data Types - The List ADT - Array based Implementation - Linked list Implementation - Doubly Linked List - Circular Linked List - Applications of Linked List - Polynomial Operations

UNIT II LINEAR DATA STRUCTURES – STACKS AND QUEUES **9**

The Stack ADT - Array Implementation - Linked List Implementation - Applications of Stack -Balancing Symbols - Postfix Expressions - Infix to Postfix Conversion - The Queue ADT - Array Implementation - Linked List Implementation - Circular Queue - Application of Queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES **10**

Preliminaries - Binary Trees - Array Implementation - Linked List Implementation - Tree Traversals - Expression Trees - Binary Search Tree - Operations on Binary Search Tree – AVL Trees - Heaps - Binary Heaps - Operations of Heaps - Binomial Queues - B-Tree -B^+ Trees.

UNIT IV NON LINEAR DATA STRUCTURES -GRAPHS **10**

Representation of Graphs –BreadthFirst Traversal- Depth First Traversal - **Bi-connectivity – Cut vertex – Euler circuits**– Topological Sorting– Application of Graphs - Shortest Path Algorithm: Floyd Warshall - Bellman Ford - Dijkstra'sAlgorithm -Minimum Spanning Trees: Prim's Algorithm - Kruskal's Algorithm.

UNITV SEARCHING, SORTING AND HASH TECHNIQUES **10**

Searching: Linear Search - Binary Search

Sorting: Insertion Sort - Selection Sort - Shell Sort - Bubble Sort - Quick Sort - Merge Sort - Radix Sort **Hashing**: Hash Functions - Separate Chaining -Open Addressing - Rehashing - Extendible Hashing.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Implement List ADT to solve real time problems.

CO2: Develop applications using Stack and Queues data structures.

CO3: Design and Implement applications on trees.

CO4: Implement graph data structure for solving problems.

CO5: Develop various Sorting, Searching and Hashing algorithms to small and large data sets.

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2016.
2. Debasis Samanta, "CLASSIC DATA STRUCTURES", Second Edition, PHI Learning Private Limited Publishers, 2011.

REFERENCE BOOKS:

1. Michael T. Goodrich ,Roberto Tamassia , David Mount , "Data Structures and Algorithms in C++", Second Edition, 2016.
2. Wisnu Anggoro ,"C++ Data Structures and Algorithms: Learn how to write efficient code to build scalable and robust applications in C++", 2018
3. Ellis Horowitz, Sartaj Sahani,Dinesh Mehta, "Fundamentals of Data Structures in C++",Second Edition,2008

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement List ADT to solve real time problems	3	3	3	2									3	2	
CO2	Develop applications using Stack and Queues data structures	3	3	2	2										3	
CO3	Design and Implement applications on trees		3	3										2		
CO4	Implement graph data structure for solving problems		2	3	3										3	
CO5	Develop various Sorting, Searching and Hashing algorithms to small and large data sets		3	3	2											3

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318CIT06	COMPUTER ORGANIZATION	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To have insight into the basic structure of computers.
- To understand the design and implementation of ALU.
- To comprehend the importance of the memory and I/O communication.
- To familiarize basic concepts of Parallelism.

Prerequisites: Nil

UNIT-I BASIC STRUCTURE OF COMPUTER SYSTEM 9

Functional units – Basic operational concepts – Bus structures – Memory Locations and Addresses – Instructions and instruction sequencing - Addressing modes –**RISC and CISC** - Basic I / O Operations.

UNIT-II COMPUTER ARITHMETIC AND CONTROL UNIT 9

Number Representation and Arithmetic Operations - Addition and Subtraction of Signed Numbers – Multiplication of Positive Numbers – Signed Operand Multiplication– Integer Division - Floating point Numbers and operations - Control Units - Fundamental concepts – Instruction Execution– Hardwired control – Micro programmed control.

UNIT-III PIPELINING 9

Basic concepts – Data hazards – Instruction hazards - Unconditional branches – Conditional branches –Branch Prediction – Influence on instruction sets – Data path and control considerations - Super scalar operations – Performance considerations.

UNIT-IV MEMORY & I/O ORGANIZATION 9

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories –**Performance Considerations of Cache memory - Virtual memory** - Accessing I/O devices – Interrupts – Direct Memory Access – Interface circuits – Standard I/O Interfaces: USB, **Firewire**.

UNIT-V PARALLELISM 9

ILP – Concepts & Challenges – Compiler Techniques – Reducing branch costs – Dynamic scheduling - Parallel Processing and Performance- Hardware Multithreading – Flynn's Classification (SISD, MIMD, SIMD, SPMD) - Vector (SIMD) Processing - Shared-Memory Multiprocessors - Cache Coherence - Message-Passing Multi computers - Parallel Programming for Multiprocessors - Performance Modeling.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand basic operational concepts of computers, ALU and Instructions.

CO2: Know the computer arithmetic and control unit operations.

CO3: Comprehend and analyze the Pipelined Execution.

CO4: Know the various Memory Systems and I/O Organization.

CO5: Understand Parallelism and Multiprocessor architectures.

TEXT BOOKS:

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky&NaraigManjikian-"Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.
2. John L. Hennessey and David A. Patterson, - "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, Sixth Edition, 2017.

REFERENCE BOOKS:

1. David A. Patterson and John L. Hennessy, -"Computer Organization and Design: The Hardware / Software interface", Fourth Edition, Elsevier, 2012.
2. William Stallings, - "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand basic operational concepts of computers, ALU and Instructions	3	3	2										3		
CO2	Know the computer arithmetic and control unit operations	2	3	3	2										3	
CO3	Comprehend and analyze the Pipelined Execution		3	3	3	2										
CO4	Know the various Memory Systems and I/O Organization	1	2		3										2	
CO5	Understand Parallelism and Multiprocessor architectures		2		3	3								2		

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318CIP07	DIGITAL ELECTRONICS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE(S):

- Identify the various functions of digital IC's.
- Demonstrate the various combinational circuits using logic gates.
- Design and Implement various sequential circuits using logic gates
- Develop VHDL code for various combinational
- Generate VHDL code for various sequential circuits

PREREQUISITES: Nil

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of Adder / Subtractor, Encoders/Decoders, Code Converters using basic gates.
3. Design and implementation of 4-bit binary adder / subtractor using MSI Circuits.
4. Design and implementation of parity generator / checker using basic gates and MSI Circuits
5. Design and implementation of Magnitude Comparator
6. Design and implementation of Multiplexers/Demultiplexers
7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters.

VHDL PROGRAMMING

9. Simulation of Adder/Subtractor.
10. Simulation of Encoders/Decoders.
11. Simulation of Shift Registers.
12. Simulation of Counters.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Apply Digital ICs for various applications.

CO2: Analyze the various combinational circuits using logic gates.

CO3: Implement various sequential circuits using logic gates.

CO4: Write VHDL code for various combinational circuits.

CO5: Write VHDL code for various sequential circuits.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Apply Digital ICs for various applications.	3	3											3		
CO2	Analyze the various combinational circuits using logic gates.	2	3													
CO3	Implement various sequential circuits using logic gates	3	3	3											3	
CO4	Write VHDL code for various combinational circuits		3	3		2									3	
CO5	Write VHDL code for various sequential circuits					3										3

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318ITP08 **OBJECT ORIENTED PROGRAMMING LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- To learn object oriented programming concepts using C++ to solve problem.
- To implement various concepts of OOP using C++.

LIST OF EXPERIMENTS:

Implement the following concept using C++

1. Simple C++ Control Structures and arrays.
2. Simple class, objects and array of objects.
3. Function Recursion and Inline function.
4. Constructors, Destructors.
5. Method and Operator Overloading
6. Inheritance, Data conversions.
7. Friend function and Friend class.
8. Virtual function and virtual base class.
9. Templates (Function and Class) and **STL**
10. File operations and Exception handling

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Implement class, object, and constructor concepts by using object oriented programming language.
CO2: Develop programs using inheritance and polymorphism.
CO3: Develop and implement overloading concepts & various functions.
CO4: Construct generic classes using templates & STL.
CO5: Implement various file concepts, exception handling by using object oriented concepts.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement class, object, and constructor concepts by using object oriented programming language	2	3	3	2									3		
CO2	Develop programs using inheritance and polymorphism		2	3	3										3	
CO3	Develop and implement overloading concepts & various functions	3	2	3	1											
CO4	Construct generic classes using templates & STL		3	2												
CO5	Implement various file concepts, exception handling by using object oriented concepts			3	3	3	1								3	2

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318ITP09 **DATA STRUCTURES LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- Efficiently implement the different Linear Data Structures
- Learn and Expose Non-Linear Data Structures.
- Build knowledge on Application of Graph
- Learn to implement Searching, Sorting and hashing Algorithms.

PREREQUISITES: Programming in C

DATA STRUCTURE USING C / C++:

1. Linked List Implementation of Singly and Doubly Linked list.
2. Polynomial Operations (Addition)
3. Linked List Implementation of Stack and Queue.
4. Applications of Linked List and Stack
5. Tree Traversal algorithms.
6. Operation of Binary Search Tree.
7. Heaps using Priority Queue.
8. Graph Traversal algorithms.
9. Applications of Graph (Dijkstra's, Prims, Kruskal)
10. Searching Algorithms
11. Sorting Algorithms. (Insertion, Quick, Merge)
12. Hashing techniques.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Implement programs for manipulating List, Stack and Queue ADT with its Applications.
CO2: Perform various Tree Operations
CO3: Apply and implement Graph Data Structures for Real Time Applications.
CO4: Implement various Searching and Sorting Algorithms.
CO5: Implement Hashing Algorithms.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement programs for manipulating List, Stack and Queue ADT with its Applications.		3	3	3									3		3
CO2	Perform various Tree Operations		3	3		1									3	
CO3	Apply and implement Graph Data Structures for Real Time Applications.			2	3	2	2									
CO4	Implement various Searching and Sorting Algorithms.		2		2									2		
CO5	Implement Hashing Algorithms.		3	3		32							2			

418DMT01 **DISCRETE MATHEMATICS**

L	T	P	C
3	1	0	4

OBJECTIVE(S):

- To master combinatorics which deals with the counting principles.
- To identify the basic properties of graph and model simple applications.
- To understand the concept of logic and hence to construct valid mathematical arguments.
- To expose the basic properties and concepts of algebraic structures.
- To introduce the concept of Lattices and Boolean algebra.

UNIT-I COMBINATORICS **9+3**

Mathematical Induction – The basics of Counting Principle - The Pigeonhole principle - Permutations and Combinations – Recurrence relations- Solving linear recurrence relations - Generating functions – Inclusion and exclusion principle.

UNIT-II GRAPHS **9+3**

Graphs – preliminaries - Types of graphs – properties – walks, trials and paths – Isomorphism of graphs – Matrix representations of graphs - Connectivity of a graph – Bipartite graphs - Euler and Hamilton graphs - Colouring of graphs - Chromatic number of a graph.

UNIT-III LOGICS AND PROOFS **9+3**

Propositional Logic – Propositional equivalences - Predicates and quantifiers – Nested Quantifiers – Rules of inference - introduction to proofs – proof methods and strategy.

UNIT-IV ALGEBRAIC STRUCTURES **9+3**

Algebraic systems – Semi groups and monoids – Groups-Subgroups and homomorphisms – Cosets and Lagrange's theorem – Rings & Fields.

UNIT-V LATTICES AND BOOLEAN ALGEBRA **9+3**

Partial ordering – Posets – Lattices as Posets – Properties of lattices-Lattices as algebraic systems – Sub lattices – direct product and Homomorphism – Some special lattices – Boolean algebra.

TOTAL HOURS:60 PERIODS

COURSE OUTCOMES:

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

CO1: Understand and demonstrate the applications of basic concepts of an algorithm and Counting principles in combinatorial mathematics.

CO2: acquaint the graph theory concepts which serves as the base for the real time applications in network analysis.

CO3: Expertise the knowledge of logics helps to verify the correctness of computer programs and to draw conclusions from scientific experiments.

CO4: internalize the abstract algebraic structures which provides the ability to deal the theory of sequential machines, formal languages and syntactic analysis.

CO5: Imbibe the concept of Lattices and Boolean algebra.

TEXT BOOKS:

1. T.Veerarajan, "Discrete Mathematics with Graph Theory and Combinatorics", Tata McGraw - Hill Pub. Co. Ltd, New Delhi.

REFERENCE BOOKS:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Seventh edition, Special Indian edition , Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2011.
2. Trembly J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, thirtieth re-print 2007.
3. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, 2007.
4. Thomas Koshy, ``Discrete Mathematics with Applications", Elsevier Publications, 2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand and demonstrate the applications of basic concepts of an algorithm and Counting principles in combinatorial mathematics.	3		3		3								3		3
CO2	Acquaint the graph theory concepts which serves as the base for the real time applications in network analysis.	3	3		3										3	
CO3	Expertise the knowledge of logics helps to verify the correctness of computer programs and to draw conclusions from scientific experiments.	3	3	2		3									3	3
CO4	Internalize the abstract algebraic structures which provides the ability to deal the theory of sequential machines, formal languages and syntactic analysis.	2	3	3												3
CO5	Imbibe the concept of Lattices and Boolean algebra.		3			3								3		

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418CIT02	DESIGN AND ANALYSIS OF ALGORITHM	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Learn about Asymptotic Notations to solve Recurrence Equations.
- Understand various Algorithm Design Techniques like Divide and Conquer, Greedy Method, Dynamic Programming, Backtracking, Branch and Bound.
- Critically analyze the Efficiency of alternative Algorithm Solutions for Real World Problems.
- Learn about NP Class of Problems and their Variations.

