STUDENT HANDOUT

AY: 2015 - 16

DR MAHALINGAM MCET COLLEGE OF ENGINEERING AND TECHNOLOGY

BACHELOR OF ENGINEERING (B.E.)
COMPUTER SCIENCE AND ENGINEERING
DR. MAHALINGAM COLLEGE OF ENGINEERING AND TECHNOLOGY, POLLACHI – 642003 INDIA
AN AUTONOMOUS INSTITUTION (Approved by AICTE, Affiliated to Anna University, ISO 9001:2008 Certified)

CONTENTS

1 INSTITUTE VISION AND MISSION

Vision of the Institute:

We develop a globally competitive workforce and entrepreneurs.

Mission of the Institute:

Dr.Mahalingam College of Engineering and Technology, Pollachi endeavors to impart high quality, competency based technical education in Engineering and Technology to the younger generation with the required skills and abilities to face the challenging needs of the industry around the globe. This institution is also striving hard to attain a unique status in the international level by means of infrastructure, state-of-art computer facilities and techniques.

2 DEPARTMENT VISION AND MISSION

Vision of the Department:

To develop engineers with global employability, entrepreneurship capability, research focus and social responsibility

Mission of the Department:

- To develop internationally competent engineers in dynamic IT field by providing state-of-art academic environment and industry driven curriculum.
- To motivate and guide students to take up higher studies and establish entrepreneurial ventures.
- To enrich the department through committed and technically sound faculty team with research focus in thrust areas.
- To undertake societal problems and provide solutions through technical innovations and projects in association with the industry, society and professional bodies

3 GRADUATE ATTRIBUTES

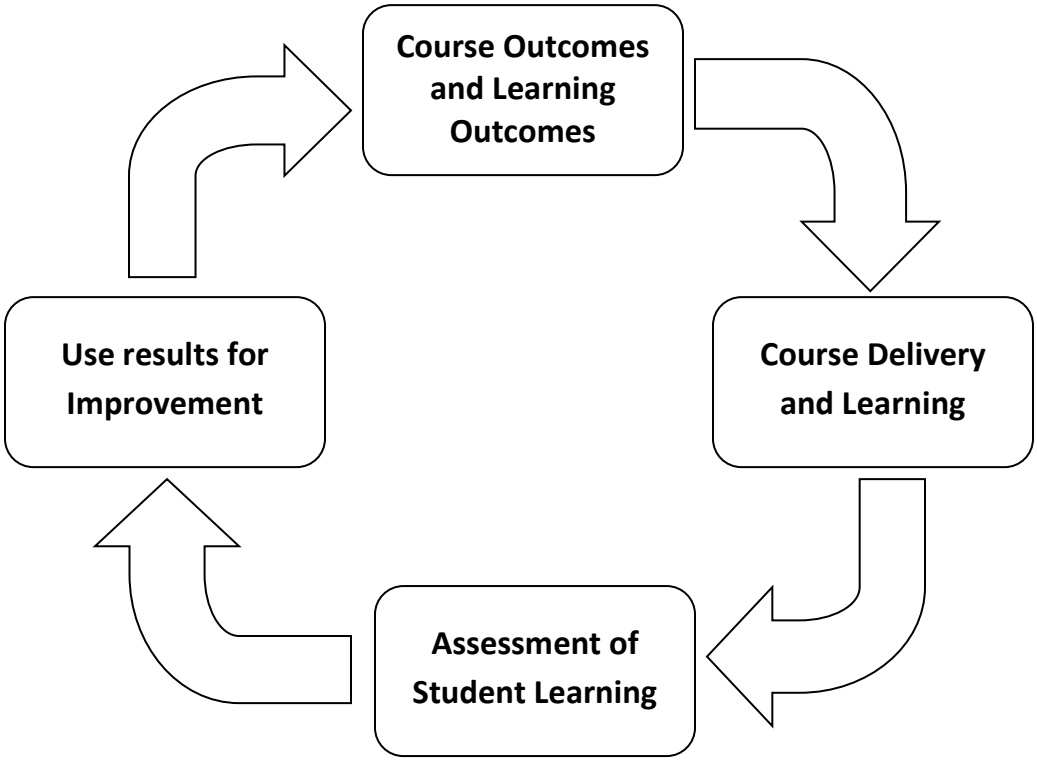
1 Engineering Knowledge
2 Problem Analysis
3 Design and Development of Solutions
4 Conduct Investigations of complex problems
5 Modern Tool Usage
6 Engineer and Society
7 Environment and Sustainability
8 Ethics
9 Individual and Team work
10 Communication
11 Project Management & Finance
12 Lifelong Learning

4 OUTCOME BASED EDUCATION

Outcome-Based Education (OBE) at MCET

MCET has stepped into outcome-based education (OBE) to meet out the global standards and expectations from its stake-holders in all its engineering programmes. The goal of our institution is to create entrepreneurs, innovators, engineers and scientists with good ethical and professional values by adapting OBE. To achieve and to enhance the learning outcomes, Outcome Based Education at MCET, continuously develops and raises the capabilities of teaching, learning and evaluation. The objectives of OBE model is to:

- Transform the learners into employable engineering professional with skill based competence and behavioral competence.
- Redesign of curriculum, teaching-learning methods, assessment and reporting practices in education based on the inputs from Stakeholders
- Create a clear expectation of what needs to be accomplished by the end of the course
- Create Learner-centric environment



5 PROGRAMME EDUCATIONAL OBJECTIVES

The Programme Educational Objectives of our department are:

Our graduates will

PEO1. **Domain Expertise**: Possess expertise and emerge as key players in IT integrated domains

PEO2. **Computing Skills and Ethics**: Employ computing skills to solve societal and environmental issues in an ethical manner

PEO3. **Lifelong Learning and Research**: Involve in lifelong learning and research to meet the demands of global technology

6 PROGRAMME OUTCOMES

The following are the Programme Outcomes of the course Bachelor in Computer Science and Engineering:

PO1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and concepts of Computer Science to solve complex engineering problems

PO2. **Problem Analysis:** Identify, review literature, formulate and analyse complex engineering problems using first principles of mathematics and engineering sciences

PO3. **Design and Development of Solutions:** Design and develop computing solutions for complex engineering problems with societal and environmental awareness

PO4. **Complex problem Investigation:** Investigate complex problems by employing research methods to arrive at valid conclusions

PO5. **Modern Tool Usage:** Evaluate and use appropriate tools and techniques in engineering activities

PO6. **Societal Contribution:** Follow professional engineering practice by applying contextual knowledge to assess societal and legal issues

PO7. **Environment and Sustainability:** Understand and provide professional engineering solutions taking into consideration environmental and economic sustainability

PO8. **Ethics:** Follow ethical principles and norms in engineering practice

PO9. **Individual and Team work:** Function effectively as an individual, team member or leader in diversified environments

PO10. **Communication:** Communicate effectively through various modes for all engineering activities

PO11. **Project Management and Finance:** Apply Engineering knowledge and management principles for effective project management in multi-disciplinary environments

PO12. **Life-long Learning:** Engage in independent life-long learning and skill development for professional and social well being

7 COURSE CURRICULUM AND SYLLABUS

Regulation 2014

Curriculum for B.E. Computer Science and Engineering for Semester I & II with effect from 2015-16

SEMESTER I

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS0101	Communication Skills- I	2	0	2	3	100
141CS0102	Engineering Mathematics – I	3	1	0	4	100
141CS0103	Engineering Physics	3	0	0	3	100
141CS0104	Engineering Chemistry	3	0	0	3	100
141CS0105	Fundamentals of Programming	3	0	2	4	100
141CS0106	Basics of Civil and Mechanical Engineering	3	0	0	3	100
PRACTICAL						
141CS0107	Engineering Physics and Chemistry Laboratory	0	0	2	1	100
141CS0108	Engineering Practices Laboratory (Civil and mechanical)	0	0	2	1	100
141CS0109	Sports for Wellness	0	0	2	1	100
	TOTAL	**17**	**1**	**10**	**23**	**900**

SEMESTER II

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS0201	Communication Skills- II	2	0	2	3	100
141CS0202	Engineering Mathematics – II	3	1	0	4	100
141CS0203	Material Science	3	0	0	3	100
141CS0204	C Programming	3	0	0	3	100
141CS0205	Basics of Electrical and Electronics Engineering	3	0	0	3	100
141CS0206	Engineering Graphics	1	3	0	4	100
PRACTICAL						
141CS0207	C Programming Laboratory	0	0	2	1	100
141CS0208	Engineering Practices Laboratory (Electrical and Electronics)	0	0	2	1	100
141CS0209	Promotion of Students' Wellness	0	0	2	1	100
	TOTAL	**15**	**4**	**8**	**23**	**900**

SEMESTER I

Course Code: 141CS0101	**Course Title:** COMMUNICATION SKILLS I
Core/Elective: Core	**L : T : P : C : M** - 2: 0 : 2 : 3 : 100
Type: Lecture & Practical	**Total Contact Hours:** 60

Course Outcomes

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

CO1. Write grammatically correct sentences in English.
CO2. Listen to conversations comprehend, make notes and answer questions.
CO3. Speak about a process, things, about oneself and others.
CO4. Read passages, infer and respond to the question.
CO5. Write short pieces of business correspondence such as emails, letters and reports.

UNIT I GRAMMAR 12

Parts of speech - Kinds of sentences – statement, interrogative, imperative and exclamatory – action word and its importance in a sentence –kinds of verbs& forms of verbs - auxiliary verbs and its importance, modal auxiliaries and its usage - Tenses and impersonal passive voices – Spelling - prepositions

UNIT II LISTENING 12

Listening for specific information – short conversation and monologues, Telephone conversation, extended monologues, listening for gist – conversation, interview and discussion, multiple choice, gap filling, note-taking.

UNIT III SPEAKING 12

Elements of effective speech – exchange of basic personal information –narration –talk on general topics– describing events, pictures and people – Working Mechanism of a machine.

UNIT IV READING 12

Business articles -Advertisements – company websites – Interpreting visual information – skimming and scanning -data from email, articles, books and report- Newspaper articles – short Messages- pamphlets, brochures, flyers, leaflets and real-world notices – Error spotting – Cloze Test- extracting relevant information – identifying main and subordinate ideas–comprehension – making inferences – reading critically – determining fact versus opinion

UNIT V WRITING 12

Formal & informal emails- letter writing- leave letter, permission seeking letter- format, content, set phrases and etiquettes of e-mails and letters- fax –memo- note- reports.

TEXT BOOKS:

1. M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education Pvt. Ltd., New Delhi 2005.
2. BEC-Preliminary-Cambridge Handbook for Language Teachers, 2nd Edition, CUP 2000

REFERENCES:

1. Business Benchmark Guy Brook-Hart, Norman Whitby, Cambridge ESOL, 2006.
2. Richard Huseman, Business Communication-Strategies and Skills, Alger Press, 1988
3. Sylvie Donna, Teach Business English, CUP
4. Mathew Monipally, Business Communication Strategies, Orient Longman.

WEB REFERENCES

1. www.cambridgeenglish.org/exams/business/business-preliminary/
2. http://www.pearsonlongman.com/intelligent_business/bec_tests/preliminary.html

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0102	**Course Title:** ENGINEERING MATHEMATICS - I
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:** 60

Course Outcomes

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

CO1. Understand the basic concepts of Matrices.
CO2. Calculate Eigen values and Eigen vectors of given matrix.
CO3. Evaluate the inverse of given matrix.
CO4. Realize the basic concepts of sequence.
CO5. Evaluate the concepts of infinite series.

