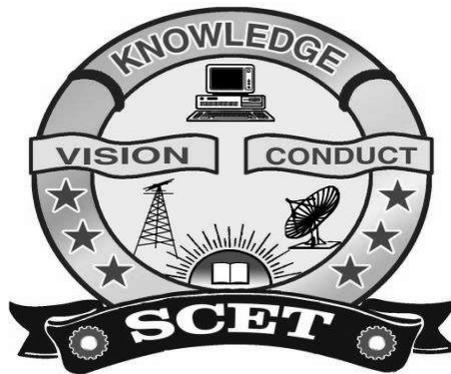


**R16 - Syllabus**



**SWARNANDHRA  
COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)  
DEPARTMENT OF INFORMATION TECHNOLOGY  
SEETHARAMAPURAM, NARSAPUR -534 280, W.G.DT  
ANDHRAPRADESH**

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16BS1T01: PROFICIENCY COURSE IN ENGLISH -I</b>				

### **COURSE OBJECTIVES**

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.  
To provide hands-on experience through case –studies, mini –projects, group and individual presentations
6. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
7. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
8. To assist students to carry on the tasks and activities through guided instructions and materials.
9. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
10. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
11. To assist students to carry on the tasks and activities through guided instructions and materials.

12. To effectively integrate English language learning with employability skills and training.
13. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
14. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.
15. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
16. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
17. To assist students to carry on the tasks and activities through guided instructions and materials.
18. To effectively integrate English language learning with employability skills and training.
19. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
20. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.
21. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
22. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
23. To assist students to carry on the tasks and activities through guided instructions and materials.
24. To effectively integrate English language learning with employability skills and training.
25. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.  
To provide hands-on experience through case –studies, mini –projects, group and individual presentations
26. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
27. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.

28. To assist students to carry on the tasks and activities through guided instructions and materials.
29. To effectively integrate English language learning with employability skills and training.
30. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
31. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.

## **COURSEOUTCOMES**

### **A) Reading Skills.**

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

### **B) Writing Skills:**

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

### **C) Interactive skills:**

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

### **D) Grammar in context**

- Enable the skills of grammar using in a situation
- Identifying the needs of apt grammar in life related situation

- Promoting discourse with grammar effectively

**Syllabus:**

S No	Content	Hours
UNIT-I	The Power of Prayer One word substitutes Nouns – Pronouns	8
UNIT-II	Is progress real? Commonly Confused words Verbs	8
UNIT-III	Secret of Work Collocations Adjectives ,Adverbs and Articles	8
UNIT-IV	An Astrologer's Day GRE words Prepositions and Sentences	8
UNIT-IV	Marriage Proposal Idioms Conjunctions and Interjections	8
UNIT-VI	The Road not Taken Phrasal Verbs Tenses	8
		48

**Text Book:** Proficiency Course in English, Semester –I by Maruti Publications.

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16MA1T01: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS</b>				

### **PREREQUISITES**

Knowledge of differentiation, integration, logarithms, hyperbolic functions, and trigonometry is necessary. Concept of functions and their types, partial differentiation is also needed.

### **COURSE OBJECTIVES**

1. The study of differential equations is introduced to make the students how to solve the problems in first order and first degree differential equations.
2. The study of second and higher order differential equations with constant coefficients.
3. To transform a given problem from one domain into another so that solving the corresponding problem becomes easier, Laplace transforms are introduced.
4. To know various physical and geometrical problems involving two or more independent variables, partial differential equations will be studied.

### **COURSE OUTCOMES**

The students are able to

1. solve linear differential equations of all orders.
2. solve the first order partial differential equations.
3. apply the knowledge to find the expansions of functions using Taylors and Maclaurin's series.
4. solve many problems in engineering with the knowledge of Laplace transforms.

### **UNIT -I Differential equations of first order and first degree**

Linear – Bernoulli – Exact - Reducible to exact - Newton's Law of cooling-Law of natural growth and Decay - Orthogonal Trajectories.

### **UNIT -II Linear differential equations of higher order**

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax}V(x)$ ,  $xV(x)$ . Method of Variation of parameters for solving second order linear differential equations.

### **UNIT -III Partial Derivatives**

Taylor series and Maclaurin's series expansions of functions of single and two variables (without Proofs) - Jacobian, Functional dependence.

### **UNIT -IV Partial Differential Equations**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations - Solutions of Linear Partial differential equations with constant coefficients by the method of separation of Variables.

### **UNIT -V Laplace transforms**

Laplace transforms of standard functions - Shifting Theorems, Transforms of derivatives and integrals – Unit step function – Dirac's delta function.

### **UNIT -VI Inverse Laplace transforms**

Inverse Laplace transforms - Convolution theorem (without proof).

Application: Solutions of ordinary differential equations using Laplace transforms.

#### **Text Books:**

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42<sup>nd</sup> Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

#### **Reference Books:**

1. **ERWIN KREYSZIG**, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, Wiley-India

SEMESTER - I	L	T	P	C
	3	-	-	3

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<b>16EE1T01: BASIC ELECTRICAL AND ELECTRONICS</b>
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### COURSE OBJECTIVES

The student able to Understand:

- To study the concepts of various electrical elements, various network reduction techniques and AC circuits.
- To understand the principle of operation and performance of DC and AC machines.
- To study the principle of operation and working of various types of measuring instruments.
- To study the construction details, operation and characteristics of various semiconductor devices, digital and logic operations.

### COURSE OUTCOMES

Students are able to

- Solve electrical networks with network topology concepts.
- Analyze the characteristics and performance of DC and AC machines.
- Choose right type of instrument for measurement of various electrical parameters.
- Explain the operation and characteristics of various semiconductor devices and concepts of digital and logic operations.

### UNIT – I

**Introduction To Electrical Engineering:** Basic Electrical circuit elements (Resistor, Inductor and capacitor)-voltage and current sources-Ohm's Law-Kirchhoff's Laws-series circuits-equivalent resistance-star/delta conversion- Node and mesh analysis of DC circuits - Simple problems.

**Network Theorems (DC Excitation)**-Superposition-Thevenin's-Norton's-Maximum Power Transfer Theorem-Simple problems

### UNIT – II

**Ac Fundamentals:** Introduction to AC circuits-RMS value-average value-form and peak factors – Real and reactive power – Apparent power- power factor- Behavior of R, L, and C in AC Circuits- Introduction to three phase circuits- phase and line parameters-three phase balanced and unbalanced systems-Simple problems.

### **UNIT – III**

**Electrical Machines:** DC Machines: Classification of DC Machines-DC Generator and Motor- Construction-Principle of operation –EMF Equation-Performance Characteristics-Simple problems  
AC Machines: Classification of AC Machines-Transformers-Synchronous Machines, Induction motor-Performance Characteristics-Starting Methods-Simple problems.

### **UNIT – IV**

**Measurement and Measuring Instruments:** Introduction – Analog and Digital Instruments – Passive and Active Instruments – Static

Characteristics – Linear and Non-linear Systems – Dynamic Characteristics – Classification of the Instrument System – Measurement of Error – Indicating type Instruments – Measurement of Power- Voltmeter and Ammeter method- two and three wattmeter method-Measurement of Energy.

### **UNIT-V**

**Semi Conductor Devices And Its Characteristics :** Characteristics of PN Junction Diode — Zener Diode- Intrinsic and Extrinsic Semiconductors – Semiconductor Diodes– Bipolar Junction Transistors-CB, CE, CC Configurations and Characteristics – FET – MOSFET – Silicon-controlled Rectifier – DIAC – TRIAC-Half wave and Full wave Rectifiers- Voltage Regulation.

### **UNIT – VI**

**Introduction To Digital Electronics :** Binary Number System – Logic Gates – Boolean Algebra - De Morgan's Theorem- Simplification of Boolean Expressions using De Morgan's Theorem – Half and Full Adders – A/D and D/A Conversion.

### **Text Books:**

1. Electrical and Electronic Principles and Technology-John Bird, Published by Elsevier Ltd

2. Engineering Circuit Analysis – William H. Hayt & Jack E. Kemmerly, Tata McGraw-Hill Company, 7th Edition.

**. Reference Books:**

1. Basic Electrical and Electronics Engineering – S. K. Bhattacharya, Pearson Publications.
2. Basic Electrical & Electronics Engineering – J. B. Gupta, S. K. Kataria & Sons Publications.
3. A Course in Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, Dhanpat Rai & Co.
4. Electronic Devices and Circuit Theory – Robert L. Boylestad & Louis Nashelsky, Prentice-Hall of India, 6th Edition.
5. Electrical & Electronics Engineering – J. B. Gupta, S. K. Kataria & Sons Publications.

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16BS1T03: ENGINEERING PHYSICS</b>				

### **COURSE OBJECTIVES**

- 1) Understand the basic concepts, definitions, characteristics and phenomena.
- 2) Recognize the classical ideas and physical phenomena and also define and analyze the concepts.
- 3) Assess the role of Science and in particular, physics, in helping us better understanding the complex, technological society of which we are apart.
- 4) Investigate and understand physical behavior in the lab using scientific reasoning and logic and interpret the result of simple experiments and demonstration of physical principles and also evaluate the impact of physical discoveries on how we view the world.
- 5) Solve a variety of basic problems and given word problems, student will identify the physical principle required to solve the problem, formulate the equation necessary to solve the problem.
- 6) Effectively communicate experimental results and solutions to application problems through oral and written reports.

Explain physical phenomena using realistic mathematical modeling at the level of general physics

### **COURSE OUTCOMES**

#### **Student able to understand:**

1. Basic crystal systems and determination of crystal structures.
2. Proper choice of Magnetic/Dielectric Materials as per the functionality of appliance could be realized.
3. Concept of Magnetic Induction and Maxwell's equations.
4. Application of Schrodinger equation and Concept of band theory of solids.
5. Pure & doped Semiconductor devices for better utility.
6. Optical properties of solids and super conducting properties of solids and their applications.

### **UNIT-I CRYSTALLOGRAPHY AND X-RAY DIFFRACTION**

Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC, BCC and FCC – Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law - Bragg's Spectrometer.

## **UNIT-II MAGNETIC AND DIELECTRIC PROPERTIES**

**MAGNETIC PROPERTIES:** Origin of magnetic moment - Magnetic Materials: Classification of Magnetic Materials and properties - Hysteresis Loop of ferromagnetic material.

**DIELECTRIC PROPERTIES:** Introduction - Electronic, ionic and orientational (Qualitative) polarizations - Internal fields in solids – Clausius - Mossotti equation.

## **UNIT-III ELECTROMAGNETISM**

Introduction - Concept of Electric Flux - Gauss's Law – Integral and Differential forms - Magnetic Field – The Biot-Savart's Law - Ampere's Law - B for a Solenoid - Faraday's Law of induction - Lenz's law - Displacement Current - Maxwell's Equations.

## **UNIT –IV QUANTUM MECHANICS AND BAND THEORY OF SOLIDS:**

De Broglie concept of matter waves, Schrodinger Time Independent wave equation – Application to a Particle in a box - Defects of Classical free electron theory of metals – Quantum free electron theory – concept of Fermi energy - Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semiconductors & insulators.

## **UNIT – V SEMICONDUCTOR PHYSICS**

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion currents – Einstein's equations - Hall Effect and its applications.

## **UNIT-VI LASERS AND SUPER CONDUCTIVITY**

**LASERS:** Introduction– Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein’s coefficients – Population inversion - Three level and four level laser pumping schemes - Ruby laser – Helium-Neon laser- Applications of Laser.

**SUPERCONDUCTIVITY:** General properties – BCS Theory of Superconductivity - Meissner effect – Type-I and Type-II superconductors – Flux quantization – Josephson effects – Applications of Superconductors.

### **TEXT BOOKS**

- 1 A text book of Engineering Physics by M-N- Avadhanulu & P.G. Kshirasagar (S-Chand publications)
- 2 Engineering Physics by R.K. Gaur and S.L. Gupta.

### **REFERENCE BOOKS**

- 1 Engineering Physics“ by Palanisamy (Scitech Publishers)
- 2 Engineering Physics by Mani Naidu S (Pearson Publications)
- 3 Introduction to solid state physics“ by Charles Kittel (Wiley India Pvt-Ltd)
- 4 Applied Physics“ by T. Bhimasenkaram (BSP BH Publications)
- 5 Applied Physics“ by M. Arumugam (Anuradha Agencies)
- 6 Physics by David Halliday and Robert Resnick – Part I and Part II

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16CS1T01: FUNDAMENTALS OF COMPUTERS AND C PROGRAMMING</b>				

### **PREREQUISITES**

Basic Mathematical Problems and their Solutions

### **COURSE OBJECTIVES**

1. To enable the student to learn about the major components of a computer system.
2. To introduce the basic structure of the Algorithm and Flowchart.
3. To know the concepts of conditional & loop statements.
4. To implement the different user defined and pre-defined functions.
5. To know the pointers, structures and unions concept used in various areas.
6. To provide practical, hands-on training in C programming.

## COURSE OUTCOMES

The student will be proficient in the following:

1. Identification and Usage of each part of a computer system.
2. The Evolution and Purpose of Programming.
3. Mastering in basic programming concepts and logic implementations.
4. Knowledge in file I/O operations (i.e. open, close, read, write, seek)
5. Ability to identify and implement appropriate Solution for a given Problem.
6. Know the terms "Structured Programming", "Algorithm", "Flowchart", "Data Types", "Control Statements", "Arrays", "Functions", "Pointers", "Structures", "Unions", "File I/O" and where they are applicable.

### UNIT-I COMPUTER FUNDAMENTALS

**Computer System:** definition, block diagram, **Hardware:** Components, mother board layout, block diagram of mother board, **Software:** definition, types of software, **Algorithm:** definition, properties of algorithm, algorithms on basic problems, **Flowchart:** definition, symbols used in flow charts, flow charts for basic problems, types of computer Languages, bits, bytes, binary system.

### UNIT-II FUNDAMENTALS OF C LANGUAGE

Character Set, Tokens, Identifiers, Constants, Basic Data Types and Sizes, Arithmetic Operators, Relational Operators, Logical Operators, Conditional Operator, Increment and Decrement Operators, Assignment Operators, Bit-wise Operators, Special Operators, Expressions, Operator Precedence and Order of Evaluation, Evaluation of Expressions, Type Conversions: Implicit and Explicit, Structure of C Program.

### UNIT-III CONTROL STRUCTURES

**Selection Statements:** Simple if, if-else Statement, Nested if Statement, else-if Ladder, switch Statement.

**Iterative Statements:** while, do-while and for loops, break and continue statements, goto statement.

### ARRAYS

Array definition, declaration, initialization and accessing array elements of 1-D and 2-D arrays.

### STRINGS

String definition, declaration, initialization and accessing, string handling functions in **string.h**

## UNIT-IV FUNCTIONS

Introduction to Function, Types of Functions, Return Statement, Declaration, Definition and Calling a Function, Parameter Passing Techniques, Storage Classes, Passing 1-D Array to Functions.

**Recursion:** Types of recursion, rules of recursion, recursive solutions for factorial of a number, Fibonacci Series and GCD of two numbers.

**C Preprocessors:** File Inclusion and Macro Substitution.

## UNIT-V POINTERS

Pointer Definition, Declaration, Initialization and Accessing a Pointer, void pointer, null pointer, Pointer Arithmetic, Pointer to Pointer, Dynamic Memory Management Functions.

## STRUCTURES AND UNIONS

Definition, Declaration and Initialization of Structures, Accessing Structures, Nested structures, Array of Structures, Pointer to structures

Definition, Declaration and Initialization of Unions, difference between structures and unions

## UNIT-VI FILES

Introduction to Files, File I/O functions, File opening modes, sequential and random accessing files, file operations.

### Text Books:

- |                          |                 |     |
|--------------------------|-----------------|-----|
| 1. Programming in ANSI C | E. Balagurusamy | TMH |
|--------------------------|-----------------|-----|

### Reference Books:

- |                                      |                          |         |
|--------------------------------------|--------------------------|---------|
| 1. Programming with ANSI and Turbo C | Ashok N. Kamthane        | Pearson |
| 2. Let us C                          | Yashwant Kanetkar        | BPB     |
| 3. The C Programming Language        | Kernighan & Ritchie      | PHI     |
| 4. Programming in C                  | Pradip Dey & Manas Ghosh | Oxford  |

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>1</b>	<b>-</b>	<b>4</b>	<b>3</b>
<b>16ME1T01: ENGINEERING DRAWING</b>				

### **COURSE OBJECTIVE**

Engineering drawing is the principle method of communication for engineers. The objective to introduce the students, the techniques of constructing the various types of polygons and curves. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

### **COURSE OUTCOMES**

1. Usage of drawing instruments and construct polygons.
2. Understand the orthographic projections of points, lines and planes in different positions.
3. Understand the orthographic projections of Solids.
4. Convert the Orthographic projections into Isometric and vice versa.

### **UNIT - I**

**INTRODUCTION:** Engineering Drawing and Plane Curves, Use of Drawing Instruments and Conventions.

**GEOMETRICAL CONSTRUCTIONS:** Constructions of Polygons using General Method.

**CONICS:** Construction of Ellipse, Parabola and Hyperbola by Eccentricity Method.

**CYCLOIDAL CURVES:** Construction of Cycloid, Epi-Cycloid and Hypo-Cycloid.

### **UNIT - II**

**PROJECTIONS OF POINTS AND LINES:** Introduction to Orthographic Projections - Projection of Points.

**PROJECTION OF STRAIGHT LINES:** Parallel to both the Planes, Parallel to One Plane and Inclined to Other Plane, Inclined to Both the Planes.

### **UNIT - III**

**PROJECTIONS OF PLANES:** Introduction to Perpendicular Planes, Perpendicular to both the Reference Planes, Perpendicular to One Plane and Parallel to Other Plane, Perpendicular to One Plane and Inclined to Other Plane, Inclined to Both the Reference Planes.

**UNIT – IV**

PROJECTIONS OF SOLIDS: Projections of Simple Solids like Prism, Cylinder, Pyramids and Cones. Projections of Solids with Axis Perpendicular to one Plane, Projections of Solids with Axis Parallel to Both the Planes.

**UNIT – V**

PROJECTIONS OF SOLIDS – AXIS INCLINED TO ONE PLANE: Projections of Solids with Axis inclined to one plane and parallel to other Plane (Axis inclined to the VP and Parallel to the HP, Axis Inclined to the HP and Parallel to the VP).

**UNIT – VI**

ISOMETRIC PROJECTIONS: Principles of Isometric Projections - Isometric Scale, Isometric Projections of Planes, Simple Solids, Conversion of Isometric to Orthographic Views and Vice Versa.

**Text Books:**

1. Engineering Drawing by N.D. Bhatt, Charotar Publishers.
2. Engineering Drawing by K.L. Narayana & P. Khannaiah., SCIETECH Publishers.

**Reference Books:**

1. Engineering Drawing by M.B. Shah & B.C. Rana., Pearson's Publishers.
2. Engineering Drawing by K. Venugopal., NEW AGE Publications.

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>4</b>	<b>2</b>
<b>16BS1L01: ENGLISH PROFICIENCY LAB</b>				

### **COURSE DESCRIPTION**

Communicating in a language is also a skill. So a student has to look for an opportunity to practice English language in order to acquire proficiency in English. ‘Strengthen your Communication Skills: Part - A’ is designed to provide opportunities for engineering students to revise and consolidate the basic skills in listening, speaking, reading and writing in addition to giving ample practice in various communicative functions and Life skills.

### **PREREQUISITES**

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary

## **COURSE OBJECTIVES**

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

## **COURSE OUTCOMES**

### **a) Reading Skills.**

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

### **b) Writing Skills:**

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

### **c) Interactive skills:**

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.

- Presenting ideas coherently within a stipulated time.

**d) Life Skills and Core Skills:**

- Examining self-attributes and identifying areas that require improvement self diagnosis, self-motivation.
- Adopting to a given situation and developing a functional approach to find solutions- adaptability, problem-solving.
- Understanding the importance of helping others-community service, enthusiasm.

**Syllabus**

WEEK			TOPIC
			Introduction to syllabus
1	UNIT- 1	Section-A	Greeting, Introducing and taking leave
2	UNIT- 1	Section-B	Pure Vowels
3	UNIT- II	Section-A	Giving Information and Asking for information
4	UNIT- II	Section-B	Diphthongs
5	UNIT- III	Section-A	Inviting, Accepting and Declining Invitations
6	UNIT- III	Section-B	Consonants
7	UNIT- IV	Section-A	Commands, Instructions and Requests
8	UNIT- IV	Section-B	Accent and Rhythm
9	UNIT- V	Section-A	Suggestions and Opinions
10	UNIT- V	Section-B	Intonation
10WEEKS			TOTAL

**Text Books:**

Strengthen Your Communication Skills: Part – A by Maruthi Publications.

**Reference Books:**

- 1) INFOTECH English (Maruthi Publications)
- 2) Personality Development and Soft Skills (Oxford University Press, New Delhi)

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>4</b>	<b>2</b>
<b>16BS1L03: ENGINEERING PHYSICS LAB</b>				

### **COURSE OBJECTIVES**

1. To Investigate and understand physical behavior in the lab using scientific reasoning and logic and interpret the result of simple experiments and demonstration of physical principles and also evaluate the impact of physical discoveries on how we view the world.
2. Effectively communicate experimental results and solutions to application problems through oral and written reports.
3. Understand the basic concepts, definitions, characteristics and phenomena's.

Recognize the classical ideas and physical phenomena and also define and analyze the concepts

### **COURSE OUTCOMES**

1. An understanding of professional and develop confidence on recent trends
2. Able to gain technical Knowledge of measuring, operating and testing of physics instruments and equipments.
3. Acquire ability to apply knowledge of Physics.
4. Exposed to the real time working environment.
5. Demonstrate the ability to design and analyze Laws and Principles and conduct experiments
6. Ability to work on laboratory and multidisciplinary tasks

#### **Any Ten Experiments of the Following**

##### **A. Mechanics:**

1. Determination of the Rigidity Modulus of given material wire using Torsional Pendulum.
2. Determination of the Acceleration due to Gravity and Radius of Gyration using Compound Pendulum.
3. Determination the Frequency of vibration in Transverse and Longitudinal Modes using Melde's Apparatus.
4. Determination Frequency of A.C supply by using Sonometer

**B. Optics:**

5. Determination of wavelength of Laser using diffraction grating.
6. Determination of Numerical Aperture of an Optical Fiber.