Pre-requisites: Data Structures and Algorithms

UNIT-I INTRODUCTION TO ALGORITHM ANALYSIS 9

Algorithm - Fundamentals of Algorithmic Problem Solving: Algorithm Design and Analysis Process - Algorithm Design Techniques - Methods of Specifying an Algorithm - Algorithm Analysis - Important Problem Types - Asymptotic Notations - Properties of Big-Oh Notation - Recurrence Equations - Solving Recurrence Equations: Substitution Method, Iteration Method - Master's Method.

UNIT-II DIVIDE AND CONQUER AND GREEDY ALGORITHMS 10

Divide and Conquer: General Method - Binary Search - Finding Maximum and Minimum - Merge Sort - **Quick Sort** - Greedy Algorithms: General Method - Single Source Shortest Path Problem - Container Loading - Knapsack Problem - Huffman Codes.

UNIT-III DYNAMIC PROGRAMMING AND ITERATIVE IMPROVEMENT 10

Dynamic Programming: General Method - Multistage Graphs - All Pair Shortest Paths - Optimal Binary Search Trees - 0/1 Knapsack - Travelling Sales Person Problem. Iterative Improvement: The Maximum Flow Problem - Maximum Matching in Bipartite Graphs - The Stable Marriage Problem.

UNIT-IV BACKTRACKING AND BRANCH AND BOUND 9

Backtracking: General Method - 8 Queens Problem - Sum of Subsets - Graph Coloring - Hamiltonian Circuit Problem - Knapsack Problem. Branch and Bound: Least Cost Search - The 15 Puzzle Problems - FIBO Branch and Bound - LC Branch and Bound - 0/1 Knapsack Problem - **Assignment Problem.**

UNIT-V NP-HARD AND NP-COMPLETE PROBLEMS 8

Basic Concepts: The Class NP-Hard and NP-Complete - **NP Hard Graph Problems - Clique Decision Problem - Node Cover Decision Problem - Chromatic Number Decision Problem - NP Hard Scheduling Problem - Flow Shop Scheduling - Job Shop Scheduling.**

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to:

CO1: Design Algorithms for various Computing Problems.

CO2: Design and analyze algorithm using Divide and Conquer, Greedy Techniques

CO3: Solve and analyze problems using Dynamic programming and iterative improvement

CO4: Analyze back tracking and Branch and Bound algorithm

CO5: Identify any Problem as belonging to the Class of P and NP.

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms / C++, Second Edition, Universities Press, 2007.
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

REFERENCE BOOKS:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Harsh Bhasin , "Algorithms: Design and Analysis", Oxford University Press, 2015.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design Algorithms for various Computing Problems.	3		3		3								3		3
CO2	Design and analyze algorithm using Divide and Conquer, Greedy Techniques	3	3		3										3	
CO3	Solve and analyze problems using Dynamic programming and iterative improvement	3	3	2		3									3	3
CO4	Analyze back tracking and Branch and Bound algorithm	2	3	3												3
CO5	Identify any Problem as belonging to the Class of P and NP.		3			3								3		

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418CIT03	JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To learn the basic syntax and semantics of the Java language and programming environment.
- To understand error handling and multithreading concepts in java.
- Have the ability to write a simple GUI programs with Applet & Swing.
- Be aware of the importance of Utility Classes & Generic Classes.

Pre-requisites: Object Oriented Programming

UNIT -I INTRODUCTION TO JAVA 9

Basic Concepts of Java - Features of Java - Difference between C++ and Java - Class fundamentals - Declaring Objects- Object Reference Variables - Introducing methods - Constructors – Input & Output - Type Conversions and Casting – **Introduction to Wrapper classes**- Arrays - Command line arguments - This keyword – static variables and methods. Polymorphism- Inheritance – Final class and Methods

UNIT-II PACKAGES & EXCEPTION HANDLING 9

Abstract class and methods - Nested classes - Inner classes. **Interfaces**-Packages - Importing a Packages - Exception Handling: Exception Types - Uncaught Exceptions - Using Try Catch - Multiple Catch - Nested Try – Built in Exceptions - User defined Exceptions.

UNIT – III MULTITHREADING&STRING HANDLING 9

Adapter classes - Thread Model - Synchronization – Interthread communication – String Handling: String functions - String class methods - Special String Operations - Character Extraction - String Comparison - Modifying a String - String Buffer – **String Builder**-Introduction to Collection Framework: **ArrayList – Map – Set.**

UNIT-IV DATABASE CONNECTIVITY, APPLET & SWING 9

Accessing database using JDBC - Applet Architecture- Applet Lifecycle-Simple Applet - Introduction to Swings – JFrame – JLabels - JButtons – JComboBox - Event Handling: Event Delegation Model - Event Classes – Event Listener Interface.

UNIT-V UTILITY CLASSES & GENERIC CLASSES 9

Utility Classes: String Tokenizer – BitSet – Date - Calendar - Gregorian – Random- Streams and Files –Byte stream - Character Streams - Stream I/O -**Scanner Class** – Serialization - Generic Class- Generic Method - Generic Interface.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of this course, students are able to:

CO1: Develop Java Programs using OOPs Principles

CO2: Create a real-world application by applying the user defined packages, interfaces.

CO3: Implement multithreading concepts in real time scenarios.

CO4: Design a GUI-based application using Applets &Swings.

CO5: Understand the usage of Utility & Generic Classes.

TEXT BOOKS:

1. R.NageswaraRao, "Core Java An Integrated Approach(Includes all versions JAVA 8)", Dream tech Press, ISBN:978-8177228366,2013
2. C.Xavier, "Java Programming", 1st Edition, McGraw Hill Education, 2011.

REFERENCE BOOKS:

1. Shirish Chavan, "Java for Beginners", 2nd Edition, Shroff Publishers and Distributors Pvt.Ltd, ISBN: 9789350237557, 2012
2. Kathy Sierra, Bert Bates, "Head First Java", 2nd Edition, O'Reilly Media, 2005.
3. H. Schildt, "Java: The complete Reference", 9th Edition, TataMc GrawHill, 2014.
4. Paul Deitel, Harvey Deitel, "Java How to Program",10th Edition, Pearson Education, 2016.
5. Cay S. Horstmann, "Core Java: Volume I- Fundamentals", 10thEdition, Prentice Hall, 2015.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Develop Java Programs using OOPs Principles	3	3	3										3		
CO2	Create a real-world application by applying the user defined packages, interfaces.	3	2	3	3	3	3							3	3	
CO3	Implement multithreading concepts in real time scenarios.	3	1	3	2		2									
CO4	Design a GUI-based application using Applets &Swings.	3	3	3	3			3							3	3
CO5	Understand the usage of Utility & Generic Classes.	3	2	3	3	2										

418ITT05	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Learn the fundamentals of data models and conceptualize and depict a database system using ER diagram.
- Make a study of SQL and relational database design.
- Know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To know the internal storage structures, indexing and advanced database concepts.

Pre-requisites: Nil

UNIT-I INTRODUCTION **7**

Purpose of Database System – Views of data - Database Languages – Data Models – Database System Architecture – Database users and Administrator – Entity Relationship model (E-R Model) – E-R Diagrams.

UNIT-II RELATIONAL MODEL **9**

The relational Model – The catalog - Types of Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - SQL fundamentals – Additional Basic Operations – **Set Operations –Join Operations - Aggregate Functions – Nested Sub Queries** - Integrity – Triggers - Security & Authorization – Embedded SQL– Dynamic SQL - Views.

UNIT-III DATABASE DESIGN **9**

Functional Dependencies – Non-loss Decomposition– First, Second, Third Normal Forms & Dependency Preservation – Boyce / Codd Normal Form - Multi-Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT-IVTRANSACTION MANAGEMENT **9**

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Two Phase Commit – Save Points – Concurrency Control – Locking Based Protocols – Deadlock Handling – **Timestamp Based Protocols** - Serializability – **Transaction as SQL statements.**

UNIT-V STORAGE STRUCTURES **11**

Overview of Physical Storage Media – Tertiary storage – RAID - File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B tree - B+ tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Measures of query cost – Database Tuning - OODB & XML Databases – **Introduction to Distributed Databases.**

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Gain and design extensive knowledge on various data models and ER diagram.

CO2: Recognize and develop sophisticated queries and authorization techniques to extract information from database

CO3: Analyze and eliminate all kind of dependency in a database schema via normalization techniques.

CO4: Apply concurrency control and recovery mechanism.

CO5: Understand the internal storage structures using different file and indexing techniques & advanced database concepts.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 7th Edition, Tata McGraw Hill, 2019.
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2012.

REFERENCE BOOKS:

1. Ramez Elmasri, Shamkant B. Navathe, "Database Systems", 6th Edition, Pearson, 2014.
2. Raghu Ramakrishnan, J.Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill, 2014.
3. Shio Kumar Singh, "Database Systems Concepts, Design and Applications", 2nd Edition, Pearson, 2011.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Gain and design extensive knowledge on various data models and ER diagram.	3	3	1										3		
CO2	Recognize and develop sophisticated queries and authorization techniques to extract information from database	3	3		3								3		3	
CO3	Analyze and eliminate all kind of dependency in a database schema via normalization . techniques.	3	3	2										3		
CO4	Apply concurrency control and recovery mechanism.	2	3	3											3	
CO5	Understand the internal storage structures using different file and indexing techniques & advanced database concepts	2	2	3												3

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418CIT06	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Provide an overview of software engineering and software process models.
- Comprehend fundamental concepts of requirements engineering and requirements specification.
- Understand the different design techniques and software architectural styles.
- LearnVarious testing strategies and maintance measures

UNIT-I SOFTWARE PROCESS MODELS AND AGILE DEVELOPMENT 9

Introduction –The Nature of Software –The Changing Nature of Software - The Software Process - Process Models: The waterfall model – Incremental - Spiral - WINWIN Spiral - Evolutionary model – Prototyping - Object oriented - The Concurrent Development Model - Specialized Process Models - The Unified Process - **Introduction to Agility - Agile process - Extreme Programming - XP Process.**

UNIT-II REQUIREMENTS ENGINEERING 8

Functional and Non-Functional Requirements - User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements Elicitation and Analysis - Requirements Validation - Requirements Management.

UNIT-III ANALYSIS AND DESIGN MODELING 10

The Analysis Concepts - Design Process and Concepts - Design Model - Design Heuristic - Architectural Design - Software Architectural - Architectural Styles - **Architectural Design for Web Apps and Mobile Apps** - User Interface Design - **User Interface Analysis and Design - WebApp and MobileApp Interface Design - Design Evaluation.**

UNIT-IV IMPLEMENTATION & TESTING 10

Programming Standards and Procedures - Programming Guidelines - Documentation- **Software Testing Strategies - Test Strategies for Conventional Software - Object Oriented Software -**Web App - Mobile App - Software Testing Fundamentals - Internal and External Views of Testing - White box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing - Regression Testing - Unit Testing - Integration Testing - User Acceptance Testing - Validation Testing - System Testing and The Art of Debugging - Case Study : Software testing tool – Selenium.

UNIT-V SOFTWARE MAINTENANCE 8

Verification and Validation - Metrics for Process, Project and Product - Process Improvement- Risk Management - Software Maintenance - Business Process Reengineering - Software Reengineering - Reverse Engineering - Restructuring.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Compare and analyze the various life cycle models of software process.

CO2: Describe the process of requirement engineering and Feasibility Studies.

CO3: Prepare Software Requirement document and build requirement model then design the methods for software architecture.

CO4: Formulate various implementation and testing strategies in a system.

CO5: Familiarize various measurements for a software system and Software maintenance.

TEXT BOOKS

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", 8th Edition, McGraw Hill International Edition, 2015 Reprint
2. Ian Sommerville, "Software Engineering", 10th Edition, Pearson Education Asia, 2015.

REFERENCE BOOKS:

1. Shari Lawrence Pfleeger and Joanne M. Atlee, "Software Engineering: Theory and Practice", 4th Edition, Pearson Education, 2010.
2. Watts S.Humphrey,"A Discipline for Software Engineering", Pearson Education, 2007.
3. James F. Peters and WitoldPedrycz," Software Engineering, An Engineering Approach", Wiley-India, 2007.
4. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.
5. S.A.Kelkar,"Software Engineering", Prentice Hall of India Pvt, 2007.
6. Zaigham Mahmood, Saqib Saeed: Software Engineering framework for the cloud computing Paradigms, Springer, 2013.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Compare and analyze the various life cycle models of software process	2	3	3	3							3		3		3
CO2	Describe the process of requirement engineering and Feasibility Studies		3	3	3	3				3		3				3
CO3	Prepare Software Requirement document and build requirement model then design the methods for software architecture	3	3	3	3	2				3		3		3	3	3
CO4	Formulate various implementation and testing strategies in a system		3	3	2							2		2		3
CO5	Familiarize various measurements for a software system and Software maintenance									3		3				3

418CIP07 **JAVA PROGRAMMING LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- To create Java programs that leverage the object-oriented features such as Abstraction, Inheritance and Interfaces.
- To implement error-handling techniques using exception handling.
- To create an event-driven GUI Applications using Swing components.
- To implement I/O functionality to read and write the files.