UNIT I MATRICES 9+3

Definition – Properties of a Matrix – Addition and Multiplication of Matrices – Transpose, Adjoint and Inverse of a Matrix – Null, Identity, Diagonal, Scalar, Triangular, Symmetric and Skew-symmetric Matrices.

UNIT II EIGEN VALUES AND EIGEN VECTORS 9+3

Rank of a matrix Row – Reduced Echelon Form – Consistency of a System of linear equations – Solution of the matrix equation AX = B – Eigen Values and Eigen Vectors of a real Matrix – Properties of Eigen Values and Eigen Vectors.

UNIT III ORTHOGONAL REDUCTION 9+3

Characteristic Equation - Cayley Hamilton Theorem – Finding Inverse and Powers of a Matrix –Reduction of Quadratic Form to Canonical form by Orthogonal Transformation – Index, Signature and Nature of Quadratic Form.

UNIT IV SEQUENCES 9+3

Sequence of real numbers – Limit of a Sequence – Constant Sequence – Convergence, Divergence and Oscillation of a Sequence – Sub-sequence – Bounded Sequence - Cauchy Sequence — Monotonic Sequence.

UNIT V SERIES 9+3

Series – Infinite Series – Necessary Condition for Convergence – Comparison Test for Convergence – D'Alembert's Ratio Test – Alternating Series – Conditional and Absolute Convergence of a Series.

TEXT BOOK

1. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, 2007.

REFERENCES

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Third edition, Laxmi Publications (p) Ltd., 2008.
2. T.Veerarajan, "Engineering Mathematics", Updated Edition, McGraw Hill, 2013.
3. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley &Sons. Singapore, 10th edition, 2012.
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008

WEB REFERENCE

1. http://nptel.ac.in/video.php?subjectId=122107036

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0103	**Course Title:** ENGINEERING PHYSICS
Core/Elective: Core	**L : T : P : C : M** – 3 :0 :0:3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes

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

CO1. Explain the properties of light and colors based on electronic display devices
CO2. Illustrate the characteristics, principles and applications of laser
CO3. Explain the mode of propagation and attenuation in optical fibers
CO4. Demonstrate the nature of semiconductors
CO5.Describe the concept of luminescence in various electronic display devices

UNIT I LIGHT 9

Nature of Light- Laws of reflection and refraction -Total internal reflection - Dispersion- Interference - Diffraction - Mono chromatic light- Dispersion and combining white light- Colors - Primary and secondary colors – Color addition and subtraction - The electromagnetic spectrum- properties of electromagnetic radiation. Quantum concepts: Properties of matter waves- Debroglie wave equations.

UNIT II LASERS 9

Laser principles: Stimulated and spontaneous emissions of radiations - Population inversion and pumping methods- Properties of lasers - Nd: YAG laser and CO_2 molecular laser - Semiconductor laser (Homo junction and hetro junction) - Holograms and Holographic data storage (record/read).

UNIT III FIBER OPTICS 9

Optical fibers - Propagation of light through optical fibers -Expressions for numerical aperture and acceptance angle -Types of optical fibers based on material, refractive index, and mode of propagation- Losses in optical fiber - Attenuation- Bending and reflection losses- Photo detectors: PN, PIN & Avalanche photo diodes- Fiber optic communication link.

UNIT IV SEMICONDUCTORS 9

Classification of solids based on band gap - Properties of semi conducting materials -Covalent bond in semiconductors (Ge, Si)- Intrinsic and extrinsic semiconductors- Expression for carrier concentration (n type) - Variation of carrier concentration and fermi level with temperature - Hall Effect – Determination of Hall co efficient- Applications: Hall multiplier-Hall effect sensor.

UNIT V DISPLAY DEVICES 9

Human vision - Red, Blue, Green (RGB) color scheme - Optical Emissions: Luminescence, photoluminescence, cathodoluminescence- electroluminescence -Injection electro Luminescence- Displays (Working principles): Plasma display, LED display, Liquid crystal display (LCD) and Numeric display.

TEXT BOOKS

1. Gilbert Rowell, Sydney Herbert, Physics, Cambridge University Press, 2008.
2. M. N. Avadhanulu and P. G. Kshirsagar, "Text Book of Engineering Physics", S. Chand & Company Ltd., New Delhi, 2013.
3. David Armitage "Introduction to Micro displays", John Wiley & Ltd, 2006.

REFERENCES

1. R.K. Gaur, S.L. Gupta, Engineering Physics, DhanpatRai Publications, 2013.
2. A. Marikani "Engineering Physics" 2nd Edition, PHI Learning, New Delhi, 2014.
3. Arthur Beiser, "Modern Physics", Tata McGraw-Hill Co, New Delhi, 2003.
4. David Halliday, Robert Resnick, Jearl Walker, Fundamentals of Physics Extended, 9thEdition, Wiley India, 2014.

WEB REFERENCES

1. http://nptel.ac.in/syllabus/syllabus.php?subjectId=115103034
2. http://nptel.ac.in/syllabus/syllabus.php?subjectId=115104041
3. http://nptel.ac.in/courses/115102025/
4. http://www.slideshare.net/ManojHarsule/display-devices-crt-and-lcd-screen
5. http://educypedia.karadimov.info/library/Display%20Technology%20Overview.pdf

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0104	**Course Title:** ENGINEERING CHEMISTRY
Core/Elective: Core	**L : T : P : C : M** – 3 :0 :0:3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes

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

CO1. Describe the theoretical aspects of polymer chemistry and its applications
CO2. Identify the latest applications of specialty polymers
CO3. Determine the analytical testing methods for various substances
CO4. Explain the fundamentals of electrochemistry and corrosion
CO5. Select the type of battery and fuel cell for specific applications

UNIT I BASICS OF POLYMERS 9

Monomer - Functionality - Degree of polymerization –Classification of Polymers-Types of polymerization- Addition, Condensation and Copolymerization –Engineering plastics- Thermoplastics and Thermosetting plastics-examples– Moulding of plastics (injection moulding)-Composites-classification and Fiber Reinforced Plastics.

UNIT II SPECIALTY POLYMERS AND ITS APPLICATIONS 9

Adhesives (Epoxy Resins -Araldite)-Conducting Polymers-types and examples -Applications of conducting polymers. Semiconducting Polymers-types. Ion Exchange Resins- Biodegradable Polymers – classification and applications.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photo physical laws – Grotthus Draper law, Stark Einstein law and Beer Lamberts law, Photo process – Fluorescence, Phosphorescence, Chemiluminescence and Photosensitization. Spectroscopy – Electromagnetic spectrum, Absorption and Emission spectroscopy – UV – Visible Spectroscopy, Flame photometry – Principle and Instrumentation (Block Diagram only) and applications.

UNIT IV ELECTROCHEMISTRY 9

Introduction-Conductors-Electrochemical cell-Standard electrode potential-Types of electrodes- Standard Hydrogen Electrode, Calomel Electrode-Indicator electrode (Glass electrode) – Emf series – Principles of Chemical and Electrochemical corrosion - Corrosion control (Sacrificial anode and Impressed current methods).

UNIT V BATTERIES AND FUEL CELLS 9

Batteries – characteristics, voltage, current, capacity, electricity storage density, power, discharge rate, cycle life, energy efficiency, shelf life. Modern Batteries- Nickel –Metal Hydride Batteries – Lithium batteries. Fuel Cells-Comparison with conventional cells-Hydrogen - Oxygen fuel cell – Types of Fuel Cells (Methanol Oxygen Fuel Cell, Solid Polymer Electrolyte Fuel Cell).

TEXT BOOK

1. Wiley Engineering Chemistry, Second Edition, Wiley India Pvt. Ltd. New Delhi (2011).

REFERENCES

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 16th Ed., Dhanpat Rai Pub, Co., New Delhi (2004).
2. L. Brown and T. Holme, Chemistry for Engineering Students, 3rd Edition, Cengage Learning (2010).
3. P.W. Atkins and de Paula Julio, "Physical Chemistry", Oxford University Press, 9th Ed. (Indian Student Edition) (2011).
4. O. G. Palanna, Engineering Chemistry, Fourth Reprint. Tata McGraw Hill Education Pvt. Ltd. New Delhi (2009).
5. S. S. Dara "A text book of Engineering Chemistry" S. Chand & Co. Ltd., New Delhi (2006).

WEB REFERENCES

1. http://www.tndte.com/TEXT%20BOOKS/Complete%20Books/Engineering%20Chemistry-I%20&%20II/Engineering%20Chemistry%20-%20Sem%201&2.pdf
2. http://www.slideshare.net/Santachem/water-technology-and-green-chemistry
3. http://www.chettinadtech.ac.in/coursenotes/Corrosion.pdf
4. http://webhost.bridgew.edu/c2king/CH489/Lec%204B_Enviro%20Chem%20Anal2_Mod.pdf
5. http://www.uniwersytetradom.pl/files/File/MK%20Ppt%20presentation.pdf
6. https://www.smartzworld.com/notes/engineering-chemistry/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	3											
CO4	3											
CO5	3											

Course Code: 141CS0105	**Course Title:** FUNDAMENTALS OF PROGRAMMING
Core/Elective: Core	**L : T : P : C : M** – 3 :0 :2: 4 : 100
Type: Lecture & Practical	**Total Contact Hours:**75

Course Outcomes

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

CO1. Develop flow charts for simple problems

CO2. Comprehend the process of language independent program development

CO3. Construct programs using suitable selection and repetition structures

CO4. Solve searching and sorting problems using arrays

CO5. Create modular programs using functions

UNIT I INTRODUCTION TO PROGRAMMING AND DATA REPRESENTATION 9

Introduction to Programming: General Problem Solving Strategy, Program Development Cycle - Basic Programming Concepts: A Simple Program, Data Input, Program Variables and Constants - Data Types - Data Processing and Output - Case Study: RAPTOR

UNIT II PROGRAM DEVELOPMENT AND SELECTION STRUCTURES 9

Process of Developing a Program - Program Design - Coding, Documenting, and Testing a Program - Structured Programming - Types of Selection Structures - Relational and Logical Operators - Applications of Selection Structures

UNIT III REPETITION STRUCTURES 9

Introduction to Repetition Structures - Types of Loops - For Loop - Combining Loops and Selection Structures - Nested Loops - Applications of Repetition Structures

UNIT IV ARRAYS, SEARCHING AND SORTING 9

Introduction to Arrays - One Dimensional Arrays - Arrays Declaration, Strings as Arrays of Characters - Two-Dimensional Arrays - Introduction to Sorting and Searching - Bubble Sort Technique - Binary Search - Applications of Arrays

UNIT V FUNCTIONS 9

Introduction to Arguments and Parameters - Subprograms: Value and Reference Parameters - Difference between Value and Reference Parameters- Scope of a Variable - Functions: Built-in Functions - User Defined Functions - Applications of Functions

LAB COMPONENT 30

(Students have to take-up the following experiments. These lab components are given weightage of 12 marks out of 40 marks in the internal assessment)

Students must develop programs for any two problems (not limited to the list) in each category using RAPTOR / SCRATCH tool.