Determination of the Planck's constant using Photo

**C. Electro-Magnetism and Electronics:**

7. Study the variation of Magnetic Field along the axis of a solenoid coil using Stewart-Gee's Apparatus.
8. Determination of the Time Constant for a C-R Circuit.
9. Determination of the Band Gap of a Semiconductor using a p-n junction diode.
10. Study of Characteristic curves ( $I/V$ ) of a Zener diode to determine its Breakdown voltage.

Determination of Thermoelectric coefficient of a Thermistor by using its Characteristic

**Reference Book:**

1. Engineering Physics Lab Manual Prepared by Physics Faculty.

<b>SEMESTER - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	4	2
<b>16CS1L01: C PROGRAMMING LAB</b>				

### **COURSE OBJECTIVES**

1. The Objective of this course is to introduce the field of programming using C language.
2. To have fundamental knowledge on basics of computers hardware and number systems.
3. To enhance their analyzing and problem solving skills and use the same for writing programs.
4. To learn and acquire art of computer programming.
5. The nature of C language is emphasized with a wide variety of examples.
6. To write efficient, maintainable, and portable code.

### **COURSE OUTCOMES**

After Completion of the course student are

1. Able to identify different components of computer and their usage.
2. Able to write algorithms and flowcharts for basic problems.
3. Able to know concepts in problem solving.
4. Able to write, compile and debug programs in C language.
5. Design programs involving decision structures, loops and functions, pointers.
6. Able to understand the basic terminology used in computer programming.
7. Use of different data types in program.
8. To write diversified solutions using C language.

### **EXERCISE-I**

- 1) Identify different components of a computer system. Write about them.
- 2) Prepare block diagram of mother board of a PC and describe each component.
- 3) Prepare algorithm for sequence and selection control structures.
- 4) Prepare algorithm for iterative control structure
- 5) Draw flowcharts for control structures (sequence, selection & iterative).

### EXERCISE-II

- 1) Demonstrate the structure of C program
- 2) Write a C program to find the size of basic data types in C language.
- 3) Write a C program to find the biggest of three numbers using ternary operator.
- 4) Write a C program to convert decimal number to binary number using bitwise operators.

### EXERCISE-III

- 1) Write a C program to find the biggest of three numbers using nested if-else statement.
- 2) Write a C Program to find the roots of a quadratic equation.
- 3) Write a C program to perform arithmetic operations using switch statement.
- 4) Write a C program to calculate the electricity bill using else-if ladder statement.
- 5) Write a C program to find the sum of elements of an integer array.

### EXERCISE-IV

- 1) Write a C program to find the smallest and largest elements of an integer array.
- 2) Write a C program to perform matrix addition by checking compatibility.
- 3) Write a C program to perform matrix multiplication by checking compatibility.
- 4) Write a C program to generate the prime numbers up to n.

### EXERCISE-IV

- 1) Write a C program to find given number is Armstrong number or not
- 2) Write a C program to find the length of the string without using string functions.
- 3) Write a C program to check the given string is palindrome or not without using string functions.
- 4) Write a C program to perform string operations using string handling functions.

### EXERCISE-VI

- 1) Write a C program to find the square of a number using function and macro.
- 2) Write a C program to demonstrate the use of static storage class.
- 3) Write a C program to pass array to function and count the sum of elements in the array.

### **EXERCISE-VII**

- 1) Write C functions to generate Fibonacci series with and without using recursion.
- 2) Write C functions to factorial with and without using recursion.
- 3) Write C functions to GCD of two numbers with and without using recursion.

### **EXERCISE-VIII**

- 1) Write a C program to find address of a variable and a pointer variable.
- 2) Write a C functions to swap two numbers using call by value and call by reference
- 3) Write a C program to print employee details using structures and array of structures.

### **EXERCISE-IX**

- 1) Write a C program to read and write individual characters to a file.
- 2) Write a C program to copy contents of one file to another.
- 3) Write a C program to reverse the contents in a file.
- 4) Write a C program to merge two files into third file.

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16BS2T01: PROFICIENCY COURSE IN ENGLISH -II</b>				

### **COURSE OBJECTIVES**

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.

### **COURSE OUTCOMES**

#### **a) Reading Skills.**

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.

Using words and phrases in different contexts

**b) WRITING SKILLS:**

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

**c) INTERACTIVE SKILLS:**

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

**d) GRAMMAR IN CONTEXT**

- Enable the skills of grammar using in a situation
- Identifying the needs of apt grammar in life related situation
- Promoting discourse with grammar effectively

**SYLLABUS:**

S No	Content	Hours
UNIT-I	Inspiring speech One word substitutes Subject- verb agreement Describing objects	8
UNIT-II	Dial 000 Commonly confused words Voice Paragraph writing	8
UNIT-III	My Struggle for Education Collocations Reported speech Letter writing	8
UNIT-IV	A Snake in the grass GRE words Conditional clauses Note making and note taking	8
UNIT-V	Lithuania Idioms Degrees of comparison Resume	8
UNIT-VI	Virtue Phrasal verbs Simple compound and complex sentences Report writing	8
	Total	48

**Text Book:** Proficiency Course in English -II by Maruti Publications.

<b>SEMESTER -II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16MA2T01: LINEAR ALGEBRA AND VECTOR CALCULUS</b>				

### **PREREQUISITES**

The two year intermediate course of Mathematics.

### **OBJECTIVES**

1. To train the students for finding Rank –Echelon form, Normal form, and solution of liner systems – Direct Methods- Gauss Elimination, Gauss Jordon.
2. To train the student effectively how to find Eigen values, Eigen vectors and their properties.
3. To make the student to know the Cayley Hamilton Theorem-Applications: Finding Inverse and powers of a matrix by using Cayley-Hamilton theorem.

To evaluate many improper integrals easily by using Beta and Gamma functions.

## OUTCOMES

The students are able to

1. apply the knowledge of matrices for solving linear system of equations
2. find the powers of the matrices by using Cayley Hamilton theorem.
3. apply the knowledge of evaluate improper integrals by using Beta and Gamma functions.
4. apply the knowledge of Vector Differentiation and Vector Integration in finding work done by a force.

## Syllabus:

### UNIT I: Linear systems of equations

Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination, Jacobi and Gauss Seidel Method.

### UNIT II: Eigen values - Eigen vectors

Eigen values - Eigen vectors - Properties (without proof)-Cayley-Hamilton Theorem (without proof)  
Applications: Finding Inverse and powers of a matrix by using Cayley-Hamilton theorem.

### UNIT III: Special functions

Beta and Gamma functions - Properties - Relation between Beta and Gamma functions Application: Evaluation of improper integrals.

### UNIT IV: Multiple integrals

Multiple integrals - Double and triple integrals - Change of variables - Change of order of Integration. Application: Applications of Integration to Lengths, Volumes and Surface areas of solids of revolution in Cartesian Coordinates.

### UNIT V: Vector Differentiation

Gradient-Divergence- Curl - Laplacian and second order operators -Vector identities.

### UNIT VI: Vector Integration

Line integral - work done - Potential function - area - surface and volume integrals.

**Vector integral theorems:** Greens, Stokes and Gauss Divergence Theorems (without proof) and related problems.

**Application:** Work done by a force

**TEXT BOOKS:**

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill

**REFERENCE BOOKS:**

1. ERWIN KREYSZIG, Advanced engineering Mathematics, 9<sup>th</sup> Edition, Wiley-India

SEMESTER -II	L	T	P	C
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<b>16MA2T02: NUMERICAL METHODS AND INTEGRAL TRANSFORMS</b>
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### PREREQUISITES

The two year intermediate course of Mathematics.

### COURSE OBJECTIVES

1. To give a good training to the student in each topic and method.
2. To get the good results of the student in competitive examinations like GRE, GATE etc., by training in this context.
3. To develop the skills of the student to solve the different mathematical methods efficiently to meet the needs of solving the different mathematical models involving in real world process and engineering.
4. To motivate the student for innovating ideas by learning mathematical methods in the context of the real world applications and the need of the world.
5. To produce the competent engineers and professional, to meet the needs of industries in the context scenario.

### COURSE OUTCOMES

Students are able to

1. solve the algebraic and transcendental equations by different methods and also know the different interpolation formulae to find a polynomial or the value of the polynomial at a given point.
2. find the quadrature, the solutions of ODEs by different formulae.
3. solve the problems on Z-transforms and Fourier transforms.
4. interpret a function as a Fourier series.

## Syllabus

### UNIT-I: Solution of Algebraic and Transcendental Equations

Introduction - Bisection Method - Method of False Position - Iteration Method - Newton Raphson Method.

### UNIT-II: Interpolation

Introduction - Finite differences - Forward Differences Backward differences - Central differences - Symbolic relations, Differences of a polynomial - Newton's formulae for interpolation - Lagrange's Interpolation formula for unevenly spaced points.

### UNIT-III: Numerical integration and solution of ordinary differential equations

Numerical Integration: Trapezoidal rule - Simpson's 1/3 rule - Simpson's 3/8 rule.

Numerical Solution of Ordinary Differential Equations: Solution by Taylor's series method - Euler's Method - Euler's Modified Method - IV order Runge Kutta Method

### UNIT-IV: Z-Transform

Introduction - properties - Damping rule - Shifting rule - Initial and final value theorems - Inverse z transform- -Convolution theorem.

**Applications:** Solution of difference equations by Z-transforms.

### UNIT – V: Fourier Series

Introduction- Determination of Fourier coefficients - even and odd functions - change of interval - Half-range sine and cosine series

### UNIT – VI: Fourier Transforms

Fourier integral theorem (statement only) - Fourier Transforms, Fourier sine and cosine transforms - properties - inverse transforms - Finite Fourier transforms.

### TEXT BOOKS:

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

### REFERENCE BOOKS:

1. S. S. Sastri (PHI), Introductory Methods of Numerical Analysis 5<sup>th</sup> Edition.
2. ERWIN KREYSZIG, Advanced Engineering Mathematics, 9th Edition, Wiley-India

SEMESTER -II	L	T	P	C
	3	-	-	3

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<b>16BS2T02: ENGINEERING CHEMISTRY</b>
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### COURSE OBJECTIVES

1. For prospective engineers knowledge about water used in industries (boilers etc) and for drinking purposes is useful hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.
2. Knowledge of galvanic cells , electrode potentials is necessary for engineers to understand corrosion problem and its control, also this knowledge helps in understanding modern bio-sensors, fuel cells improve them.
3. The problem associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them.
4. A board understanding of the more important fuels employed on a large scale is necessary for engineer to understand energy – related problems and solve them.
5. Plastics are materials used very widely an engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics/elastomers helps in selecting suitable materials for different purpose.
6. With the knowledge available now, future engineers should know at least some of the Engineering materials that are becoming available. Hence some of them are introduced here.

### COURSE OUTCOMES

1. Student able to understand how to produce soft water & potable water by various methods.
2. Student can learn about nature and working various electrodes and cells.
3. Student can able to understand how to protect metals from the environment
4. Student can understand the importance of fuels and characteristics and HCV & LCV.
5. Student can understand the properties of polymers & their applications in our day today life.
6. Student can understand the building materials, solar materials and nanomaterials and principles of green chemistry.

## Syllabus

### UNIT I WATER TECHNOLOGY

Hard Water – Estimation of Hardness By EDTA Method – **Potable Water**- Sterilization and Disinfection – Boiler Feed Water – **Boiler Troubles** – Priming And Foaming , Scale Formation, Boiler Corrosion, Caustic Embrittlement – **Softening of Water** - By Lime Soda, Zeolite Processes – Ion Exchange Process – Desalination Process by - Reverse Osmosis – Electro Dialysis.

### UNIT II ELECTRO CHEMISTRY

Electro Potential –Determination of single electrode potential –Standard electrode potential - Nernst Equation(problems)–Electro Chemical cell (Galvanic Cell) -**Reference Electrodes**-Standard Hydrogen Electrode, Calomel Electrode Determination of pH and conductivity – Applications (Strong Acid Vs Strong Base) - **Batteries** – Primary Cell: Dry Cell – Secondary Cell: Lead Acid Accumulator, Lithium Ion Battery – **Fuel Cells** – Hydrogen – Oxygen Fuel Cell, Methanol – Oxygen Fuel Cell.

### UNIT III CORROSION

Introduction - **Theories of Corrosion**(i) Dry Corrosion (Pilling Bed worth rule) (ii) Wet Corrosion – Galvanic Series – **Types of Corrosion**: Galvanic Corrosion, Differential Aeration Corrosion, Pitting Corrosion, Stress Corrosion – Factors Influencing Corrosion – Nature of The Metal , Nature of The Environment – **Corrosion Control**: Material Selection & Design –Cathodic Protection- Surface Coatings – Methods of Applications on Metals -Hot Dipping , Electroplating, Electroless Plating – Paints – Their Constituents & Their Function.

### UNIT-IV FUELS

Introduction to Fuels – Classification – **Solid Fuels** Merits & Demerits - Calorific Value – HCV and LCV – Bomb Calorimeter - Problems Based on Calorific Values – Analysis of Coal (Proximate and Ultimate Analysis) – Numerical Problems Based on Analysis – **Liquid Fuels** Merits & Demerits – Petroleum – Refining – Cracking(types) –Petrol – Diesel Knocking – Octane Number, Cetane Number - **Gaseous Fuels** Merits & Demerits – Natural Gas – LPG, CNG.

### **UNIT-V POLYMERS SCIENCES & TECHNOLOGY**

**POLYMERS-** introduction – Types of Polymers – Mechanism of Polymerization (Addition and Condensation) – Determination of Molecular weight by weight and number average methods - Individual Polymers (Preparation Properties and uses of PS, PVC and Bakelite) – Biodegradable polymers – Ziegler Natta Catalysis.

**PLASTICS** – Types – Compounding of Plastics – Moulding (Four Types) - Bullet Proof Plastics – Engineering Applications.

**RUBBER & ELASTOMERS:** Introduction – Preparation – Vulcanization – Compounding of Rubber – Preparation, Properties Uses of Buna-S, Buna-N and Thiokol-Engineering Applications.

### **UNIT VI ENGINEERING MATERIALS, GREEN AND NANO CHEMISTRY**

**Refractories** (Types, Properties Applications) – **Cement**-Hardening and Setting-Deteriorations of cement concrete – **Solar Energy Materials** – Introduction - Advantages and Disadvantages – Construction and Working of Photovoltaic cell – Solar Reflectors - **Carbon Nano tubes** - Preparation (Arc discharge, Laser Ablation, Chemical Vapor Deposition (CVD) methods), Properties & Applications – **Green Chemistry** – Principles -Engineering Applications.

#### **TEXT BOOKS:**

1. N. Y. S. Murthy, V. Anuradha, K Ramana Rao” A Text Book of Engineering Chemistry”, Matuthi.
2. K.Sesha Maheswaramma and Mridula chugh (2013) A Text Book of Engineering Chemistry, Pearson Publications.

#### **REFERENCE BOOKS:**

1. Shashi Chawal “A Text Book of Engineering Chemistry, Dhanpat Rai Publishing company Ltd.
2. S. S. Dara (2013) Text Book of Engineering Chemistry, S. Chand Technical Series.

SEMESTER -II	L	T	P	C
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**16CS2T01: OBJECT ORIENTED PROGRAMMING THROUGH C++  
SYLLABUS**

### **COURSE DESCRIPTION**

This course is a comprehensive hands-on introduction to object oriented programming in C++ for students. Emphasis is placed on the features of C++ that support effective modeling of the problem domain and reuse of code and provides in-depth coverage of object-oriented programming principles and techniques using C++. Topics include classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, and exceptions.

### **PREREQUISITES**

Knowledge of C programming.

### **COURSE OBJECTIVES**

1. To enable the student to learn Object oriented technology.
2. To enable the student to understand concepts of objects and their importance in real world.
3. To Design classes and inheritances
4. To know how to handle Data through files
5. To know how to handle exceptions.
6. To provide practical, hands-on training in C++ programming.

### **COURSE OUTCOMES**

**The student will be proficient in the following:**

1. Principles of object oriented technology.
2. The Evolution and Purpose of Object Oriented Programming.
3. Mastering in basic Object Oriented programming concepts and logic implementations.
4. Knowledge in file I/O operations and exceptions
5. Ability to identify and implement appropriate Solution for a given Problem.\

6. Know the terms "Object oriented Programming", "Class", "Object", "Constructor", "Destructor", "friend", "static", "Data Abstraction", "Encapsulation", "Inheritance", "Polymorphism", "File I/O", "Exceptions" and where they are applicable.

## **SYLLABUS**

### **UNIT I INTRODUCTION**

The Object Oriented Technology, Disadvantages of Conventional Programming, Advantages of OOP. Structure of a C++ Program, Differences between C and C++, Header Files and Libraries.

### **INPUT AND OUTPUT IN C++**

Streams, Stream Classes Hierarchy, Bit Fields, Manipulators.

### **UNIT II**

Tokens in C++, Variable Declaration and Initialization, Data Types, Constants, L Value and R Values, Operators in C and C++, Scope Access Operator, Comma Operator, This Operator, Reference Variable, Decision and Loop Statements.

### **FUNCTIONS IN C++**

Structure of a Function, Passing Arguments, Return by Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Recursion.

### **UNIT III CLASSES AND OBJECTS**

Class Definition, Declaring Objects, Access Specifiers and their scope, Member functions, Outside member functions as inline, Data Hiding or Encapsulation, Memory for Class and Objects, Static Member variables, Static Member Functions, Static Object, Array of Objects, Objects as Function Arguments, Friend Functions, Friend class, Local class, Empty Class, Qualifiers and Nested Classes, Member Function and Non-Member Function.

### **UNIT IV CONSTRUCTORS AND DESTRUCTORS**

Introduction of Constructor, Characteristics, Applications, Parameterized Constructors, Overloading Constructors, Constructor with Default Arguments, Copy Constructor and Destructors.

### **OPERATOR OVERLOADING**

Introduction of Overloading, Overloading Unary Operators, Constraint on Increment and Decrement Operators, Overloading Binary Operators, Overloading with Friend Functions, Overloading Assignment Operator, Rules for Overloading Operators.

## **UNIT VINHERITANCE**

Introduction of Inheritance, Access Specifiers, Protected Data with Private Inheritance, Types of Inheritances, Virtual Base Class, Constructors and Destructors in Inheritance, Constructor and Destructor in Derived Class, Advantages and Disadvantages of Inheritance.

## **POLYMORPHISM**

Polymorphism, Types, Pointer and Inheritance, Virtual and Pure Virtual Functions, Abstract Classes.

## **UNIT VIAPPLICATIONS WITH FILES**

File Stream Classes, File Opening Modes, File Pointers and Manipulators, Sequential Access Files, Binary and ASCII Files, Random Access Files.

## **EXCEPTION HANDLING**

Principles of Exception Handling, Keywords, Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions.

### **Text Books**

1. Programming in C++, Ashok N Kamthane, Pearson 2<sup>nd</sup> Edition

### **References Books**

1. Object Oriented Programming C++, Joyce Farrell, Cengage.
2. Mastering C++, Venugopal, Raj Kumar, Ravi Kumar TMH.
3. Object Oriented Programming with C++, 2<sup>nd</sup> Ed, SouravSahay, and OXFORD.

<b>B SEMESTER -II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16BS2T04: ENVIRONMENTAL SCIENCE</b>				

### **COURSE OBJECTIVES**

The objectives of the course is to impart

1. Overall understanding of the natural resources.
2. Basic understanding of the ecosystem and its diversity.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impact of developmental activities.
5. Awareness on the social issues, environmental legislation and global treaties.

### **COURSE OUTCOMES**

**After completion of the course student able to understand:**

1. The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.

**SYLLABUS:**

**UNIT – I**

**Multidisciplinary nature of Environmental Science:** Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT – III**

**Ecosystem and its conservation:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

#### UNIT-IV

**Biodiversity and its management:** Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

#### UNIT –V

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

#### UNIT - VI

**Social Issues:** Population growth and explosion, effects. Water conservation, rain water harvesting. Role of information Technology in Environment and human health. Environmental Protection Act - Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act – Motor Vehicle Act - Issues involved in enforcement of environmental legislation.

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Field work: visit to an industrial area/ecosystem area (Forest, Grassland, Desert, and Aquatic)

#### TEXT BOOKS:

1. Environmental Studies by K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. A text book of Environmental Studies by C. P. Kaushik & Anubha Kaushik, New Age International Publishers.

#### REFERENCE BOOKS:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A text book of Environmental Studies by Shaashi Chawla, TMH, New Delhi.

<b>SEMESTER -II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16BS2L01: ENGLISH COMMUNICATION SKILLS LAB</b>				

**COURSE DESCRIPTION**

Communicating in a language is also a skill. So a student has to look for an opportunity to practice the language he is learning in order to acquire communication skills. ‘Strengthen your Steps’ is designed to provide opportunities for engineering students to revise and consolidate communication skills in different contexts formal and informal. It prepares the student for facing Interviews, participating in group discussions and making presentations.

**PREREQUISITES**

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

**Syllabus and Lesson Plan**

No. of Sessions	Name of the Topic
2	Unit - 6    Body Language
2	Unit - 7    Dialogues
2	Unit - 8    Presentation Skills
2	Unit - 9    Group Discussion
2	Unit - 10    Interviews and Telephonic interviews.
2	Unit - 11    Debates
<b>12</b>	<b>Total</b>

**TEXT BOOK:**

1. Strengthen Your Communication Skills – Maruthi Publications.

**REFERENCE BOOKS:**

1. Effective technical communication – Ashraf Rizvi.
2. A course in English communication – Madhavi Apte.

<b>SEMESTER -II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16BS2L02: ENGINEERING CHEMISTRY LAB</b>				

### COURSE OBJECTIVES

1. To Investigate and understand physical behavior in the lab using scientific reasoning and logic and interpret the result of simple experiments and demonstration of chemical principles and also evaluate the impact of chemical discoveries on how we view the world.
2. Effectively communicate experimental results and solutions to application problems through oral and written reports.
3. Understand the basic concepts, definitions, characteristics and phenomena's.
4. Recognize the classical ideas and chemical phenomena and also define and analyze the concepts.