Pre-requisite: Object Oriented Programming

LIST OF EXPERIMENTS:

Solving Simple problems using

1. Class, Methods- use type casting and Static Members Concepts
2. Polymorphism: Method overloading & Constructor overloading
3. Inheritance (overriding)
4. Implement Packages – Use Abstract class and Final Keyword
5. Threads (single and multithreads) – Use Exception Handling Concepts
6. String Handling functions
7. **Collection Classes any one (ArrayList, Map and Set)**
8. File handling and I/O handling
9. Develop an applicaton using Applet
10. Application Development using Swing, JDBC and Event handling techniques

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

Upon successful completion of this course, students should be able to:

CO1: Write a programs that use the fundamental program constructs, including packages & Interfaces.

CO2: Create &access database connection and handling exceptions.

CO3: Design a GUI-based event handling application using Applets &Swings.

CO4: Understand the I/O functionality to read & write in the files.

CO5: Understand the concept of collection classes

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Write a programs that use the fundamental program constructs, including packages & Interfaces.		3	3	3	3								3	3	3
CO2	Create &access database connection and handling exceptions.		2	3	1	3								3	3	3
CO3	Design a GUI-based event handling application using Applets &Swings.		3	3	2	2								3	3	3
CO4	Understand the I/O functionality to read & write in the files.		3	2	3									3	3	3
CO5	Understand the concept of collection classes		3	3	2										3	2

418CIP08	OPERATING SYSTEM LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE(S):

- Learn shell programming and the use of various system calls in the UNIX environment.
- Expose to process creation, scheduling and inter process communication.
- Be familiar with implementation of page replacement algorithms file allocations, memory management and deadlock avoidance.

Pre-requisites: Programming in C

LIST OF EXPERIMENTS:

(Implement the following on LINUX or other UNIX like platform. Use C for high level language implementation)

1. Basic Shell commands.
2. Write programs to implement File management and Directory management system calls of UNIX operating system (open (), close (), lseek(), read(), write(),mount, umount, link, unlink, mkdir, rmdir).
3. Write programs to implement Process management system calls of UNIX operating system (fork (), wait(), execlp(), exit(), signal(sig, handler), kill(sig, pid)).
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for CPU scheduling algorithms (preemptive and non preemptive). For each of the Scheduling policies, compute and print the average waiting time and average turnaround time.
5. Implementation of Inter Process Communication (using pipes/ shared memory/ message queues).
6. Implement the producer consumer problem using semaphores.
7. Implementation of deadlock avoidance & prevention algorithms.
8. Implementation of Memory management algorithms.
9. Implementation of page replacement algorithms.
10. Implementation of file allocation methods (linked/indexed/contiguous).
11. Implementation of disk scheduling algorithms.
12. Implementation of file organization techniques.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Implement basic services and functionalities of operating system using system call.
CO2: Implement various CPU scheduling algorithm and inter process communication and Semaphores.
CO3: Simulate Producer Consumer problem for process synchronization
CO4: Implement memory management and file allocation techniques algorithms.
CO5: Illustrate disk scheduling algorithms.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Implement basic services and functionalities of operating system using system call.	2	2	3	2	3								3		
CO2	Implement various CPU scheduling algorithm and inter process communication and Semaphores.	3	2	3	3	3									2	
CO3	Simulate Producer Consumer problem for process synchronization	3	2	3	3	2									3	
CO4	Implement memory management and file allocation techniques algorithms.	3	2	3		3									2	3
CO5	Implement memory management and file allocation techniques algorithms.	2	3	2		2								3		3

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418ITP09	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE(S):

- Create database with different types of integrity constraints and use the SQL commands such as DDL, DML & DCL to access data from database.
- Learn to implement SQL join operations & functions, Views
- To know the fundamental concepts of procedures & reports
- To design a database using different tools

Pre-requisites: NIL

LIST OF EXPERIMENTS:

1. Create table for any schema & perform following operations
   A. Add new fields, modify table & fields, remove any record & empty using DDL Commands
   B. Add new record, remove old record & update fields using DML Commands
   C. Apply following constraints: Check, Default, Null, Primary & Foreign key
2. Create tables for any schema & perform Undo, Redo operations, User permission using DCL Commands
3. Create any two tables & convert into normalized form using
   A. Nested Queries
   B. Join queries
   C. Set Operations
4. Implement SQL functions such as Date, Character, general, Aggregate & number functions, etc...
5. Create trigger for update & modify database.
6. Implement PL/SQL Programs with Embedded SQL form
   A. Control structures using Loop, if-else, While & for loop
   B. Procedures to update & reflect in related tables
   C. Using Functions
7. Create Horizontal view, Vertical view & perform following operations add, remove, join, check view updates
8. Design any simple program using VB / VC++.
9. Develop menu design for any schema using VB.
10. Display database details with oracle reports using manual & design wizard option.
11. Design & develop any schema with front-end tools using VB/VC++ with Database connection.
12. **Study on Mongo DB.**

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Design and implement database schema for a given problem domain.
CO2: Populate and query a database using SQL operations.
CO3: Prepare reports.
CO4: Design & develop an application using advanced databases.
CO5: Develop any application using VB/VC++.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design and implement database schema for a given problem domain.	2	3	3	3	2								3		3
CO2	Populate and query a database using SQL operations.		3	2	3	2								3		3
CO3	Prepare reports.		2	3	3	3								2	3	2
CO4	Design & develop an application using advanced databases.	1	1	3	2	3									3	3
CO5	Develop any application using VB/VC++			1	2	2								3	2	3

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518PST01	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

OBJECTIVE(S):

- To impart the knowledge of basic probabilistic theory.
- To learn one dimensional discrete and continuous probability distributions occurring in natural phenomena
- To extend the probability theory to two dimensional random variable and to study the statistical measures.
- To introduce the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems.
- To expose to statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.

UNIT I PROBABILITY AND RANDOM VARIABLE **9 + 3**

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II PROBABILITY DISTRIBUTIONS **9 + 3**

Binomial, Poisson, Geometric, Uniform, Exponential, and Normal distributions and their properties - Functions of a random variable-simple applications.

UNIT III TWO-DIMENSIONAL RANDOM VARIABLES **9 + 3**

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Central limit theorem (Statement and applications only for independent and identically distributed random variables).

UNIT IV TESTING OF HYPOTHESIS **9 + 3**

Sampling distributions - Tests for single mean, Proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi-square test for goodness of fit – Independence of attributes.

UNIT V DESIGN OF EXPERIMENTS **9 + 3**

Analysis of variance – Completely Randomized Design (CRD) -one way classification – Randomized Block Design (RBD) -two way classification - Latin Square Design (LSD) – Factorial Designs- 2^2 Factorial designs- Control charts for measurements - $\overline{x}$ chart, R-chart, p - chart and np – chart.

TOTAL HOURS:60 PERIODS

Note: Use of approved statistical table is permitted in the examination.

COURSE OUTCOMES

CO 1: Imbibing the knowledge of basic probability improves the quality of interpretation and decision making in real time problems of uncertainty.

CO 2: Understanding the real time application of probability distributions.

CO 3: Learning the concept of two dimensional random variables helps to understand and analyse the Statistical measures which describe an outcome of a random experiment.

CO 4: Drawing inference & decision making through hypothesis testing.

CO 5: Acquainting the knowledge of analysis of variance and control limits.

TEXT BOOKS

1. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2012.

REFERENCES

1. Spiegel, M.R, Schiller, J and Alu Srinivasan, R, "Schaum's Outlines Probability and Statistics", Tata McGraw-Hill Publishing Company Ltd. New Delhi , 2010.
2. Gupta.S.C., & Kapoor,V.K., "Fundamentals of mathematical statistics", 11th edition, Sultan Chand & Sons publishers, New Delhi, 2013.
3. Ibe, O.C.,"Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1st Indian Reprint, 2007.
4. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw-Hill publishing company Limited, New Delhi, 2014.
5. Kandasamy.P,Thilagavathy,K.,&Gunavathi.K., "Probability, Statistics and Queueing Theory"., S.Chand & Company Ltd., New Delhi, 2014.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Imbibing the knowledge of basic probability improves the quality of interpretation and decision making in real time problems of uncertainty	3	2	3	3	3							3	3	2	
Co2	Understanding the real time application of probability distributions.	3	3	2	3	3							3		3	3
Co3	Learning the concept of two dimensional random variables helps to understand and analyse the Statistical measures which describe an outcome of a random experiment.	3	3	3	1	3								2	3	3
Co4	Drawing inference & decision making through hypothesis testing.	3	2	2	3	3							3			3
Co5	Acquainting the knowledge of analysis of variance and control limits.	3		3	2								3	2		3

518CIT02	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Summarize the architecture and assembly language programming of microprocessors
- Defend the architecture and assembly language programming of microcontrollers
- Demonstrate the concept of interrupts and interfacing with various peripherals.
- Integrate the features of a microcontroller and its timer applications
- Justify the architectural features of 801XX with 8086 processor

UNIT I 8086 MICROPROCESSOR 9

Intel 8086 microprocessor – Architecture - Minimum and Maximum mode Configuration – Signals (Pin Configuration)- Instruction Set-Addressing Modes-Assembly Language Programming-Assembler Directives- Interrupts And Interrupt Service Routines.

UNIT II MEMORY AND I/O INTERFACING 9

Memory interfacing and I/O interfacing with(8086) – parallel communication interface – serial communication interface – timer-keyboard/display controller – interrupt controller – DMA controller (8257).

UNIT III 8051 MICROCONTROLLERS 9

Architecture of 8051 Microcontroller(Pin Configuration) – I/O ports – memory – counters and timers-serial data I/O – interrupts.

UNIT IV INTERFACING WITH 8051 9

Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs-Stepper Motor.

UNIT V MICROPROCESSOR TECHNOLOGY 9

Architecture of Intel 80286,80386,80486 –Features of Pentium I and II processors

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

CO1: Recognize the basic Microprocessor architecture and its concepts.
CO2: Outline the concepts of peripheral interfacing mechanisms.
CO3: Design various assembly language programming using microprocessors and microcontroller.
CO4: Extend the real world interfacing with microcontroller
CO5: Extrapolate the architectural features of 801XX with 8086 processor.

Text Books

1 Yn-cheng Liu,Glenn A.Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", second edition, Prentice Hall of India , 2006

2 Kenneth J. Ayala, 'The 8051 microcontroller Architecture, Programming and applications' second edition , Penram international.

3 Mohamed Ali Mazidi, Janice Gillispie Mazidi," The 8051 microcontroller and embedded systems using Assembly and C", second edition, Pearson education /Prentice hall of India , 2007.

4 The Intel Microprocessor Architecture, Programming and Interfacing, Barry B. Brey ,6th edition, Pearson education, 2002.

Reference Books

1 Douglas V.Hall, "Microprocessors and Interfacing: Programming and Hardware", second edition, Tata Mc Graw Hill, 2006.

2 A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Tata Mc Graw Hill, 2006.

3 Peter Abel, "IBM PC Assembly language and programming", fifth edition, Pearson education / Prentice Hall of India Pvt.Ltd, 2007.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Recognize the basic Microprocessor architecture and its concepts.	3	2	3	3		2							3		
CO2	Outline the concepts of peripheral interfacing mechanisms.	2	3	2	3		3							2		3
CO3	Design various assembly language programming using microprocessors and microcontroller.	3	3	2											3	
CO4	Extend the real world interfacing with microcontroller	3	3	3		3	3								3	
CO5	Extrapolate the architectural features of 801XX with 8086 processor.				2											3

518ITT03	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Grasp the principles of data communication and to learn various mediums used in Physical layer
- Understand the functions of Data link layers.
- Understand the networking concepts and different routing protocol
- Get familiarized with different Transport and application layer protocols.

Pre-requisites: Computer Architecture

UNIT I DATA COMMUNICATIONS & PHYSICAL LAYER **8**

Introduction: Components –Data representation –Direction of Data flow – Networks: criteria and physical structure – **Network Types** –Protocols and Standards – Layered Tasks–ISO / OSI model and layers in the OSI model – Addressing. **Performance Metrics** - Transmission Media: Guided Transmission Media –Twisted pair – Coaxial Cable – Fiber Optics – Unguided Media – Radio waves – Microwaves–Infrared. Network Components: Connectors – Transceivers – Media converters – Network Interface card – PC cards.

UNIT II DATA LINK LAYER **10**

Error Detection and Correction : Types of Errors–Redundancy– LRC – CRC –**Checksum**- Data Link Control : Flow and Error control Protocols: Stop and wait – **Stop and wait ARQ** - Go back-N ARQ – Selective repeat ARQ- Sliding window – HDLC. Media Access Control (MAC) – CSMA / CD - Wired LAN: Ethernet IEEE 802.3 –IEEE 802.4 – IEEE 802.5 – **Virtual LAN.**

UNIT III NETWORK LAYER **10**

Logical Addressing: IPv4 Addresses – Ipv6 Addresses - Connecting Devices: Repeaters – Hubs – Bridges – Switches – Routers – Modems – Gateways - **Switching: Circuit Switching -** Packet Switching– Logical Addressing: IPv4 Addresses – Ipv6 Addresses - Internet Protocols: IPV4 – IPV6 - Unicast Routing Protocols: Distance Vector Routing – Link State Routing –Address Mapping: ARP, **RARP**- ICMP.

UNIT IV TRANSPORT LAYER **9**

Process to process delivery –User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control Techniques– Congestion Prevention Policies - Quality of services (QoS) – **Techniques to improve QoS** - Integrated Services - **Differentiated Services.**

UNIT V APPLICATION LAYER **8**

Domain Name Space (DNS) – SMTP – POP3 – WWW - FTP – HTTP – SNMP – **SSO**

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students are able to

CO1: Understand the basic layers and its functions in computer networks.