1. Programs using Fundamental Algorithms
   i. Exchanging the values of Two Variables
   ii. Counting, Summation of a set of Numbers
   iii. Factorial Computation
   iv. Reversing the Digits of an Integer
2. Programs using Factoring Methods
   i. Finding the square Root of a number
   ii. The Smallest Divisor of an Integer
   iii. The Greatest Common Divisor of Two Integers
   iv. Computing the n^{th} Fibonacci number
3. Programs using Array Techniques
   i. Array Order Reversal
   ii. Finding the Maximum Number in a Set
   iii. Removal of Duplicates from an Ordered Array
   iv. Finding the k^{th} Smallest Element
4. Programs using Sorting and Searching
   i. Bubble Sort
   ii. Selection Sort
   iii. Linear Search
   iv. Binary Search
5. Programs using Function
   i. Area of Circle
   ii. CGPA calculation
   iii. Simple Interest Calculation
   iv. Fibonacci Series

TEXT BOOKS

1. Venit S, and Drake E, "Prelude to Programming Concepts and Design", Sixth Edition, Pearson Education, 2015
2. R.G.Dromey, "How to Solve it by Computer", Second Edition, Pearson Education, India, 2008. (For Lab Component)

REFERENCES

1. Tony Gaddis, "Starting Out with Programming Logic and Design", Fourth Edition, Pearson Education, 2015
2. MajedMarji, "Learn to Program with Scratch", No Starch Press, 2014

WEB REFERENCES

1. Web URL: http://raptor.martincarlisle.com/
2. Web URL: https://scratch.mit.edu/

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0106	**Course Title:** BASICS OF CIVIL AND MECHANICAL ENGINEERING
Core/Elective: Core	**L : T : P : C : M** – 3 :0 :0:3 : 100
Type: Lecture	**Total Contact Hours:**45

Course Outcomes

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

CO1. Select the best material and suitable foundation for the required construction.

CO2. Impart basic knowledge about the components of structures.

CO3. Explain the various alternate sources of energy and components of a power plant.

CO4. Explain different manufacturing processes like casting, forming, welding and machining operations.

CO5. Discuss the construction and working of IC engines and refrigerators.

UNIT I CIVIL ENGINEERING MATERIALS and BUILDING COMPONENTS 9

Scope of Civil Engineering - Functions of civil Engineer and Basic areas in Civil Engineering. Civil Engineering Materials and their properties: - Stones, bricks, sand, aggregate, cement, steel, concrete and Reinforcement cement concrete.

Sub structure: - Bearing capacity of soil – Problems with soil – Type of foundation - Selection of foundation based on soil conditions – Requirement of good foundation – Various types of foundations.

UNIT II BUILDING COMPONENTS, HIGHWAY AND RAILWAY ENGINEERING 9

Super structure: - Vertical Components such as brick masonry walls, stone masonry walls and columns – Horizontal components such as Beam, Lintels, sun shades – various types of roofs and floors.

Highway and Railway Engineering: - Importance of transportation networks-classification of highways-Railway Engineering and its components- Classification of Bridges.

UNIT III ALTERNATE SOURCES OF ENERGY, POWER PLANTS AND BOILERS 9

Types of Boilers –Simple Vertical, Babcock and Wilcox and La-Mont Boiler, Differences between fire tube and water tube boiler. Types of steam turbines- working of a single stage impulse and reaction turbines. Power Plant: Classification of Power Plants- Steam - Nuclear, Diesel, and Hydro Power Plants. Solar, Wind, Tidal, Geothermal and Ocean Thermal Energy Conversion (OTEC).

UNIT IV MANUFACTURING PROCESSES 9

Metal Casting - Foundry – Moulding and Casting Processes. Metal Forming - Forging, Rolling, Extrusion processes. Metal Joining processes - Welding, Metal machining – Turning, Milling, Drilling, Shaping - 3D Printing.

UNIT V THERMAL ENGINEERING 9

Refrigeration - Principle of vapour compression system – Layout of typical domestic refrigerator, Refrigerants – types and properties. Air conditioning – Definition, working principle of Window and Split type room air conditioners. Internal combustion engines – Working principle of Petrol and Diesel Engines –Two stroke and Four stroke cycles – Comparison of two stroke and four stroke engines.

TEXT BOOKS

1. Jayagopal.L.S & Rudramoorthy.R, "Elements of Civil and Mechanical Engineering", Vikas Publishing House, New Delhi, 2010.
2. Shanmugam.G and Palanichamy.M.S, "Basic Civil and Mechanical Engineering", Tata Mc Graw Hill Publishing Co., New Delhi, 1996.

REFERENCES

1. Bindra.S.P and Arora.S.P, "The text book of Building construction", Dhanpat Rai Publications (P) Ltd., New Delhi, 2011.
2. Ananthanarayanan.P, "Basic Refrigeration and Air Conditioning", Tata McGraw HilI Publishing Co., New Delhi, 2003.
3. Srinivasan. S, "Automotive engineering" Tata McGraw Hill Publishing Co., New Delhi, 2003.

WEB REFERENCES:

1. http://nptel.ac.in/courses/112105128/
2. http://nptel.ac.in/courses/Webcourse Contents/IIT%20Kharagpur/Ref%20and%20Air%20Cond/New_index1.html
3. http://www.engineeringcivil.com/
4. http://www.bmtpc.org/
5. http://www.aboutcivil.org/engineering-materials.html

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0107	**Course Title**: ENGINEERING PHYSICS AND CHEMISTRY LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 :0 :2: 1 : 100
Type: Practical	**Total Contact Hours:** 30

LIST OF EXPERIMENTS

PHYSICS

Course Outcomes

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

CO1. Measure optical parameters of laser and optical fiber.
CO2. Estimate electrical properties of metal and semiconductor.
CO3. Evaluate magnetic properties of a soft magnetic material.

Any five experiments

1. Determination of Laser parameters- Wave length and particle size
2. Determination of Acceptance angle and Numerical aperture of an optical fiber – Laser diffraction method
3. Determination of band gap of semi conducting materials – Thermistor (Germanium)
4. Determination of specific resistance- Carey Foster's Bridge
5. Light Illumination characteristics of Light dependent resistor (LDR)
6. Coercivity, Retentivity, Saturated magnetism, Permeability – Hysteresis loop
7. Conductivity, Resistivity – Four Probe method

REFERENCES

1. Dr. Jayaraman, V.Umadevi, S.Maruthamuthu & B. Saravanakumar, Engineering Physics Laboratory Manual, Pearson Publishers, New Delhi, 2014.

Mapping of Course Outcomes to Programme Outcomes:

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

CHEMISTRY

Course Outcomes

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

CO1. Measure corrosion rate of a mild metal.
CO2. Verify photo physical law.
CO3. Determine concentration of a solution through electrical method.

Any five experiments

1. Estimation of iron in water by colorimetric method- verification of Beer- Lambert's Law.
2. Estimation of Fe^{2+} by potentiometric titration
3. Determination of strength of acid by pH metry
4. Determination of corrosion rate by weight loss method
5. Measurement of emf of electrochemical cell – potentiometry
6. Determination of molecular weight of a polymer using Ostwald's Viscometer

REFERENCES

1. Laboratory Manual on Engineering Chemistry, S.K.Bhasin,S.Rani, Dhanpat Rai Publishing.
2. Laboratory Manual, Faculty of Chemistry, MCET

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0108	**Course Title:** ENGINEERING PRACTICES LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 :0 :2: 1 : 100
Type: Practical	**Total Contact Hours:** 30

Course Outcome

At the end of the course, students will be able to provide exposure to the students with hands- on various basic engineering practices in Civil and Mechanical Engineering

LIST OF EXPERIMENTS

CIVIL

1. Study of pipe line joints, its location and functions, valves, tapes, couplings, unions, reducers and elbows in house hold fittings.
2. Hands- on - exercise on basic pipe connections- mixed pipe material connections – pipe connections with different joining components
3. Study of the joints in doors, windows and furniture.
4. Hands on exercise: wood work-Joints by sawing, planning and cutting.
5. Demonstration on carpentry using power tools

MECHANICAL

1. Study of tools and joints – planning, chiselling, marking and sawing practice, different joints, use of power tools.
2. Study of tools, chipping, filing, cutting, drilling, tapping, male and female joints, and stepped joints.
3. Exercise on forging of hexagonal bolt.
4. Exercise on sand preparation and moulding making.
5. Selection of different gauge sheets, types of joints, trays and containers.
6. Hands on exercise for making butt joints, lap joints and tee joints using arc welding.

REFERENCES

1. Jeyachandran.K, Natarajan.S. & Balasubramanian.S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
2. Rajendra Prasad. A & Sarma.P.M.M.S, "Workshop Practice", Sree Sai Publication, 2002.
3. Kannaiah.P & Narayana.K.L, "Manual on Workshop Practice", Scitech Publications, 1999.

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				1							

Course Code: 141CS0109	**Course Title:** SPORTS FOR WELLNESS
Core/Elective: Core	**L : T : P : C : M** – 0 :0:2:1 : 100
Type: Practical	**Total Contact Hours:** 30

Course Outcomes

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

CO1. Explain the significance of physical fitness for healthy living

CO2. Maintain physical fitness through exercises

CO3. Exhibit mental agility

UNIT I HEALTH

Meaning of health - Components of health - physical, mental, social, emotional, spiritual -importance of health - Personal hygiene - Heredity and environment –Adopting healthy habits

UNIT II FITNESS & WELLNESS

Fitness and wellness – what is physical fitness - categories - components of health related physical fitness- components of skill related physical fitness-values of physical fitness – Physical fitness development.

What is wellness - importance of wellness for engineers –factors promoting wellness – Physiology and health: cardio-respiratory, muscular and nervous systems – ageing

UNIT III FOOD & HEALTH

Energy balance and body composition – nutrients- problems of surplus and deficiency- balanced diet - good food habits for better health – hazards of junk food - food and the gunas.

UNIT IV FITNESS & DEVELOPMENT I

Exercises related ailment and injuries - safety and precautions - first aid.

Muscular strength – exercises (calisthenics): pull-up, sit-up, push-up and weight training.

Explosive power – exercises: vertical jump, long jump,

Cardio respiratory endurance– exercises: walking, jogging, treadmill, stair climbing, bicycling, skipping.

Flexibility –exercises: stretching

UNIT V FITNESS & DEVELOPMENT II

Speed, agility, balance and coordination – exercises: sprint, cone drill, ladder drill, hurdle drill, ball throw - mental agility tests.

Dexterity - 12 minutes cooper test – long run – adventure games

Team games.

REFERENCES

1. Tony Buzan, Harper Collins, The Power of Physical Intelligence (English)
2. Padmakshan Padmanabhan, Handbook of Health & Fitness, Indus Source Books, First Edition, 2014

OPERATIONAL MODALITIES WITH PROGRAM SCHEDULE:

Special lectures by invited resource persons at semester beginning (for covering Units I, II, III)

3 lectures x 4 hours = 12 hours

Practical:

2 hours/week; (6th and 7th hour)

12 weeks x 2 hours/week = 24 hours

Evaluation:

Unit I, II, III = Theory

Unit IV and V = Practical

Mid semester: Written (objective type and short answers) and Exercises: (40% weightage)

End semester exam: Written and exercises (60% weightage)

Criteria for passing: 50% put together.