### COURSE OUTCOMES

1. An understanding of professional and develop confidence on recent trends
2. Able to gain technical Knowledge of measuring, operating and testing of chemical instruments and equipment's.
3. Acquire ability to apply knowledge of Chemistry.
4. Exposed to the real time working environment.
5. Demonstrate the ability to learn principles, design and conduct experiments
6. Ability to work on laboratory and multidisciplinary tasks

### List of Experiments

S. No	TITLE
	Introduction to chemistry lab
1	Estimation of HCl using standard Na <sub>2</sub> CO <sub>3</sub>
2	Determination of Total hardness of water
3	Estimation of Ferric iron
4	Estimation of KMnO <sub>4</sub> using standard H <sub>2</sub> C <sub>2</sub> O <sub>4</sub>

5	Estimation of Dissolved Oxygen by Wrinkles Method
6	Determination of pH by pH – Meter and universal indicator Method
7	Conductometric titration of Strong acid Vs Weak base
8	Conductometric titration of strong acid Vs Strong base
9	Potentiometric titration of Strong acid Vs Strong base
10	Potentiometric titration of Strong acid Vs Weak base
11	Preparation of Phenol-Formaldehyde Resin
12	Determination of saponification value of oils
13	Determination of Pour and Cloud point of oils

**TEXT BOOKS:**

1. Engineering Chemistry Lab Manual Prepared by Chemistry Faculty.

**REFERENCE BOOK:**

1. Dr. Jyotsna Cherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. K. Mukkanti (2009) Practical Engineering Chemistry, B. S. Publication.

SEMESTER -II	L	T	P	C
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<b>16BS2L02: OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB</b>
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### COURSE OBJECTIVES

1. The Objective of this course is to introduce the Object oriented programming techniques.
2. To write efficient, maintainable, and portable code.
3. To strengthen the ability to identify and apply the suitable object oriented concept for the given real world problem
4. To gain knowledge in practical applications of object oriented concept.

### COURSE OUTCOMES

After Completion of the course student are:

1. Able to differentiate structure oriented programming and object oriented programming.
2. Able to understand and apply various object oriented features.
3. Able to know concepts in operator overloading, function overloading & polymorphism.
4. Able to write, compile and debug programs in C++ language.
5. Able to design programs involving constructors, destructors.
6. Able to reuse of code using inheritance.
7. Able to write diversified solutions using C++ language.

### EXERCISE-1

- 1) Write a CPP Program to demonstrate the structure of a C++ program.
- 2) Write a CPP Program to display the names of header files, definitions and list of functions supported.
- 3) Write a program to show the base of a numeric value of a variable using **Hex, Oct** and **Dec** manipulator functions.
- 4) Write a CPP Program to use of the standard manipulators normally used in the stream classes.
- 5) Write a CPP Program to demonstrate the usage of bit fields.

### EXERCISE-2

- 1) Write a CPP Program to define constant pointer and pointer to constant and perform possible operations.
- 2) Write a CPP Program access a variable in different scopes by using scope resolution operator and the use of comma operator.
- 3) Write a CPP Program to swap two numbers using call by value, call by address, call by reference and return by reference.
- 4) Write a CPP Program to calculate square and cube of a number using inline functions and macros. (Demonstrate the use of inline functions compared to macros).
- 5) Write a CPP Program to find the area of a rectangle, a triangle and surface area of a sphere using function overloading.

### EXERCISE-3

- 1) Write a CPP Program to declare all members of a class as public, Access the members using objects. (Use public, protected, private).
- 2) Write a CPP Program to access the member functions inside and outside a class.
- 3) Write a CPP Program to access private data using non-member functions. (Use friend function).
- 4) Write a CPP Program to pass objects to functions by pass by value method.
- 5) Write a CPP Program to declare main () function as member function and overload it.

### EXERCISE-4

- 1) Write a CPP Program to show that “for each object constructors is called separately” and read the values through keyboard (Use Constructor).
- 2) Write a CPP Program to create constructor with arguments and pass the arguments to constructor.
- 3) Write a CPP Program to create object and release them using destructor.
- 4) Write a CPP Program to perform addition, subtraction, multiplication of two objects using operator keyword.
- 5) Write a CPP Program to overload unary and binary operator overloading with friend function.

### **EXERCISE-5**

- 1) Write a CPP Program to derive a class publicly from base class. Declare base class members under public, private and protected.
- 2) Write a CPP Program to derive single and multiple inheritances.
- 3) Write a CPP Program to declare virtual base class. Derive a class using two virtual classes.
- 4) Write a CPP Program to implementation of Virtual Function.
- 5) Write a CPP Program to Implementation of Pure Virtual Function.

### **EXERCISE-6**

- 1) Write a CPP Program to write and read text in a file. Use ofstream and ifstream classes.
- 2) Write a CPP Program to open a file for writing and reading purpose. Use open () function.
- 3) Write a CPP Program write text in a file. Read the text from the file from EOF. Display the contents in reverse order.
- 4) Write a CPP Program to demonstrate that the data is read from file using ASCII format.
- 5) Write a CPP Program to find the factorial of a number. Throw multiple exceptions and define multiple catch statements to handle exceptions.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16CS3T01: DATA STRUCTURES</b>				

### **COURSE OBJECTIVES**

1. To impart the basic concepts of data structures and algorithms.
2. To gain knowledge of linear and non-linear data structures.
3. To familiarize with different sorting and searching techniques.

### **COURSE OUTCOMES**

1. Implement single, circular and double linked list.
2. Implement stacks and queues using arrays and linked lists.
3. Implement various operations on binary trees.
4. Apply appropriate sorting and searching techniques for the given data.
5. Implement various operations on Graphs.

### **UNIT – I**

Introduction- Concept of data structures, overview of data structures, implementation of data structures. Searching: Linear Search, Binary Search, Fibonacci search. Sorting (Internal): Basic concepts, Sorting by: insertion (Insertion sort), selection (selection sort), exchange (Bubble sort, quick sort), distribution (radix sort) and merging (merge sort).

### **UNIT – II**

Stacks Representation using Arrays and Linked List, operations on stack, factorial calculation, evaluation of arithmetic expression.

### **UNIT – III**

Queues Representation using Arrays and Linked List, operations on queue, circular queue, queue using stack.

### **UNIT – IV**

Linked lists: Linked Lists- Single linked list, Circular linked list, Double linked list, Circular double linked list.

### **UNIT – V**

Trees Binary Trees: Basic tree concepts, Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, threaded binary tree. Binary search trees: Basic concepts, BST operations: Search, insertion, deletion and traversals, Creation of binary search tree from in-order and pre (post)order traversals.

### **UNIT – VI**

Graphs Basic concepts, representations of graphs, operations on graphs- vertex insertion, vertex deletion, find vertex, edge addition, edge deletion, graph traversals (BFS & DFS)(No Programs required).

### **Text Books**

1. Richard F, Gilberg , Forouzan, Data Structures, 2nd edition, , Cengage.
2. Debasis samanta, Classic Data Structures, PHI, 2 nd edition, 2011.

### **Reference Books**

1. Seymour Lipschutz, Data Structure with C, TMH.
2. G. A. V. Pai, Data Structures and Algorithms, TMH, 2008.
3. Horowitz, Sahni, Anderson Freed, Fundamentals of Data Structure in C, University Press, 2 nd edition.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16IT3T01: OPERATING SYSTEMS</b>				

### **COURSE OBJECTIVES**

- 1 To understand the fundamental concepts and techniques of Operating Systems.
- 2 To study the concepts in process management and concurrency control mechanisms
- 3 To understand the concepts in memory managements and deadlocks
- 4 To study on file management and storage structures

### **COURSE OUTCOMES**

1. An ability to understand basic concepts of operating systems.
2. An ability to describe process management ,scheduling and concurrency control mechanisms.
3. An ability to analyze memory management and deadlocks.
4. An ability to compare various file systems and its operating systems examples.

### **UNIT-I**

**Computer System and Operating System Overview:** Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

### **UNIT-II**

**Process Management** – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

### **UNIT-III**

**Concurrency:** Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, and Synchronization examples

### **UNIT-IV**

**Memory Management:** Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

### **Virtual Memory Management**

virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

### **UNIT-V**

**Principles of deadlock** – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

### **UNIT-VI**

**File system Interface-** the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

**File System implementation-** File system structure, allocation methods, free-space management **Mass-storage structure** overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling.

### **TEXT BOOKS**

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Gagne 7<sup>th</sup> Edition, John Wiley.
2. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education

### **REFERENCE BOOKS**

1. [http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New\\_index1.html](http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html)
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2<sup>nd</sup> Edition, TMH
3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3<sup>rd</sup> edition PHI.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16CS3T03: SOFTWARE ENGINEERING</b>				

### **COURSE OBJECTIVES**

1. To make the students learn about the basic concepts on software engineering methods and practices and their appropriate application in software industry.
2. To develop an understanding of software process models and Software Development Life Cycle.
3. To provide an idea on software testing techniques.
4. To teach an understanding role of the different aspects of Software Project Management.
5. To develop an approach on ethical and professional issues those are important for software Project Management.

### **COURSE OUTCOMES**

1. Capabilities to identify, formulate, and solve software engineering problems.
2. Be able to elicit, analyze and specify software requirements with various stakeholders of a software development project.
3. Ability to participate in design, development, deployment and maintenance of a medium scale software development project.
4. Ability to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of models, tools, and techniques.

### **UNIT-I**

**Introduction to Software Engineering:** The evolving role of software, Software Characteristics, Changing Nature of Software, Software myths.

**A Generic view of Process:** Software engineering- A layered technology, a Process framework, The Capability Maturity Model Integration (CMMI), Process assessment, Product and Process.

### **UNIT-II**

**Process models:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

**Software Requirements:** User requirements, System requirements, Functional and non-functional requirements, the Software Requirements Document (SRS).

### UNIT-III

**Requirements Engineering Process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

**Project planning and estimation:** Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques: COCOMO, PERT/CPM method.

### UNIT-IV

**Design Engineering:** Design process and Design quality, Design concepts, Software Architecture, Architectural Styles and Patterns.

**Object-Oriented Design:** Objects and object classes, An Object-Oriented design process, Design evolution

### UNIT-V

**Performing User Interface Design:** Golden Rules, User interface analysis and design, interface design steps, Design evaluation.

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, Validation testing, System testing, the art of Debugging, Black-Box and White-Box testing.

### UNIT-VI

**Risk management:** Reactive vs Proactive risk strategies, Software risks, RMMM, RMMM Plan.

**Quality Management :** Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards, Metrics for software quality.

### TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6<sup>th</sup> edition, McGraw-Hill International Edition.
2. Software Engineering- Sommerville, 9th edition, Pearson education.

**REFERENCES BOOKS:**

1. Software Engineering- K.K. Agarwal&Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16MA3T01: DISCRETE MATHEMATICS</b>				

**COURSE OBJECTIVES**

1. Enable the students to understand and create mathematical arguments and solving them with logical skills.
2. Enable the students to learn Number Theory, Which is applied in data security and Networking.
3. Enable the students to learn Set Theory, Graph Relations, functions which are used in cryptography and data structures, basic concepts of Graph Theory

**COURSE OUTCOMES**

- 1 Ability to apply logic and Mathematical reasoning in practical applications like computer programming
- 2 Ability to employ Number Theory concepts in cryptography and security
- 3 Ability to differentiate set theory concepts in designing efficient Algorithms both in space and time and Graph Theory concepts
- 4 Ability to solve various methods of solving Recurrence relations

**UNIT-I**

**Mathematical Logic:** Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence, implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof.

**UNIT-II**

**Predicate calculus:** Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

**UNIT-III**

**Set theory & Relations:** Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram.

**Functions:** composition of functions, Inverse Function, Principle of Inclusion-Exclusion, Pigeonhole Principles and its application.

**UNIT-IV**

**Recurrence Relations:** Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

**UNIT-V**

**Graph Theory:** Basic Concepts, Representation of Graph, Subgraphs, Multigraphs, Euler Paths, Euler circuits and Graph Isomorphism and its related Problems.

**UNIT-VI**

**Graph Theory and Applications:** Hamiltonian graphs, Chromatic Numbers, Spanning Trees, minimal Spanning Trees, BFS, DFS, Kruskals Algorithm, Prim's Algorithm's Binary trees, Planar Graphs.

**Textbooks:**

1. Discrete Mathematical Structures with Applications to computer science J.P Trembley, R. Manohar, TMH
2. Discrete Mathematical for computer Scientists & Mathematicians "J.L.Molt, A.Kandel, T.P.Baker, PHI

**Reference Books:**

1. Discrete Mathematics and its Applications, Kenneth .H. Rosen, 5<sup>th</sup>ed, T MGraw-Hilled,2006.
2. Discrete Mathematical Structures, Kolman, Busby, Ross, 6<sup>th</sup>ed., PHI,2009
3. Discrete Mathematics with Combinatorics and Graph Theory, Santha, Cengage Learning, 2000

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT3T02: COMPUTER ORGANIZATION</b>				

### **COURSE OBJECTIVES**

1. To Design simple combinational circuits.
2. To impart the basic knowledge of computer system including the analysis and design of components of the system.
3. To understand the register transfer language, micro operations and design of basic components of the system.
4. To outline the description of different parameters of a memory system, organization and mapping of various types of memories.

### **COURSE OUTCOMES**

1. Graduates will have fundamental knowledge about digital circuits and structure of computers.
2. Graduates will be able to choose appropriate addressing modes and instructions for writing programs.
3. Graduates will understand the need for using Peripheral devices for efficient operation of system.
4. Graduates will gain basic ability to analyze Micro operations such as Arithmetic micro operations, Shift micro operations and Logic micro operations.

### **UNIT-I**

**Digital Logic Circuits:** Digital Computers, Logic Gates, Boolean Algebra: Compliment of a Function, Map Simplification: Product-of-Sums Simplification, Don't-Care Conditions, Combinational Circuits: Half-Adder, Full-Adder, Flip-Flops: SR Flip-Flop, D Flip-Flop, JK FlipFlop, T Flip-Flop, Edge-Triggered Flip-Flops, Excitation Tables.

### **UNIT-II**

#### **Basic Structure of Computers:**

Basics of computer, Von Neumann Architecture, Generation of Computer, Types of Compute, Functional unit, Basic Operational Concepts and Bus Structures.

**Computer Arithmetic:** Addition and Subtraction, multiplication algorithms, Division Algorithms.

### **UNIT-III**

**Register Transfer Language and Micro Operations:** Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

**Basic Computer Organization and Design:** Instruction codes, Computer Registers, Computer Instructions, Timing and control, Instruction Cycle, Memory – Reference, Input – Output and Interrupt Instructions. Design of basic computer, Design of Accumulator logic.

#### **UNIT-IV**

**Central Processing Unit:** General Register Organization, STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer.

**Micro Programmed Control:** Control Memory, Address sequencing, micro program example, design of control unit.

#### **UNIT-V**

**Input- Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access.

**The Memory System:** Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory and Virtual Memory.

#### **UNIT-VI**

##### **Parallel Processing and Vector Processing**

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

##### **TEXT BOOKS:**

1. Computer System Organization, M.Moris Mano, 3rd Edition, Pearson / PHI
2. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
3. Computer Organization, a quantitative approach, John L.Hennessy and David A.Patterson, Fourth Edition Elsevier

**REFERENCE BOOKS**

1. Computer Organization and Architecture - William Stallings Sixth Edition, Pearson / PHI
2. Structured Computer Organization - Andrew s. Tanenbaum, 4th Edition, PHI/Pearson.
3. Fundamentals of Computer Organization and Design, - Sivaraama Dandamudi, Springer Int. Edition.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>4</b>	<b>2</b>
<b>16CS3L01: DATA STRUCTURES LAB USING C</b>				

**COURSE OBJECTIVES**

1. Develop program to implement linked lists, stacks, queues and binary search trees.
2. Implement searching and sorting algorithms.

**COURSE OUTCOMES**

Students are able to

1. Demonstrate the implementation of linked lists.
2. Implement stack and queue using arrays and linked lists.
3. Demonstrate applications of stack.
4. Demonstrate the implementation of binary search trees.
5. Implement different searching and sorting algorithms.

**Note:** Student has to complete at least 10 programs.

Write a c program for the following

**EXERCISE – I**

1. Use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
2. Use both recursive and non recursive functions to perform Binary search for a Key value in a given list.

**EXERCISE – II**

4. Implement following techniques to sort a given list of integers in ascending order (i) Insertion sort (ii) Bubble sort (iii) Selection sort

**EXERCISE - III**

5. Implement following techniques to sort a given list of integers in ascending order. (i) Quick sort (ii) Merge sort

**EXERCISE - IV**

6. Implement stack (its operations) using arrays.

**EXERCISE – V**

7. To evaluate postfix expression.
8. To Convert infix expression into postfix expression.

**EXERCISE – VI**

9. Implement queue (its operations) using arrays.

**EXERCISE – VII**

10. Use functions to (i) Create a singly linked list.  
(ii) Insert an element into a singly linked list.  
(iii) Delete an element from a singly linked list.

**EXERCISE - VIII**

11. Implement stack (its operations) using Linked list  
12. Implement Queue (its operations) using linked lists.

**EXERCISE - IX**

13. To reverse elements of a single linked list.  
14. Use functions to  
(i) Create a circular linked list.  
(ii) Insert an element into a circular linked list.  
(iii) Delete an element from a circular linked list.

**EXERCISE –X**

15. Use functions to  
(i) Create a Doubly linked list.  
(ii) Insert an element into a doubly linked list.  
(iii) Delete an element from a doubly linked list.

**EXERCISE - XI**

16. To create a Binary Search Tree of integers, insert, delete and search integers into (from) Binary search tree.

**EXERCISE – XII**

17. Use recursive functions to traverse a binary search tree in preorder, inorder and postorder.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>4</b>	<b>2</b>
<b>16IT3L01: OPERATING SYSTEMS LAB</b>				

### **COURSE OUTCOMES**

At the end of the lab student is able to

1. Understand concepts of CPU Scheduling.
2. Describe process management, scheduling and concurrency control mechanisms.
3. Analyze Page Replacements and deadlocks.
4. Compare various file systems and its operating systems examples

### **LIST OF PROGRAMS:**

1. Simulate First Come First Serve CPU scheduling algorithm.
2. Simulate Shortest Job First CPU scheduling algorithm.
3. Simulate Priority CPU scheduling algorithm.
4. Simulate Round Robin CPU scheduling algorithm.
5. Simulate Sequential file allocation strategy.
6. Simulate Linked file allocation strategy.
7. Simulate Indexed file allocation strategy.
8. Simulate First In First Out page replacement algorithm.
9. Simulate Least Recently used page replacement algorithm.
10. Simulate Optimal page replacement algorithm.
11. Write Programs to simulate free space management.
12. Simulate Bankers Algorithm for Dead Lock Avoidance.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>4</b>	<b>2</b>
<b>16CS3L03: SOFTWARE ENGINEERING LAB</b>				

### **COURSE OBJECTIVE**

The Software Engineering lab will facilitate the students to develop a preliminary yet practical understanding of software development process and tools .

**COURSE OUTCOME** After completion of this lab student will be able to know about preparing SRS and how to generate test cases for software testing.

Take any real time problem and do the following experiments

1. Do the Requirement Analysis and Prepare SRS.
2. Draw the use case and class diagrams.
3. Using COCOMO model estimate effort.
4. Calculate effort using FP oriented estimation model.
5. Analyze the Risk related to the project and prepare RMMM plan.
6. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
7. Draw E-R diagrams, DFD, CFD and structured charts for the project.
8. Design of Test cases based on requirements and design
9. Prepare FTR

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16CS4T01: JAVA PROGRAMMING</b>				

### **COURSE OBJECTIVES**

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3. Be aware of the important topics and principles of software development
4. Be able to use the Java SDK environment to create, debug and run simple Java programs.

### **COURSE OUTCOMES**

1. An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
2. Develop confidence for self-education and ability for life-long learning needed for advanced java technologies.
3. Students will learn how to develop secure java applications
4. Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results.

### **UNIT-I**

**Basics of Object Oriented Programming:** Introduction to OOPS: Paradigms of Programming Languages - Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented Programming - Objects and Classes – Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication – Benefits of OOP – Application of OOPs. Introduction to Java : History – Java features, Creating and Executing a Java program – Java Tokens: Keywords, Character set, Identifiers, Literals, Comments in Java program Separator – Java Virtual Machine (JVM).

### **UNIT-II**

**Java Basics:** Data types, variables, scope and life time of variables, arrays, operators, expressions, control Statements, type conversion and casting, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion and string handling methods.

### **UNIT-III**

**Inheritance:** Defining a subclass – Deriving a sub class – Single Inheritance – Multilevel Inheritance – Hierarchical Inheritance – Overriding methods – Final variables and methods – Final classes - Abstract methods and classes – Visibility Control: public access, private access, protected. Member access rules, super keyword and abstract keyword.

### **UNIT-IV**

**Packages and Interfaces:** Packages: Defining, Creating and Accessing a Package, Understanding Class path, importing packages. Interfaces: Defining an interface, implementing interface, Differences between classes and interfaces, variables in interface and extending interfaces.

### **UNIT-V**

**Exception handling:** Concepts of exception handling, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally keywords, built-in and user defined exceptions.

### **UNIT-VI**

**Multithreading:** Define thread, Differences between multi threading and multitasking, Creating Threads, Running Thread, Life Cycle of a Thread, Thread Methods, ThreadPriority, Synchronization, Implementing runnable interface and thread groups.

### **TEXT BOOKS:**

1. Herbert Schildt: “Java The complete reference”, 7th Edition, Tata McGraw Hill, 2011.
2. E.Balaguruswamy: “Programming with Java A Primer”, 4th Edition, Tata McGraw Hill, 2009.

### **REFERENCE BOOK:**

1. Programming in Java by saurabh chaudhary , sachin malhotra, oxford edition.
2. Java: How to Program, 8/e, Dietal, Dietal, PHI
3. JAVA Programming, K.Rajkumar, Pearson.
4. Core JAVA, Black Book, NageswaraRao, Wiley, Dream Tech.
- 5.

<b>SEMESTER -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16IT4T01: DATA BASE MANAGEMENT SYSTEMS</b>				

### **COURSE OBJECTIVES**

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. To understand the relational database design principles.
4. To become familiar with the basic issues of transaction processing and concurrency control.
5. To become familiar with database storage structures and access techniques.

### **COURSE OUTCOMES**

At the end of the course student able to

1. To understand the different issues involved in the design and implementation of a database system
2. Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
3. An ability to use different concurrency control techniques while implementing real time applications
4. An ability to Show how various kind of secondary storage devices to store data

### **UNIT-I**

History of DBMS, File Systems vs DBMS, Advantages of DBMS, Describing and Storing Data in DBMS, Transaction Management, Structure of a DBMS, people who work with Databases, Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship sets

### **UNIT-II**

Additional Features of ER Models, Conceptual Design with ER Models, Conceptual Design for Large Enterprise. Relational Model- Introduction to Relational Model, Integrity constraints over relations, Enforcing Integrity constraints, Logical Database Design, Views.