CO2: Explore various flow and error control protocols in data link layer.

CO3: Understand and evaluate the performance of various routing algorithms.

CO4: Analyze flow control and congestion control algorithm for QoS at end to end level.

CO5: Explore the features and working of various application layer protocols.

TEXT BOOK:

1. Behrouz A. Forouzan, "Data communication and Networking", Fifth Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi, 2013.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, "Computer Networks", Fifth Edition PHI Learning, NewDelhi, 2016.
2. William Stallings, "Data and Computer Communication", Tenth Edition, Pearson Education, New Delhi 2014.
3. Alberto Leon Garcia and Indra Widjaja, "Communication Networks Fundamental Concepts and key Architectures", Second Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi, 2009.
4. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, New Delhi 2012.
5. Larry L.Peterson and Peter S. Davie, "Computer Networks", Fifth Edition Harcourt Asia Pvt. Ltd.,USA, 2011.
6. Prakash C Gupta, "Data Communications and Computer Networks", Second Edition, PHI Learning Pvt. Ltd., New Delhi, 2009.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the basic layers and its functions in computer networks.	3	3	3	3									3		
CO2	Explore various flow and error control protocols in data link layer.	3	2	3	3	3										
CO3	Understand and evaluate the performance of various routing algorithms.	3	3	2	3	3									3	
CO4	Analyze flow control and congestion control algorithm for QoS at end to end level.	3	3	3	2											
CO5	Explore the features and working of various application layer protocols.	3	2	2		3								3	3	

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518ITT04	COMPUTATIONAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To understand the various characteristics of Intelligent agent
- To learn the different search strategies in CI
- To learn to represent knowledge in solving CI problems
- To know about the various applications of CI

Pre-requisites: Nil

UNIT-I INTRODUCTION 8

Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT-II PROBLEM SOLVING METHODS 9

Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems– Constraint Satisfaction Problems – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning

UNIT-III KNOWLEDGE REPRESENTATION AND LOGICAL REASONING 10

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation-Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT-IV PLANNING, UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING 9

Planning with state-space search-Partial-order planning-Conditional Planning, Multi agent planning, planning graphs-uncertainty-probabilistic reasoning-Bayesian networks-Temporal Model-Hidden Markov model.

UNIT-V LEARNING AND APPLICATIONS 9

Learning from observation-Inductive learning-Decision trees-statistical learning methods-Reinforcement Learning.Applications–Computational Intelligence in medicine-industrial automation–- Natural Language Processing – Speech Recognition – Robotics.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Understand the fundamentals and various characteristics of artificial intelligence.

CO2: Use appropriate search algorithms for any AI problem.

CO3: Represent a problem using first order and predicate logic.

CO4: Solve uncertainty problems and acquire decision making capability based on reasoning.

CO5: Apply intelligent techniques for problem solving.

TEXT BOOKS:

1. Stuart Russell, Peter Norvig, —Artificial Intelligence: A Modern Approach, Third Edition, Pearson Publishers , 2015.
2. Elaine Rich and Kevin Knight, —Artificial Intelligence, Third Edition, Tata McGraw-Hill, 2010.

REFERENCES:

1.Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
2. Dan W.Patterson, —Introduction to Artificial Intelligence and Expert Systems, PHI, 2006.
3. Nils J. Nilsson, —Artificial Intelligence: A new Synthesis, Morgan Kaufmaan Publishers Inc; Second Edition, 2003.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the fundamentals and various characteristics of artificial intelligence.		3	2	3	3	3							3	3	3
CO2	Use appropriate search algorithms for any AI problem.		3	2	3	3	3							3		
CO3	Represent a problem using first order and predicate logic.		3	2	3	3									2	3
CO4	Solve uncertainty problems and acquire decision making capability based on reasoning.			3	3	3	2	2						3		
CO5	Apply intelligent techniques for problem solving .		2	2	2	3	1							2	3	3

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518CIE01	C# & .NET PROGRAMMING	L	T	P	C
		3	1	0	4

OBJECTIVE(S):

- To understand the fundamentals of .NET Programming
- To develop real time applications using C#

PREREQUISITE: Object Oriented Programming.

UNIT-I C# LANGUAGE FUNDAMENTALS **9**

The Building Block of the .NET Platform (CLR,CTS, and CLS) – Overview of Assemblies - The Anatomy of a Simple C# Program - Defining Classes and Creating Objects - The System Console Class-Establishing Member Visibility - Default Values of Class Member Variables-Member Variable Initialization Syntax- Static Keyword - Method Parameter Modifiers - Iteration Constructs - Decision Constructs and the Relational / Equality Operators - Understanding Value Types and Reference Types-Boxing and Unboxing - Working with .NET Enumerations - Overriding Some Default Behaviors of System. Object - The System Data Types - String Data Type - .NET Array Types - Custom Namespaces.

UNIT-II OBJECT ORIENTED PROGRAMMING WITH C# **9**

Understanding the C# Class Type - Reviewing the Pillars of OOP - The First Pillars: C#'s Encapsulation Services, The Second Pillar: C#'s Inheritance Support - Programming for Containment/Delegation - The Third Pillar: C#'s Polymorphic Support-C# Casting Rules - Understanding Object Lifetime - Basics of Object Lifetime - Role of Application Roots - Garbage Collection - Building Finalizable and Disposable Types. Exception Handling - Throwing a Generic Exception - Catching Exceptions.

UNIT-III INTERFACES, COLLECTIONS, DELEGATES, EVENTS AND LAMDA EXPRESSION **9**

Defining Interfaces in C#-Implementing an Interface in C# - Contrasting Interfaces to Abstract Base Classes-Building Interface Hierarchies - Building Enumerable Types (IEnumerable and IEnumerator) Building Cloneable Objects (ICloneable) -Building Comparable Objects (IComparable) -The Interfaces of the System. Collections Namespace - Defining a Delegate in C# -Simplest Possible Delegate Example-Enabling Multicasting -C# Events - Lamdas Expression.

UNIT-IVDEVELOPING WINDOW APPLICATION FORMS **9**

Windows Forms Types - Application Class- Functionality of the Control Class - Functionality of the Form Class- Building Windows Applications - Working with Status Strips - Working with Tool Strips - Building an MDI Application - Basic Controls.

UNIT-V ADO.NETAND ASP.NET **9**

ADO.NET Overview – Using Database Connections, Commands, The Data Reader, The Dataset Class,ASP.NET Introduction – Web Forms – ADO.NET and Data Binding-ASP.NET Features – User and Custom Controls – Master Pages- Site Navigation – Security.

TOTAL HOURS:60 PERIODS

COURSE OUTCOMES:

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

CO1: Understand anatomy of C# Programming.

CO2: Develop Console application using object oriented concepts, advanced features in C#.

CO3: Develop Applications using Interfaces and Events.

CO4: Develop Window form application with Database connectivity.

CO5: Build Applications using ADO.NETAND ASP.NET.

TEXT BOOKS:

1. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework" Apress, Sixth Edition,2012 ISBN: 978-1-4302-4233-8
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

REFERENCE BOOKS:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004.
3. O`Reilly "Programming C# 5.0", O'Reilly Media ISBN: 978-1-4493-2041-6 | ISBN 10:1-4493-2041-4, October 2012.
4. Michael Schmalz "C# Database Basics" O'Reilly Media ISBN:978-1-4493-0998-5, 2012

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand anatomy of C# Programming.				3	1								3		
CO2	Develop Console application using object oriented concepts, advanced features in C#.			3	3	3	2	3						3	3	
CO3	Develop Applications using Interfaces and Events.			3	3	3		3						3	3	
CO4	Develop Window form application with Database connectivity.		2	3	2	3	3	3						3	3	3
CO5	Build Applications using ADO.NETAND ASP.NET.			2	3	3	3	3						3	3	3

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518BAO03	ENGINEERING ETHICS AND HUMAN VALUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE(S):

- Understand the moral values that ought to guide engineering profession or practice.
- Resolving moral issues in engineering.
- Justifying the moral judgements in engineering. It deals with set of moral problems and issues connected with engineering.

Pre-requisites: **ENGINEERING ETHICS AND HUMAN VALUES**

UNIT-I HUMAN VALUES **10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality

UNIT-II ENGINEERING ETHICS **9**

Scope of Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles - Self-interest – Ethical Egoism.

UNIT- III ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study.

UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS **9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – The Three Mile Island and Chernobyl Case Studies – Team Work and Loyalty - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT-V GLOBAL ISSUES **8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Sample Code of Conduct.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students are able to

CO1: It ensures students sustained happiness through identifying the essentials of human values and skills.

CO2: It facilitates a correct understanding between profession and happiness

CO3: It helps students understand practically the importance of trust, mutually satisfying human behavior

CO4: It helps students enriching interaction with nature.

CO5: Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 4th Edition, 2010.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Thompsonwadsworth, A Division of Thomson Learning Inc., United States, 2000.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", OxfordUniversity Press, Oxford, 2001.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	It ensures students sustained happiness through identifying the essentials of human values and skills.		2	2	3	2								3		
CO2	It facilitates a correct understanding between profession and happiness		3	2	3	1								2		
CO3	It helps students understand practically the importance of trust, mutually satisfying human behavior		3	3	3	2									3	
CO4	It helps students enriching interaction with nature.		2	2	2	3								1		
CO5	Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.		3	3	2	1								2		

518CIP07	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE(S):

- Develop the code in assembly language programming.
- Test the developed code using 8086 processors and 8051 controllers.
- Demonstrate the interface peripherals with microprocessor and microcontroller
- Integrate the peripherals for real world applications.
- Design the various ALU for analysis of microprocessor and microcontroller.

1.8086 based Experiments

- 16 bit arithmetic operation using 8086.
- Generate a Fibonacci series using 8086.
- Searching Largest Number and Smallest Number in an array using 8086.
- To generate factorial of number using 8086.
- String manipulation using 8086.

2. 8051 based experiments

- 8-bit arithmetic operations using 8051 microcontroller
- Design of simple ALU using 8051 microcontroller.
- Searching Largest Number and smallest number in an array using 8051.
- Solve the logic equations using 8051 microcontroller.

3. Interfacing Experiments with 8086/8051

- Traffic light controller
- Stepper motor interfacing
- 8279 keyboard/display controller
- ADC and DAC interfacing

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

CO1: Generate the code for arithmetic operations in assembly language

CO2: Generalize the developed code using 8086 processors and 8051 controllers.

CO3: Reorganize the Interfacing peripherals with microprocessor and microcontroller

CO4: Interpolate the peripherals for real world applications.

CO5: Propose the various ALU for analysis of microprocessor and microcontroller.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Generate the code for arithmetic operations in assembly language	3	2	3	3		2							3		
CO2	Generalize the developed code using 8086 processors and 8051 controllers.	2	3	2	3		3							2		3
CO3	Reorganize the Interfacing peripherals with microprocessor and microcontroller	3	3	2											3	
CO4	Interpolate the peripherals for real world applications.	3	3	3		3	3								3	
CO5	Propose the various ALU for analysis of microprocessor and microcontroller				2											3

518ITP08	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE(S):

- Get familiarized with socket programming
- Understand the basic networking commands
- Analyze the performance of protocols in different layers using simulation tools.

Prerequisite: Programming in C , Object Oriented Programming.

LIST OF EXPERIMENTS:

1. Basic network command line utilities such as ping, netstat, tracert, nslookup, port scan, ARP, ipconfig.

Implement the following experiments in C/C++/Java:

2. Generate Hamming code for error detection and correction
3. Implement Error Detection code using CRC
4. Implementation of stop and wait protocol
5. Implementation of sliding window protocol
6. Implementation of UDP
7. Implementation of TCP

Implement the following experiments using simulator:

8. Study of Basic concepts of Network Simulator (NS2), its installation and working environment.

9. Using NS2 Network Simulation,
   i) Initialize & Network simulator object.
   ii) Group of Nodes to form a LAN
   iii) Delay of Link
   iv) Bandwidth of Link.

10 Simulate a four Duplex network and apply TCP agent between two nodes and UDP agents between other two nodes and by changing the parameters, determine the number of packets sent and dropped by TCP/UDP.

11 Simulate a wired network and measure the following performance metrics

a. Throughput ii) Delay iii) Packet Loss

12 Implement Link State routing and Distance Vector routing measure the following performance metrics

a. Throughput ii) Delay iii) Packet Loss

13 Experiment on packet capture and network traffic using wire shark tool.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course student should be able to

CO1: Gain knowledge on the basic network commands and concepts of open source network simulator.

CO2: Implement data link protocols.

CO3: Analyze and implement various routing algorithms.

CO4: Simulate networks and analyze traffic using various tools.

CO5: Analyze the performance of protocols in different layers.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Generate the code for arithmetic operations in assembly language	1	1											1		
CO2	Implement data link protocols.		2	2												
CO3	Analyze and implement various routing algorithms.					3									2	
CO4	Simulate networks and analyze traffic using various tools.		1			3									2	
CO5	Analyze the performance of protocols in different layers.			2		2										

518CIP09	EMPLOYABILITY SKILLS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

1. To equip students of engineering and technology with effective speaking and listening skills in English.
2. To help them enrich their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their career.
3. To enhance the performance of the students in the recruitment processes, self enhancement and launching start ups.

Unit 1: Listening **7**

Listening Audios and answering MCQs - Watching video clips on famous speeches, motivational videos, documentaries and answering MCQs - Listening Comprehension and TED talks.