MEASUREMENTS: At the Beginning + At Semester End

SCHEDULE OF EXERCISES FOR STUDENTS WITH DIFFERENT PHYSICAL CONDITIONS

Underweight	**Normal**	**obese**
Flexibility exercises - stretching	Flexibility exercises - stretching	- Brisk walking
Minor games -forward running relay -backward running relay - over&under relay -circle games, etc.	-Walking - Walking-cum-jogging	- Minor games
Strength Training - Calisthenics	Cardio/Functional Fitness - Skipping - Stair climbing - jogging - bicycling - long distance running	flexibility exercises - stretching - Cycling (static)
Cardio/Functional Fitness - Skipping - Stair climbing - jogging - bicycling	Agility - ladder drills - hurdle drill - cone drill	Cardio/Functional Fitness Skipping Jogging Bicycling
Agility exercises - ladder drills - hurdle drill - cone drill	Strength Training -Calisthenics -gym workout for major muscles	Strength Training - Calisthenics - gym workouts
Diet Considerations	Diet considerations	Diet considerations
Measurements		
BMI Hand grip strength test 12 m Cooper run Sit&reach	BMI 12 m Cooper run Sit & reach test Illinois agility test	BMI Body fat percentage Waist-to-hip ratio Sit&reach

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

SEMESTER II

Course Code: 141CS0201	**Course Title:** COMMUNICATION SKILLS II
Core/Elective: Core	**L : T : P : C : M -** 2 : 0 :2 :3 : 100
Type: Lecture & Practical	**Total Contact Hours:** 60

Prerequisites:

The student should have:

- Undergone 60 hours of communication skills I training

Course Outcomes

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

CO1. Write concisely and ensure accuracy through proof reading.

CO2. Listen to lectures and presentations, comprehend and respond

CO3. Use appropriate non-verbal skills to present ideas and participate in discussions.

CO4. Use various reading techniques, make notes and respond.

CO5. Write effectively for various professional situations.

UNIT I GRAMMAR 12

Types of sentences – simple, compound and complex, Concord – One word substitutions, word formation, commonly confused words, idioms and phrases –Editing-punctuation, spelling - correct use of articles-usage of question tags.

UNIT II LISTENING 12

Listening to fill up gapped texts -Listening to identify context and Speaker's opinion-Note Taking-Listening to Conversation, to business lecturers, presentation, interviews, ted talk, pep talk, documentaries and cricket commentaries.

UNIT III SPEAKING 12

Non-verbal skills – importance & types - conversational practices, debate Narration, mock interview, GD - impromptu talks, story-telling, likes and dislikes, role plays & presentations on business themes.

UNIT IV READING 12

Exposure to different reading techniques-Intensive & Extensive reading-Reading Comprehension - speed reading-obstacles in reading- eye fixation, regression and sub- vocalization - Note Making– Jumbled Sentences – short stories and Newspaper articles.

UNIT V WRITING 12

Free writing on any given topic, Letter of application - content, format & Resume writing- Writing Business Letters- calling for quotations, placing orders, a letter of complaint regarding manufacturing defects, Writing Instructions-Proof Reading.

TEXT BOOK

1. Meenakshi Raman &Sangeetha Sharma, Technical Communication Principles and Practice, Second edition, Oxford Higher Education, New Delhi, 2011.
2. Cambridge BEC Vantage- Practice Tests, Self-study Edition, Cambridge University Press, 2002

REFERENCES

1. R C. Sharma, Krishna Mohan, Business Correspondence and Report Writing, Tata McGraw Hill Publishing Co., Ltd., New Delhi 2002
2. ShaliniVerma,Verbal, Ability and Reading Comprehension, Pearson publications, 2013
3. Edgar Thorpe, Showick Thorpe, Objective English, fifth edition, Pearson publications, 2014.
4. M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education Pvt. Ltd., New Delhi 2005.

WEB REFERENCES

1. http://www.englishgrammarsecrets.com/
2. http://www.grammarly.com/handbook/
3. http://www.talkenglish.com/
4. http://www.englishleap.com/
5. http://www.ieltsbuddy.com/ielts-writing-task-1.html

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0202	**Course Title:** ENGINEERING MATHEMATICS-II
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:** 60

Prerequisites: The student should have undergone the course(s):

- Engineering Mathematics I

Course Outcomes

At the end of course, students will be able to
CO1. Analyze the basic concepts of Relations and Maps.
CO2. Evaluate the A.M, G.M and H.M.
CO3. Calculate Permutation and Combination.
CO4. Understand the basic concepts of Divisibility.
CO5. Realize the concepts of Congruence.

UNIT I SET THEORY AND MAPPINGS 9+3

Sets and their representations, Union, Intersection and Complement of Sets and their Algebraic Properties – Relations – Equivalence Relation – Mappings – One-One and Onto Mappings – Composition of Mappings-Inverse Mappings.

UNIT II COMBINATORICS 9+3

Arithmetic, Geometric and Harmonic Progressions – Insertion of Arithmetic, Geometric and Harmonic Means between two given numbers – Relation between A.M., G.M. and H.M.

UNIT III PERMUTATION AND COMBINATION 9+3

Fundamental Principle of Counting: Permutation as an arrangement and Combination as selection with repetition – Meaning of nPr and nCr, Circular Permutation – Relation between Permutation and Combination.

UNIT IV DIVISIBILITY AND CANONICAL DECOMPOSITIONS 9+3

Division Algorithm – Prime and Composite Numbers – Fibonacci Numbers – Fermat Numbers – GCD – Euclidean Algorithm – Fundamental Theorem of Arithmetic – LCM.

UNIT V CONGRUENCE'S 9+3

Definition – Linear Congruence's – Applications – Divisibility Tests – Modular Designs – Chinese Remainder Theorem - 2×2 Linear Systems.

TEXT BOOKS

1. Kenneth H Rosen, "Discrete Mathematics and its Applications", Eight Edition, Tata McGraw Hill,2006.
2. Thomas Koshy, "Elementary Number Theory with Applications", Second Edition, Elsevier Publications,2002.

REFERENCES

1. SeymourLipschutz, "Schaum's Outline Essential Computer Mathematics", Third Edition, McGrawHill.
2. Ralph P Grimaldi, Ramana.B.V, "Discrete and Combinatorial Mathematics", 5th edition, Pearson Education India, 2006.

WEB REFERENCES:

1. http://learnerstv.com/Free-Maths-video-lecture-courses.htm
2. http://nptel.ac.in/video.php?subjectId=122107036

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0203	**Course Title:** MATERIAL SCIENCE
Core/Elective: Core	**L : T : P : C : M** – 3 :0 :0:3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):

- Engineering Physics

Course Outcomes

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

CO1. Interpret the fundamental behavior of conducting materials
CO2. Explain the functioning of semiconductor devices
CO3. Identify a suitable technique for fabricating integrated circuits (ICs)
CO4. Choose suitable magnetic and dielectric material for specific engineering application

UNIT I CONDUCTING MATERIALS 9

Conductors – Resistivity - Ohms law- Conductivity- Current density- Mobility - Classical free electron theory of metals - Derivation for electrical and thermal conductivity- Wiedemann Franz law- Draw backs of Classical free electron theory- Fermi distribution function - Expression for density of states.

UNIT II SEMICONDUCTING DEVICES 9

PN junction diode – Forward bias – Reverse bias - Light emitting diode (LED) - Bi polar junction transistors- Common emitter (CE) configuration characteristics - Metal oxide semiconductor field effect transistor (MOSFET) and characteristics.

UNIT III INTEGARATED CIRCUITS (ICs) 9

Advantages of Integrated circuits (ICs) over discrete components- IC classification- Construction bipolar transistor - Epitaxial growth & Oxidation- Photolithography- Isolation diffusion - Base diffusion- Emitter diffusion - Contact mask- Aluminium metallization – passivation- Structures of integrated PNP transistor

UNIT IV MAGNETIC MATERIALS 9

Introduction to magnetic materials – Origin of magnetic moment – Properties of dia, para, ferro, antiferro and ferri magnetic materials - Domain theory of ferromagnetism - Hysteresis – Properties of hard and soft magnetic materials - Applications of magnetic materials: Magnetic hard disc, Memory sticks, smart card and flash cards.

UNIT V DIELECTRIC MATERIALS 9

Dielectric constant - Polarization – Electronic, ionic, orientation and space charge polarization –Internal field- Claussius mosotti relation- Frequency and dependence of polarization- Dielectric loss- Dielectric breakdown- Applications : Transformers, capacitors and capacitive touch screens.

TEXT BOOKS

1. Avadhanulu M.N. and Kshirsagar P G, "Text Book of Engineering Physics", S. Chand & Company Ltd., New Delhi, 2013.
2. D. Roy Choudhry, Shail Jain, Linear Integrated Circuits, 3rd Edition New Age International Pvt. Ltd, 2010.

REFERENCES

1. A. Marikani "Engineering Physics" 2nd Edition, PHI Learning, New Delhi, 2014.
2. William D Callister, "Fundamentals of Materials Science and Engineering**:** An Integrated Approach", John Wiley and Sons Inc., Sixth Edition, New York, 2012.
3. V Rajendran, "Engineering Physics", Tata McGraw-Hill Co, New Delhi, 2009.
4. S.O. Kasap, "Principles of Electronics Materials and Devices", McGraw Hill Higher Education, New Delhi, 2006.

WEB REFERENCES

1. http://nptel.ac.in/courses/115102026/2
2. http://nptel.ac.in/syllabus/syllabus.php?subjectId=115103029
3. http://nptel.ac.in/courses/115102014/
4. http://nptel.ac.in/syllabus/syllabus.php?subjectId=115103029
5. http://www.physicscentral.com/
6. http://www.physicsclassroom.com/

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0204	**Course Title**: C PROGRAMMING
Core/Elective: Core	**L : T : P : C : M** – 3 :0 :0:3 : 100
Type: Lecture	**Total Contact Hours**: 45

Prerequisite:

- Fundamentals of Computing and Programming

Course Outcomes

At the end of the course, students will be able to
CO1. Choose and specify appropriate programming constructs
CO2. Construct programs using arrays and functions
CO3. Formulate suitable structure or union for a given problem
CO4. Apply pointers for effective memory access
CO5. Handle Files and use Dynamic Memory Allocation & Pre-processor directives

UNIT I DATA TYPES, OPERATORS AND STATEMENTS 9

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping. Enumerated Data type, Renaming Data type with typedef – Type Casting.

UNIT II ARRAYS AND FUNCTIONS 9

Arrays: Defining – Initializing - Character Arrays – Multidimensional Arrays- Variable Length Arrays. Functions: Defining – Arguments and Local variables –Returning functions – Functions calling – Functions and Arrays – Recursive Functions.

UNIT III STRUCTURES AND STRINGS 9

Structure: Structure definition – Initializing Structure –Functions and Structures-Array of Structures - Structure containing structure –Union Definition - Processing union – Bit fields - Strings: Arrays of Characters –Variable Length character Strings - Escape Characters.

UNIT IV POINTERS 9

Dynamic Memory Allocation, Pointers: Defining Pointer variable—Pointers in Expressions – Working with Pointers & Structures – Keyword const and Pointers - Pointers and Functions – Pointers and Arrays - Operations on Pointers- Pointers to functions.

UNIT V FILES 9

Introduction to files - File access - File organization – Various File operations - Command line arguments. C Preprocessors – Features – Macro Expansion – File inclusion- Conditional compilation – Miscellaneous Directives – Header files functions – Graphics Functions.

TEXT BOOK

1. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.

REFERENCES

1. Stephen G. Kochan "Programming in C", Fourth edition, Addison Wesley Publishing, August 2014.
2. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
3. K.N.King, "C Programming A modern Approach", Second Edition, W.W.Norton and Company, 2008.
4. E.Balagurusamy, "Programming in ANSI C 6/e", Tata McGraw Hill, 2012.