### **UNIT-III**

Relational Algebra-Selection and projection, Set Operators, Renaming, joins, divisions. Form of Basic SQL Query, Nested Queries, Correlated Nested Queries, Set Comparison Operators,

Aggregate Operators, Logical Connectivity Operators, Joins and Types, introduction to Triggers.

**UNIT-IV**

Introduction to Schema Refinement, functional Dependencies, Normal forms-1NF, 2NF,3NF, BCNF, Properties of decompositions, Multivalued Dependencies, Fourth Normal Form and Fifth Normal Form, Transaction Management-ACID properties, Transaction and schedules, concurrent execution of transactions.

**UNIT –V**

Lock based Concurrency Control-Strict 2PL, Dead Locks. Concurrency Control without Locking, Crash Recovery-Introduction to ARIES, LOG, Write a Head Log Protocol, Check Point, Recovery from a System Crash.

**UNIT-VI**

Data on External Storage, File Organization and indexing, Index Data Structures, Comparison of File Organizations, Tree structured indexing-Indexed Sequential Access Method, B+ trees.

**TEXT BOOKS:**

1. Database Management Systems- Raghurama Krishnan, Johannes Gehrke, Tata McGraw-Hill., 3rd Edition.

**REFERENCE BOOKS:**

1. Database System Concepts, Silberschatz, Korth, McGraw hill, 5th edition.
2. Database Management Systems, Elmasri Navathe-5th Edition.

<b>SEMESTER -IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT4T02: FLAT and Compiler Design</b>				

### COURSE OBJECTIVES

1. To impart the basic concepts of theory of automata, languages and computation.
2. To develop understanding about machines for sequential computation, formal languages and grammars.
3. To make the student to understand the process involved in a compiler, create an overall view of various types of translators, phases of a compiler, understand what is syntax analysis, various types of parsers especially the top down approach, awareness among students the various types of bottom up parsers, understand the syntax analysis and, intermediate code generation, type checking, the role of symbol table and its organization, Code generation, machine independent code optimization.

### COURSE OUTCOMES

1. Ability to prove the equivalence of languages described by finite state machines and regular expressions
2. Ability to construct pushdown automata and the equivalent context free grammars.
3. To introduce the major concept areas of language translation and compiler design
4. To develop an awareness of the function and complexity of compilers.
5. To provide practical, hands on experience in compiler design
6. Identify the similarities and differences among various parsing techniques and grammar transformation techniques

### UNIT-I

**Formal Language:** Languages, operations on Languages, Sets, Relations, Finite automata, equivalence of DFA and NFA, finite automata with e-moves, NFA with and without e-moves, minimization of DFA, finite automata with output.

### UNIT-II

**Regular Expressions and CFG:** Concepts and Definitions, converting RE to e-NFA, manipulation of Regular Expressions, Pumping Lemma for Regular sets, application of Pumping Lemma, Closure properties of Regular sets.

**CFG:** Derivation trees, LMD.RMD, ambiguous Grammar, Eliminating Useless symbols, Normal Forms of CFG.

### **UNIT-III**

**Introduction to Compiler and Syntax analyzer:** Types of Translators, Difference between Compiler and Interpreter, Phases of a Compiler, Lexemes, Tokens and Patterns, Lexical analyzer, Lexical errors, Left recursion, Left factoring, FIRST AND FOLLOW.

### **UNIT-IV**

**Top-Down Parsing:** Brute-Force Parsing, Recursive Descent Parsers, Predictive Parser.

**Bottom Up Parsing:** Shift Reduce Parser, SLR, CLR, LALR parsing tables, ambiguous grammar, YACC tool.

### **UNIT-V**

**Semantic Analysis:** SDD, attribute grammar, intermediate code generation, Postfix notation, Abstract Syntax tree, Three Address Code, Chomsky hierarchy of languages, storage allocation strategies.

### **UNIT-VI**

**Code Optimization and Code Generation:** Machine dependent Optimization, machine independent optimization, principal sources of optimization, Optimization of basic blocks, loop optimization, Peephole optimization, Design issues of a code generation.

#### **Text Books:**

1. Introduction to Automata Theory Languages & Computation, 3/e, Hopcroft, Ullman, PEA
2. Introduction to Automata and Compiler Design, Dasaradha Ramaiah K, PHI.

#### **Reference Books:**

1. Principles of Compiler Design, A.V. Aho . J.D.Ullman; PEA
2. Theory of Computer Science, Automata languages and computation , 2/e, Mishra, Chandra Shekaran, PHI
3. Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and Francis Group.

<b>B. TECH 4<sup>th</sup> SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16MA4T01: PROBABILITY AND STATISTICS</b>				

### PREREQUISITES

Subject needs the knowledge in fundamentals of set theory, basic counting principles and elementary calculus.

### COURSE OBJECTIVES

The student should be able to

1. Calculate probabilities of events using sample space and counting techniques, understand the idea of independent events and calculating conditional probabilities using Baye's theorem
2. Identify the appropriate distribution for use in solving a problem. Distinguish between discrete and continuous random variables.
3. Differentiate between the binomial and the Poisson discrete probability distributions and their applications.
4. Construct a probability distribution for discrete/continuous random variable, determine its mean and variance
5. Learn how to formulate and test hypothesis about a population mean and/or a population proportion.
6. Understand the types of errors possible when conducting a hypothesis test.

### COURSE OUTCOMES

The student should be able to

1. Compute probabilities by modeling sample spaces and applying rules of permutation and combinations, additive and multiplicative laws and conditional probability. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.
2. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance. Also compute probabilities based on practical situations using the binomial and normal distributions.
3. Use the normal distribution to test statistical hypothesis and to compute confidence intervals.
4. Use least squares approximation to find the best fit linear curve for a given set of data points.

#### **UNIT-I**

**PROBABILITY:** Sample spaces and events-probability-the axioms of probability-some elementary theorems-conditional probability-Bayes's theorem.

#### **UNIT-II**

**RANDOM VARIABLES & DISTRIBUTIONS:** Introduction-random variables and its classifications. Discrete random variable – moments and moment generating functions.

**Discrete Probability Distributions:** Binomial & Poisson distributions with moment generating functions.

#### **UNIT-III**

**CONTINUOUS PROBABILITY DISTRIBUTIONS:** Continuous random variable, Normal and exponential distributions with moment generating functions.

#### **UNIT-IV**

**SAMPLING DISTRIBUTIONS:** Population and samples – Sampling distribution of mean for large and small samples (with known and un-known's variance) – Sampling Distribution of Proportions - sampling distribution of Sums and differences of means – sampling distributions of variances – point and interval estimators for means and proportions.

#### **UNIT-V**

**TESTS OF HYPOTHESIS:** Introduction – Type I and Type II errors – Maximum error – one tail, two tail tests – Tests concerning one mean and proportion, two means – proportions and their differences using Z-test, Student's t-test – F-test and Chi-square test.

#### **UNIT-VI**

**CURVE FITTING:** Method of least squares – Fitting a straight line, second degree parabola – exponential curve – power curves.

#### **TEXT BOOKS:**

1. Probability and Statistics by Mr. K. Murugesan and Mr.P.Gurusamy
2. Probability and Statistics for Engineers and scientists by R.E.Walpole and Raymond H. Myers.

#### **REFERENCES:**

1. Probability and Statistics for Engineers by Miller & Freund's
2. Higher Engineering Mathematics by Dr. B. S. Grewal.
- 3.

<b>SEMESTER -IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16BM4T02: PRINCIPLES OF ECONOMICS AND MANAGEMENT</b>				

### **COURSE OUTCOMES**

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

1. Differentiate between Micro and Macro Economics and apprise the nitty gritty of demand function.
2. Identify various kinds of markets, the pricing methods used and solve the basic problems using BEP analysis.
3. Comprehend the basic concepts of Management and Human Resource Management.
4. Apply the basic concepts of Production Management and Marketing Management in planning the production and distribution of products.
5. Evaluate the basic forms of organization best suited for entrepreneurship and appreciate the importance of Financial Management in a firm.

### **UNIT-I**

**Introduction to Economics:** Concept, Nature & Scope of Economics-Macro and Micro Economics- Demand Analysis: Demand Determinants- Law of Demand& its exceptions- Elasticity of Demand-Types –Demand Forecasting-Methods.

### **UNIT-II**

**Market Structures:** Types of Markets-Price output determination in Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly - Pricing methods - Break – Even Analysis (simple problems).

### **UNIT-III**

**Introduction to Management:** Concept - Functions of Management - Scientific Management- Principles of Management- Leadership Styles - Functional areas of Management.

**Human Resource Management:** Definition, Significance and Functions - PM Vs HRM– Recruitment, Selection, Training and Development -Job Analysis - Role and position of HR department – Performance Appraisal.

### **UNIT-IV**

**Marketing Management** : Needs- Wants - Products - Market- Marketing- Production Concept, Product Concept, Sales Concept, Marketing Concept, Societal Marketing Concept- Organizing the Marketing Department - **Marketing Mix**: Product, Price, Place, Promotion (in brief)

**Production Management**: Concept of production management-Types of Production processes- Plant Location& Layout, Statistical Quality Control.

#### **UNIT-V**

**Financial Management**: Financial Statements–Contents of Trading Account, Profit and Loss Account– Balance Sheet (Theory only) - Analysis of Financial statements : Ratio analysis (simple problems) - Concept of Finance - Objectives of Finance-Wealth Maximization Vs. Profit Maximization - Functions of Finance - Role of financial manager - Organization of finance function.

#### **UNIT-VI**

**Forms of Business Organizations**- Sole Proprietorship, Partnership, Joint Stock Company -Private limited and Public limited Companies, Public enterprises and their types, Business Cycles.

**Entrepreneurship**- Entrepreneur–Qualities of good entrepreneur - Entrepreneurial Functions, Entrepreneurial Development: Objectives, Training, Benefits - Phases of Installing a Project

#### **TEXT BOOKS:**

1. P.G.Ramanujam, B.V.R.Naidu & PVR Sastry, **Management Science**, Himalaya Publishing House, Mumbai.
2. A.R. Aryasri, **Managerial Economics and Financial Analysis**, Tata Mc Graw- Hill, New Delhi.

#### **REFERENCE BOOKS:**

1. M.Y.Khan & P.K.Jain, **Financial Management**, TATA McGraw-Hill, New Delhi.
2. Koontz O Donnel, **Management**, TATA McGraw-Hill, New Delhi.
3. K. Aswathappa, **Production Management**, Himalaya Publishing House, Mumbai.
4. P.Subba Rao, **Human Resource Management**, Himalaya Publishing House, Mumbai.
5. Philip Kotler, **Marketing Management**, Pearson Prentice Hall, New Delhi.
6. Vasant Desai, **Entrepreneurship**, Himalaya Publishing House, Mumbai.
7. Varshini & Maheswari, **Managerial Economics**, SChand & Co, New Delhi.
- 8.

SEMESTER -IV	L	T	P	C
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<b>16CS4L01: JAVA PROGRAMMING LAB</b>
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### **COURSE OBJECTIVES**

1. Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
2. Able to implement Exception Handling in java.

### **COURSE OUTCOMES**

1. Develop solutions for a range of problems using object-oriented programming.
2. Create Java programs that solve simple business problems

- Note:**
1. Use JDK 1.5 or above on any platform.
  2. Student has to complete at least 16 experiments.

### **LAB EXPERIMENTS**

1. Installation of JDK, setting Class path and Executing simple java programs.
2. Write a program that displays welcome dear user followed by user name. Accept username from the user.
3. Write a Java Program to develop a class for Rational numbers.
4. Write a Java program to create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user
5. Write a Java program that checks whether a given string is a palindrome or not. Ex: MALAYALAM is a palindrome. Using command line arguments.
6. Write a Java Program to implement array of objects.
7. Write a Java program to practice using String class and its methods.
8. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
9. Write a Java program to create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviours, depending on the specific type of Rodent. Create

an array of Rodent, fill it with different specific types of Rodents and call your base class methods.

10. Write a Java program to create and Manage bank account using inheritance concept.
11. Write a Java program to develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application
12. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object
13. Write a Java program to develop a vehicle class hierarchy in Java to demonstrate the concept of polymorphism.
14. Write a Java program to Design a package to contain the class Student that contains data members such as name, roll number and another package contains the interface Sports which contains some sports information. Import these two packages in a package called Report which process both Student and Sport and give the report.
15. Write a Java program to find the account balance using package
16. Write a Java program to demonstrate super key word.
  
17. Write a Java program to create an abstract class named Shape, that contains an empty method named numberOfSides (). Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method numberOfSides(), that contains the number of sides in the given geometrical figure.
18. Write a Java program that reads two numbers from the user to perform integer division into Num1 and Num2 variables. The division of Num1 and Num2 is displayed if they are integers. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception
19. Write a Java program to create user defined package and interface.
20. Write a Java program to create a multi-threaded to print all numbers below 100,000 that are both prime and Fibonacci number (some examples are 2, 3, 5, 13, etc.). Design a thread that generates prime numbers below 100,000 and writes them into a pipe. Design another thread that generates Fibonacci numbers and writes them to another pipe. The main thread should read both the pipes to identify numbers common to both.

21. Write a java program to read the names of users, number of units consumed and print out the charge using default. An electricity board charges the following rates to domestic users to discourage large conceptions of energy. 100 units Rs 1.50 p/unit 200 units Rs 1.80 p/unit Beyond 200 Rs 2.50 p/unit All users are charged a minimum of Rs 50/-. If the total amount is more than 300 then an additional surcharge of 15% is added.
22. Write a Java program that creates 3 threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third displays “Welcome” every 3 seconds. ( by implementing Runnable interface).

**Text Books:**

1. Herbert Scheldt: “Java The complete reference”, 7th Edition, Tata McGraw Hill, 2011.
2. E.Balaguruswamy: “Programming with Java A Primer”, 4th Edition, Tata McGraw Hill, 2009

<b>SEMESTER -IV</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT4L01: DATA BASE MANAGEMENT SYSTEMS LAB</b>				

### **COURSE OBJECTIVES**

1. To understand the concept of Database system and Client Server Architecture.
2. To understand and develop the concepts of Relational Data Model, Security and Integrity.
3. To understand and execute different SQL queries and PL/SQL programs.
4. To understand the concept of Transaction Control and Data Control language.

### **COURSE OUTCOMES**

1. An ability to define, manipulate and control data using Structured Query Language (SQL).
2. An ability to enforce Database Integrity Constraints (primary & foreign keys; null, unique & check constraints).
3. An ability to develop applications using various features of PL/SQL like Database Function, Stored Procedure, Package, Triggers.
4. An ability to develop Database system to handle the real world problem.

### **LIST OF EXPERIMENTS**

1. DDL and DML Commands.
2. Restricting and sorting the Data Base.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP by, HAVING Clause.
4. Queries using Conversion functions (to char, to number and to date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next day, add months, last day, months between, least, greatest, trunc, round, tochar, to date).
5. Key constraints, Set operators, controlling user access commands.
6. Displaying Data from Multiple Tables
  - i) Equi join
  - ii) Non-Equi joins
  - iii) Outer joins
  - iv) Self joins
  - v) Cross joins
7. Sub queries, Views.

8. Creation of simple PL/SQL program which includes declaration n section, executable section and Exception handling section.
9. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, User defined Exceptions, RAISE-APPLICATION ERROR.
10. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
11. Develop Programs using Triggers.
12. Develop programs using Cursors.

SEMESTER -IV	L	T	P	C
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**16IT4L02: LANGUAGE PROCESSOR LAB**

### **COURSE OBJECTIVES**

To enlighten the student with knowledge base in compiler design and its applications

### **COURSE OUTCOMES**

Demonstrate a working understanding of the process of lexical analysis, parsing and other compiler design aspects.

### **LAB EXPERIMENTS**

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines
2. Simulate First and Follow of a Grammar.
3. Construct a recursive descent parser for an expression.
4. Construct a LL(1) parser for an expression
5. Design predictive parser for the given language
6. Implementation of shift reduce parsing algorithm.
7. Design a LALR bottom up parser for the given language.
8. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools
9. Write a program to perform loop unrolling.
10. Convert the BNF rules into YACC form and write code to generate abstract syntax tree.
11. Write a program for constant propagation.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16CS5T01: COMPUTER NETWORKS</b>				

## COURSE OUTCOMES

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

1. Differentiate network reference models such as OSI, TCP/IP
2. Classify various Data Link Layer protocols such as sliding window.
3. Distinguish various MAC sub Layer Protocols, such as ALOHA, CSMA, CSMA/CD
4. Differentiate various Network layer protocols and Its Applications
5. Distinguish various Transport layer protocols and its applications
6. Illustrate various application layer protocols such as www And HTTP etc.

### UNIT 1:

**Data communication Components:** Representation of data and its flow Networks, categories of Networks, Various Connection Topology, Protocols and Standards, OSI model, TCP/IP Protocol suit, Transmission Media.

### UNIT 2:

**Data Link Layer:** Error Detection and Error Correction -Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking.

### UNIT 3:

**Medium Access Sub Layer:** Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

### UNIT 4:

**Network Layer:** Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP – Delivery, Forwarding and Unicast Routing protocols.

### UNIT 5:

**Transport Layer:** Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

**UNIT 6:**

**Application Layer:** Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP.

**Suggested books**

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

**Suggested reference books**

1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16IT5T01: DATA WAREHOUSING AND DATA MINING</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain data pre processing techniques to build data warehouse
2. Design and implement simple data warehouse applications.
3. Analyze transaction databases for association rules.
4. Define classification methods and prediction techniques on transaction databases.
5. Classify various clustering techniques for categorizing data.
6. Explain different methods for outlier analysis.

### UNIT-I

**Introduction:** What Motivated Data Mining? Why Is It Important, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining.

### UNIT-II

**Data Pre-processing:** Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

### UNIT-III

**Data Warehouse and OLAP Technology: An Overview:** What Is a Data Warehouse? Differences between OLAP and OLTP, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, schemas, From Data Warehousing to Data Mining.

### UNIT-IV

**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

**Model Over fitting:** Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap.

#### **UNIT-V**

**Association Analysis: Basic Concepts and Algorithms:** Introduction, Frequent Item Set generation, Rule generation, Compact Representation of frequent item sets, FP-Growth Algorithm.

#### **UNIT-VI**

**Cluster Analysis: Basic Concepts and Algorithms:** What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting Kmeans, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses.

#### **TEXT BOOKS:**

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

#### **REFERENCE BOOKS:**

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining: Introductory and Advanced topics: Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
4. Data Mining Techniques, Arun K Pujari, Universities Press.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT5T02: DESIGN AND ANALYSIS OF ALGORITHMS</b>				

## **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Analyze the asymptotic runtime complexity of algorithms for real world problems developed using different algorithmic methods.
2. Identify the optimal solutions by using advanced design and analysis of algorithm techniques like greedy method and dynamic programming.
3. Apply the search space and optimization problem techniques like backtracking and branch and bound method to solve problems optimally where advanced algorithm design techniques fail to find solution.
4. Distinguish the problems and its complexity as polynomial and NP problems and can formulate some real world problems to abstract mathematical problems.
5. Apply the Travelling sales person problem.
6. Explain the fundamentals Dynamic Programming methods.

### **UNIT-I**

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic Analysis. Disjoint Sets - disjoint set operations, union and find algorithms, spanning trees, connected components and bi-connected components.

### **UNIT-II**

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen's matrix multiplication.

Greedy method: General method, applications, Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees and Single source shortest path problem.

### **UNIT – III**

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem and Reliability design.

#### **UNIT-IV**

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring and Hamiltonian cycles.

#### **UNIT-V**

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

#### **UNIT-VI**

NP- Hard and NP- complete problems: NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem

#### **Text Books:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharam, Universities Press.
2. The Algorithm Design Manual, 2nd edition, Steven S. Skiena, Springer.
3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd.

#### **Reference Books:**

1. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, PEA
2. Design and Analysis of Algorithms, ParagHimanshu Dave, Himansu B Alachandra Dave, Pearson Education.
3. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGraw Hill.
4. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT5T03: ARTIFICIAL INTELLIGENCE</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Define the fundamentals of AI techniques and search techniques.
2. Compare the Knowledge Representation rules.
3. Explain the various Reasoning Techniques.
4. Apply AI techniques to solve problems of game playing, expert systems, machine learning and natural language processing.
5. Solve the learning problems.
6. Explain the knowledge Expert system.

## UNIT-I

**Introduction:** I problems, The Underlying Assumption, AI Techniques, The Level of the Model, Criteria for Success **Problems, Problem Spaces and Search:** Defining the Problem as a State Space Search, production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs

**Heuristic Search Techniques:** Generate – and – Test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

## UNIT-II

**Knowledge Representation:** Issues in Knowledge Representation, Representing Simple Facts in Predicate Logic, Representing Instance and ISA Relations, Computable Functions and Predicates, Resolution, Natural Deduction

**Representing Knowledge Using Rules:** Procedural Vs Declarative Knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge.

**Weak Slot – and – Filler Structures:** semantic nets, frames **Strong Slot – and – Filler Structures:** conceptual dependency, scripts, CYC

## UNIT-III

**Reasoning Techniques:** Introduction to Nonmonotonic reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation of Depth First Search and Breadth First Search, Probability and Bayes Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks.

#### **UNIT-IV**

**Game Playing:** Overview, Minimax Search, Alpha – Beta Cutoffs

**Planning System:** Overview, The Blocks World, Components of a Planning System, Goal Stack Planning, Hierarchical Planning

**Understanding:** Understanding as constraint satisfaction, Waltz Algorithm

**Natural Language Processing:** Introduction, Syntactic Processing, Augmented Transition Networks, Semantic Analysis

#### **UNIT-V**

**Learning:** What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees

#### **UNIT-VI**

**Expert Systems:** Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

#### **Text Books:**

1. Artificial Intelligence” 3rd Edn., E.Rich and K.Knight (TMH)
2. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI.,2010

#### **References:**

1. Artificial Intelligence A Modern Approach, Second Edition, Stuart Russell, Peter Norvig, PHI/Pearson Education.
2. Artificial Intelligence and Expert systems – Patterson PHI
3. SarojKaushik, “Artificial Intelligence”, Cengage Learning India, 2012.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT5E01: E-COMMERCE</b>				

## **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Define the fundamentals E-commerce framework.
2. Explain the basics of Consumer Oriented Electronic models.
3. Distinguish different electronic payment systems and their issues.
4. Demonstrate Inter-organizational and intra-organizational electronic commerce.
5. Analyze the Information search and Retrieval .
6. Explain advertising and marketing on the Internet, consumer search and resource discovery and key multimedia concepts.