Unit 2: Speaking **10**

Prepared talk - Extempore - story knitting - Picture Talk - Brainstorming - Debate - Group Discussion - Elevator Speech - Mock HR Interviews - Story Narration - Miming - Short Skits.

Unit 3: Reading **12**

Reading Comprehension - Verbal Analogy - Classification - Alphabet Test - Logical Sequence of Words - Statement & Conclusions - Statement & Courses of Action - Situation Reaction Test - Theme Detection - Deriving Conclusions from Passages.

Unit 4: Writing **7**

Business Letters - Email Writing - Essay Writing - Paragraph Writing - Paraphrasing.

Unit 5: Career Skills **9**

Vocabulary Test (GRE, TOEFL, TOEIC & CAT Exam words) - Confused Pair of words - Contronyms - One Word Substitution - Sequencing of Sentences – Sentence correction.

TOTAL HOURS:45 PERIODS

Lab Requirements:

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

COURSE OUTCOMES:

On completion of the course, the students shall have the ability to:

CO1: Comprehend the various strategies of listening and its significance.

CO2: Articulate their views clearly and concisely with self-confidence and persuasiveness.

CO3: Understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.

CO4: Communicate the corporate and social requirements in an impressive written mode.

CO5: Enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.

TEXT BOOKS:

1. Agarwal R. S., A Modern Approach to Verbal and Non-verbal Reasoning, Chand & Co., New Delhi, 2012.
2. Ashraf Rizvi M. Effective Technical Communication. TATA McGraw Hill, New Delhi: 2007.

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1. Lingua: Essays for TOEFL/IELTS, Dreamtech Press, New Delhi, 2016.
2. Lily Mangalam, Global English Comprehension, Allied Publishers Pvt. Ltd., New Delhi, 2014.
3. Sharon Weiner Green and Ira K. Wolf, Barron's GRE, Glagotia Publications Pvt. Ltd., 18th Edition, New Delhi, 2011.
4. Mohamed Elias, R. Gupta's IELTS/TOEFL Essays, Ramesh Publishing House, 6th Edition, New Delhi, 2016.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Comprehend the various strategies of listening and its significance.									3	3	3	3			3
CO2	Articulate their views clearly and concisely with self-confidence and persuasiveness.									3	3	3	3			3
CO3	Understand the prevailing practices of testing in the recruitment process by the corporates and the institutional selection processes.									3	3	3	3			3
CO4	Communicate the corporate and social requirements in an impressive written mode.									3	3	3	3			3
CO5	Enhance their verbal skills in the screening tests competently both for recruitment and pursuing higher studies as well.									3	3	3	3			3

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618ITT01	SCRIPTING LANGUAGES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Understand versatile open source software tools
- Explores the nature of scripting and provides skills in scripting language design.
- Learn to write simple scripts to automate system using appropriate languages.
- Conceive basics of text processing, client and server level scripting and GUI programming.

PREREQUISITE: Programming in C and Object Oriented Programming

UNIT I INTRODUCTION TO SCRIPTING AND PERL 9

Scripts and Programs - Origin of Scripting - Characteristics of Scripting Languages - Uses of Scripting Languages - Web Scripting. Perl backgrounder- Perl overview - Perl parsing rules - Variables and Data - Statements and Control structures –Subroutines - Packages - Modules - Working with Files - Data Manipulation.

UNIT II Introduction to PHP 9

Introduction - Programming in web environment - variables – constants - data types - operators - Statements - Functions - Arrays – OOP: Classes and Objects-Constructor- Inheritance-Overloading and overriding - String Manipulation and regular expressions - File handling and data storage.

UNIT III PHP and MySQL 9

Setting up webpages to communicate with PHP – Handling Form Controls -PHP and MySQL database - PHP Connectivity - Sending and receiving E-mails - Debugging and error handling - PHP Frameworks: Codeignter – Laravel.

UNIT IV OOC AND DB INTEGRATION IN PYTHON 9

Python Basics - Introduction to OOC – Classes and Instances – Static and Class Methods – Composition – Inheritance – Built-in Functions – Integrated Web Applications in Python - Python and MySQL Database Integration: Connect Database – Create and Insert Operations – Parameter Passing – Retrieving data from Database. Case Study on SciPy, Django, Open CV.

UNIT V Introduction to Ruby 9

Introduction to Ruby - Core Programming Elements – Conditional Structures – Loop Structures – Arrays – Using Objects - Defining Classes and Creating Objects - Object Inheritance – File Input/Output.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Apply Perl scripts in application development and data analysis
CO2: Create and run simple web applications using PHP
CO3: Develop Web based application using PHP and MySQL
CO4: Design and implement short and efficient Python scripts for longer constructs.
CO5: Illustrate Ruby scripts in application development.

TEXT BOOKs

1. Martin C. Brown, "Perl: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2012.
2. Steve Suehring, "PHP6& MySQL Bible", John Wiley Publishing Inc., Reprint 2010.
3. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2010.
4. Ophir Frieder, Gideon Frieder and David Grossman, "Computer Science Programming Basics with Ruby", First Edition, O'Reilly, 2013.

REFERENCES

1. RasmusLerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2012.
2. Tom Christiansen, Jon Orwant, Larry Wall, Brian Foy, "Programming Perl", 4th Edition, O'Reilly Media, 2012.
3. Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2010.
4. Paul Barry, "Head First Python", O'Reilly Media, 2010.
5. Garrett Grolemund, "Hands-On Programming with R", Paperback Edition, O'Reilly Media, 2016.
6. Colin Gillespie and Robin Lovelace, "Efficient R Programming", First Release, O'Reilly, 2016.

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1. https://www.perl.org/
2. http://php.net/manual/en/
3. http://www.learnpython.org/
4. http://www.pythontutor.com/
5. http://www.diveintopython3.net./

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the construction of deterministic and nondeterministic automata.		3	3	2	3	2							2	3	
CO2	Understand the concept of lexical analysis and various phases of a compiler		2	2	3	3	3				3			1	3	3
CO3	Parse the generated tokens using top down and bottom up parsers.		3	3	3	3	3				3				3	3
CO4	Represent the intermediate code for the source languages		2	3	2	3	3				3				3	3
CO5	Design and analyze code generation schemes and various optimization techniques.		2	3	2	2	2							2		2

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618ITT02	COMPILER ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To learn about automata theory and regular expressions.
- To learn to design and implement a lexical analyzer.
- To learn the role of a parser and to study the different ways of parsing tokens.
- To study the process of Intermediate Code generation and its representations.
- To study the concepts of machine code generation.
- To study the concepts of Code Optimization

PREREQUISITES: Nil

UNIT-I INTRODUCTION TO AUTOMATA THEORY AND REGULAR EXPRESSIONS 9

Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – NFA to DFA – Finite Automata with Epsilon Transitions – Epsilon-NFA to DFA – Kleene's Theorem – Minimization of Automata – Regular Expressions – Equivalence between Regular Expression and Automata – Properties of Regular Expressions.

UNIT-II LEXICAL ANALYSIS 9

Introduction – The Structure of Compiler – Evolution of Programming Languages – Application of Compiler Technology – Programming Languages Basics – Lexical Analysis – Role of Lexical Analyzer – Specification and Recognition of Tokens – Lexical Analyzer Generators.

UNIT-III SYNTAX ANALYSIS 9

Introduction – Context Free Grammar – Top Down Parsing – Recursive Descend Parsing – Predictive Parsing – Non-Recursive Predictive Parsing – Error Recovery – Bottom Up Parsing – LR Parsers – Construction of SLR (1) Parsing Table, Canonical LR (1) Parsing Table and LALR (1) Parsing Table – Parser Generators.

UNIT-IVINTERMEDIATE CODE GENERATION 9

Symbol Table – Construction – Syntax Directed Definitions – Evaluation Orders for Syntax Directed Definitions – Applications of Syntax Directed Translation – Intermediate Code Generation – Three Address Code – Types and Declarations – Expression Translation – Type Checking – Back Patching.

UNIT-V CODE GENERATION AND OPTIMIZATION 9

Issues – Design of Code Generator – Addresses in the Target Code – Basic Blocks in Flow Graph – Simple Code Generator – Peephole Optimization – Machine Independent Optimization – Principal Sources of Optimizations – Bootstrapping a Compiler – Compiling Compilers – Full Bootstrap.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the construction of deterministic and nondeterministic automata.
CO2: Understand the concept of lexical analysis and various phases of a compiler
CO3: Parse the generated tokens using top down and bottom up parsers.
CO4: Represent the intermediate code for the source languages
CO5: Design and analyze code generation schemes and various optimization techniques.

TEXT BOOKS:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman, "Compilers: Principles, Techniques, and Tools", Second Edition, Pearson Education, 2014.
2. John Hopcroft, Rajeev Motwani, Jeffrey Ullman, "Introduction To Automata Theory Languages, and Computation", Third Edition, Pearson Education, 2008.

REFERENCES:

1. Dhamdhere D M, "Compiler Construction Principles and Practice" Second edition, Macmillan India Ltd., New Delhi, 2005.
2. Torbengidius Mogensen, "Basics of Compiler Design", Springer, 2011.
3. Charles N, Ron K Cytron, Richard J LeBlanc Jr., "Crafting a Complier", Pearson Education, 2010.
4. K. D. Cooper, L. Torczon, "Engineering a Compiler", Morgan-Kaufmann, Second Edition, 2011.
5. Micheal Sipser, "Introduction to the Theory of Computation", Third Edition,2014.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the construction of deterministic and nondeterministic automata.		3	3	2	3	2							2	3	
CO2	Understand the concept of lexical analysis and various phases of a compiler		2	2	3	3	3				3			1	3	3
CO3	Parse the generated tokens using top down and bottom up parsers.		3	3	3	3	3				3				3	3
CO4	Represent the intermediate code for the source languages		2	3	2	3	3				3				3	3
CO5	Design and analyze code generation schemes and various optimization techniques.		2	3	2	2	2							2		2

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618CIT03	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To make familiar with the various concepts of data warehouse architecture, Online Analytical Processing (OLAP), Meta data, Data mart, and multidimensional data models.
- To understand data pre-processing and data visualization techniques.
- To study algorithms for finding hidden and interesting patterns in data.
- To familiarize with data mining algorithms and its application in various fields.

Prerequisite: Database Management Systems

UNIT-I DATA WAREHOUSE & OLAP TECHNOLOGY **8**

Data Warehouse Overview - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation -Data Warehousing to Data Mining.

UNIT-II DATA MINING **9**

Introduction - Kinds of data - Data Mining Functionalities - Interestingness of Patterns - Classification of Data Mining Systems - Data Mining Task Primitives - Integration of a Data Mining System with a Data Warehouse - Issues - Data Preprocessing.

UNIT-III ASSOCIATION RULE MINING **10**

Mining Frequent Patterns- Associations and Correlations - Frequent item set Mining Methods – Mining Various Kinds of Association Rules - Correlation Analysis - Constraint Based Association Mining-Evaluation of Association Patterns.

UNIT- IV CLASSIFICATION **9**

Basic Concepts - Classification and Prediction - Issues - Decision Tree Induction – Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines – Associative Classification - Prediction.

UNIT-V CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING **9**

Cluster Analysis - Types of Data - Categorization of Major Clustering Methods – k-Means - Partitioning Methods - Hierarchical Methods - Density-Based Methods –Grid Based Methods - Clustering High Dimensional Data - Outlier Analysis - Data Mining Applications –Data Mining and Society- Trends in Data Mining - Case study : WEKA Tool and Python Libraries.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Have an extensive knowledge on concepts of data warehousing Modeling and Implementation

CO2: Discover and measure interesting patterns from different kinds of databases.

CO3: Apply association rule mining techniques for data analysis.

CO4: Compare and contrast the various classifiers.

CO5: Explore different clustering techniques and data mining applications.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.

REFERENCES BOOKS:

1. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, 35th Reprint 2016.
2. Ian H.Witten and Eibe Frank, -Data Mining: Practical Machine Learning Tools and Techniques‖, Elsevier, Second Edition.
3. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Have an extensive knowledge on concepts of data warehousing Modeling and Implementation				2					3				3	1	3
CO2	Discover and measure interesting patterns from different kinds of databases.		3	2	3	3				3				3	3	
CO3	Apply association rule mining techniques for data analysis.		3	3	3	2				3					3	3
CO4	Compare and contrast the various classifiers.		2	2	1	2				3				2		
CO5	Explore different clustering techniques and data mining applications.		2	3	2	3				3						3

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618ITT04	OBJECT ORIENTED MODELING AND DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Understand the fundamentals of modeling and design.
- Develop the OO system modeling in terms of a state and interaction modeling
- Understand the development stages of modeling and design
- Design and development of system specific design and application modeling
- Understand the design and development of implementation modeling.

PREREQUISITES: Software Engineering

UNIT - 1 INTRODUCTION, MODELING CONCEPTS, CLASS MODELING STATE MODELING 9

What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history. Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.

Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips. State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips.

UNIT – 2 ADVANCED STATE MODELING, INTERACTION MODELING 9

Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.

UNIT - 3PROCESS OVERVIEW, SYSTEM CONCEPTION, DOMAIN ANALYSIS 9

Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.

UNIT – 4 APPLICATION ANALYSIS, SYSTEM DESIGN 9

Application Analysis: Application interaction model; Application class model; Application state model; Adding operations. Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

UNIT – 5 CLASS DESIGN, IMPLEMENTATION MODELING & LEGACY SYSTEMS 9

Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example. Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing. Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Apply fundamental Object Oriented (OO) modeling and design in solving complex problems and Analyze problem scenario and identify classes/ Objects, their properties and associations.