WEB REFERENCES

1. http://www.cprogramming.com/
2. http://www.tutorialspoint.com/cprogramming/
3. http://www.c4learn.com/

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0205	**Course Title:** BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
Core/Elective: Core	**L : T : P : C : M** – 3 :0 :0:3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes

At the end of the course, students will be able to
CO1. Apply basic laws to study simple DC circuits.
CO2. Comprehend basic AC circuits and their phasor representation.
CO3. Differentiate and specify electrical machines like motor, generator and transformer.
CO4. Identify suitable basic electronic and display devices for simple applications.
CO5. Categorize opto-electronic devices and transducers for real time entities.

UNIT I FUNDAMENTALS OF DC CIRCUITS 9

Definition, Symbol and Unit of Quantities – Computation of resistance at constant temperature and at different Temperature – Ohm's law: statement, illustration and limitation – Kirchoff's Laws: statement and illustration – Resistance in series and voltage division technique – Resistance in parallel and current division technique – Method of solving a circuit by Kirchoff's laws – Star to Delta and Delta to Star Transformation.

UNIT II AC FUNDAMENTALS 9

Generation of Alternating EMF – Terminology – Concept of 3-Phase EMF generation – Root Mean Square – Average Value of AC – Phasor representation of alternating quantities –Pure resistive, inductive and capacitive circuits.

UNIT III ELECTRICAL MACHINES 9

DC generator and DC motor: Construction, Working Principle, Characteristics – Speed Control of DC Motors – Transformer – Three phase induction motor: Construction , Working Principle – Single phase motor.

UNIT IV SEMICONDUCTOR DEVICES 9

Theory of semiconductor: Forward Bias Condition, Reverse Bias Condition, V-I Characteristics – Bipolar Junction Transistor: Operation of NPN and PNP Transistor, Types of configuration: Common Emitter, Common Base, Common Collector – Field Effect Transistor: Construction and operation of n- channel Junction Field Effect Transistor.

UNIT V DISPLAY DEVICES AND TRANSDUCERS 9

Opto-Electronic Devices: Working principles of photoconductive cell, photovoltaic cell, solar cell, phototube – Display Devices: Light Emitting Diode, Liquid Crystal Display - Transducers: Capacitive and Inductive transducer, Linear Variable Differential Transformer, Oscillation and Potentiometric transducer, Thermistors, Piezoelectric and Photoelectric transducer.

TEXT BOOKS

1. Muthusubramanian R &Salivahanan S, "Basic Electrical, Electronics Engineering", Tata McGraw Hill Limited, New Delhi, 2009.

REFERENCES

1. William D.Stanley , John R.Hackworth, Richard L.Lones, " Fundamentals of Electrical Engineering and Technology", Thomson Delmar Learning, 2007.
2. Theraja.B.L and Theraja.A.K, "A Text book of Electrical Technology", (Volume I and II), S.Chand and Company Ltd., New Delhi (India), 2001.
3. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, New York (US), 2001.

WEB REFERENCES

- Basic Circuit Analysis Method (KVL and KCL Method) URL: http://www.learnerstv.com/video/Free-video-Lecture-861-Engineering.htm
- Useful laws in Basic Electronics.URL: http://www.learnerstv.com/video/Free-video-Lecture-1681-Engineering.htm

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0206	**Course Title:** ENGINEERING GRAPHICS
Core/Elective: Core	**L : T : P : C : M** –1 :3 :0: 4 : 100
Type: Lecture & Practical	**Total Contact Hours:**60

Course Outcomes

At the end of the course, students will be able to
CO1. Sketch different curves and explain its application.
CO2. Prepare orthographic projection from pictorial views and models
CO3. Draw the projection of solids
CO4. Draw the projection of sectioned solids
CO5. Draw the development of surfaces of simple solids with cuts and slots

UNIT I CURVES USED IN ENGINEERING PRACTICES ` 10

Application of curves in Engineering. Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloids and involutes of square and circle.

UNIT II ORTHOGRAPHIC PROJECTION 15

First angle projection – layout of views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects. Orthographic projection of solids.

UNIT III PROJECTION OF SOLIDS 15

Projection of solids – Types of solids- Polyhedra and solids of revolution-Orthographic views of solids- Axis inclined to one reference plane.

UNIT IV SECTION OF SOLIDS 10

Sectional view -Types of section planes-True shape of section-Orthographic views of sectioned solids - Section plane inclined to one reference plane and perpendicular to the other.

UNIT V DEVELOPMENT OF SURFACES 10

Development of lateral surfaces of simple and truncated solids –Parallel line method - Radial Line method.

TEXT BOOK

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2013).

REFERENCES

1. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited (2008).
2. Cencil Jensen, Jay D. Helsel and Dennis R. Short Engineering Drawing and Design. Tata McGraw Hill Publishing Company Limited (2012).

WEB REFERENCES

1. http://www.engineeringdrawing.org
2. http://nptel.ac.in
3. http: //iitd.ac.in

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0207	**Course Title:** C PROGRAMMING LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 :0 :2: 1 : 100
Type: Practical	**Total Contact Hours: 3**0

Course Outcomes

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

CO1. Select and model data using primitive and structured types.
CO2. Use different operators, formatting input and outputs in designing a program.
CO3. Design programs involving decision making, loops and functions.
CO4. Comprehend the dynamics of memory by the use of pointers.
CO5. Construct programs using advanced features like preprocessor, macros, files and DMA.

LIST OF EXPERIMENTS

1. Program to process Data types, operators and Expression Evaluation.
2. Program using formatting inputs and outputs.
3. Program using decision making and looping Statements
4. Program using Functions and Arrays
5. Program for String manipulation
6. Program using Structures and union
7. Program using Functions and Pointers
8. Program on basic File Operations
9. Program using dynamic memory allocation techniques
10. Program using preprocessor directives and macros
11. Program using graphics functions.

REFERENCES

1. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
2. Stephen G. Kochan "Programming in C", Fourth edition, Addison Wesley Publishing, August 2014.
3. E.Balagurusamy, "Programming in ANSI C 6/e", Tata McGraw Hill, 2012.

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0208	**Course Title:** ENGINEERING PRACTICES LABORATORY (Electrical and Electronics)
Core/Elective: Core	**L : T : P : C : M** – 0 :0 :2: 1 : 100
Type: Practical	**Total Contact Hours:** 30

Course Outcomes

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

CO1. Implement the basic concepts of DC and AC circuits

CO2. Interpret various characteristics of basic electronic components

CO3. Exhibit connections on electrical machining

CO4. Recite the working of few home appliances

LIST OF EXPERIMENTS

ELECTRICAL

1. Stair case wiring, assembling and testing of a lamp circuit & fault finding.
2. Simple electrical circuit implementation to verify Ohm's law and Kirchoff's law
3. DC motor connected through three point starter to the load
4. Single phase AC motor connection with load
5. Three phase squirrel cage induction motor with DOL starter
6. Rectifier circuit using single step down transformer
7. Diagnosing simple faults in induction and heating elements based home appliances

ELECTRONICS

1. Handling of CRO, function generator, power supply units with fault identification and trouble shooting
2. Soldering and testing a given simple electronic circuits using PCB.
3. V-I Characteristics of NPN / PNP transistors (Any one of the following configuration: CC, CE and CB)
4. Design a circuit for seven segment display device using resistors and light emitting diodes

REFERENCES

1. Jeyachandran.K, Natarajan.S & Balasubramanian.S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, Tamilnadu (India), 2007.
2. Jeyapoovan.T, M.Saravanapandian & Pranitha.S, "Engineering Practices Lab Manual", Vikas Puplishing House Pvt. Ltd., Uttar Pradesh (India), 2006.
3. Rourke.J & Zacker.C, "The complete reference", Tata McGraw Hill publishing company Ltd, Uttar Pradesh (India), 2001.
4. Gilster & Ron, "A Beginners Guide", Tata McGraw Hill publishing company Ltd, Uttar Pradesh (India), 2001.

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 141CS0209	**Course Title:** PROMOTION OF STUDENTS WELLNESS
Core/Elective: Core	**L : T : P : C : M** – 0 :0 :2:1 : 100
Type: Practical	**Total Contact Hours:**30

Course Outcomes

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

CO1. Maintain physical wellbeing - grooming, BMI, flexibility, muscle strength, body compositions (vatha, pitha, kapa)
CO2. Maintain mental wellbeing - perceptions, attention/concentration, memory, gunas
CO3. Maintain social wellbeing - etiquettes, emotional and psychological aspects, stress management, morality and values

UNIT I PHYSICAL HEALTH
Physical structure and functions of human body – simplified physical exercises (hand exercises, Leg exercises, breathing exercises, eye exercises – kapalapathi – Maharasanas 1-2 – Massages – Acupuncture – relaxation – importance and benefits. Suryanamaskar.

UNIT II MENTAL HEALTH
Maintenance of youthfulness and life force – kayakalpa yoga – anti ageing process – benefits. Mind and its functions – mind wave frequency – meditation process – Agna, shanthi, thuriam – benefits

UNIT III PERSONALITY DEVELOPMENT – I
Purpose of life and analysis of thought – philosophy of life – introspection – practice. Moralization of desires and neutralization of anger - practices

UNIT IV PERSONALITY DEVELOPMENT – II
Eradication of worries and benefits of blessings – wave theory –practices. Genetic centre – purification – cause and effect theory

UNIT V SOCIAL HEALTH
Greatness of guru – cultural education – love and compassion – fivefold culture. Greatness of friendship and social welfare – individual, family and world peace.

TEXT BOOK

1. Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar ,"Value education for harmonious life (Manavalakalai Yoga)", Vethathiri Publications, Erode, I Ed. (2010)

REFERENCES

1. Dr.R.Nagarathna, Dr.H.R.Nagendra, "Integrated approach of yoga therapy for positive health", Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.
2. Dr.R.Nagarathna, Dr.H.R.Nagendra , "New perspectives in stress management", Swami Vivekananda Yoga Prakashana, Bangalore, I Ed June 1986

OPERATIONAL MODALITIES

Theory and practice demonstration:

3 days of Theory and practice demonstration- 7 hours /day for syllabus coverage

Follow-Up Practice

12 weeks x 2 hours/week: 24 hours

EVALUATION

Unit I : Practical

Unit II & Unit III : Written (Objective type test)

Unit IV & Unit V : Written (Objective type test)

Mid semester & Model : Written and Practical

End semester : Written and Practical

Assessment: Using measurement gadgets and questionnaires (as suggested by SVYASA and scoring sheets (from Aliyar)

DIMENSIONS AND TOOLS IN MEASUREMENT

Dimension	Sub dimension	Measurement tools
Physical	BMI	Electronic Weighing Machine, Height Measurement
	Flexibility	Sit & Reach
	Muscle Strength	Handgrip Dynamometer
Mental	Perception	Critical Flicker Fusion
Social	Interpersonal Effectiveness & Self Concept	FIRO B
	Psychological Well Being	Short wellbeing scale
		Short Happiness scale
		Barrat Impulsive Scale

Mapping of Course Outcomes to Programme Outcomes:

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

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End of Semester - II

Regulation – 2014 (Revision 0)

SEMESTER I

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CO0101	Technical English	2	0	2	3	100
140CO0102	Engineering Mathematics - I	3	1	0	4	100
140CO0103	Engineering Physics	3	0	0	3	100
140CO0104	Engineering Chemistry	3	0	0	3	100
140CO0105	C Programming	3	0	0	3	100
140CS0106	Basics of Electrical and Electronics Engineering	3	0	0	3	100
PRACTICAL						
140CO0107	Engineering Practices Laboratory (Electrical, Electronics and PC hardware)	0	0	3	2	100
140CO0108	C Programming Laboratory	0	0	3	2	100
140CO0109	Engineering Graphics	2	0	3	3	100
140CO0210	Engineering Physics and Chemistry Laboratory (Annual Pattern)	0	0	3	-	-
	TOTAL	**19**	**1**	**14**	**26**	**900**