### **UNIT-I**

Electronic Commerce-Frame work, anatomy of E-Commerce applications,E-Commerce Consumer applications, E-Commerce organization applications.

### **UNIT-II**

Consumer Oriented Electronic commerce - Mercantile Process models, Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

### **UNIT-III**

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks. Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

### **UNIT-IV**

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research.

### **UNIT-V**

Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering.

#### **UNIT-VI**

Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing, Desktop video conferencing.

#### **Text Books:**

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.

#### **References Books:**

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, TharamDillon,Elizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal – Galgotia.E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
3. Electronic Commerce – Gary P.Schneider – Thomson.
4. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol GuyericoTraver.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT5E02: SOFTWARE TESTING</b>				

## **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Explain software testing process, various methods of testing, different levels of testing
2. Analyze testing issues and solutions in software unit test integration, regression, and system testing.
3. Analyze the Static Testing methods.
4. Explain the Dynamic Testing methods.
5. Define software reliability, quality concepts, assurance & standards
6. Apply various testing tools to test software in order to improve test efficiency with automation

## **UNIT-I**

**Software Testing and Methodology:** Introduction, Evolution, Goals, Model for testing, Effective Vs Exhaustive Software Testing, Software Testing Life Cycle, relating test life cycle to development life cycle.

**Verification and Validation:** Verification & Validation, Verification Activities, Validation Activities, How to verify code.

## **UNIT-II**

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

**Dynamic Testing II: White-Box Testing:** need, Logic coverage criteria, Basis path testing, Loop testing, data flow testing

### UNIT-III

**Static Testing:** Inspections, Structured Walkthroughs, Peer reviews, Formal Technical reviews  
Validation activities: Unit testing, Integration testing, system testing-Functional, Non- functional, Usability testing, acceptance testing

### UNIT-IV

**Regression testing:** Progressive Vs regressive testing, Regression testability, Objectives of regression testing, Regression testing types, Regression testing techniques.

**Software Quality Management:** Software Quality metrics, SQA models, Debugging: process, techniques, Importance of bugs, Consequence of bugs.

### UNIT-V

**Software Reliability and Modeling:** The Need for Software Reliability, Reliability Definitions , Software versus Hardware Reliability, Halstead's Software Metric, McCabe's Cyclomatic Complexity Metric, Reliability Growth Models, Failure Rate Models.

### UNIT-VI

**Automated Testing and Testing Tools:** Introduction, the Benefits of Automation and Tools, Software Test Automation, Random Testing, Realities of Using Test Tools and Automation, Open Source Testing Tools, Case Studies on Testing Tools-Selenium

#### Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford.
2. Foundations of Software testing, Adyta P Mathur, 2ed, Pearson.
3. Software Testing- Yogesh Singh, CAMBRIDGE.

#### Reference Books:

1. Software testing techniques - BarisBeizer, International Thomson computer press,second edition.
2. Software Reliability Engineering - H.Pham, Springer- Verlag, Singapore,2000.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16CS5E03:COMPUTER GRAPHICS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain the fundamentals of computer graphics.
2. Design the general software architecture of programs that use 3D computer graphics.
3. Explain hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.
4. Select among models for lighting/shading: Color, ambient light; distant and light with sources.
5. Compare Phong reflection model, shading like flat, smooth, Gourand, Phong models.

## UNIT-I

**Introduction:** Application of Computer Graphics, raster scan systems, random scan systems

**Output primitives:** Points and lines, line drawing algorithms(DDA and Bresenham's Line algorithms), mid-point circle algorithms.

**Filled area primitives:** Scan line polygon fill algorithm, Inside and outside tests, boundary-fill algorithm.

## UNIT-II

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

**2-D viewing:** The viewing pipeline, window to view-port coordinate transformation, Cohen-Sutherland line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

## UNIT-III

**3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curves and surfaces, B-Spline curves and surfaces.

## UNIT-IV

**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections(Parallel and Perspective).

#### **UNIT-V**

**Visible surface detection methods:** Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSPtree methods, area sub-division and octree methods.

#### **UNIT VI**

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

#### **Text Books:**

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

#### **Reference Books:**

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson
2. Computer Graphics, Steven Harrington, TMH
3. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.
4. The Computer Graphics manual, Vol 2, David, Soloman, Springer
5. Procedural elements for Computer Graphics, David F Rogers, 2/e, TMH
6. Computer Graphics with Virtual Reality Systems, Rajesh K Maurya, Wiley

<b>SEMESTER-V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>16EC5E05:MICROPROCESSOR AND ITS APPLICATIONS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Recall details about various microprocessors/microcontrollers
2. Construct various peripherals with microprocessors/microcontrollers.
3. Define and write assembly language programs.
4. Build basic systems using microprocessor/microcontroller.

### UNIT-I

**Introduction and 8085 Microprocessor:** Introduction to Microprocessors and Microcomputers, Family of Intel processors. 8085 microprocessor Features, Architecture, Register organization, Timing diagrams.

### UNIT-II

**8086 Microprocessor:** Features, Architecture, Memory organization, Pin diagram, Minimum mode and Maximum mode of operations.

### UNIT-III

**8086 Programming:** Addressing modes, Instruction set, Assembler directives, Procedures and Macros, Assembly language programming, Example programs.

### UNIT-IV

**Interfacing:** 8255 PPI, Interfacing with 8086 –ADC, DAC, DC motor and stepper motor.

### UNIT-V

**8051 Microcontroller:** Microprocessor Vs Microcontroller, 8051–Features, Architecture, Pin diagram, Ports, Memory organization.

### UNIT-VI

**ARM Processor:** ARM processors –introduction to 16/32 bit processors, ARM architecture and organization, Thumb programming model, thumb instruction set and development tools.

### Text Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085 Ramesh S. Gaonkar, 4thEdition, Penram International, 1999.
2. Advanced microprocessor & Peripherals –A K Ray and K M Bhurchand TMH, 2000.

**REFERENCE BOOKS:**

1. A.K.Ray, K.M.Bhurchandi ,”Advanced Microprocessors and Peripherals”, Tata McGraw Hill Publications, 2000.
2. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, “Microprocessors and Microcontrollers”,

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>4</b>	<b>2</b>
<b>16CS5L01:COMPUTER NETWORKS LAB</b>				

### **COURSE OUTCOMES**

At the end of this course, students are able to

1. Identify the different types of network devices and their functions within a network.
2. Design TCP iterative Client and Server application
3. Identify the basic protocols of computer networks, and how they can be used to assist in network design and Implementation.
4. Design UDP Client Server
5. Configure a network using packet tracer software
6. Implement and build the skills of sub-netting and routing mechanisms.

### **LIST OF PROGRAMS:**

1. Study of Networking Commands (Ping, Tracert, TELNET, nslookup, netstat, ARP, RARP) and Network Configuration Files.
2. Linux Network Configuration.
  - a. Configuring NIC's IP Address.
  - b. Determining IP Address and MAC Address using if-config command.
  - c. Changing IP Address using if-config.
  - d. Static IP Address and Configuration by Editing.
  - e. Determining IP Address using DHCP.
  - f. Configuring Hostname in /etc/hosts file.

3. Design TCP iterative Client and Server application to reverse the given input sentence.

4. Design a TCP concurrent Server to convert a given text into upper case using multiplexingsystem call “select”.
5. Design UDP Client Server to transfer a file.
6. Study of different types of network cables and practically implement the cross wired cable and straight through cable using clamping tool
  
7. Study of network devices in detail
8. Study of network ip
9. Connect the computers in LAN network
10. Study of basic network command and network configuration commands using packet tracer
11. Configure a network topology using packet tracer software using two different networks.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	-	-	<b>4</b>	<b>2</b>
<b>16IT5T01: DATA WAREHOUSING AND DATA MINING LAB</b>				

### **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Apply Data Pre-Processing techniques.
2. Develop and implement the Clustering algorithms.
3. Develop and implement the Classification algorithms.
4. Apply the techniques of feature selection and visualization to real world data.

All the programs should be carried out using tools like Weka/Python/R.

### **LIST OF PROGRAMS:**

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses. arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
10. Demonstration of clustering rule process on dataset student.arff using simple k-means
11. Demonstration of clustering rule process on dataset student.arff using Bayesian Network.

<b>SEMESTER -V</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16IT6T01: MACHINE LEARNING</b>				

## **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Define a wide variety of learning algorithms.
2. How to apply a variety of learning algorithms to data.
3. Explain the strengths and weaknesses of many popular machine learning approaches.
4. Evaluate the learning algorithms and model selection.
5. Apply the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

### **UNIT-I**

**Introduction:** Learning, Types of Machine Learning. Concept learning: Introduction, Version Spaces and the Candidate Elimination Algorithm. Learning with Trees: Constructing Decision Trees, CART and Classification Example.

### **UNIT-II**

**Linear Discriminants:** The Perceptron, Linear Reparability. Linear Regression Multilayer Perceptron (MLP): Going Forwards, Backwards, and MLP in practices, deriving back, Propagation Support Vector Machines: Optimal Separation, Kernels.

### **UNIT-III**

**Linear Regression & Logistic Regression:**

**Predicting numeric values: regression** - Finding the best fit lines with linear regression, locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff.

**Logistic Regression:** Classification with logistic regression and the sigmoid function, using optimization to find the best regression coefficients.

#### **UNIT-IV**

**Some Basic Statistics:** Averages, Variance and Covariance, The Gaussian. The Bias-Variance Tradeoff, Bayesian learning: Introduction, Bayes theorem, Bayes Optimal Classifier, Naive Bayes Classifier.

**Graphical Models:** Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models and The Forward Algorithm.

#### **UNIT-V**

**Evolutionary Learning:** Genetic Algorithms, Genetic Operators. Genetic Programming Ensemble learning: Boosting, Bagging. Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis

#### **UNIT-VI**

**Clustering:** Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison.

#### **TEXT BOOKS:**

1. Tom M. Mitchell, "**Machine Learning**", MacGraw Hill, 1997.
2. Stephen Marsland, "**Machine Learning - An Algorithmic Perspective**", CRC Press, 2009.

#### **REFERENCE BOOKS:**

1. Margaret H Dunham, "**Data Mining**", Pearson Edition, 2003.
2. Galit Shmueli, Nitin R Patel, Peter C Bruce, "**Data Mining for Business Intelligence**", Wiley India Edition, 2007.
3. Rajjall Shinghal, "**Pattern Recognition**", Oxford University Press, 2006.

<b>SEMESTER -VI</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16IT6T02:WEB TECHNOLOGIES</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Distinguish various static web pages and dynamic web pages using html and java script.
2. Apply the client side validation using Java Script.
3. Demonstrate the PHP programming
4. Develop a well formed XML document.
5. Construct the web servers with servlets.
6. Demonstrate a java server side programming and connection with database.

### UNIT-I

**HTML & CSS:** HTML tags, Lists, Tables, Images, forms, Frames, Cascading style sheets.

### UNIT-II

**Java script:** Scripting Languages: Java Scripts, Control structures, functions, arrays & objects, DHTML.

### UNIT-III

**Introduction to PHP**

**PHP Programming:** Creating PHP script- Variables, Constants, Data types, Operators, Control Structures, Arrays, Function. Working with forms and Database using MySQL.

### UNIT-IV

**XML EXTENSIBLE MARKUP LANGUAGE:** XML-Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

### UNIT-V

**Web Servers and Servlets:** Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading

Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

#### **UNIT-VI**

**Introduction to JSP:** The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC.

**JSP Application Development:** Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Passing Control and Data Between Pages – Sharing Session and Application Data Memory Usage Considerations.

**Database Access:** Database Programming using JDBC, Studying Java.sql.\* package, Accessing a Database from a JSP Page.

#### **TEXT BOOKS:**

1. Web Technologies – Black Book, Kogent Learning solutions Inc sol. Dreamtech press.
2. The complete Reference Java 2, 7th Edition by Patrick Naughton and Herbert Schildt. TMH
3. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. An Introduction to Web Design + Programming, Wang, Katila, CENGAGE

#### **REFERENCE BOOKS:**

1. Web Technologies, Uttam K Roy - Oxford .
2. Head first Java – Kathy seirra -Orielly –
3. Core SERVLETS AND JAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson
4. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
5. Murach's beginning JAVA JDK 5, Murach, SPD

<b>SEMESTER -VI</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT6T03: DISTRIBUTED SYSTEMS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain the concept of distributed systems and various distributed models.
2. Elaborate knowledge on inter-process communication mechanisms used in distributed systems.
3. Compare RPC and RMI.
4. Explain Synchronization and Replication.
5. Define distributed file systems and name services.
6. Examine distributed transactions and concurrency control.

## UNIT-I

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models, Fundamental Models.

## UNIT-II

**Inter Process Communication(IPC):** Introduction, The API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX.

## UNIT-III

**Distributed Objects and Remote Invocation:** Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI.

## UNIT-IV

**Synchronization and Replication:** Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Coordination and Agreement –

Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication.

#### **UNIT-V**

**Distributed File Systems:** Introduction, File Service Architecture, Case Study 1: Sun Network File System, Case Study 2: The Andrew File System. **Name Services:** Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

**Process & Resource Management:** Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

#### **UNIT-VI**

**Transactions and Concurrency Control:** Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

**Distributed Transactions:** Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.

#### **TEXT BOOKS:**

1. Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 41<sup>st</sup> Edition. 2009.

#### **REFERENCE BOOKS:**

1. Distributed Systems, Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2nd Edition, PHI.
2. Distributed Systems, An Algorithm Approach, Sukumar Ghosh, Chapman&Hall/CRC, Taylor &Fransis Group, 2007.

<b>SEMESTER -VI</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>16IT6E01:SEMANTIC WEB AND SOCIAL NETWORKS</b>				

**COURSE OUTCOMES**

After the completion of the course the students are able to

1. Define Web Intelligence
2. Apply Knowledge for Representation of the Semantic Web
3. Analyze Ontology Engineering
4. Develop Semantic Web Applications, Services and Technology
5. Evaluate Social Network Analysis and semantic web

**UNIT-I**

**Web Intelligence:** Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today’s Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

**UNIT-II**

Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

**UNIT-III**

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

**UNIT-IV**

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services,

Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

#### **UNIT-V**

Social Network Analysis and semantic web What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities,

#### **UNIT-VI**

Web Based Networks. Building Semantic Web Applications with social network features.

#### **TEXT BOOKS:**

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

#### **REFERENCE BOOKS:**

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies,R. Studer, P. Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C.Evans, J. Taylor, O'Reilly, SPD

<b>SEMESTER -VI</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT6E02:EMBEDDED SYSTEMS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain the basics of an embedded system
2. Develop a Program on an embedded system
3. Design, implement and test an embedded system.
4. Identify the unique characteristics of real-time systems
5. Explain the general structure of a real-time system
6. Define the unique design problems and challenges of real-time systems

### UNIT-I

**Embedded Computing:** Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples.

### UNIT-II

**The 8051 Architecture:** Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

### UNIT-III

**Basic Assembly Language Programming Concepts:** The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions.

### UNIT-IV

Arithmetic Operations, Decimal Arithmetic, Jump and Call Instructions, Further Details on Interrupts.

## UNIT-V

**Applications:** Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

## UNIT-VI

**Introduction to Real – Time Operating Systems:** Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

### Text Books:

1. Computers as Components-principles of Embedded computer system design, Wayne Wolf, Elsevier.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

### Reference Books:

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

<b>SEMESTER -VI</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	-	-	<b>3</b>
<b>16IT6E03:IMAGE PROCESSING</b>				

## **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Explain digital image processing fundamentals: hardware and software, digitization, enhancement and restoration, encoding, segmentation, feature detection
2. Apply image processing techniques in both the spatial and frequency (Fourier) domains
3. How digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation.

## **UNIT-I**

Fundamental steps of image processing, components of an image processing of system. The image model and image acquisition, sampling and quantization, relationship between pixels, distance functions, scanner. Statistical and spatial operations, Intensity functions transformations, histogram processing, smoothing & sharpening – spatial filters Frequency domain filters, homomorphism filtering, image filtering & restoration. Inverse and weiner filtering, FIR weiner filter, Filtering using image transforms, smoothing splines and interpolation.

## **UNIT-II**

Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.

## **UNIT-III**

Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and laplace operators, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds.

#### **UNIT-IV**

Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding, Digital Image Water marking.

#### **UNIT-V**

Representation and Description, Chain codes, Polygonal approximation, Signature Boundary Segments, Skeletons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description, Relational Descriptors

#### **UNIT-VI**

Pattern Recognition Fundamentals: Basic Concepts of pattern recognition, Fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model.

Pattern classification: Pattern classification by distance function: Measures of similarity, Clustering criteria, K-means algorithm, and Pattern classification by likelihood function: Pattern classification as a Statistical decision problem, Bayes classifier for normal patterns.

#### **TEXT BOOKS:**

1. Digital Image Processing Third edition, Pearson Education, Rafael C. Gonzalez, Richard E.Woods
2. Pattern recognition Principles: Julius T. Tou, and Rafael C. Gonzalez, Addison-Wesley Publishing Company

#### **REFERENCE BOOKS:**

1. S.Sridhar, "Digital Image Processing" Oxford Publishers, 2011
2. S.Jayaraman, S.Esakkirajan, T.Veerakumar, "Digital Image Processing" Mc Graw Hill Publishers, 2009

<b>SEMESTER -VI</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT6E04:SOFTWARE PROJECT MANAGEMENT</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain the basic concepts of Software Engineering and Process framework.
2. Define the various software process models and its requirements.
3. Outline software project management principles based on conventional software project management.
4. Distinguish different Software Management life cycle phases
5. Define the artifacts and knowledge on Model Based Software Architecture.
6. Illustrate various software workflows and checkpoints of the process.

### UNIT-I

**Conventional Software Management and Economics:** The waterfall model, conventional software Management performance, Software Economics.

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

### UNIT-II

**The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

### UNIT-III

**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**Model based software architectures:** A Management perspective and technical perspective.

### UNIT-IV

**Work Flows of the process:** Software process workflows, Iteration workflows.

**Checkpoints of the process:** Major mile stones, Minor Milestones, Periodic status assessments.

#### **UNIT-V**

**Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

**Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.

#### **UNIT-VI**

**Process Automation:** Automation Building blocks, The Project Environment.

**Project Control and Process instrumentation:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

#### **Text Books:**

1. Software Project Management, Walker Royce: Pearson Education, 2005.

#### **Reference Books:**

1. Software Project Management, Bob Hughes and Mike Cotterell : Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson.

SEMESTER -VI	L	T	P	C
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**16IT6L01: MACHINE LEARNING LAB**

### **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Apply Data summarization and visualization. .
2. Develop and implement the Linear Regression Analysis
3. Develop and implement the Logistic Regression Analysis.
4. Apply the Classification using Support Vector Machine.

All the programs should be carried out using tools like Weka/Python/R-Programming/Orange.

### **LIST OF EXPERIMENTS**

1. Installation and running of Scipy.
2. Data loading
3. Data summarization
4. Data visualization
5. Data Predictions
6. Case Study on Linear Regression Analysis
7. Case Study on Logistic Regression Analysis
8. Case Study on Data Classification using Support Vector Machine

SEMESTER -VI	L	T	P	C
	-	-	4	2

**16CS6L02:WEB TECHNOLOGIES LAB**

### COURSE OUT COMES

After the completion of the course the students are able to

1. Distinguish various static web pages and dynamic web pages using html,xml and JavaScript.
2. Construct and review on php & mysql database connectivity .
3. Design web applications using servlets & jsp using oracle database connectivity.
4. Design and implement the web application projects.

### LIST OF PROGRAMS:

1. Develop static web pages (using only HTML) of an online products store. The pages should resemble: www.apple.com. The website consist the following pages. Home, Registration Login, Profile, Products, Catalog, Shopping cart, Payment mode, Order confirmation.
2. Validate the registration, user login , user profile and payment mode using JavaScript (Use PHP to connect with the database for storing the above details).
3. Redesign the catalog page using all CSS properties (like font-styles, background image etc.
4. Create and save an XML document, which contains 10 students information. Display the information by using html tables.
5. Install TOMCAT web server. Access the static web pages of exp1 and exp2 using tomcat server. Hint: User's information (user id, password,) would be stored in web. Xml.
6. User authentication for the login form in exeperiment1 and display whether a valid user or not using cookies.
7. Install a database (Mysql/Oracle/MsAccess). Create tables for user details in the registration form and catalog page in the website Practice of JDBC Connectivity.
8. Write a JSP for creating registration form.
9. Modify the catalogue page by using http sessions.

<b>B. TECH VI SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>4</b>	<b>2</b>
<b>16BS6L01:SOFT SKILLS AND APTITUDE LAB</b>				

- Total Number of Laboratory Sessions: 10
- Total Number of Modules: 4

List of Modules:

- Module-I: Communicative Grammar and Language Skills
  - i) Grammar:
    - a) Parts of Speech
    - b) Articles and useful prepositions
    - c) Sentence and its types
    - d) Verb forms and Tenses
    - e) Question Tags
    - f) Do-Forms and Wh-questions
    - g) Common mistakes at proficiency
  - ii) Language Skills
    - a) Listening activity with a CD on Parts of Speech
    - b) Listening activity with a CD on Articles and Prepositions
    - c) Listening activity through CD on sentence and its types
    - d) Listening activity with a CD on Verb forms and Tenses
    - e) Reading activity on Question Tags
    - f) Reading activity on Do-Forms and Wh-questions
    - g) Writing activity (Resume)
    - h) Writing activity (E-mail)
    - i) Writing activity (Guided Composition)
    - j) Writing activity (Guided Composition)

- Module-II: Communication Skills
  - a) JAM/J2M on a given topic
  - b) Introduce yourself (Strengths and weaknesses)
  - c) Conversations
  - d) Body Language
  - e) Presentations
  - f) Group Discussion
  - g) Interview Skills
- Module-III: Vocabulary
  - a) 20 useful vocabulary for an engineering resume
  - b) Commonly confused words
  - c) One-word Substitutes
  - d) Useful phrases or expressions for a Telephonic Interview
  - e) Useful phrases or expressions for introduction and conclusion at a speech, interview, presentation, seminar, conference, GD etc.
  - f) GRE words
  - g) Useful phrases for an interview
- Module-IV: Soft Skills
  - a) Positive Attitude- Courtesy and etiquette
  - b) Motivation
  - c) Adaptability
  - d) Goal Setting
  - e) Leadership Qualities
  - f) Team Work
  - g) Problem Solving
  - h) Time and Stress Management
  - i) Negotiation and conflict resolution
  - j) Interpersonal Skills

Method/Approach to be Adopted: Communicative, implicit, incidental and activity based method to create enthusiasm among the students.