CO2: Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation

CO3: Propose the appropriate strategies to incorporate standard quality parameters in the design of a system.

CO4: Construct models to show the importance of system Modeling and Design in solving complex problems.

CO5: Apply the concept of Reverse Engineering and Maintenance.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Apply fundamental Object Oriented (OO) modeling and design in solving complex problems and Analyze problem scenario and identify classes/ Objects, their properties and associations.	3	3	3	2					3		3		3		
Co2	Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation		3	2	3					3		3			3	
Co3	Propose the appropriate strategies to incorporate standard quality parameters in the design of a system.		3	2	1				3	3		3				3
Co4	Construct models to show the importance of system Modeling and Design in solving complex problems.		2	3	3					2	2	3		2		3
Co5	Apply the concept of Reverse Engineering and Maintenance.	3	3	3	2					3		3		3		

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618ITE04	MOBILE COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To impart the fundamental concepts of mobile communications systems
- To understand working knowledge on various telecommunication systems and MAC protocols.
- To study the working principles of TCP/IP and its standards.
- To learn about MANET & VANET design, routing and security issues.
- To build skills in working with Wireless application Protocols to develop mobile content.

UNIT I INTRODUCTION 9

Basics of Communication technologies - Mobile Computing Introduction – Mobile Computing Vs Wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application-Cellular Mobile Communication.

UNIT II TELECOMMUNICATION SYSTEM & MAC PROTOCOLS 9

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS). MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes-802.11 MAC Standard-MAC Protocols for Ad Hoc Networks.

UNIT III MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER 9

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization-Dynamic Host Configuration Protocol. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT IV AD-HOC NETWORKS 9

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Routing in MANETs - MANET Routing Protocols: DSDV,DSR , ZRP – Vehicular Ad Hoc networks (VANET) — Security Attacks and Counter Measures in MANETs, Introduction to FANETs, MANET Vs VANET Vs FANETs.

UNIT V APPLICATION LAYERS 9

WAP-Architecture, WDP, WTLS, WTP, WSP, WAE, WML, WML Script, WTA, Push Architecture, Push/Pull Services.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Gain knowledge on the mobile telecommunication systems.

CO2 : Apply MAC protocols for mobile and wireless environments.

CO3: Deploy various protocols that support mobility at network layer and transport layer.

CO4: Use proactive, reactive and hybrid protocols to design Ad hoc networks

CO5: Develop wireless applications using script and mark-up languages.

TEXT BOOKS:

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2018.
2. Jochen Schiller, "Mobile Communications", PHI/Pearson Education, Second Edition, 2011.
3. http://tarjomefa.com/wp-content/uploads/2017/08/7432-English-TarjomeFa.pdf (FANETs)

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1. C.Siva Ram Murthy and B.S.Manoj, "AdHoc Wireless Networks", Second Edition, Pearson Education, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4. William.C.Y.Lee,"Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition,Tata Mc Graw Hill Edition ,2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Gain knowledge on the mobile telecommunication systems.	3	2	1	3		2							1	2	
CO2	Apply MAC protocols for mobile and wireless environments.		3	2	2		2								1	
CO3	Deploy various protocols that support mobility at network layer and transport layer.	1	3	3	2		2							2		
CO4	Use proactive, reactive and hybrid protocols to design Ad hoc networks	1			3		2							3		
CO5	Develop wireless applications using script and mark-up languages.			1	3		3							3		

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618ECO09	SATELLITE COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

At the end of the course, the students should be able to:

- Understand the Kepler's law of motion and different orbital elements
- Know the Attitude and orbit control in spacecraft subsystems and link design
- Understand the analog and digital multiple access
- Understand the distinct types of Earth segment
- Summarize the various applications of Satellite.

UNIT-I ORBIT DYNAMICS 9

Kepler's Laws of planetary motion , orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

UNIT-II SPACE SEGMENT AND LINK DESIGN 9

Space Segment: Power Supply – Attitude Control – Spinning Satellite Stabilization – Momentum Wheel Stabilization – Station Keeping – Thermal Control – TT&C Subsystem – Transponders – Wideband Receiver – Input Demultiplexer – Power Amplifier – Antenna Subsystem

Link Design: Satellite uplink – down link- link power budget equation - c/no- G/T- Noise temperature- System noise- propagation factors- rain and ice effects- Earth Station parameters- polarization.

UNIT-III SATELLITE ACCESS 9

Modulation and Multiplexing: Voice, Data and Video- Analog Satellite communication – FDMA Technique, SCPC,CSSB system – Digital satellite communication system –TDMA ,CDMA Techniques.

UNIT-IV EARTH SEGMENT 9

Introduction - Active and passive satellite- Transmitters- receivers- Antennas- Terrestrial Interface- TVRO- MATV- CATV- Test Equipments- Measurements on G/T- C/No- EIRP- Antenna Gain.

UNIT-V SATELLITE APPLICATIONS 9

INTELSAT Series, INSAT, VSAT, INMARSAT, Satellite Navigational System-IRNSS , Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

Upon Completion of this course, students will be able to:

CO1: Analyze different orbital elements.
CO2: Control the space craft subsystems and design link budget analysis.
CO3: Apply multiple access technique for Satellite Communication.
CO4: Describe the various types of Earth Segments.
CO5: Understand different applications of Satellite.

TEXT BOOKS:

1. Dennis Roddy, "Satellite Communication", 4th Edition, Mc Graw Hill International, 2006.
2. Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.
3. Timothy Pratt - Charles Bostian& Jeremy Allmuti- "Satellite Communications" -John Willy & Sons (Asia) Pvt-Ltd- 2004.

REFERENCE BOOKS:

1 Tri T. Ha, "Digital Satellite Communication", II nd edition, 1990.

2 M-Richharia : " Satellite Communication Systems (Design Principles)" Pearson Second Edition, 2003.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Analyze different orbital elements.	2			2				2							
CO2	Control the space craft subsystems and design link budget analysis.					3						3		2		
CO3	Apply multiple access technique for Satellite Communication.		2													
CO4	Describe the various types of Earth Segments.		2		3										3	
CO5	Understand different applications of Satellite.				2			3	2							3

618ITP07 **SCRIPTING LANGUAGES LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVES

- Understand versatile open source software tools.
- Build dynamic and sustainable web applications.
- Embed general purpose scripting languages in real time application.

PREREQUISITE: Object Oriented and Java Programming

LIST OF EXPERIMENTS

1. Create Perl scripts using arrays and functions.
2. Implement simple Data Structures (Linked List, Stack and Queue) using Perl scripts.
3. Establish database connectivity with Perl and MySQL for any enterprises.
4. Create dynamic web pages with Perl and CGI.
5. Implement functions, strings and arrays in PHP.
6. Perform basic file handling operations in PHP.
7. Implement OOP concepts in PHP.
8. Create forms in PHP to get form data and to retrieve data from get requests.
9. Create a database with PHP and MySQL to perform create, insert, delete and update operations.
10. Implement collections (Strings, Tuples, Lists, Sets and Dictionaries) in Python.
11. Implement the following in Python
    i. User-defined and Built-in Functions
    ii. Object and classes
12. Perform file handling operations with exception handling in Python.
13. Implement database connectivity with Python and MySQL for any application.
14. Implement conditional and looping structures in Ruby.
15. Perform file handling operations in Ruby.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

At the end of course students should be able to

CO1: Create dynamic web pages and implement database connectivity with Perl and CGI.

CO2: Develop OOP concepts, file handling functions and database connections with PHP.

CO3: Implement functions, collections and database integrations in Python.

CO4: Implement basic operations in Ruby.

CO5:Implement file handling operations in Ruby.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Create dynamic web pages and implement database connectivity with Perl and CGI.		3	3	3	3								3	3	3
Co2	Develop OOP concepts, file handling functions and database connections with PHP.		3	2	3	2									2	
Co3	Implement functions, collections and database integrations in Python.		3	2	2	3								3	1	
Co4	Implement basic operations in Ruby.		2	3	2	3										
Co5	Implement file handling operations in Ruby		2	1	3	1										

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618ITP08 **COMPILER ENGINEERING LABORATORY**

L	T	P	C
0	0	2	1

OBJECTIVE(S):

- Be exposed to compiler writing tools.
- Designing the different phases of a compiler.
- To learn code generation process
- To learn optimization techniques

LIST OF EXPERIMENTS:

1. Construction of NFA from a given regular expression.
2. Construction of minimized DFA from a given regular expression
3. Symbol table creation from a list of declarations
4. Lexical analyzer to recognize patterns in C (ex. Identifiers, constants, comments, operators etc.)
5. Count the number of lines, words, blank spaces and characters in a file
6. Program to recognize a valid variable which starts with a letter followed by any number of letter or digits.
7. Implementation of shift-reduced parsing algorithm.
8. Construction of LR-parsing table
9. Implementation of calculator using Lex and Yacc.
10. Evaluation of arithmetic expression with LEX and YACC.
11. Syntax tree creation from —if statement.
12. Three address code generation for assignment statement with array references
13. Three address code generation for Conditional Expression.
14. Construction of DAG.
15. Code Optimization techniques (Constant Propagation, Constant Folding).

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Construction of NFA and DFA from a given regular expression

CO2: Construct a token recognizer using LEX and YACC.

CO3: Demonstrate parsing and construct a syntax tree for control statements.

CO4: Generate intermediate code for the intermediate language

CO5: Translate the source to target code and optimize it.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Construction of NFA and DFA from a given regular expression		2	2	3	2								3		
Co2	Construct a token recognizer using LEX and YACC.		3	2	3	1								2		
Co3	Demonstrate parsing and construct a syntax tree for control statements.		3	3	3	2									3	
Co4	Generate intermediate code for the intermediate language		2	2	2	3								1		
Co5	Translate the source to target code and optimize it.		3	3	2	1								2		

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618ITP09	OBJECT ORIENTED MODELING AND DESIGN LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- Learn the basics of OO analysis and design skills
- Be exposed to the UML design diagrams
- Learn to map designing to coding modules
- Be familiar with the various testing techniques

LIST OF EXPERIMENTS

To develop a mini-project by following the 5 exercises listed below

1. To develop a problem statement.
2. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer.

Suggested List of Applications

1. Fundamental of UML diagrams and notations
2. A business perspective-of-sales system
3. E-bookshop
4. Online auction system
5. Student information system
6. Software personnel management system
7. Conference Management System

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES

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

CO1: Use the UML analysis and design diagrams
CO2: Apply appropriate design patterns
CO3: Design and implement applications using OO concepts
CO4: Validating the code and design
CO5: Develop and Test User Interface Layer.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Use the UML analysis and design diagrams		3	3	2	3				3		3		3		3
CO2	Apply appropriate design patterns		2	3	3	2						3			2	
CO3	Design and implement applications using OO concepts		3	3	3	2						3			3	3
CO4	Validating the code and design		1	2	3	2						3		2		
CO5	Develop and Test User Interface Layer		3	3	2	3				3		3				

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715ITT01	MOBILE COMMUNICATIONS	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To impart the fundamental concepts of mobile communications systems
- To understand working knowledge on various telecommunication systems and MAC protocols.
- To study the working principles of TCP/IP and its standards.
- To learn about MANET & VANET design, routing and security issues.
- To build skills in working with Wireless application Protocols to develop mobile content.

UNIT-I INTRODUCTION 9

Basics of Communication technologies - Mobile Computing Introduction – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application-Cellular Mobile Communication.

UNIT-II TELECOMMUNICATION SYSTEM& MAC PROTOCOLS 9

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS). MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes-802.11 MAC Standard-MAC Protocols for Ad Hoc Networks.

UNIT-III MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER 9

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization-Dynamic Host Configuration Protocol. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT-IV MOBILE AD-HOC NETWORKS 9

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Routing in MANETs - MANET Routing Protocols : DSDV, DSR, AODV – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security Attacks and Counter Measures in MANETs.

UNIT-V APPLICATION LAYERS 9

WAP-Architecture, WDP, WTLS, WTP, WSP, WAE, WML, WML Script, WTA, Push Architecture, Push/Pull Services.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Explore the basics of mobile telecommunication system.
CO2: Familiarize with working aspects of telecommunication system & MAC protocols.
CO3: Analyze the working principles of TCP/IP & its standards.
CO4: Understand design issues of Ad hoc networks,
CO5: Develop a mobile application.

TEXT BOOKS:

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.
2. Jochen Schiller, "Mobile Communications", PHI/Pearson Education, Second Edition, 2011.

REFERENCE BOOKS:

1. C.Siva Ram Murthy and B.S.Manoj, "AdHoc Wireless Networks", Second Edition, Pearson Education, 2007.
2. Dharma PrakashAgarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4. William.C.Y.Lee,"Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition,TataMcGraw Hill Edition ,2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Explore the basics of mobile telecommunication system.	3	2	1	3		2							1	2	
CO2	Familiarize with working aspects of telecommunication system & MAC protocols.		3	2	2		2								1	
CO3	Analyze the working principles of TCP/IP & its standards.	1	3	3	2		2							2		
CO4	Understand design issues of Ad hoc networks,	1			3		2							3		
CO5	Develop a mobile application.			1	3		3							3		

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715CIT02	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To make familiar with the various concepts of data warehouse architecture, Online Analytical Processing (OLAP), Meta data, Data mart, and multidimensional data models.
- To sail along with the various approaches in data mining.
- To familiarize with data mining algorithms and its application in various fields.