SEMESTER II

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CO0201	Communication Skills	2	0	2	3	100
140CO0202	Engineering Mathematics – II	3	1	0	4	100
140CO0203	Material Science	3	0	0	3	100
140CO0204	Environmental Science	3	0	0	3	100
140CS0205	Object Oriented Programming Concepts	3	0	0	3	100
140CS0206	Basics of Civil and Mechanical Engineering	3	0	0	3	100
PRACTICAL						
140CO0207	Engineering Practices Laboratory (Civil & Mechanical)	0	0	3	2	100
140CS0208	Object Oriented Programming Laboratory	0	0	3	2	100
140CO0210	Engineering Physics and Chemistry Laboratory (Annual Pattern)	0	0	3	2	100
	TOTAL	**17**	**1**	**11**	**25**	**900**

SEMESTER III

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS0301	Engineering Mathematics– III	3	1	0	4	100
140CS0302	Digital System Design	3	0	0	3	100
140CS0303	Principles of Communication Engineering	3	0	0	3	100
140CS0304	Data Structures	3	0	0	3	100
140CS0305	Java Programming	3	0	0	3	100
140CS0306	Operating Systems	3	0	0	3	100
PRACTICAL						
140CS0307	Digital Design Laboratory	0	0	3	2	100
140CS0308	Data Structures Laboratory	0	0	3	2	100
140CS0309	Operating Systems Laboratory	0	0	3	2	100
	TOTAL	**18**	**1**	**9**	**25**	**900**
LIST OF ONE CREDIT COURSES OFFERED						
Practical approach of Problem Solving Techniques						
Open Source programming Using Linux						

SEMESTER IV

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS0401	Discrete Mathematics	3	1	0	4	100
140CS0402	Microprocessor Systems and Interfacing	3	0	0	3	100
140CS0403	Design and Analysis of Computer Algorithms	3	0	0	3	100
140CS0404	Database Systems	3	0	0	3	100
140CS0405	UNIX Internals	3	0	0	3	100
140CS0406	Principles of Software Engineering	3	0	0	3	100
PRACTICAL						
140CS0407	Microprocessor Systems and Interfacing Laboratory	0	0	3	2	100
140CS0408	Design and Analysis of Computer Algorithms Laboratory	0	0	3	2	100
140CS0409	Database Systems Laboratory	0	0	3	2	100
	TOTAL	**18**	**1**	**9**	**25**	**900**
LIST OF ONE CREDIT COURSES OFFERED						
PHP/MySQL						
Programming Mobile Application and Android Handheld Systems						

SEMESTER V

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS0501	Computer Networks	3	0	0	3	100
140CS0502	Formal Languages and Automata Theory	3	0	0	3	100
140CS0503	System Software Design	3	0	0	3	100
140CS0504	Computer Architecture	3	0	0	3	100
140CS0505	Web Technologies	3	0	0	3	100
140CS0506	Data warehousing and Mining	3	0	0	3	100
PRACTICAL						
140CS0507	Computer Networks Laboratory	0	0	3	2	100
140CS0508	System Software Design Laboratory	0	0	3	2	100
140CS0509	Web Technologies Laboratory	0	0	3	2	100
	TOTAL	**18**	**0**	**9**	**24**	**900**

SEMESTER VI

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS0601	Artificial Intelligence	3	0	0	3	100
140CS0602	Compiler Design	3	0	0	3	100
140CS0603	Software Quality Assurance and Testing	3	0	0	3	100
140CS0604	Object Oriented System Design	3	0	0	3	100
XXX	Elective – I	3	0	0	3	100
XXX	Elective – II	3	0	0	3	100
PRACTICAL						
140CS0607	Compiler Design Laboratory	0	0	3	2	100
140CS0608	Object Oriented System Design Laboratory	0	0	3	2	100
140CS0610	Mini Project	0	0	3	2	100
	TOTAL	**18**	**0**	**9**	**24**	**900**

ELECTIVES I & II

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS9161	TCP/IP	3	0	0	3	100
140CS9162	Multimedia Systems and Applications	3	0	0	3	100
140CS9163	Advanced Data Structures	3	0	0	3	100
140CS9164	Network Security	3	0	0	3	100
140CS9165	Big Data	3	0	0	3	100
140CS9166	Probability and queuing theory	3	0	0	3	100

SEMESTER VII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS0701	Engineering Economics & Cost Analysis	3	0	0	3	100
140CS0702	Open Source Software Development	3	0	0	3	100
140CS0703	Graphics and Visualization	3	0	0	3	100
XXX	Elective – III	3	0	0	3	100
XXX	Elective – IV	3	0	0	3	100
PRACTICAL						
140CS0707	Open Source Software Development Lab	0	0	3	2	100
140CS0708	Graphics and Visualization Lab	0	0	3	2	100
140CS0810	Project Work (Annual Pattern)	0	0	3	-	100
	TOTAL	**15**	**0**	**9**	**19**	**800**

SEMESTER VIII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS0801	Principles of Management	3	0	0	3	100
XXX	Elective – V	3	0	0	3	100
XXX	Elective – VI	3	0	0	3	100
PRACTICAL						
140CS0810	Project Work (Annual Pattern)	0	0	12	8	200
	TOTAL	**9**	**0**	**12**	**17**	**500**

ELECTIVES III & IV

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS9170	Professional Ethics	3	0	0	3	100
140CS9171	High Speed Networking	3	0	0	3	100
140CS9172	User Interface Design	3	0	0	3	100
140CS9173	Neural Network and Fuzzy Logic	3	0	0	3	100
140CS9174	Digital Image Processing	3	0	0	3	100
140CS9175	Optimization Techniques	3	0	0	3	100
140CS9176	Virtualization	3	0	0	3	100
140CS9177	Social Network Analysis	3	0	0	3	100
140CS9179	Agile Software Development	3	0	0	3	100

ELECTIVES V & VI

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
140CS9181	Distributed Systems Design	3	0	0	3	100
140CS9182	Mobile and Pervasive Computing	3	0	0	3	100
140CS9183	Information Retrieval Techniques	3	0	0	3	100
140CS9184	Graph Theory	3	0	0	3	100
140CS9185	Cyber Security and Cyber Laws	3	0	0	3	100
140CS9186	Business Intelligence	3	0	0	3	100
140CS9187	Information Visualization	3	0	0	3	100
140CS9188	Cloud Technology	3	0	0	3	100

SEMESTER III

Course Code:140CS0301	**Course Title:** ENGINEERING MATHEMATICS III
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:** 60

Prerequisites: The student should have undergone the course(s):
140CO0202 ENGINEERING MATHEMATICS II

Course Outcomes:

At the end of the course the student should be able to:
CO1. Describe vector spaces and its properties.
CO2. Compute the Fourier series expansion for given periodic functions.
CO3. Calculate Fourier transform for aperiodic functions.
CO4. Determine the solution of first and second order PDE.
CO5. Solve one dimensional wave equation, one dimensional heat and two dimensional heat flow equations.

Course Content:

UNIT I LINEAR ALGEBRA 9+3

Vector spaces, subspaces, basis and dimension - Systems of linear equations, linear transformations - Kernel and Image - Geometric ideas - Inner product spaces - Orthogonality - Orthogonal basis - Reflections and Orthogonal maps of the plane - Orthogonal complements and Projections.

UNIT II FOURIER SERIES 9+3

Fourier series – Dirichlet's conditions - Half range Fourier cosine and sine series - Parseval's identity - Fourier series in complex form - Harmonic analysis.

UNIT III FOURIER TRANSFORMS 9+3

Fourier transforms - Fourier cosine and sine transforms - inverse transforms - convolution theorem and Parseval's identity for Fourier transforms - Finite cosine and sine transforms.

UNIT IV PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations- Lagrange's linear equation – Solutions of standard types of first order partial differential equations- Linear partial differential equations of second and higher order with constant coefficients.

UNIT V APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION 9+3

Solutions of one-dimensional wave equation - One-dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (insulated edges excluded) - Fourier series solutions in Cartesian coordinates.

TEXT BOOKS:

1. Venkataraman, M.K., 'Engineering Mathematics Vol.4', National publishing company, 2004.
2. Veerarajan, T., "Transforms and Partial Differential Equations", Tata McGraw Hill, 2012.
3. David C. Lay., "Linear Algebra and its applications," Pearson Education, 2003.

REFERENCES:

1. Grewal. B. S., "Higher Engineering Mathematics", Khanna Publishers,2000.
2. Ramana.B.V. "Higher Engineering Mathematics",Tata Mc-Graw Hill Publishing Company Limited, New Delhi.
3. Erwin kreyszig, "Advanced Engineering Mathematics",Wiley India, 8th edition, 2007.

WEB REFERENCES:

- http://nptel.ac.in/courses/122107037/19
- http://nptel.ac.in/courses/111108066/
- http://freevideolectures.com/Course/2349/Networks-and-Systems/7
- http://freevideolectures.com/Course/2300/Multivariable-Calculus/15
- http://nptel.ac.in/courses/111103021/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										√
CO2	√	√										√
CO3	√	√										√
CO4	√	√										√
CO5	√	√										√

Course Code: 140CS0302	**Course Title:** DIGITAL SYSTEM DESIGN
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Demonstrate the simplification of Boolean functions by employing Boolean algebra & K-map method and to implement digital circuits using universal logic gates.

CO2. Design and analyze a combinational logic circuit

CO3. Devise state diagram for designing clocked sequential circuit and design asynchronous sequential circuit

CO4. Describe knowledge of the nomenclature and technology in the area of memory devices: ROM, RAM, PROM, PLD,

CO5. Analyses different instruction set architectures and their relationship to the CPU design.

Course Content:

UNIT I NUMBER SYSTEMS AND BOOLEAN ALGEBRA 9

Review of binary, octal and hexadecimal number systems - Conversion methods-Number representations - signed, unsigned, fixed point, floating point numbers- One's complement - Two's complement -addition, subtraction- Computer codes - BCD, Gray code - parity codes- Hamming codes- Boolean algebra – basic postulates, theorems , Boolean functions, canonical forms-logic gates.

UNIT II COMBINATIONAL LOGIC DESIGN 9

Standard representation of logic functions- Simplification of logic functions through K-maps and tabulation method- Implementation using logic gates – Adder, subtractor, decoder, encoder, multiplexer and demultiplexer.

UNIT III SEQUENTIAL CIRCUITS 9

Introduction to sequential circuits- Flip-flops- latches - Level triggering, edge triggering- Master slave configuration - Design and analysis of synchronous sequential circuits- Shift registers - Ring counter - Johnson counter -up/down, binary and modulus counters -Introduction to asynchronous sequential circuits.

UNIT IV MEMORY ORGANIZATION AND TRANSISTOR LOGIC 9

Input/output Organization: Asynchronous Data Transfer - Interrupt initiated I/O - DMA transfer. Memory Organization: Main Memory - ROM, RAM and its types - Programmable memory (PLA and PAL), TTL and ECL.

UNIT V COMPUTER ORGANIZATION AND DESIGN 9

Instruction Code – Computer Instruction – Timing and Control - Instruction Cycle - Memory reference instructions - Input/output Instructions - Design of Basic Computer. Central Processing Unit: General Register Organization -Stack Organization –Instruction Format- Addressing Modes.