Division of Syllabus for each Laboratory Session

Lab-I: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Parts of Speech

Language Skills Topic: Listening activity with a CD on Parts of Speech. Activity follows

Part-II: Communication Skills

Topic: JAM/J2M on a given topic

Part –III: Vocabulary

Topic: 20 useful vocabulary for an engineering resume

Part-IV: Soft Skills

Topic: Positive Attitude- Courtesy and etiquette

Lab-II: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Articles and useful prepositions

Language Skills Topic: Listening activity with a CD on Articles and Prepositions.

Follow-up Activity: Articles and Prepositions

For E.g., Picture Description on Articles and Prepositions

Part-II: Communication Skills

Topic: Introduce yourself (Strengths and weaknesses)

Activity: Role Play/Simulation

Part –III: Vocabulary

Topic: Commonly confused words

Part-IV: Soft Skills

Topic: Motivation

Lab-III: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Sentence and its types

Language Skills Topic: Listening activity through CD on sentence and its types.

Follow-up Activity: Sentence and its types

Part-II: Communication Skills

Topic: Conversations

For E.g., Greetings and Introducing, Making Requests etc.

Activity: Role Play/Simulation

Part –III: Vocabulary

Topic: One-word Substitutes

Part-IV: Soft Skills

Topic: Adaptability

Lab-IV: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Verb forms and Tenses

Language Skills Topic: Listening activity with a CD on Verb forms and Tenses

Follow-up Activity: Story Narration

Part-II: Communication Skills

Topic: Conversations

Part –III: Vocabulary

Topic: Useful phrases or expressions for a Telephonic Interview

Part-IV: Soft Skills

Topic: Goal Setting

Lab-V: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Question Tags

Language Skills Topic: Reading activity with a CD on Question Tags

Follow-up Activity: Question Tags

Part-II: Communication Skills

Topic: Body Language

Part –III: Vocabulary

Topic: Useful phrases or expressions for introduction and conclusion at a speech, interview, presentation, seminar, conference, GD etc.

Part-IV: Soft Skills

Topic: Leadership Qualities

Lab-VI: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Do-Forms and Wh-questions

Language Skills Topic: Reading activity without a CD on Do-Forms and Wh-questions

Follow-up Activity on Do-Forms and Wh-questions

Part-II: Communication Skills

Topic: Presentations

Part -III: Vocabulary

Topic: GRE words

Part-IV: Soft Skills

Topic: Team Work

Lab-VII: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Resume)

Part-II: Communication Skills

Topic: Group Discussion

Part -III: Vocabulary

Topic: GRE Words

Part-IV: Soft Skills

Topic: Problem Solving

Lab-VIII: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (E-mail)

Part-II: Communication Skills

Topic: Group Discussion

Part -III: Vocabulary

Topic: GRE words

Part-IV: Soft Skills

Topic: Time and Stress Management

Lab-IX: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Guided Composition)

Part-II: Communication Skills

Topic: Group Discussion

Part –III: Vocabulary

Topic: Common mistakes at proficiency

Part-IV: Soft Skills

Topic: Negotiation and conflict resolution

Lab-X: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Guided Composition)

Part-II: Communication Skills

Topic: Interview Skills

Part –III: Vocabulary

Topic: Common mistakes at proficiency

Part-IV: Soft Skills

Topic: Interpersonal Skills

APTITUDE LAB (40 HOURS)

TOPICS

<u>APTITUDE</u>		<u>REASONING</u>	
• PERCENTAGES	(3)	BLOOD RELATIONS	(2)
• RATIO AND PROPORTIONS	(3)	DIRECTIONS	(2)
• AVERAGES	(2)	SYLLOGISM	(2)
• TIME AND WORK	(2)	CODING AND DECODING	(2)
• PIPES AND CISTERNS	(1)	ANALOGY	(2)
• PROFIT AND LOSS	(3)	CLASSIFICATION	(2)
• LCM & HCF	(3)	SERIES	(2)
• SIMPLE INTEREST	(2)		
• COMPOUND INTEREST	(3)		
• TIME AND DISTANCE	(2)		
• TRAINS ,BOATS & STREAMS	(2)		

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16IT7T01: BIG DATA ANALYTICS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain the basic concepts of Big Data Analytics
2. Design and explain Hadoop architecture
3. Develop the Map Reduce application
4. Make use of the Advanced Analytical methods for clustering
5. Apply the Advanced Analytical methods using classification and Text Analysis
6. Identify the various tools in Hadoop Ecosystem

### UNIT-I

**Introduction to Big Data Analytics:** Big Data Overview, State of the Practice in Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics Data Analytics Lifecycle: Data Analytics Lifecycle Overview, Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize.

### UNIT-II

**Introduction Hadoop:** Google File System, Hadoop Distributed File System (HDFS) –Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

### UNIT-III

**MapReduce Programming :** A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

### UNIT-IV

**Advanced Analytical Theory and Methods-Clustering-:** k-means, additional algorithms; Association Rules: Apriori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules, Transactions in a Grocery Store, Validation and Testing.

#### UNIT-V

**Advanced Analytical Theory and Methods-Classification:** Decision Trees, Naïve Bayes; Advanced Analytical Theory and Methods-Time Series Analysis: Overview of Time Series Analysis, ARIMA Model. **Advanced Analytical Theory and Methods-Text Analysis:** Text Analysis Steps, Text Analysis Example, Collecting Raw Text, Representing Text, Term Frequency—Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments.

#### UNIT-VI

**Hadoop Ecosystem:** Using Query Languages HIVE and PIG for data analytics, BASE, Mahout-machine learning algorithms using Hadoop map reduce HDFS

#### TEXT BOOKS:

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data by EMC Education Services- Wiley
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss.

#### REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne .
3. Big Data Analytics with R and Hadoop-VigneshPrajapati.  
Software Links:
4. Hadoop:<http://hadoop.apache.org/>
5. Hive: <https://cwiki.apache.org/confluence/display/Hive/Home>
6. Piglatin: <http://pig.apache.org/docs/r0.7.0/tutorial.html>

SEMESTER -VII	L	T	P	C
	3	1	-	4

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<b>16IT7T02: CRYPTOGRAPHY AND NETWORK SECURITY</b>
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### COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain the basic knowledge of different types of Security attacks
2. Analyze and compare different security mechanisms and services
3. Distinguish different modern encryption Algorithms
4. Compare different Authentication Mechanisms
5. Justify latest techniques used in different Security aspects (e.g. network security, web security etc.)

### UNIT-I

Introduction: Security Attacks, Security Services, Security Mechanisms, and a Model for Network Security, Basics of Cryptography - Symmetric Cipher Model, Substitution Techniques, and Transportation Techniques, Steganography

### .UNIT-II

Secret Key Cryptography: Data Encryption Standard(DES), Strength of DES, Block Cipher Design Principles and Modes of Operations, Triple DES, Blowfish, AES.

### UNIT-III

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, the Chinese Remainder Theorem, Discrete Logarithms.

### UNIT-IV

Public Key Cryptography: Principles of Public Key Cryptosystems, RSA Algorithm, Diffie-Hellman Key Exchange, Introduction to Elliptic Curve Cryptography.

### UNIT-V

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm, MD5, Message Authentication Codes - Message Authentication Requirements and

Functions, HMAC, Digital signatures, Digital Signature Schemes, Authentication Protocols, Digital Signature Standards.

#### **UNIT-VI**

Authentication Applications: Kerberos, X.509 Authentication Service. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME, IP Security: IP Security architecture, Web Security, Intruders, Malicious Software, Firewalls.

#### **TEXT BOOKS:**

1. Cryptography and Network Security: Principles and Practice, 5th Edition, William Stallings, Pearson Education, 2011.
2. Network Security and Cryptography, Bernard Menezes, Cengage Learning, 2011.
3. Cryptography and Network, 2nd Edition, Behrouz A. Fourouzan and DebdeepMukhopadhyay, McGraw-Hill, 2010.

#### **REFERENCE BOOKS:**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Principles of Information Security, Whitman, Thomson.
3. Introduction to Cryptography, Buchmann, Springer.

<b>SEMESTER - VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT7T03: CLOUD COMPUTING</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain basics of cloud computing technology.
2. Demonstrate the concept of virtualization and the development of Cloud Computing.
3. Analyze various cloud services and service providers.
4. Explain and Uses cloud scalability, security and disaster management.
5. Analyze Aneka Cloud Application Platform.
6. Explain the different cloud platforms and its application.

### UNIT-I

**Introduction to Cloud:** Cloud Computing at a Glance, the Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model. Characteristics and Benefits, Challenges Ahead, Historical Developments.

### UNIT-II

**Virtualization:** Introduction, Characteristics of Virtualized Environment, Classification of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples- VMware and Microsoft Hyper-V.

**Before the Move into the Cloud:** Know Your Software Licenses, The Shift to a Cloud Cost Model, Service Levels for Cloud Applications.

### UNIT-III

**Cloud Computing Architecture :** Introduction, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Interoperability and Standards, Scalability and Fault Tolerance.

### UNIT-IV

**Defining the Clouds for Enterprise:** Storage as a service, Database as a service, Process as a service, Information as a service, and Integration as a service and Testing as a service. Scaling cloud

infrastructure - Capacity Planning, Cloud Scale. Disaster Recovery: Disaster Recovery Planning, Disasters in the Cloud, Disaster Management.

#### **UNIT-V**

**Aneka: Cloud Application Platform** Framework Overview, Anatomy of the Aneka Container, From the Ground Up: Platform Abstraction Layer, Fabric Services, Foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode ,Hybrid Cloud Deployment Mode, Cloud Programming and Management ,Aneka SDK, Management Tools.

#### **UNIT-VI**

**Cloud Applications:** Scientific Applications – Health care, Geo science and Biology. Business and Consumer Applications- CRM and ERP, Social Networking, Media Applications and Multiplayer Online Gaming.

**Cloud Platforms in Industry:** Amazon Web Services- Compute Services, Storage Services, Communication Services and Additional Services. Google AppEngine-Architecture and Core Concepts, Application Life-Cycle, cost model. Microsoft Azure- Azure Core Concepts, SQL Azure.

#### **TEXT BOOKS:**

1. “Mastering Cloud Computing” by RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvifrom TMH 2013.
2. George Reese “Cloud Application Architectures”, First Edition, O’Reilly Media 2009.

#### **REFERENCE BOOKS:**

1. Cloud Computing and SOA Convergence in Your Enterprise, *A Step-by-Step Guide* by David S. Linthicum from Pearson 2010.
2. Cloud Computing, 2nd Edition by Dr. Kumar Saurabh from Wiley India 2012.
3. Cloud Computing, – web based Applications that change the way you work and collaborate Online – MichealMiller.Pearson Education

SEMESTER -VII	L	T	P	C
	3	-	-	3

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<b>16IT7E01: INFORMATION RETRIEVAL SYSTEMS</b>
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## COURSE OUTCOMES

After the completion of the course the students are able to

1. Define the basic information storage and retrieval concepts
2. Apply various data structures to store and represent information
3. Analyze effective information retrieval system using automatic indexing and clustering techniques
4. Choose clustering techniques for different data base systems
5. Apply searching techniques for different data base systems
6. Compare various information visualization technologies and explain different types of search algorithms

### UNIT-I

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital Libraries and Data Warehouses, **Information Retrieval System Capabilities:** Search, Browse, Miscellaneous

### UNIT-II

**Data Structures:** Introduction, Stemming Algorithms, Inverted File Structure, N-Gram data Structure, PAT data structure, Signature file structure, Hypertext data structure.

### UNIT-III

**Automatic Indexing:** Classes of Automatic Indexing, Statistical Indexing, Natural language, Concept indexing, Hypertext linkages.

### UNIT-IV

**Document and Term Clustering:** Introduction, Thesaurus Generation, Item Clustering, Hierarchy of clusters

### UNIT-V

**User Search Technique** Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the internet and Hypertext

#### **UNIT-VI**

**Information Visualization** Introduction, Cognition and Perception, Information Visualization Technologies

**Text Search Algorithms:** Introduction, Software Text Search Algorithms, Hardware Text Search Systems

#### **TEXT BOOKS:**

1. Kowalski, Gerald, Mark T May bury: Information Retrieval Systems Theory and Implementation, Kluwer Academy Press,1997

#### **REFERENCE BOOKS:**

1. Modern Information Retrieval by Yates, Pearson Education
2. Information Storage and Retrieval by Robert Korfhage - John Wiley and Sons

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT7E02: MOBILE COMPUTING</b>				

### **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Define mobile computing and explain GSM services and Architecture
2. Explain technical issue related to the new paradigm and come up with a solution(s).
3. Develop new ad hoc network applications and/or algorithms/protocols.
4. Compare any existing and new protocol related to mobile environment.

### **UNIT-I**

**Introduction:** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

### **UNIT-II**

**(Wireless) Medium Access Control (MAC):** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

### **UNIT-III**

**Mobile Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

### **UNIT-IV**

**Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues:** Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QOS Issues.

#### **UNIT-V**

**Data Dissemination and Synchronization:** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

#### **UNIT-VI**

**Mobile Ad hoc Networks (MANETs) :** Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

**Protocols and Platforms for Mobile Computing:** WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.

#### **TEXT BOOKS:**

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772

#### **REFERENCE BOOK:**

1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, “Mobile Computing, Technology Applications and Service Creation” Second Edition, Mc Graw Hill.
2. UWE Hansmann, Lothar Merk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,” Second Edition, Springer.

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>4</b>
<b>16IT7E03: WIRELESS SENSOR NETWORKS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Apply knowledge of Wireless Sensor Networks to various application areas.
2. Design and implement of WSN.
3. Demonstrate performance analysis of WSN and manage of WSN.
4. Formulate and solve problems creatively in the area of WSN.

## UNIT-I

**Overview of Wireless Sensor Networks:** Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

**Architectures:** Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

## UNIT-II

**Networking Technologies:** Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

## UNIT-III

**MAC Protocols for Wireless Sensor Networks:** Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention – Based Protocols, Contention – Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

## UNIT-IV

**Routing Protocols:** Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.

#### **UNIT-V**

**Transport Layer and Security Protocols:** Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

#### **UNIT-VI**

**Security in WSNs:** Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

**Sensor Network Platforms and Tools:** Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-

Centric programming.

**Applications of WSN:** S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications.

#### **Text Books:**

- 1 Ad Hoc Wireless Networks: Architectures and Protocols – C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – JagannathanSarangapani, CRC Press
3. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks”, John Wiley, 2005.

#### **REFERENCE BOOKS:**

1. KazemSohraby, Daniel Minoli, &TaiebZnati, “Wireless Sensor Networks- Technology, Protocols, and Applications”, John Wiley, 2007.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach”, Elsevier, 2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
4. Wireless Sensor Networks – C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
5. Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16IT7E04: ADVANCED COMPUTER NETWORKS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain basic computer network technology and identify the different types of routing algorithms.
2. Compare IPV4 & IPV6 address, address space and types of addressing
3. Discuss different transport layer protocols TCP, UDP & SCTP and also process to process delivery.
4. Define the DNS, Architecture of World Wide Web, E-mail and different multimedia streaming protocols.
5. Distinguish functioning and services of Wireless Sensor and Wireless Mesh networks

### UNIT-I

**Network Layer:** Network layer design issues: store and forward packet switching, services provided to transport layer, implementation of connectionless service, implementation of connection oriented service, comparison of virtual circuit and datagram subnets.

**Routing algorithm:** Shortest path routing algorithm, flooding, distance vector routing, link state routing, hierarchical routing, broadcast routing, multicast routing, routing for mobile hosts, routing in adhoc networks.

### UNIT-II

**IPV4 Address:** Address space, notations, classful addressing, classless addressing, network address translation(NAT).

**IPV6 address:** structure address space **Internetworking:** need for network layer internet as a datagram, internet as a connection less network

### UNIT-III

IPV4 datagram, fragmentation, checksum, options. IPV6 advantages, packet format, extension headers, translation from IPV4 to IPV6.

#### **UNIT-IV**

**Process to Process delivery:** client/server paradigm, multiplexing and demultiplexing, connectionless versus connection oriented services, reliable versus unreliable.

**UDP:** well known ports for UDP, user datagram, checksum, UDP operation, and uses of UDP.

**TCP:** TCP services, TCP features, segment, A TCP connection, flow control, error control, congestion control.

**SCTP:** SCTP services, SCTP features, packet format, an SCTP Association, flow control, error control.

#### **UNIT-V**

**Domain Name System:** the name space, resource records, name servers.

**E-mail:** architecture and services, the user agent, message formats, message transfer, final delivery.

**WWW:** architecture overview, static web documents, dynamic web documents, hypertext transfer protocol, performance elements, the wireless web.

**Multimedia:** introduction of digital audio, audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, voice on demand, the Mbone-the multicast backbone.

#### **UNIT-VI**

**Wireless Sensors networks:** WSN functioning, operation system support in sensor devices, WSN characteristics, sensor network operation, sensor architecture, cluster management.

**Wireless Mesh networks:** WMN design, issues in WMNs.

**Computational Grids:** grid features, issue in grid construction technology.

**P2P networks:** characteristics and addressing, components of SIP, SIP session establishment, SIP security, HTMLS.

**TEXT BOOKS:**

1. Data Communications and Networking, 4<sup>th</sup> Edition, Behrouz A Fourzan, TMH.
2. Computer Networks, 4<sup>th</sup> Edition, Andrew S Tannenbaum, Perarson.
3. Comuter Networks, Mayank Dave, Cengage.

**REFERENCE BOOKS:**

1. Computer networks: A systems approach, 5<sup>th</sup> Edition, Larry L Peterson and Bruce S Davie,
2. Elsevier.

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>4</b>	<b>2</b>
<b>16IT7L01: BIG DATA AND HADOOPLAB</b>				

**COURSE OUTCOMES**

After the completion of the course the students are able to

1. How to install Apache Hadoop Environment.
2. Define and implement the Map Reduce Programs.
3. Design and implement the NO-SQL Database queries.
4. Apply queries on PIG & HIVE.

**LIST OF LAB EXPERIMENTS:**

1. Configure and install apache hadoop environment: To understand distributed and parallel computing environment.
2. Hadoop file management: Adding files and directories, Retrieving files , Deleting files
3. Write Word Count application: Map Reduce program to understand Map Reduce Paradigm
4. Write a Map Reduce program that mines weather data.
5. Graph Mining: Use Map Reduce to find the shortest path between two people in a social graph.
6. Implement Matrix Multiplication with Hadoop Map Reduce.
7. NO-SQL database –Apache Hbase: To set Hbase shell environment and to create tables, insert rows, display contents etc .
8. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter yourdata.
9. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
10. Case Study on Sentiment Analysis using R –Programming.
11. Case Study on Text Analysis using R –Programming.
12. Case Study on Time Series using R –Programming

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT7L02: CLOUD COMPUTING LAB</b>				

### **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Identify the systems, protocols and mechanisms to support cloud computing
2. Develop applications for cloud computing
3. What is the hardware necessary for cloud computing
4. Design and implement a novel cloud computing application

### **LIST OF EXPERIMENTS:**

1. Study on various cloud platforms -Google App Engine, Microsoft Azure and Amazon
2. Building a cloud application using Google App Engine.
3. Building a cloud application using Microsoft Azure.
4. Building a cloud application using Amazon.
5. Implement Virtual OS using virtual box.

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>4</b>	<b>2</b>
<b>16IT7LE1: ANDROID LAB</b>				

**COURSE OUTCOMES:**

After the completion of the course the students are able to

1. Define Android platform and explain the Architecture and features.
2. Design User Interface and develop activity for Android App.
3. Use Internet, Broadcast receivers and Internet services in Android App.
4. Design and implement Database Application and Content providers.
5. Make Use of multimedia, camera and Location based services in Android App.
6. Discuss various security issues in Android platform.

**LIST OF EXPERIMENTS:**

1. Installation of Android Studio.
2. Develop an Android Application using Widgets.
3. Develop an Android Application for Layout Managers and Event Listeners.
4. Develop an Android Application using Activity and Intents.
5. Develop an Android Application using Menus.
6. Develop an Android Application using Android Service.
7. Develop an Android Application using Multimedia.
8. Develop an Android Application using SQLite.
9. Develop an Android Application using Telephony –Call, SMS, and Email.
10. Develop an Android Application using Google Maps.

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>-</b>	<b>-</b>	<b>4</b>	<b>2</b>
<b>16IT7LE2: SOFTWARE TESTING LAB</b>				

### **COURSE OUTCOMES**

After the completion of the course the students are able to

1. What a software bug is, how serious they can be, and why they occur.
2. Test the software to meet quality objectives & requirements
3. Apply testing skills to common testing tasks
4. Design the planning and documentation of test efforts
5. Evaluate the software quality concepts, assurance & standards
6. Make use of testing tools to test software in order to improve test efficiency with automation

### **LIST OF EXPERIMENTS:**

1. a. Identify the Software Defects, Prepare the document during the execution of software.  
b. Prepare the document for skills required Recovery of defects/Errors
2. Prepare the document on Verification and Validation Tests like sequential code testing, if conditions, Nested if conditions, Looping and Nested Looping on Sample Software Programs in C , C++ and Java.
3. a. Write Programs in C‘ Language to demonstrate the working of the following constructs:  
i) do...while ii) while...do iii) if...else iv) switch v) for  
b. Write a program in ‘C‘ language to demonstrate the working of palindrome using do..while
4. a. A Program written in C‘ Language for Matrix Multiplication fails! Introspect the causes for its failure and write down the possible reasons for its failure.  
b. Write a Program in ‘C‘ Language to demonstrate the working of addition of diagonal elements in a matrix
5. a. Take any system (e.g. ATM system) and study its system specifications and report the Various bugs.

- b. Write down the test cases for any known applications (e.g. Banking Application).
  - c. Write down the system specifications for elevator system.
- 6.
- a. Create a test plan document for any application (e.g. Library Management System).
  - b. Study of any testing tool (e.g. Win runner).
  - c. Create a test plan document for cellular phone.
- 7.
- a. Study of any web testing tool (e.g. Selenium).
  - b. Study of any bug tracking tool (e.g. Bugzilla, bug bit).
  - c. Study of any test management tool (e.g. Test Director).
  - d. Compare different testing tools.
- 8.
- a. Study of any open source-testing tool (e.g. Test Link).
  - b. Explain how test link is different from test director.