Prerequisite: Database Management Systems

UNIT-I DATA WAREHOUSE & OLAP TECHNOLOGY 9

Data Warehouse Overview - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation - Data Warehousing to Data Mining.

UNIT-II DATA MINING 9

Introduction - Kinds of data - Data Mining Functionalities - Interestingness of Patterns - Classification of Data Mining Systems - Data Mining Task Primitives - Integration of a Data Mining System with a Data Warehouse - Issues - Data Preprocessing.

UNIT-III ASSOCIATION RULE MINING 9

Mining Frequent Patterns- Associations and Correlations - Frequent item set Mining Methods – Mining Various Kinds of Association Rules - Correlation Analysis - Constraint Based Association Mining.

UNIT- IV CLASSIFICATION 9

Basic Concepts - Classification and Prediction - Issues - Decision Tree Induction – Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines – Associative Classification - Prediction.

UNIT-V CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING 9

Cluster Analysis - Types of Data - Categorization of Major Clustering Methods – k-Means - Partitioning Methods - Hierarchical Methods - Density-Based Methods - Grid Based Methods - Model-Based Clustering Methods - Clustering High Dimensional Data - Constraint – Based Cluster Analysis - Outlier Analysis - Data Mining Applications - Trends in Data Mining - Case study : DBMiner , WEKA Tool.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Have an extensive knowledge on concepts of data warehousing and differentiate OLTP and OLAP.

CO2: Discover and measure interesting patterns from different kinds of databases.

CO3: Apply the technique of association finding to solve real life problems.

CO4: Compare and contrast the various classifiers.

CO5: Able to explore recent trends in data mining and its applications.

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, 2007.

REFERENCES BOOKS:

1. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining", Pearson Education, 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
5. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Have an extensive knowledge on concepts of data warehousing Modeling and Implementation				2					3				3	1	3
Co2	Discover and measure interesting patterns from different kinds of databases.		3	2	3	3				3				3	3	
Co3	Apply association rule mining techniques for data analysis.		3	3	3	2				3					3	3
Co4	Compare and contrast the various classifiers.		2	2	1	2				3				2		
Co5	Able to explore recent trends in data mining and its applications.		2	3	2	3				3						3

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715CIT03	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To learn the characteristics of mobile applications.
- To learn about the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.
- To learn development of mobile applications.

Prerequisites: Java Programming

UNIT –I GETTING STARTED WITH MOBILITY 9

Mobility landscape, Mobile platforms – Apple iPhone Platform- Google Android Platform – Eclipse Simulator, Mobile apps development, setting up the mobile app development environment along with an emulator - Case Study on Mobile App development.

UNIT-II BUILDING BLOCKS OF MOBILE APPS – I 9

App user interface designing – mobile UI resources (Layout, UI elements, Drawable Menu), Activity-states and life cycle, interaction amongst activities. App functionality beyond user interface - Threads, ASync task, Services – states and lifecycle, Notifications.

UNIT-III BUILDING BLOCKS OF MOBILE APPS – II 9

Broadcast receivers, Telephony and SMS APIs , Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)

UNIT-IV SPRUCING UP MOBILE APPS 9

Graphics and animation – custom views, canvas, animation APIs, multimedia – Audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope)

UNIT-V TESTING MOBILE APPS AND TAKING APPS TO MARKET 9

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk, Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Familiarize with Mobile apps development aspects.
CO2: Design and implement the user interfaces for mobile applications
CO3: Develop useful mobile applications using Google Android and Eclipse simulator.
CO4: Develop mobile applications using graphics and animation
CO5: Perform testing, signing, packaging and distribution of mobile apps

TEXT BOOK:

1. Anubhav Pradhan, Anil V Deshpande, "Mobile Apps Development", First Edition, Wiley India, (2013)

REFERENCE BOOKS:

1. Barry Burd , "Android Application Development All in one for Dummies", First Edition , Wiley India ,(2011)
2. Lauren Darcey , Shane Conder, "Teach Yourself Android Application Development In 24 Hours", Second Edition, Wiley India , (2012)

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Familiarize with Mobile apps development aspects.		2	3										1		
CO2	Design and implement the user interfaces for mobile applications			3			2							3		
CO3	Develop useful mobile applications using Google Android and Eclipse simulator.			2		3	2	2							3	
CO4	Develop mobile applications using graphics and animation			3	2		3								3	
CO5	Perform testing, signing, packaging and distribution of mobile apps					3		2	2					3		2

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715CIT04	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To be able to set up a private cloud.

UNIT-I INTRODUCTION 8

Introduction - Historical Development - Cloud Computing Architecture – The Cloud Reference Model – Cloud Characteristics – Cloud Deployment Models: Public, Private, Community, Hybrid Clouds - Cloud Delivery Models: IaaS, PaaS, SaaS – Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack.

UNIT-II VIRTUALIZATION 9

Data Center Technology - Virtualization - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization - Implementation Levels of Virtualization - Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V.

UNIT-III CLOUD COMPUTING MECHANISM 9

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

UNIT-IV HADOOP AND MAP REDUCE 10

Apache Hadoop – Hadoop Map Reduce – Hadoop Distributed File System- Hadoop I/O- Developing a Map Reduce Application - Map Reduce Types and Formats - Map Reduce Features– Hadoop Cluster Setup – Administering Hadoop.

UNIT-V SECURITY IN THE CLOUD 9

Basic Terms and Concepts – Threat Agents – Cloud Security Threats – Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Articulate the main concepts, key technologies, strengths and limitations of cloud computing.

CO2: Choose the appropriate technologies, algorithms and approaches for the related issues in cloud.

CO3: Identify the architecture, infrastructure and delivery models of cloud computing.

CO4: Understand and apply Map and Reduce Programming.

CO5: Understand the core issues of cloud computing such as security, privacy and interoperability.

TEXT BOOK:

1. Thomas Erl, Zaigham Mahood, Ricardo uttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, 2013.

REFERENCE BOOKS:

1. Toby Velte, Anthony Velte, Robert C. Elsenpeter, - Cloud Computing, A Practical Approach Tata McGraw-Hill Edition, 2010.
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, - Mastering Cloud Computing, Tata McGraw-Hill, 2013.
3. Arshdeep Bahga, Vijay Madisetti, - Cloud Computing: A Hands- On Approach‖, Universities Press, 2014.
4. Tom White, - Hadoop: The Definitive Guide, O'Reilly Media, 4th Edition, 2015.
5. James E Smith and Ravi Nair, -Virtual Machines, Elsevier, 2005.
6. John Rittinghouse and James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC Press, 2010.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing.		3	3	3	3										2
CO2	Choose the appropriate technologies, algorithms and approaches for the related issues in cloud.	3		2	2	3										
CO3	Identify the architecture, infrastructure and delivery models of cloud computing.		3	2	3	3								1	2	
CO4	Understand and apply Map and Reduce Programming.		3	3	3	3								3	3	3
CO5	Understand the core issues of cloud computing such as security, privacy and interoperability.	2		2	2	3	3	3						2	2	3

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715CIE01	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario.

Prerequisites: Nil

UNIT-I INTRODUCTION 9

Introduction to Internet of Things Definition & Characteristics of IoT, Evolution of IoT, Physical Design of IoT-Things in IoT, IoT Protocols, Logical Design of IoT, IoT Functional Blocks, IoT Communication Models ,IoT Communication APIs, IoT Enabling Technologies , Wireless Sensor Networks. Cloud Computing Big Data Analytics, Communication Protocols, Embedded Systems IoT Levels & Deployment Templates, IoT Level-1, IoT Level-2,IoT Level-3,IoT Level-4,IoT Level5,IoTLevel-6 .

UNIT-II IoT, M2M AND PLATFORM DESIGN METHODOLOGY 9

IoT and M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Software Defined Networking, Network Function Virtualization, NETCONF, YANG, IoT System Management with NETCONF-YANG, IoT Platforms Design Methodology : IoT Design Methodology , Purpose & Requirements Specification , Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device & Component Integration, Application Development.

UNIT-III PYTHON PACKAGES AND IOT PHYSICAL DEVICES 8

Python Packages of Interest for IoT-JSON, XML, HTTPLib & URLLib, SMTPLib, Raspberry Pi, About the Board , Linux on Raspberry Pi, Raspberry Pi Interfaces, Serial, SPI , I2C Programming Raspberry Pi with Python-Controlling LED with Raspberry Pi , Interfacing an LED and Switch with Raspberry Pi, Interfacing a Light Sensor (LDR) with Raspberry Pi, Other IoT Devices-pcDuino, Beagle Bone Black, Cubie board.

UNIT-IV IoT PHYSICAL SERVERS & CLOUD OFFERINGS 9

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

UNIT-V DATA ANALYTICS FOR IoT & CASE STUDIES 10

Data Analytics for IoT-Apache Oozie, Setting up Oozie, Oozie Workflows for IoT Data Analysis, Apache Spark, Apache Storm, Setting up a Storm Cluster, Using Apache Storm for Real-time Data Analysis, REST- based approach, Web Socket-based approach. Case Studies Illustrating IoT Design-Smart Lighting, Smart Parking , Weather Monitoring System-Weather Reporting Bot ,Smart Irrigation, IoT Printer, Tools for IoT- Chef, Puppet.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Compare and analyze different design issues and domains of IoT.

CO2: Identify different design methodologies and end point devices of IoT.

CO3: Prepare different cloud based and embedded solution for IoT.

CO4: Formulate different case studies related to IoT framework.

CO5: Solve data analytical and real-time application problems on IoT.

TEXT BOOKS:

1. Arshdeep Bagha ,Vijay Madisetti,Internet of Things (A Hands-on-Approach), University Press, 2015.

REFERENCE BOOKS:

1. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), - Architecting the Internet of Things, Springer, 2011.
2. Honbo Zhou, - The Internet of Things in the Cloud: A Middleware Perspective, CRCPress, 2012.
3. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , -The Internet of Things – Key applications and Protocols, Wiley, 2012
5. The Evolution of Internet of Things - Texas Instruments. (http://www.ti.com/lit/ml/swrb028/swrb028.pdf)

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Compare and analyze different design issues and domains of IoT.		2	3		3								2		
CO2	Identify different design methodologies and end point devices of IoT.		3	3											3	
CO3	Prepare different cloud based and embedded solution for IoT.			3				3	2					3		
CO4	Formulate different case studies related to IoT framework.															3
CO5	Solve data analytical and real-time application problems on IoT.					2			3		3	3				3

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		L	T	P	C
15BAO03	ENGINEERING ETHICS AND HUMAN VALUES	3	0	0	3

COURSE OBJECTIVE(S):

- Understand the moral values that ought to guide engineering profession or practice.
- Resolving moral issues in engineering.
- Justifying the moral judgements in engineering. It deals with set of moral problems and issues connected with engineering.

Pre-requisites: **ENGINEERING ETHICS AND HUMAN VALUES**

UNIT-I HUMAN VALUES **10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality

UNIT-II ENGINEERING ETHICS **9**

Scope of Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles - Self-interest – Ethical Egoism.

UNIT- III ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study.

UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS **9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – The Three Mile Island and Chernobyl Case Studies – Team Work and Loyalty - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT-V GLOBAL ISSUES **8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Sample Code of Conduct.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students are able to

CO1: It ensures students sustained happiness through identifying the essentials of human values and skills.

CO2: It facilitates a correct understanding between profession and happiness

CO3: It helps students understand practically the importance of trust, mutually satisfying human behavior

CO4: It helps students enriching interaction with nature.

CO5: Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 4th Edition, 2010.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Thompsonwadsworth, A Division of Thomson Learning Inc., United States, 2000.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", OxfordUniversity Press, Oxford, 2001.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	It ensures students sustained happiness through identifying the essentials of human values and skills.		2	2	3	2								3		
CO2	It facilitates a correct understanding between profession and happiness		3	2	3	1								2		
CO3	It helps students understand practically the importance of trust, mutually satisfying human behavior		3	3	3	2									3	
CO4	It helps students enriching interaction with nature.		2	2	2	3								1		
CO5	Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.		3	3	2	1								2		

715CIP07	MOBILE APPLICATION DEVELOPMENT LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVE(S):

The student should be made to:

- Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Can able to draw basic graphical primitive on the mobile application.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand how to work with GPS location tracking information.

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multithreading
8. Develop a native application that uses GPS location information.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application that creates alarm clock

TOTAL HOURS:45 PERIODS

OUTCOMES:

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

CO1: Design and Implement various mobile applications using emulators.
CO2: Deploy applications to hand-held devices
CO3: Develop an application using basic graphical primitives and databases.
CO4: Construct an application using multi-threading and RSS feed.
CO5: Make use of location identification using GPS in an application.

LIST OF EQUIPMENTS:

- Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development
- Tools with appropriate emulators and debuggers.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Design and Implement various mobile applications using emulators.		2	3										1		
CO2	Deploy applications to hand-held devices			3			2							3		
CO3	Develop an application using basic graphical primitives and databases.			2		3	2	2							3	
CO4	Construct an application using multi threading and RSS feed			3	2		3								3	
CO5	Make use of location identification using GPS in an application.					3		2	2					3		

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715CIP08	CLOUD COMPUTING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVE(S):

- Create practical exposure to virtualization concepts by creating virtual machines
- Learn Application and back end web service development
- Learn hosting applications in the cloud environmentand use REST API's
- Expose to database hosting and accessing in virtual environment
- Familiar with cloud authentication concept by application authentication using username/password.