TEXT BOOKS:

1. Morris Mano M, "Digital Design ", Prentice-Hall of India, New Delhi, 2006.
2. Morris Mano M, "Computer System Architecture", Prentice Hall of India, New Delhi, 2007.

REFERENCES:

1. Floyd T. L., "Digital Fundamentals ", Charles E. Merrill publishing Company, 10th edition, USA, 2009
2. Tocci R. J., "Digital Systems: Principles and applications", Prentice Hall of India, New Delhi, 2001.
3. William I Fletcher, "An Engineering Approach to Digital Design ", Prentice-Hall of India, New Delhi, 1980.

WEB REFERENCES:

- https://www.cl.cam.ac.uk/teaching/0708/DigElec/Digital_Electronics_pdf.pdf
- http://ocw.utm.my/file.php/48/7-Combinational_Logic_Design_2.pdf

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√		√				√			√
CO2	√	√	√		√					√		
CO3	√	√	√		√		√	√			√	
CO4	√		√							√	√	
CO5	√	√	√	√	√		√					

Course Code: 140CS0303	**Course Title:** PRINCIPLES OF COMMUNICATION ENGINEERING
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
140CS0106 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Outcomes:
At the end of the course the student should be able to:
CO1. Design simple systems for generating and demodulating amplitude modulated signals
CO2. Analyse analog and digital communication system
CO3. Describe the use of controlled interference to achieve maximum data rate
CO4. Identify the various standards used in data communication
CO5. Evaluate the techniques in spread spectrum and multiple access techniques

Course Content:

UNIT I FUNDAMENTALS OF ANALOG COMMUNICATION 9

Basic schemes of modern communication system-Need for modulation-Types. Basics of amplitude modulation (Definition, Am waveforms, Equation, Frequency spectrum and bandwidth, Modulation index and power distribution).Angle Modulation-Frequency Modulation, Equation of FM wave, Effect of Noise in FM Noise, Pre-Emphasis and De-Emphasis, Comparison of AM and FM signals.
Phase Modulation-Definition and equation of a PM wave.

UNIT II DIGITAL COMMUNICATION 9

Introduction, Shannon limit for information capacity, bits, bit rate, baud. ASK-FSK, FSK Transmitter, Receiver, phase shift keying – binary phase shift keying QPSK, Quadrature Amplitude modulation (Principle, transmitter and Receiver block diagram only). Bandwidth efficiency, carrier recovery and clock recovery, DPSK.

UNIT III DIGITAL TRANSMISSION 9

Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise ratio – companding (analog and digital)- Vocoders-, delta modulation, adaptive delta modulation, differential pulse code modulation, Inter-symbol interference, eye patterns.

UNIT IV DATA COMMUNICATIONS 9

Introduction-Network architecture, protocol and standards-Layered network architecture-OSI- Data communication circuits and Networks, Data communication codes-Baudot, ASCII and EBCDIC only- Error Detection, Error correction-DTE,DCE-UART(Principle and transmitter and receiver block diagram only)-serial interface- RS232 only- parallel interfaces- Data communication modems.

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

DS spread spectrum with coherent binary PSK, Processing gain, FH spread spectrum, multiple access techniques – TDMA, FDMA and CDMA in wireless communication systems.

TEXT BOOKS:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6/e, Pearson Education, 2007.
2. B.Sklar,"Digital Communication Fundamentals and Applications",2/e Pearson Education 2007.

REFERENCES:

1. Taub. H., Schilling .D.L, Saha. G.,"Principles of Communication",3/e,2007.
2. Lathi. B.P.,"ModernAnalog and Digital Communication systems", 3/e, Oxford University Press, 2007
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
4. Simon Haykin, "Communication Systems", 4th Edition, John Wiley &Sons. 2001.
5. Simon Haykin, "Digital Communication", 4th Edition, John Wiley &Sons.2001.

WEB REFERENCES:

- http://nptel.ac.in/courses/106108098/LearningDataCommunication.pdf
- http://ncert.nic.in/NCERTS/l/leph207.pdf

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√		√		√	√			√	
CO2	√	√										√
CO3	√				√		√					
CO4		√			√			√				
CO5	√				√		√				√	

Course Code: 140CS0304	**Course Title:** DATA STRUCTURES
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
140CS0205 OBJECT ORIENTED PROGRAMMING CONCEPTS

Course Outcomes:

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

CO1. Comprehend the working of linear data structures and identify their applications
CO2. Understand the organization of various tree data structures and apply them for efficient retrieval of data
CO3. Apply heaps for solving problems and evaluate various hashing techniques
CO4. Develop algorithms to implement various searching and sorting techniques
CO5. Employ graph data structure for solving real world problems.

Course Content:

UNIT I LINEAR STRUCTURES 10

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list Implementation: singly - doubly- circularly linked lists – applications of lists – Stack ADT (Array and List implementation) – Queue ADT (Array and list implementation) – circular queue implementation – Applications of stacks and queues

UNIT II TREE STRUCTURES 10

Tree ADT- Preliminaries – Binary Tree ADT- Tree traversals – expression trees – binary search tree ADT – AVL tree ADT – B-Trees

UNIT III HEAPS AND HASHING 8

Heaps: binary heaps – applications of binary heaps
Hashing: General idea – Hash function – Separate Chaining – Open Addressing – Rehashing – Double Hashing

UNIT IV SEARCHING AND SORTING 8

Searching :Linear search – Binary Search - Sorting : Preliminaries – Insertion sort – Shell sort – Heap sort – Merge sort – Quick Sort – External Sorting.

UNIT V GRAPHS 9

Definitions – Topological sort – breadth-first traversal –Depth-first traversal - shortest-path algorithms: Unweighted Shortest Paths - Dijkstra's algorithm - minimum spanning tree : Prim's and Kruskal's algorithms – biconnectivity – Euler circuits

TEXT BOOK:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in Java", 3rd Edition, Pearson Education, 2011.

REFERENCES:

1. SartajSahni, "Data Structures, algorithms and applications in Java", 2nd Edition, Universities Press, 2005.
2. Mark Allen Weiss, "Data Structures & Problem Solving using Java", Pearson/Addison Wesley, 2010.
3. Yedidyah Langsam, Moshe Augenstein, Aaron M.Tenenbaum, "Data Structures using Java TM", 4th Edition 2009.

WEB REFERENCES:

- NPTEL "Data Structures and Algorithms" Course Content:. URL: http://nptel.ac.in/courses/106102064/1
- Lecture Notes based on Mark Allen Weiss book. URL: http://faculty.simpson.edu/lydia.sinapova/www/cmsc250/LN250_Weiss/Contents.htm
- Data Structures and Algorithm Visualizations. URL: http://visualgo.net/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√							√
CO2	√	√	√	√	√		√		√	√		√
CO3	√	√	√	√	√		√		√	√		√
CO4	√	√	√									
CO5	√	√	√	√	√				√	√	√	√

Course Code: 140CS0305	**Course Title:** JAVA PROGRAMMING
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):

140CS0205- OBJECT ORIENTED PROGRAMMING CONCEPTS

Course Outcomes:

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

CO1. Enumerate the principles of object orientation and Java fundamentals.
CO2. Demonstrate user and predefined exception handling mechanisms and Multithreading concept in Java.
CO3. Investigate the existing Java utilities and their functionalities.
CO4. Determine suitable file handling mechanisms for Java applications.
CO5. Construct applet based applications using interfaces, event handling and AWT controls.

Course Content:

UNIT I INTRODUCTION 8

Introduction – Object Oriented Concepts - Java Language Fundamentals – Operators, Expressions and Control Structures – Classes and Objects – Inheritance

UNIT II PACKAGES, EXCEPTIONS AND THREADS 9

Packages- Interfaces – Exception Handling – Exception Types - Java Thread Model – Multithreading – Thread Priorities - Synchronization.

UNIT III JAVA UTILITIES 9

Collection Interfaces – Collection Classes – Using Iterator – Comparators – legacy classes and interfaces- string tokenizer – Date – Calendar – Gregorian calendar- Time

UNIT IV INPUT OUTPUT STREAMS 9

I/O Classes and interfaces – Handling Files – Byte Streams – Character Streams – Serialization – String Handling

UNIT V APPLET AND AWT 10

Applet Basics - Event handling – Event Class – Event Listener interfaces – AWT basics- AWT controls

TEXT BOOKS:

1. Herbert Schildt,"The Complete Reference JAVA2", 7th edition, Tata McGraw-Hill, 2007.
2. Deitel. M. and Deitel, "Java How to Program", 7/e, Prentice Hall Publications, 2009.

REFERENCES:

1. Julio Sanchez, Maria P.Canton, "JAVA Programming for Engineers", CRC Press, 2002.
2. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, "The Java Language Specification", 2nd Edition, Addison-Wesley, 2000.

WEB REFERENCES:

- Introduction to Programming in Java URL: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092-introduction-to-programming-in-java-january-iap-2010/
- Java Preparation URL: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092-java-preparation-for-6-170-january-iap-2006/lecture-notes/
- Java lectures URL: http://www.cse.iitb.ac.in/~nlp-ai/java%20ppt/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√				√							√
CO2		√	√	√	√				√	√	√	√
CO3	√	√	√	√	√				√	√	√	√
CO4		√	√	√	√	√			√	√	√	√
CO5	√	√	√	√	√	√	√	√	√	√	√	√

Course Code: 140CS0306	**Course Title:** OPERATING SYSTEMS
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Classify computer based systems and understand different components of operating systems.
CO2. Compare and analyze various scheduling algorithms, synchronization problems and solutions and deadlock handling methods.
CO3. Explain the various memory management concepts including allocation, paging, segmentation and virtual memory.
CO4. Describe file systems and the major mechanisms for File Management in an operating system.
CO5. Examine and discuss the Linux OS based on operating system concepts and fundamentals.

Course Content

UNIT I INTRODUCTION 9

Main frame Systems, Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time systems – Hand held Systems, Operating Systems Structures: System Components – Operating System Services – System calls – System Programs – Process Concepts – Process Scheduling – Operation on Process – Co-Operating process – Inter Process Communication.

UNIT II PROCESS MANAGEMENT 10

CPU scheduling: Basic Concepts – Scheduling Algorithms. Process Synchronization: The Critical Section Problem – Synchronization Hardware – Semaphores – classical problem of Synchronization – Monitors –Deadlock: Deadlock Characterization – Methods for handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

UNIT III MEMORY MANAGEMENT 9

Background – Swapping – Contiguous Memory Allocation – Paging – Segmentation – Segmentation with paging – Virtual Memory: Demand paging – Page Replacement – Thrashing. Buddy Systems – Storage Compaction.

UNIT IV FILE SYSTEMS 9

File Concepts – Access methods – Directory Structure – File Protection – File System Implementation: File System Structure and Implementation – Directory Implementation – Allocation methods Free Space Management – Recovery – Disk Structure – Disk Scheduling.

UNIT V CASE STUDY – LINUX 8

The Linux System – Design Principles – Kernel modules – Process Management – Scheduling – Memory Management – File Systems – I/O – Security.