<b>SEMESTER -VII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT7LE3: SCRIPTING LANGUAGES LAB</b>				

### **COURSE OUTCOMES**

After the completion of the course the students are able to

1. How to install Python, Perl, Ruby, Rails.
2. Develop a program by using Python.
3. Design and Implement web application using Perl.
4. Develop a program by using Ruby-Rails.

### **PYTHON PROGRAM LIST**

1. Find the square root of a number (Newton's method)
2. Exponentiation (power of a number)
3. Find the maximum of a list of numbers
4. Linear search and Binary search
5. Selection sort, Insertion sort
6. Merge sort
7. First n prime numbers
8. Multiply matrices
9. Programs that take command line arguments (word count)

### **PERL PROGRAM LIST**

1. Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc.
2. Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.
3. Write a Perl program to display a digital clock which displays the current time of the server.
4. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.

### **RUBY-RAILS PROGRAM LIST**

1. Write a Ruby program to display the current date and time
2. Write a Ruby program which accept the radius of a circle from the user and compute the parameter and area.
3. Write a Ruby program to lower case, upper case and capitalizes all the words of a given String.
4. Write a Ruby program to compute the sum of elements in a given array.
5. Write a Ruby program to split a delimited string into an array.
6. Build a Rails application to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.

SEMESTER -VII	L	T	P	C
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**16IT7LE4: R PROGRAMMING LAB**

### **COURSE OBJECTIVES**

After the completion of the course the students are able to

1. Apply Data Summarization and Visualization.
2. Develop and implement the Clustering algorithm.
3. Develop and implement the Regressions and Classification.
4. Apply the Data Analytics case study.

### **LAB EXPERIMENTS:**

1. Introduction R and Installations
2. Getting Data In and Out of R
3. Control Structures and Functions
4. Loop Functions
5. Data Manipulation (dplyr, reshape2 packages)
6. String Operations (stringr package)
7. Packaging, Debugging and Object Oriented Programming
8. Data Visualization (ggplot2 package)
9. Clustering
10. Regressions and Classification
11. Data Analytics Case Study

<b>SEMESTER -VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT8E01: PARALLEL COMPUTING</b>				

### **COURSE OUTCOMES**

After the completion of the course the students are able to

1. Develop and apply knowledge of parallel and distributed computing techniques and Methodologies.
2. Explain the need of parallel computing and know the various aspects to improve the Parallelism in computations.
3. Define different network topologies and communication models used in Parallel Computing
4. Explain about various design principles/methodologies for writing parallel algorithms.
5. Analyze the analytics of parallel algorithms and the issues like performance and Scalability.

### **UNIT-I**

Introduction to parallel computing: Parallel programming platforms: Trends in microprocessor Architectures, Limitations of memory system performance, Dichotomy of parallel computing platforms, physical organization of parallel platforms, communication costs in parallel machines, Routing mechanisms for interconnection network, Impact of process processors mapping and mapping techniques.

### **UNIT-II**

Principles of parallel algorithm design: Preliminaries, Decomposition techniques, Characteristics of tasks and interactions, Mapping techniques for load balancing, Methods for containing. Interactions overheads, Parallel algorithm models.

Basic communication operations: One-to-All Broadcast and All-to-One Reduction, All-to-All broadcast and reduction All-Reduce and prefix sum operations, scatter and gather, All-to-All personalized communication, circular shift, improving the speed of some communication operation.

### **UNIT-III**

Analytical modeling of parallel programs: Performance metrics for parallel systems, Effect of granularity of performance, scalability of parallel system, Minimum execution time and minimum cost-optimal execution time, Asymptotic analysis of parallel programs, other scalability metrics.

#### **UNIT-IV**

Programming using the message passing paradigm: Principle of message – Passing programming, Send and receive operations, The message passing interface, Topologies and embedding, Overlapping communication with computation, collective communication and computation operations, Groups and communicators.

#### **UNIT-V**

Programming using share address space paradigm: Multi-threading, Explicit multithreading using pthread library, Thread management, Thread synchronization using mutex and condition objects, Directive based multithreading – OpenMP, work sharing directives - parallel, for, sections directives, data sharing directives and clauses, Global functions and environment variables.

#### **UNIT-VI**

Dense matrix algorithm: Matrix-vector multiplication, Matrix-matrix algorithm, Solving a system of linear equations.

Sorting: Parallel sorting methods, Bitonic Sort, Odd-even transposition Sort, Merge sort, Quick Sort, Sample Sort and Shell Sort

#### **TEXT BOOKS:**

1. Introduction to Parallel Computing, Second Edition, Ananth Gram, Anshul Gupta, George Karypis, Vipin Kumar Person Education.
2. Parallel computing Theory and Practice, Second Edition, Michael J. Quinn, TMH.

#### **REFERENCE BOOKS:**

1. Introduction to Parallel Processing- by M.SasiKumar (Author), Dinesh Shikare(Author), P.Raviprakash (Author), PHI, 2<sup>nd</sup> Edition.
2. ParallelandDistributedSystems(WIND) Paperback –2016by Arun Kulkarni (Author), NupurPrasadGiri (Author), Nikhilesh Joshi (Author), BhushanJadhav (Author)

<b>SEMESTER -VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT8E02: INTERNET OF THINGS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Define the fundamentals of IoT.
2. Illustrate the IoT design methodology.
3. Explain the Microcontroller and various IoT Platforms.
4. Construct the IoT using Raspberry Pi
5. Explain the basics of IoT sensors and communications.
6. Analyze applications of IoT in real time scenario.

### UNIT-I

**Fundamentals of Iot:** Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

### UNIT-II

**IOT Design Methodology:** IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

### UNIT-III

**8051 Microcontroller:** Introduction to Microcontrollers, The 8051 Instruction Set, AT89S8253 Microcontroller, Assembly Language, Examples, Development systems.

**IOTPlatform:** IoT Platform overview, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino

And Intel Galileo boards.

### UNIT-IV

**Building IOT With Raspberry I:** Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services.

### UNIT-V

**Programming The Microcontroller For IOT Basics of Sensors & Actuators:** Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – RASPBERRY PI /Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors;

**Communication:** Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / Ethernet.

#### **UNIT-VI**

**Case Studies and Advanced Topics:** Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software & Management Tools for IoT

#### **Text Books:**

1. ArshdeepBahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press,2015.
2. CharalamposDoukas “Building Internet of Things With the Arduino”, CreateSpace Independent Publishing Platform, 2012.
3. Milan Verle, “Architecture and Programming of 8051 Microcontrollers” 1st Edition mikro
4. Elektronika (eBook Online) 2009.
5. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011
6. Matt Richardson & Shawn Wallace, “Getting Started with Raspberry Pi” O'Reilly (SPD), 2014.

#### **REFERENCE BOOKS:**

1. Luigi Atzor et.al, “The Internet of Things: A survey“, Journal on Networks, Elsevier Publications, October, 2010
2. Web Link 1: <http://postscapes.com/>(Accessed on 16 February 2016).
3. Web Link 2: <http://www.theinternetofthings.eu/what-is-the-internet-of-things>(Accessed on 16 February2016).
4. Web Link 5: [http://www.libelium.com/top\\_50\\_iot\\_sensor\\_applications\\_ranking/](http://www.libelium.com/top_50_iot_sensor_applications_ranking/) (Accessed on 16 February 2016).

<b>SEMESTER -VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT8E03: FOG COMPUTING</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain basics of fundamentals cloud computing technology.
2. Demonstrate the concept IoT from cloud to fog.
3. Analyze the fog computing features.
4. Explain the fundamentals of Fog Networking concepts.
5. Analyze the Quality of Services using Fog Computing.
6. Explain the different security features in fog computing.

### UNIT-I

**Cloud Computing:** Introduction to Cloud Computing, Cloud Architecture, Service Models, Cloud Security, Limitations in Cloud Computing.

### UNIT-II

**Internet of Things:** Introduction to IoT, Features of IoT, Data and Knowledge Management in IoT, Use of Devices in IoT Technology, and IoT from Cloud to Fog.

### UNIT-III

**Fog Computing:** Introduction, History of Fog, Why Fogging, Limitations overcome in Fog, Role of Fog Computing, Architecture, Characteristics, Applications of Fog Computing, Cloud Computing vs Fog Computing.

### UNIT-IV

**Fog Networking:** Principles of Edge and Peer-to-Peer Networking, Smart data pricing for new Network Services, Client side control and configuration, Client-side measurement and Control Signaling, Edge Resource Pooling and Caching.

### UNIT-V

**Quality of Service (QoS):** Quality of Services using Fog Computing, Issues, Benefits.

### UNIT-VI

**Security and Privacy in Fog Computing:** Issues, Methods, Limitations, Implementation, and Additional Features, Example of Decoy System, Features and advantages.

**TEXT BOOKS:**

1. Fog Computing in the Internet of Things, intelligence at the Edge, Rahmani, A., Liljeberg, P., Preden, J.-S., Jantsch, A.
2. Fog Computing: A Platform for Internet of Things and Analytics, Flavio Bonomi, Rodolfo Milito, Preethi Natarajan and Jiang Zhu

**REFERENCE BOOKS:**

1. Fog Computing: Principles, Architectures, and Applications Amir VahidDastjerdi, Harshit Gupta, Rodrigo N. Calheiros, Soumya K. Ghosh, Rajkumar Buyya

<b>SEMESTER -VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16IT8E04: PATTERN RECOGNITION</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM).
2. Analyze classification problems probabilistically and estimate classifier performance.
3. Define and analyze methods for automatic training of classification systems.
4. Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models.
5. Explain the principle of Bayesian parameter estimation and apply them in relatively simple probabilistic models.

### UNIT-I

**Introduction:** Is Pattern Recognition Important; features, feature vectors, and classifiers; supervised, unsupervised and semi supervised learning.

### UNIT-II

**Classifiers based on Bayes Decision Theory:** Introduction, Bayes Decision Theory; discriminant functions and decision surfaces; Bayesian classification for normal distributions- the Gaussian probability density function, the Bayesian classifier for normally distributed classes;

### UNIT-III

**Linear & Non linear Classifiers:** Introduction; linear discriminant functions and decision hyper planes, the perceptron algorithm, Nonlinear Classifiers: introduction, the xor problem, the two-layer perception-classification capabilities of the two-layer perceptron; three-layer perception.

### UNIT-IV

**Feature Selection:** Introduction, Preprocessing- outlier removal, data normalization, missing data; the peaking phenomenon; class separability measures- divergence, chernoff bound and Bhattacharya distance, scatter matrices.

## UNIT-V

**Supervised Learning:** Introduction, error-counting approach, exploiting the finite size of the data set; a case study from medical imaging; semi supervised learning- generative models, graph-based methods, transductive support vector machines.

## UNIT-VI

**Skin based Pattern Extraction and Recognition:** Introduction, Neural color Constancy based skin detection, Image segmentation, Local region graph Pattern, Skin region Synthesis pattern, Matching multiple regions with Local Global Graph Method.

Graph-based methods Introduction, Hyper graph matching and Algorithms, Parquet graphs-similarity function, Local Feature Detectors.

## TEXT BOOKS:

1. SergiosTheodoridis, Konstantinos Koutroumbas, “Pattern Recognition” Fourth Edition, (Unit I –V) Elsevier
2. Horst Bunke, Abrahmkadel, MarksLast, “Applied Pattern Recognition” 2008 Springer – Verlag Berlin Heidelberg

## REFERENCE BOOKS:

1. Pattern recognition Principles: Julius T. Tou, and Rafael C. Gonzalez, Addison-Wesley Publishing Company

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<b>16ITX001: SOFTWARE PROJECT MANAGEMENT</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Explain the basic concepts of Software Engineering and Process framework.
2. Define the various software process models and its requirements.
3. Outline software project management principles based on conventional software project management.
4. Distinguish different Software Management life cycle phases
5. Define the artifacts and knowledge on Model Based Software Architecture.
6. Illustrate various software workflows and checkpoints of the process

### UNIT-I

**Introduction to Software Engineering:** The evolving role of software, Software Characteristics, Changing Nature of Software, Software myths.

**A Generic view of Process:** Software engineering- A layered technology, a Process framework, The Capability Maturity Model Integration (CMMI), Process assessment, Product and Process.

### UNIT-II

**Process models:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

**Software Requirements:** User requirements, System requirements, Functional and non-functional requirements, the Software Requirements Document (SRS).

### UNIT-III

**Conventional Software Management and Economics:** Conventional software Management performance, Software Economics.

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

### UNIT-IV

**The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

#### **UNIT-V**

**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**Model based software architectures:** A Management perspective and technical perspective.

#### **UNIT-VI**

**Work Flows of the process:** Software process workflows, Iteration workflows.

**Checkpoints of the process:** Major mile stones, Minor Milestones, Periodic status assessments.

#### **TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw-Hill International Edition.
2. Software Project Management, Walker Royce: Pearson Education, 2005.

#### **REFERENCE BOOKS:**

1. Software Engineering- Somerville, 9th edition, Pearson education.
2. Software Project Management, Bob Hughes and Mike Cotter ell: Tata McGraw-Hill Edition.
3. Software Project Management, Joel Henry, Pearson Education.
4. Software Project Management in practice, Pankaj Jalote, Pearson.

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<b>16ITX002: INTERNET OF THINGS</b>				

## COURSE OUTCOMES

After the completion of the course the students are able to

1. Define the fundamentals of IoT.
2. Illustrate the IoT design methodology.
3. Explain the Microcontroller and various IoT Platforms.
4. Construct the IoT using Raspberry Pi
5. Explain the basics of IoT sensors and communications.
6. Analyze applications of IoT in real time scenario

### UNIT-I

**Fundamentals of Iot:** Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific Iots – IoT vs M2M.

### UNIT-II

**IOT Design Methodology:** IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

### UNIT-III

**8051 Microcontroller:** Introduction to Microcontrollers, The 8051 Instruction Set, AT89S8253 Microcontroller, Assembly Language, Examples, Development systems.

**IOT Platform:** IoT Platform overview, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

### UNIT-IV

**Building IOT With Raspberry PI :** Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services.

### UNIT-V

**Programming The Microcontroller For IOT Basics of Sensors & Actuators:** Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – RASPBERRY PI /Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors;

**Communication:** Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / Ethernet.

#### **UNIT-VI**

**Case Studies and Advanced Topics:** Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software & Management Tools for IoT

#### **TEXT BOOKS:**

1. ArshdeepBahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. CharalamposDoukas “Building Internet of Things With the Arduino”, CreateSpace Independent Publishing Platform, 2012.
3. Milan Verle, “Architecture and Programming of 8051 Microcontrollers” 1st Edition mikro
4. Elektronika (eBook Online) 2009.
5. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011
6. Matt Richardson & Shawn Wallace, “Getting Started with Raspberry Pi” O'Reilly (SPD), 2014.

**REFERENCE BOOKS:**

1. Luigi Atzor et.al, “The Internet of Things: A survey“, Journal on Networks, Elsevier Publications, October, 2010
2. Web Link 1: <http://postscapes.com/>(Accessed on 16 February 2016).
3. Web Link 2: <http://www.theinternetofthings.eu/what-is-the-internet-of-things>(Accessed on 16 February 2016).
4. Web Link 5: [http://www.libelium.com/top\\_50\\_iot\\_sensor\\_applications\\_ranking/](http://www.libelium.com/top_50_iot_sensor_applications_ranking/) (Accessed on 16 February 2016).
5. Lecture Series on “Introduction to Internet of Things” by Prof. Raj Jain, Washington University, available at: [https://www.youtube.com/watch?v=oc\\_qzTj26k&list=PLw5h0DiJ9PCxDZkP8pbgyiDweF3DJ8c](https://www.youtube.com/watch?v=oc_qzTj26k&list=PLw5h0DiJ9PCxDZkP8pbgyiDweF3DJ8c) (Accessed on 16 February 2016)

<b>SEMESTER- VI/ VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16CEXO01: GREEN BUILDINGS AND INFRASTRUCTURE</b>				

**COURSE OUTCOMES:** Students are able to

1. Recognize existing energy codes, green building codes and green rating systems.
2. Compare cost and performance of building materials with recycled components.
3. List out construction materials and methods that more easily allow for salvage and re-use of building materials.
4. List out available renewable energy resources.
5. Develop the techniques and benefits of building performance testing, monitoring and metering.
6. Identify techniques for weatherization and sustainable remodeling of existing structures.

#### **UNIT – I**

**Green Buildings:** Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage.

#### **UNIT - II**

**Environmentally friendly building materials and technologies:** Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime-pozzolana cements, materials from agro and industrial waste, Ferro-cement and Ferro-concrete.

#### **UNIT - III**

**Energy and resource conservation:** Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings.

#### **UNIT - IV**

**Use of renewable energy resources:** Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy based buildings in India.

#### **UNIT – V**

**Climate Design:** Local climatic conditions-temperature, humidity, wind speed and direction-impact of climate change on built environment - comforts: the desirable conditions - Principles of thermal design - means of thermal -light and lighting-building acoustics- energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, case studies for passive cooling and thermal comfort.

#### **UNIT - VI**

**Green Building Rating Systems:** Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment - Modular wastewater treatment systems for built environment.

#### **TEXT BOOKS:**

1. "Alternative building materials and technologies" by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao, New age international publishers, New Delhi.
2. "Non-Conventional Energy Resources" by G. D. Rai, Khanna Publishers.

#### **REFERENCES:**

1. Kibert, C. (2005) Sustainable Construction: Green Building Design and Delivery (Hoboken, NJ: John Wiley & Sons).
2. McDonough, W. and M. Braungart (2002) Cradle to Cradle: Remaking the Way We Make Things (New York: Farrar, Straus and Giroux).

<b>SEMESTER-VI/ VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16CEXO02: DISASTER MANAGEMENT</b>				

**COURSE OUTCOMES:** Students are able to

1. Identify the tools of integrating disaster management principles in disaster mitigation process.
2. Distinguish between the different approaches needed to manage pre and post- disaster activities.
3. Explain the process of risk management.
4. Recognize the ‘relief system’, ‘disaster victim’ and relate them.
5. Evaluate the planning strategies useful in risk mitigation processes.
6. Explain about public awareness and economic incentive possibilities.

#### **UNIT-I**

**Natural Hazards and Disaster management:** Introduction of DM – Inter Disciplinary -nature of the subject- Disaster Management cycle- Five priorities for action. Case study methods of the following: floods, draughts -Earthquakes- global warming, cyclones & Tsunamis- Post Tsunami hazards along the Indian coast - landslides.

#### **UNIT-II**

**Man Made Disaster and their management along with case study methods of the following:** Fire hazards - transport hazard dynamics -Solid waste management- post disaster – bio terrorism - threat in mega cities, rail and air craft’s accidents, and Emerging infectious diseases & Aids and their management.

#### **UNIT-III**

**Risk and Vulnerability:** Building codes and land use planning - social vulnerability - environmental vulnerability - Macroeconomic management and sustainable development, climate change risk rendition - financial management of disaster - related losses.

#### **UNIT-IV**

**Role of Technology in Disaster managements:** Disaster management for infra structures, taxonomy of infrastructure - treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes -flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training transformable indigenous

knowledge in disaster reduction.

#### **UNIT-V**

**Education and Community Preparedness:** Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience-building community capacity for action.

#### **UNIT-VI**

**Multi-sectional Issues:** Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction.-Institutional capacity in disaster management -The Red cross and red crescent movement.-Corporate sector and disaster risk reduction-A community focused approach.

#### **TEXTBOOKS:**

1. 'Disaster Management - Global Challenges and Local Solutions' by Rajib shah & R. Krishnamurthy (2009), Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management - Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

#### **REFERENCE BOOKS:**

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. "Disaster Management and Mitigation" by Prof. R.B. Singh (2016), World Focus

<b>SEMESTER- VI/ VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16EXO01: ELECTRICAL SAFETY MANAGEMENT</b>				

**COURSE OUTCOMES:** Students are able to

1. Explain the objectives and precautions of Electrical safety, effects of shocks and their prevention.
2. Summarize the safety aspects during installation of plant and equipment.
3. Describe the electrical safety in residential, commercial and agricultural installations.
4. Describe the various Electrical safety in hazardous areas, Equipment earthing and system neutral earthing.
5. State the electrical systems safety management and IE rules.

#### **UNIT-I**

**Introduction to Electrical Safety, Shocks and their Prevention:** Terms and definitions- objectives of safety and security measures- Hazards associated with electric current, and voltage who is exposed, principles of electrical safety- Approaches to prevent Accidents- scope of subject electrical safety. Primary and secondary electrical shocks -possibilities of getting electrical shock and its severity- medical analysis of electric shocks and its effects - shocks due to flash/ Spark over's - prevention and safety precautions against contact shocks - flash shocks, burns, residential buildings and shops.

#### **UNIT-II**

**Safety during Installation of Plant and Equipment:** Introduction, preliminary preparations, preconditions during installation electrical plant and equipment, safety aspects. Field quality and safety during erection, personal protective equipment installation of a large oil immersed power transformer, installation of outdoor switchyard equipment, safety during installation of electrical rotating machines, drying out and insulation resistance measurement of rotating machines.

#### **UNIT-III**

**Electrical Safety In Residential, Commercial And Agricultural Installations** Wiring and fitting – Domestic appliances – shock from wet wall and water taps – fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

#### **UNIT-IV**

**Electrical Safety In Hazardous Areas :** Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations Classification of equipment provided for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

#### **UNIT-V**

**Equipment Earthing and System Neutral Earthing :** Introduction description of earth system between system grounding and Equipment Grounding, Equipment Earthing, Functional Requirement of earthing system, neutral grounding( System Grounding), Types of Grounding, Methods of Earthing Generators Neutrals.

#### **UNIT-VI**

**Safety Management of Electrical Systems:** Principles of Safety Management, Management Safety Policy, Safety organization, safety auditing, Motivation to managers, supervisors, employees towards safety.

#### **TEXT BOOKS:**

1. S. Rao, Prof. H.L. Saluja, “Electrical safety, fire safety Engineering and safety management”, Khanna Publishers. New Delhi, 1988.(units-I to V)

#### **REFERENCE BOOK:**

1. Pradeep Chaturvedi, “Energy management policy, planning and utilization”, Concept Publishing company, New Delhi, 1997.

SEMESTER- VI/ VIII	L	T	P	C
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**16EEXO02: NON CONVENTIONAL ENERGY SOURCES**

**COURSE OUTCOMES:** Students are able to

- Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- Design solar thermal collections.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind.
- Explain wind energy conversion systems, Betz coefficient , tip speed ratio.
- Explain basic principle and working of hydro, tidal, biomass ,fuel cell and geothermal systems.