LIST OF EXPERIMENTS:

1. Design and create virtual machine configuration for the given problem. Justify the use of CPU, Memory, GPU and storage. Create the Virtual machine.
2. Create key based authentication and login virtual machine from the host machines. Install required software by connecting with SSH or Putty.
3. Install Web server in the virtual machine and create sample web application(HTML,JS) and host. Run from the browser.
4. Create simple backend logic and communication with front end app using AJAX.
5. Create SQL DB and design schema for user session details .Retrieve the details from front end application.
6. Create user name, store the password in the SQL. Login using user name/password and validate.
7. Create and mount one node Hadoop cluster.
8. Access the Hadoop using API's from the application and show the data.
9. Demonstrate the use of map and reduce using simple program.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Develop and deploy cloud application using popular cloud platforms,

CO2: Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud.

CO3: Explain and identify the techniques of hadoop cluster in cloud.

CO4: Compare, contrast, and evaluate the key trade-offs between multiple approaches to map reduce in cloud system design.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Software: Eucalyptus or Open Nebula or equivalent, Virtual box , Ubuntu.

Hardware: Standalone desktops 30 Nos

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Develop and deploy cloud application using popular cloud platforms,		2	3										1		
CO2	Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud.		2	3			2							3		
CO3	Explain and identify the techniques of hadoop cluster in cloud.	2		2		3	2	2							3	
CO4	Compare, contrast, and evaluate the key trade-offs between multiple approaches to map reduce in cloud system design.			3	2		3								3	

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715ITP09 **MINI PROJECT**

L	T	P	C
0	0	4	2

AIM:

To obtain the basic knowledge of doing projects by using their programming skills learned.

OBJECTIVE:

The main objective of the Mini Project is to enhance the Student's ability in solving real time problems and situations related to industry and academics needs by the application of varying tools and techniques.

PREREQUISITE: Object Oriented and Modelling & Design Lab

IMPORTANCE OF MINI PROJECT:

1. To have a systematic approach for solving problems.
2. Provides an opportunity for the students to develop and orient their solutions to the real time problems.
3. Forms the base for working in a team and to have upper hand in application of skills and knowledge gained in the previous semesters.

GUIDELINES FOR MINI PROJECT:

1. The students in groups of not more than 4 members have to take one Mini Project.
2. The team can select the problem domain based on their area of interest.
3. Periodic Monitoring of the project will be scheduled during the project hours and phase based deliverables are expected (SRS, Design Diagrams, Coding, Test reports, Project report).
4. Projects have to be developed during the project hours and it has to be in-house project.

EVALUATION OF MINI PROJECT:

1. Each project will be guided by a guide based on their area of interest.
2. Continuous assessment of the Mini Project will be done by the conduction of 3 reviews.
3. Each Individual student will be evaluated based on the progress and performance during the reviews.

TOTAL HOURS:45 PERIODS

COURSE OUTCOME:

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

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design engineering solutions to complex problems utilizing a system approach.

CO3: Analyze engineering problem specification and recommend an optimum set of technical solutions.

CO4: Implement innovative ideas in solving contemporary issues.

CO5: Acquire industry relevant skills by working in team and efficiently communicating the deliverables.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Demonstrate a sound technical knowledge of their selected project topic.		2	3										1		
CO2	Design engineering solutions to complex problems utilizing a system approach.			3		1			2				1			1
CO3	Analyze engineering problem specification and recommend an optimum set of technical solutions.		2	3			2							3		
CO4	Implement innovative ideas in solving contemporary issues.	2		2		3	2	2							3	
CO5	Acquire industry relevant skills by working in team and efficiently communicating the deliverables.			3	2		3								3	

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815CIT01	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- Understand the terminologies, storage and processing concepts of Big Data.
- Learn various Big Data Analytic techniques.
- Explore the essentials of Data Streams.
- Familiarize with Hadoop Ecosystem, NoSQL DB, and Big Data Framework.

Prerequisites: Data Warehousing and Data Mining

UNIT-I INTRODUCTION TO BIG DATA 9

Concepts and Terminologies – Big Data Characteristics – Types of Data – Big Data Analytics Lifecycle – Big Data Storage Concepts: Clusters – File System and Distributed File System – NoSQL – Sharding – Replication – Big Data Processing Concepts: Parallel Data – Distributed Data –Batch Mode – Real Time Mode.

UNIT-II BIG DATA ANALYTICS TECHNIQUES 9

Quantitative Analysis – Qualitative Analysis – Statistical Analysis: A/B Testing – Correlation – Regression – Machine Learning: Classification – Clustering – Outlier Detection – Filtering – Semantic Analysis – Visual Analysis – Heat Maps – Time Series Plots – Network Graph – Spatial Data Mapping.

UNIT-III STREAM MEMORY 9

Introduction to Stream Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Ones in a Window – Decaying Window – Case Studies: Real Time Analytics in Platform (RTAP) Applications – Real Time Sentimental Analysis – Stock Market Predictions - Using Graph Analytics for Big Data: Graph Analytics.

UNIT-IV NoSQL DATA MANAGEMENT FOR BIG DATA 9

Schema-less Models: Increasing Flexibility for Data Manipulation – Key Value Stores – Document Stores – Tabular Stores – Object Data Stores – Graph Databases – NoSQL Databases –Introduction to MongoDB – Terms used in RDBMS and MongoDB – Data Types in MongoDB – MongoDB Query Language.

UNIT-V BIG DATA FRAMEWORK 9

Hadoop: Introduction to Hadoop – RDBMS Vs Hadoop – Hadoop Overview – Hadoop Distributors – HDFS – Processing Data with Hadoop – Managing Resources and Application with Hadoop YARN – Hadoop Ecosystem.

Hive: Introduction to Hive – Hive Architecture – Hive Data Types –Hive File Format – Hive Query Language – RC File Implementation – Ser De – User Defined Function (UDF).

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students are able to

CO1: Understand the fundamentals of big data, its storage and processing concepts.

CO2: Apply analytics for various big data based problems.

CO3: Identify the Problem appropriate to data streams.

CO4: Develop applications using NoSQL DB.

CO5: Explore on big data applications using big data framework.

TEXT BOOKS:

1. Thomas Erl, WajidKhattak, Paul Buhler, "Big Data Fundamentals: Concepts, Drivers & Techniques" ,Prentice Hall, 2015
2. Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Seema Acharya, Subhashini Chellappan, "Big Data Analytics", Wiley India Private Limited, First Edition, 2018.

REFERENCE BOOKS:

1. David Loshin, Morgan Kaufman, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Elsevier Publishers, 2013.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Tom White, "Hadoop The Definitive Guide", O'Reilly Publishers, 4th Edition, 2015.
4. Edward Capriolo, Dean Wampler, Jason Rutherglen, "Programming Hive", O'Reilly Publishers, 2012.
5. Tim Hawkins, EelcoPlugge, Peter Membrey, David Hows, "The Definitive Guide to MongoDB: A complete guide to dealing with Big Data using MongoDB", Third Edition,Apress Publishers, 3rdEdition, 2015.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
Co1	Understand the fundamentals of big data, its storage and processing concepts.		2													
Co2	Apply analytics for various big data based problems.													2		
Co3	Identify the Problem appropriate to data streams.	2	2													
Co4	Develop applications using NoSQL DB.			3		3									3	
Co5	Explore on big data applications using big data framework.					2		3								3

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815ITE02	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

BJECTIVE(S):

- To understand the basics of testing activities.
- To get exposed to the various criteria's for test case design.
- To understand the role played by Test Management, Planning and Organization.
- To understand the importance of Test Automation and Tool Selection.
- To get knowledge on testing applications using Testing Tools.

Prerequisite: Software Engineering.

UNIT-I INTRODUCTION 9

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model (TMM) - Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Correctness vs. Reliability – Testing & Debugging - Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support of Developing a Defect Repository.

UNIT-II TEST CASE DESIGN 9

Test case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements Based Testing – Boundary Value Analysis – Equivalence Class Partitioning – State Based Testing – Cause-Effect Graphing – Compatibility Testing – User Documentation Testing – Domain Testing – Using White Box Approach to Test Design – Test Adequacy Criteria – Static Testing vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Code Complexity Testing – Evaluating Test Adequacy Criteria.

UNIT-III TEST - MANAGEMENT, PLAN AND ORGANIZATION 9

People and Organizational Issues in Testing – Organization Structures for Testing Teams – Testing Services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – The Role of three Groups in Test Planning and Policy Development – Introducing the Test Specialist – Skills needed by a Test Specialist – Building a Testing Group – Integrating Testing Activity into the Software Life Cycle.

UNIT-IV TEST AUTOMATION 9

Software Test Automation - Skills - Scope - Design and Architecture for Automation - Requirements for a test tool – Process Model for Automation – Selecting a Test Tool - Challenges in Automation - Test Metrics and Measurements - Project Progress and Productivity Metrics.

UNIT-V TESTING APPLICATIONS 9

Testing Web Application: Functional and Usability Issues – Configuration and Compatibility Testing – Reliability and Availability – Performance Testing – End to End Transaction Testing – Database Testing – Post Implementation Testing, Testing Application for Security, Tools that support the Automated Testing Life cycle - Agile Software Testing - Case Study – Testing Application using Tools.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the impact of software defects and realize the importance of Software testing.

CO2: Design test cases on two fundamental criteria namely Functional and Non Functional Test cases.

CO3: Plan, manage and organize testing for the product developed.

CO4: Automate the testing process for the web application and to impart security into the application.

CO5: Use automated testing tools to test the Application projects.

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2007.
2. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
3. Renu Rajani and Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, New Delhi, 2004.

REFERENCE BOOKS:

1. Elfriede Dustin, Jeff Rashka, "Automated software testing: Introduction, Management and Performance", Pearson Education, 2008.
2. Aditya P. Mathur, "Foundations Ff Software Testing – Fundamental algorithms and techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Understand the impact of software defects and realize the importance of Software testing.	2	2		3	2						2		3		3
CO2	Design test cases on two fundamental criteria namely Functional and Non Functional Test cases.		3		3	3								2	3	3
CO3	Plan, manage and organize testing for the product developed.		3	2	2	3								2		3
CO4	Automate the testing process for the web application and to impart security into the application.			2	2	3						3			3	3
CO5	Use automated testing tools to test the Application projects.		2	3	3	3								2		

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815ITE10	INFORMATION SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVE(S):

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security.

Prerequisite: Computer Networks

UNIT-I INTRODUCTION 9

History, Introduction to Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, the SDLC, the Security SDLC.

UNIT-II SECURITY INVESTIGATION & ETHICS 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.

UNIT-III SECURITY ANALYSIS 9

Risk Management: An Overview of risk management, Risk identification & Assessment, Risk control Strategies, Quantitative versus Qualitative risk control practices

UNIT-IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT-V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Access Control Devices, Physical Security, Security and Personnel, Digital forensics.

TOTAL HOURS:45 PERIODS

COURSE OUTCOMES:

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

CO1: Discuss the basics of Information Security.
CO2: Illustrate the legal, ethical and professional issues in Information Security.
CO3: Analysis the aspects of Risk Management.
CO4: Understand the various standards in the Information Security System.
CO5: Design and implementation of Security Techniques

TEXT BOOK:

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2014.
2. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management Vol 1-3 CRC Press LLC, 2008.

REFERENCE BOOKS:

1. 1.Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003
2. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Discuss the basics of Information Security.		2													
CO2	Illustrate the legal, ethical and professional issues in Information Security.							2	3					2		
CO3	Analysis the aspects of Risk Management.		3	3	3			3						3	3	
CO4	Understand the various standards in the Information Security System.						2		3							3
CO5	Design and implementation of Security Techniques		1	3	1		3									3

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815ITP01 **PROJECT WORK**

L	T	P	C
0	0	16	8

AIM: To obtain the basic knowledge of doing projects by using their programming skills learned.

PREREQUISITE: Mini Project, All Professional Cores and Electives

OBJECTIVE:

The main objective of the Project is to enhance the Student's ability in solving real time problems and situations related to industry and academics needs by the application of varying tools and techniques.

IMPORTANCE OF PROJECT:

1. To have a systematic approach for solving problems.
2. Provides opportunity for the students to develop and orient their solutions to the real time problems.
3. Forms the base for working in a team and to have upper hand in application of skills and knowledge gained in the previous semesters.

GUIDELINES FOR PROJECT:

1. The students in groups of not more than 4 members have to take one Project.
2. The team can select the problem domain based on their Area of Specialization.
3. Periodic Monitoring of the project will be scheduled during the project hours and phase based deliverables are expected (SRS, Design Diagrams, Coding, Test reports, Project report).
4. Projects have to be developed during the project hours and it has to be in-house project.

EVALUATION OF MINI PROJECT:

1. Each project will be guided by a guide based on their Area of Specialization.
2. Continuous assessment of the Project will be done by the conduction of 3 reviews.
3. Each Individual student will be evaluated based on the progress and performance during the reviews.

COURSE OUTCOME:

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

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design engineering solutions to complex problems utilizing a system approach.

CO3: Analyze engineering problem specification and recommend an optimum set of technical solutions.

CO4: Implement innovative ideas in solving contemporary issues.

CO5: Acquire industry relevant skill s by working in team and efficiently communicating the deliverable

Course Outcome		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	Demonstrate a sound technical knowledge of their selected project topic.		2								1					
CO2	Design engineering solutions to complex problems utilizing a system approach.									1				2		
CO3	Analyze engineering problem specification and recommend an optimum set of technical solutions.	2	2						2							
CO4	Implement innovative ideas in solving contemporary issues.			3		3						2			3	
CO5	Acquire industry relevant skills by working in team and efficiently communicating the deliverables.				2	2		3								3

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