#### UNIT-I

**Fundamentals of Energy Systems :** Energy conservation principle – Energy scenario (world and India) – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

#### UNIT-II

**Solar Thermal Systems:** Liquid flat plate collections: Performance analysis – Transmissivity – Absorptivity – Product collector efficiency factor – Collector heat removal factor – Numerical problems – Introduction to solar air heaters – Concentrating collectors and solar pond.

#### UNIT-III

**Solar Photovoltaic Systems :** Balance of systems – IV characteristics – System design: Storage sizing, PV system sizing, Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

#### UNIT-IV

**Wind Energy:** Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip-speed ratio – efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

#### UNIT-V

**Hydro and Tidal power systems:** Basic working principle – Classification of hydro systems: large, small, micro – Measurement of head and flow – Energy equation – Types of turbines – Numerical

SEMESTER- VI/VIII	L	T	P	C
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**16MEXO01:COMPOSITE MATERIALS**

problems. Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

**UNIT-VI**

**Biomass, fuel cells and geothermal systems:** Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

- **Fuel cell:** classification – Efficiency – VI characteristics.
- **Geothermal:** classification – Dry rock and aquifer – Energy analysis.

**TEXT BOOKS**

- Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
- Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.
- Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

**REFERENCE BOOKS**

- Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal,World scientific, Singapore.
- Renewable Energy Technologies /Ramesh & Kumar /Narosa.
- Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.

**COURSE OUTCOMES:** Student are able to

1. Summarize the basic terminology and advantages of composite materials. [K2]
2. Classify and analyze various types of laminates. [K2, K4]
3. Analyze the mechanical behavior of composite material as well as summarize various manufacturing methods of Laminated Fiber Reinforced Composite Material.[K4]
4. Analyze the micromechanical behavior of composite material. [K4]
5. Analyze the macro mechanical behavior of composite material. [K4]
6. Explain various applications of Composite material in detail. [K2]

**UNIT – I**

## **INTRODUCTION TO COMPOSITE MATERIALS:**

Definitions: Composite material, Fiber, Matrix. Types of fibers and Raw Fiber Properties, Types of Matrix, Prepegs, Fillers and other Additives. Advantages of Composite Materials and Structures – Strength and Stiffness advantages, Cost advantages, Weight advantages, Applications

## **UNIT – II**

### **ANALYSIS OF LAMINATED COMPOSITES:**

Laminates, Basic Assumptions, Strain-Displacement Relationship, Stress-Strain Relationships, Equilibrium Equations, Laminate Stiffness, Determination of Lamina Stresses and Strains, Types of Laminate Configuration, Balanced Laminate, Anti-symmetric Laminate, Examples

## **UNIT – III**

### **BASICS OF COMPOSITE MATERIALS:**

Mechanical Behavior of Composite Materials - Lamina, Laminate: The basic building block of a composite material.

Manufacturing of Laminated Fiber-Reinforced Composite Materials

## **UNIT – IV**

### **MICROMECHANICAL ANALYSIS OF COMPOSITE STRENGTH AND STIFFNESS:**

Properties of typical composite materials, Volume and Weight Fractions, Longitudinal Strength and Stiffness. Transverse Modulus, In-plane shear Modulus, Poisson's ratio.

## **UNIT – V**

### **ELASTIC PROPERTIES OF UNIDIRECTIONAL LAMINA:**

Stress-strain relationships. Engineering Constants. Stress strain relations of a Thin Lamina. Examples

## **UNIT – VI**

### **APPLICATIONS OF COMPOSITE MATERIALS:**

Use of Composite materials in present world – Aeronautical Applications, Space applications, automotive applications and commercial applications.

### **TEXT BOOKS:**

1. Mechanics of Composite Materials - R M Jones / Taylor & Francis
2. Mechanics of Composite Materials and Structures - Madhujit Mukhopadhyay / Universities Press

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<b>16MEX002: INTRODUCTION TO OPERATION RESEARCH</b>				

**COURSE OUTCOMES:** Students are able to

1. Apply linear programming techniques to solve industrial optimization problems.[K3]
2. solve transportation and assignment problems using operation research techniques. [K3]
3. Solve sequencing problems using operation research techniques. [K3]
4. Solve replacement problems for optimization. [K3]
5. Analyze game theory and apply them for optimization. [K4]
6. Analyze queuing theory and apply it for optimization and also analyze inventory models for various industrial problems. [K4]

**UNIT—I**

**LINEAR PROGRAMMING:** Linear programming problem formulation – Graphical solution – simplex method-artificial variables techniques -two–phase method, Big-M method – Duality principle.

**UNIT – II**

**TRANSPORTATION PROBLEM:** Formulation – optimal solution, unbalanced transportation problem – Degeneracy

**ASSIGNMENT PROBLEM-** Formulation – optimal solution - variants of assignment problem-traveling salesman problem.

**UNIT – III**

**SEQUENCING PROBLEM** Introduction – Optimal Solution for processing n jobs through two machines

- Processing n jobs through three machines - processing n jobs through m machines - processing two jobs through m machines

**UNIT – IV**

**REPLACEMENT:** Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

**UNIT – V**

**THEORY OF GAMES:** Introduction – minimax (maxmin) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.

**UNIT – VI**

**WAITING LINES:** Introduction- Single channel-Poisson arrivals-Exponential service times-with infinite population model (M/M/1:FIFO/ $\infty/\infty$ )

**INVENTORY :** Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed .

**TEXT BOOKS:**

1. Operations Research / S.D.Sharma, Ramnath co,Meerut
2. Operations Research, P.K.Gupta, D.S.Hira,S.Chand

**REFERENCE BOOKS:**

1. Operations Research /A.M.Natarajan,P.Balasubramani, A.Tamilarasi/Pearson Education.
2. Operations Research / R.Pannerselvam, PHIPublications.

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<b>SEMESTER- VI/ VIII</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16ECXO01 : INTRODUCTION TO NANO TECHNOLOGY AND ITS APPLICATIONS</b>				

**COURSE OUTCOMES:** Students are able to

1. Define Nano materials and Nano Technology with properties
2. Explain Synthesis as Fabrication methods of Nano Technology
3. Demonstrate Characterization techniques of Nano Materials
4. Analyze carbon Nano technology and application of Nano technology.

**UNIT-I: INTRODUCTION:** History of nano science, definition of nano meter, nano materials, nano technology. Classification of nano materials. Crystal symmetries, crystal directions, crystal planes. Band structure. **(T1)**

**UNIT-II : PROPERTIES OF MATERIALS:** Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials. **(T1)**

**UNIT-III : SYNTHESIS & FABRICATION METHODS:** Synthesis of bulk polycrystalline samples, growth of single crystals. Synthesis techniques for preparation of nano particle – Bottom Up Approach – sol gel synthesis, hydro thermal growth, thin film growth, PVD and CVD; Top Down Approach – Ball milling, micro fabrication, lithography. **(T1)**

**UNIT-IV : CHARACTERIZATION TECHNIQUES:** X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezoresponse microscopy, X-ray photoelectron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photoluminescence spectra, Raman spectroscopy. **(T2)**

**UNIT-V : CARBON NANO TECHNOLOGY:** Characterization of carbon allotropes, synthesis of diamond – nucleation of diamond, growth and morphology. Applications of nanocrystalline diamond films, graphene, applications of carbon nanotubes, carbon nanotubes for nanoelectronics devices..(T2)

**UNIT-VI: NANO TECHNOLOGY APPLICATIONS:** Applications in material science, biology and medicine, surface science, energy and environment. Applications of nano structured thin films, applications of quantum dots..(T2)

### **TEXT BOOKS**

1. Nano science and nano technology by M.S RamachandraRao, Shubra Singh, Wiley publishers.
2. Fundamentals of nanoelectronics by George W Hanson Pearson publications, India 2008

### **REFERENCE BOOKS**

1. Introduction to Nano Technology by Charles P. Poole, Jr., Frank J. Owens, Wiley publishers.
2. Principles of Nanotechnology by Phani Kumar, SciTech.

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<b>B. TECH VI/ VIII SEMESTER</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16ECXO02 : INTRODUCTION TO GLOBAL POSITIONING AND NAVIGATION SATELLITE SYSTEMS</b>				

**COURSE OUTCOMES:** Students are able to

1. Describe the principles of GNSS based positioning methods, the main components in a satellite navigation system and their functions.
2. Estimate and represent the GPS coordinate frames & GPS orbits..
3. Analyze the influence of different error sources on the positioning precision.
4. Describe examples of the role of GNSS, or GNSS based products and services, in sustainable development.

**UNIT - I**

Overview of GPS: Basic concept, system architecture, space segment, user segment, services of GPS, applications of GPS.

**UNIT - II**

GPS Signals: Signal structure, anti spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

**UNIT - III**

GPS coordinate frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS time.

**UNIT - IV**

GPS orbits and satellite position determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

**UNIT - V**

GPS Errors: GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

**UNIT - VI**

GPS Aided Geo-Augmented Navigation (GAGAN) architecture, Indian Regional Navigation Satellite System. GNSS augmentation, Wide Area Augmentation System (WAAS), applications

**TEXT BOOKS :**

1. G S RAO, Global Navigation Satellite Systems, McGraw-Hill publications, New Delhi, 2010 **(Unit-I,III,IV,V,VI)**
2. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, ‘GPS – Theory and Practice’, Springer – Wien, New York (2001). **(Unit-I,II,IV)**

**REFERENCE BOOKS:**

1. James Ba – Yen Tsui, ‘Fundamentals of GPS receivers – A software Approach’, John Wiley & Sons, 2001.

<b>SEMESTER- VI/VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>
<b>16CSX001: INTRODUCTION TO DATA BASE MANAGEMENT SYSTEMS</b>				

**COURSE OUTCOMES:** Student are able to

1. Identify the different issues involved in the design and implementation of a database system
2. Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
3. Predict different concurrency control techniques while implementing real time applications
4. Solve real time database issues through SQL concepts
5. Organaise the data from unstructured to structured using different normal forms
6. Justify various kinds of secondary storage devices to store data

#### **UNIT-I**

History of DBMS, File Systems vs DBMS, Advantages of DBMS, Describing and Storing Data in DBMS, Transaction Management, Structure of a DBMS, people who work with Databases, Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship sets

#### **UNIT-II**

Additional Features of ER Models, Conceptual Design with ER Models, Conceptual Design for Large Enterprise. Relational Model- Introduction to Relational Model, Integrity constraints over relations, Enforcing Integrity constraints, Logical Database Design, Views.

#### **UNIT-III**

Relational Algebra-Selection and projection, Set Operators, Renaming, joins, divisions. Form of Basic SQL Query, Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, Logical Connectivity Operators, Joins and Types, introduction to Triggers.

#### **UNIT-IV**

Introduction to Schema Refinement, functional Dependencies, Normal forms-1NF, 2NF,3NF, BCNF, Properties of decompositions, Multivalued Dependencies, Fourth Normal Form and Fifth Normal Form, Transaction Management-ACID properties, Transaction and schedules, concurrent execution of transactions.

**UNIT –V**

Lock based Concurrency Control-Strict 2PL, Dead Locks. Concurrency Control without Locking, Crash Recovery-Introduction to ARIES, LOG, Write a Head Log Protocol, Check Point, Recovery from a System Crash.

**UNIT-VI**

Data on External Storage, File Organization and indexing, Index Data Structures, Comparison of File Organizations, Tree structured indexing-Indexed Sequential Access Method, B+ trees.

**TEXT BOOKS:**

1. Database Management Systems- Raghurama Krishnan, Johannes Gehrke, Tata McGraw-Hill., 3rd Edition.

**REFERENCE BOOKS:**

1. Database System Concepts, Silberschatz, Korth, McGraw hill, 5th edition.
2. Database Management Systems, Elmasri Navathe-5th Edition.

<b>B. TECH VI/ VIII SEMESTER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16CSXO02: INTRODUCTION TO BIG DATA ANALYTICS</b>				

**Course Outcomes:** Students are able to

1. Distinguish efficient big data solutions for various application areas using appropriately selected algorithms and data structures.
2. Analyze methods and algorithms, to compare and real-world problems.
3. Explain trade-offs in big data processing technique.
4. Explain the Big Data Fundamentals, including the evolution and the characteristics of Big Data
5. Solve non-relational databases, the techniques for storing and processing large volumes of structured and unstructured data.
6. Apply the novel architectures and platforms introduced for Big data.

#### **UNIT-I**

##### **Introduction to Big Data Analytics:**

Definition of Big data, Big data characteristics and considerations, Unstructured data fueling big data analytics, Analyst perspective data repositories, Key roles of the New Data Eco system, applications.

#### **UNIT-II**

**Data Analytics Life Cycle:** Data analytics life cycle, Roles of Successful Analytics project

#### **UNIT-III**

**Working with Big Data using R:** How to use R Graphical user interface, How to get data into R, Data types used in R, and the basic operations, generic functions, Data analytic methods in R

#### **UNIT-IV**

**Advanced Analytics Theory and methods:** Categorization: K-means clustering, association rules, Regression: Linear & Logistic Classification: Nave Bayesian, Decision trees, time series analysis, text analysis.

**UNIT-V**

**Advanced Analytics \_Technology and tools:** Mapreduce and Hadoop, HDFS, Using R with Hadoop

**UNIT-VI**

**Hadoop Ecosystem:** Using Query Languages HIVE and PIG for data analytics, HBASE, Mahout-machine learning algorithms using Hadoop mapreduce HDFS

**TEXT BOOKS:**

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data by EMC Education Services- Wiley
2. Big Data Analytics with R, by Simon Walkowiak

**REFERENCE:**

1. R For data science-Dan Toomey
2. Big Data Analytics with R and Hadoop-Vignesh Prajapati

<b>SEMESTER- VI/ VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>16ITXO01: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT</b>				

**COURSE OUTCOMES:** Students are able to

1. Explain the basic concepts of Software Engineering and Process framework.
2. Define the various software process models and its requirements.
3. Outline software project management principles based on conventional software project Management.
4. Distinguish different Software Management life cycle phases
5. Define the artifacts and knowledge on Model Based Software Architecture.
6. Illustrate various software workflows and checkpoints of the process.

#### **UNIT-I**

**Introduction to Software Engineering:** The evolving role of software, Software Characteristics, Changing Nature of Software, Software myths.

**A Generic view of Process:** Software engineering- A layered technology, a Process framework, The Capability Maturity Model Integration (CMMI), Process assessment, Product and Process.

#### **UNIT-II**

**Process models:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

**Software Requirements:** User requirements, System requirements, Functional and non-functional requirements, the Software Requirements Document (SRS).

#### **UNIT-III**

**Conventional Software Management and Economics:** Conventional software Management performance, Software Economics.

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

#### **UNIT-IV**

**The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

#### **UNIT-V**

**Artifacts of the process:** The artifacts sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**Model based software architectures:** A Management perspective and technical perspective.

#### **UNIT-VI**

**Work Flows of the process:** Software process workflows, Iteration workflows.

**Checkpoints of the process:** Major mile stones, Minor Milestones, Periodic status assessments.

#### **TEXT BOOKS:**

3. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
4. Software Project Management, Walker Royce: Pearson Education, 2005.

#### **REFERENCE BOOKS:**

5. Software Engineering- Somerville, 9th edition, Pearson education.
6. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
3. Software Project Management, Joel Henry, Pearson Education.

<b>SEMESTER- VI/ VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16ITX002: INTRODUCTION TO INTERNET OF THINGS (IOT)</b>				

**COURSE OUTCOMES:** Students are able to

1. Define the fundamentals of IoT.
2. Illustrate the IoT design methodology.
3. Explain the Microcontroller and various IoT Platforms.
4. Construct the IoT using Raspberry Pi
5. Explain the basics of IoT sensors and communications.
6. Analyze applications of IoT in real time scenario.

#### **UNIT-I**

**Fundamentals of IoT:** Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs. M2M.

#### **UNIT-II**

**IoT Design Methodology:** IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

#### **UNIT-III**

**8051 Microcontroller:** Introduction to Microcontrollers, The 8051 Instruction Set, AT89S8253 Microcontroller, Assembly Language, Examples, Development systems.

**IoT Platform:** IoT Platform overview, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

#### **UNIT-IV**

**Building IoT With Raspberry PI:** Physical device – Raspberry Pi Interfaces – Programming – APIs/ Packages – Web services.

## UNIT-V

**Programming The Microcontroller For IoT Basics of Sensors & Actuators:** Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IoT – RASPBERRY PI /Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors;

**Communication:** Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / Ethernet.

## UNIT-VI

**Case Studies and Advanced Topics:** Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT

### Text Books:

1. ArshdeepBahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Charalampos Doukas “Building Internet of Things With the Arduino”, Create Space Independent Publishing Platform, 2012.
3. Milan Verle, “Architecture and Programming of 8051 Microcontrollers” 1st Edition mikro
4. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011
5. Matt Richardson & Shawn Wallace, “Getting Started with Raspberry Pi” O'Reilly (SPD), 2014.

### Reference Books:

1. Luigi Atzor et.al, “The Internet of Things: A survey“, Journal on Networks, Elsevier Publications, October, 2010
2. Web Link 1: <http://postscapes.com/>(Accessed on 16 February 2016).
3. Web Link 2: <http://www.theinternetofthings.eu/what-is-the-internet-of-things>(Accessed on 16 February 2016).

<b>SEMESTER- VI/ VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16BMXO01: INNOVATION AND ENTREPRENEURSHIP</b>				

**COURSE OUTCOMES:** Students are able to

1. Comprehend the concept and levels of Innovation. [K2]
2. Discriminate the Micro & Macro perspectives & Innovation. [K4]
3. Appraise the creative Intelligence abilities. [K4]
4. Define and explain the basic concepts of Entrepreneurship & social responsibilities of an entrepreneur [K1 & K2]
5. Estimates the importance of training for Entrepreneurs, Use feedback and Performance of trainees. [K2 & K3]
6. Discover the Challenges and Sickness in MSMEs. [K2]

**UNIT-I Innovation Management:** Concept of Innovation –Levels of Innovation –Incremental Vs Radical Innovation -Inbound and Outbound Ideation –Open and Other Innovative Ideation Methods- Systems approach to innovation- Innovation in the context of emerging economies-leadership and innovation.

**UNIT-II Creative Intelligence:** Creative Intelligence Abilities – A Model Of Creative Intelligence – Convergent Thinking Ability – Traits Congenial To Creativity – Creative Personality And Forms Of Creativity.

**UNIT-III Entrepreneurship:** Entrepreneurship characteristics –classification Of Entrepreneurship – Incorporation of Business - Role of Entrepreneurship in economic development – startups.

**UNIT-IV Idea generation and opportunity assessment:** Ideas in entrepreneurship – sources of new ideas- Techniques for generating ideas- Opportunity recognition – Steps in tapping opportunities

**UNIT-V Project Formulation and Appraisal:** Preparation of Detailed project Report (DPR) – content-Guidelines for Report preparation – project Appraisal techniques-economic- steps Analysis; Financial analysis; Market analysis; Technical feasibility.

**UNIT-VI Institutions promoting small Business Enterprises:** Central level Institutions; NABARD, SIDBI,NIC,KVIC,SIDIO,NSIC - State level Institutions- DICs – SFC- SSIDC- other financial assistance, Government policy and taxation benefits- government policy for SSIs – tax incentives and concessions- Non –tax concessions- Rehabilitation investment and Allowances

**Text Books:**

1. Vasanth Desai, “Entrepreneurship’ Himalaya Publishing House, New Delhi, 2012
2. Arya Kumar: “Entrepreneurship”, Pearson, Publishing House, New Delhi, 2012.

**REFERENCES:**

1. Pradip N Khandwalla, Lifelong Creativity, An Unending Quest, Tata McGraw Hill, 2004.
2. Vinnie Jauhari, Sudanshu Bhushan, Innovation Management, Oxford Higher Education, 2014

<b>SEMESTER- VI/ VIII</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>16BMXO02: INDUSTRIAL SOCIOLOGY AND PSYCHOLOGY</b>				

**COURSE OUTCOMES:** Students are able to

1. Demonstrate an appreciation on different areas of Industrial Psychology and Sociology that have contributed to organizational effectiveness.(K3)
2. Identify critical factors that affect behavior of individual and groups in an organization.(K2)
3. Analyze the importance of organizational design and culture prevailing in an organization.(K4)
4. Interpret the role and importance of Leadership and Motivation towards achieving objectives of individuals and groups in work environment.(K3)
5. Appraise the concept of change in the dynamic business organization (K5)

**UNIT I: Industrial Sociology** : Nature and Scope of Industrial Sociology-Development of Industrial Sociology, Factors of social change – the technological factors, the cultural factors, effects of technology on major social institutions, social status system, social relations in industry.

**UNITII: Group Dynamics:** Work Teams & Groups, Group Behavior, Group formation & development, Decision Making by Individuals , Groups Decision making process, individual influences, group decision process, Group dynamics

**UNIT III: Organizational Conflicts:** Concept - Causes and Consequences of Conflict-Conflict handling techniques-Emotional Intelligence - Inter Group Behavior and Collaboration.

**UNIT I Industrial Psychology:** Nature and Meaning of Industrial Psychology, Role of Industrial Psychology, Organizational Attitude, Motivation at work-Theories of Motivation (Theory X and Y, McClelland's Theory, Maslow's Need Theory, Herzberg's Two Factor Theory) Cultural Differences in Motivation

**UNIT V: Organizational Design and Leadership** :Organizational Design & Structure- Key organizational design process, Structural differentiations, factors influencing design of organizations, Leadership, Leadership vs. Management, Leadership Theories, Emerging issues in Leadership

**UNIT VI: Organizational Culture:** Functions of organizational culture, Organizational Socialization, Assessing Cultural Values and Fit, Cross Cultural issues, Managing Change Forces for change in Organization, Resistance to change and change management.

**TEXT BOOKS:**

1. Nelson, Quick and Khandelwal, ORGB : An innovative approach to learning and teaching Organizational Behavior. A South Asian Perspective, Cengage Learning, 2012
2. Lufthansa, Fred, Organizational Behavior, McGraw Hill 2008

**REFERENCES:**

1. Gilbert Pascal, Fundamentals of Industrial sociology, Tata McGraw Hill Publishing Co., New Delhi, 1972.
2. Schneider Engno V., Industrial Sociology 2nd Edition, McGraw Hill Publishing Co., New Delhi,