TEXT BOOK:

1. AviSilberschatz, Galvin. P.B., Gagne. G. "Operating System Concepts", 7th edition, John Wiley & Sons, 2007.

REFERENCES:

1. Pradeep K.Sinha, "Distributed Operating System: Concepts and Design", IEEE computer Society Press, PHI, 2004.
2. Andrew S. Tanenbaum , "Modern Operating Systems", PHI , 2nd Edition, 2001

WEB REFERENCES:

- Operating System Engineering | Electrical Engineering and Computer Science | MIT OpenCourseWare. URL: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/
- NPTEL : Computer Science and Engineering - Operating System. URL: http://www.nptel.ac.in/courses/106108101/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√									√
CO2	√	√										
CO3	√	√										
CO4	√	√										
CO5	√		√		√	√						√

Course Code: 140CS0307	**Course Title:** DIGITAL SYSTEM DESIGN LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

CO1. Explain the basic electronics of logic circuits and be able to use integrated IC packages.
CO2. Construct and troubleshoot digital circuits.
CO3. Demonstrate theoretical device operation can be implemented in properly connected digital circuits.
CO4. Design combinational and sequential circuits can be implemented using logic gates.
CO5. Analyse and test a digital circuit using computer software application.

List of Experiments:

1. Study of Gates & Flip-flops
2. Half Adder and Full Adder
3. Magnitude Comparator (2-Bit)
4. Encoders and Decoders
5. Multiplexer and Demultiplexer
6. Code Converter
7. Synchronous Counters
8. Ripple Counter
9. Mod - N Counter
10. Shift Register - SISO & SIPO
11. Verilog HDL based design of combinational circuits and sequential circuits

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√									√	√	
CO2			√	√							√	
CO3					√				√	√		
CO4			√		√				√			
CO5		√			√		√					

Course Code: 140CS0308	**Course Title:** DATA STRUCTURES LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Implement linear data structures using array and linked list representations and use these in various applications.
CO2. Develop implementations of binary search trees, AVL trees and heap
CO3. Devise programs for sorting, searching and hashing operations with appropriate visualizations
CO4. Solve the shortest path problem and visualize the process

List of Experiments:

1. Implementation of linked lists
2. Applications of linked lists
3. Stack Implementation
4. Applications of stack
5. Queue Implementation
6. Implementation of binary search tree
7. Implementation of AVL trees
8. Implementation of binary heaps
9. Implementation of Hashing
10. Implementation of searching
11. Implementation of sorting (Visualization using Applet)
12. Implementation of shortest path algorithms (Visualization using Swing Components)

Note: Object Oriented Programming, Multithreading, exception handling concepts should be included in relevant programs.

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code:140CS0309	**Course Title:** OPERATING SYSTEMS LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Simulate basic operations of UNIX using system calls.
CO2. Implement and analyze CPU scheduling algorithms.
CO3. Demonstrate problems related to synchronization by simulation.
CO4. Implement and analyze memory allocation strategies.

List of Experiments

- Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
- Write programs using the I/O system calls of UNIX operating system open, read, write, etc
- Write C programs to simulate UNIX commands like ls, grep, etc.
- Implementation of the following Scheduling algorithms with the given details.
- List of processes, their CPU burst times and arrival times, display/print the Gantt chart for all the algorithms. For each of the scheduling policies given below, compute and print the average waiting time and average turnaround time.
    a. FCFS
    b. SJF
    c. Priority
    d. Round robin
- Implementation of Synchronization problems.
- Simulate the following memory allocation strategies.
    a. First fit
    b. Worst fit
    c. Best fit

Mapping of Course Outcomes to Programme Outcomes:

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

SEMESTER IV

Course Code: 140CS0401	**Course Title:** DISCRETE MATHEMATICS
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:** 60

Prerequisites: The student should have undergone the course(s):
140CS0301 ENGINEERING MATHEMATICS III

Course outcomes:

At the end of the course the student should be able to:
CO1: Apply the basics of logic in programming languages.
CO2: Use the concepts of relations and functions in algorithms.
CO3: Apply the concept of number theory in encryption and decryption algorithms
CO4: Develop the concept of algebraic structures which applies in network security.
CO5: Solve the real time problems using the knowledge of probability and standarddistributions

Course Content:

UNIT I MATHEMATICAL LOGIC 9 + 3

Propositional logic-connectives-tautology and contradiction-Normal forms-equivalences and implications-Inference theory-Predicate calculus-Quantifiers- equivalences and implications-Inference theory.

UNIT II RELATIONS AND FUNCTIONS 9 + 3

Sets-Cartesian product-Relations-Equivalence relation-partial ordering relations-Functions-Types of functions-Special functions: Permutation function-Hashing function-Recursive function

UNIT III NUMBER THEORY 9 + 3

Prime and composite numbers-Relative primes-Seive of Eratosthenes-Fundamental theorem of arithmetic-Euler's theorem-Congruence modulo-Fermat's little theorem-Chinese remainder theorem.

UNIT IV GROUP THEORY 9 + 3

Semigroup-Group-Abelian Group- Cyclic and permutation Group-Sub Group-Cosets-Normal Subgroup-Lagrange's theorem-Rings-Division rings-Commutative ring-Field-Finite field.

UNIT V PROBABILITY 9 + 3

Basic concepts of Probability-Sum and Product rule-Conditional Probability-Total Probability-Baye's theorem-One dimensional random variable-Mean and Variance-Discrete, Binomial, Poission and Geometric distributions.

TEXT BOOKS:

1. Tremblay. J.P., Manohar. R., Discrete Mathematical Structures with Applications to computer science, Tata Mc-GrawHill Publishing Company limited, New Delhi.
2. Hsiung. C.Y., Elementory theory of numbers, Allied Publishers, 1995
3. Kandasamy. P., Thilagavathi. K., Gunavathi. K., Probability, Random Variables and Random Process, S.Chand& Co, 2003.

REFERENCES:

1. Ross, S., "A first course in probability", 6th Edition, Pearson Education, Delhi, 2002.
2. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2002.

WEB REFERENCES:

- http://nptel.ac.in/video.php?subjectId=106106094
- http://nptel.ac.in/syllabus/syllabus.php?subjectId=111104028
- http://nptel.ac.in/syllabus/syllabus.php?subjectId=111106052
- http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html
- http://nptel.ac.in/courses/111103020/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√							
CO2	√	√	√	√	√							
CO3	√	√	√	√	√							
CO4	√	√	√	√	√							
CO5	√	√	√	√	√							

Course Code: 140CS0402	**Course Title:** MICROPROCESSOR SYSTEMS AND INTERFACING
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
140CS0302 DIGITAL SYSTEM DESIGN

Course Outcomes:

At the end of the course the student should be able to:
CO1. Understand the architecture and basic function of the microcontroller
CO2. Visualize the programmer's model of ARM processor.
CO3. Understand and analyze the instruction set associated with various ARM processors.
CO4. Design, develop and interface complete microprocessor based systems to peripheral devices and systems, at chip level.
CO5. Realize the usage of Communication interface in ARM processor

Course Content:

UNIT I INTRODUCTION TO MICROPROCESSORS & MICROCONTROLLERS 9

History of Microprocessors-Architecture of 8086 Microprocessor–8051 Microcontroller Architecture– Signals – Operational features – Memory and I/O addressing – Interrupts – Instruction set-Serial Communication Interfacing.

UNIT II HIGH PERFORMANCE RISC ARCHITECTURE – ARM 9

Introduction to ARM processors and RISC Architecture-Organization of CPU – Bus architecture –Memory management unit- ARM Organization and implementation.

UNIT III PROGRAMMING ARM PROCESSOR 9

ARM instruction set- Thumb Instruction set- addressing modes – Programming the ARM processor. Simple programs.

UNIT IV ARM BASIC PERIPHERAL INTERFACING 9

I/O interface concepts-interrupts-types of interrupts-ARM interrupts-serial communication-real-time clock and simple digital LED interface - LCD display interfacing- GLCD display interfacing – TFT display interfacing -the keyboard interfacing-the touch screen interfacing

UNIT V ARM COMMUNICATION INTERFACING 9

Synchronous and asynchronous data transfer- UART based communication- I2c Protocol basics -serial communication using I2c bus: RTC Interfacing, EEPROM data transfer - Ethernet communication – I2S voice bus interface communication.

TEXT BOOK:

1. Steve Furber ," ARM System –On –Chip architecture ", Addision Wesley , 2000
2. Kenneth J.Ayala, "The 8051 microcontroller Architecture, Programming and applications", 4th edition, Penram international, 2008

REFERENCES:

1. Andrew Sloss, Dominic Symes& Chris Wright, "ARM system Developer's guide", Elsevier.2005.
2. Ray and Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill Publishing Company, New Delhi, 2nd Edition, 2006.
3. Todd D. Morton, "Embedded Microcontrollers", Prentice Hall, 2001.
4. John Peatman, Design with Microcontroller McGraw Hill Publishing Co Ltd, New Delhi, 2nd Edition,2005.

WEB REFERENCES:

- http://www.daenotes.com/electronics/digital-electronics/Intel-8085-8-bit-microprocessor
- http://www.engineersgarage.com/microcontroller
- http://infocenter.arm.com/help/index.jsp
- http://www.arm.com/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√						√		√	√
CO2	√	√	√	√					√		√	√
CO3	√	√		√							√	
CO4	√		√			√	√	√		√		
CO5	√		√		√		√	√	√	√	√	√

Course Code: 140CS0403	**Course Title:** DESIGN AND ANALYSIS OF COMPUTER ALGORITHMS
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course:
140CS0304–DATA STRUCTURES

Course Outcomes:

At the end of the course the student should be able to:
CO1. Understand the steps in designing an algorithm and the notations used in analysis.
CO2. Develop recursive and non-recursive algorithms and analyze their complexity.
CO3. Apply Divide & Conquer and Decrease & Conquer approaches for solving problems.
CO4. Design algorithms using Greedy method and Dynamic Programming approach.
CO5. Analyze the limitations of algorithm power and design solutions using Backtracking, Branch & Bound approach.

Course Content:

UNIT I BASIC CONCEPTS OF ALGORITHMS 8

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

UNIT II MATHEMATICAL ASPECTS AND ANALYSIS OF ALGORITHMS 8

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

UNIT III SIMPLE ALGORITHMIC DESIGN TECHNIQUES 9

Brute Force: String Matching – Exhaustive Search -Divide-and-Conquer: Strassens's Matrix Multiplication -Closest-pair and Convex-Hull Problems – Decrease-and –Conquer: Insertion sort

UNIT IV GREEDY METHOD AND DYNAMIC PROGRAMMING 10

Greedy Technique: Prim's algorithm, Kruskal's algorithm, Huffman trees - Dynamic Programming: Computing a binomial coefficient, Warshall's and Floyd's algorithms-OBST.

UNIT V BACKTRACKING & BRANCH AND BOUND 10

Backtracking: N-Queens Problem – Hamiltonian Circuit – Subset–sum problem. Branch-and-Bound: Assignment Problem-Knapsack problem – Travelling salesman problem. Limitations of Algorithm Power – P, NP and NP- complete problems.

TEXT BOOK:

1. AnanyLevitin, "Introduction to the Design & Analysis of Algorithms", Pearson Education, 2nd edition, 2005.
2. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", 2nd edition, Galgotia Publications, New Delhi, 2003.

REFERENCES:

1. Aho. A.V., Hopcroft. J. E. and Ullman. J. D., "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2003.
2. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2003.
3. Cormen.T.H.,Leiserson.C.E., Rivest. R.L. and Stein.C., "Introduction to Algorithms", PHI Pvt. Ltd., 2001.

WEB REFERENCES:

- NPTEL Design and Analysis of Algorithms Course Content:. URL: http://nptel.ac.in/courses/106101060/
- John McHugh and Dr.R.W.M.Lyttle, The Animation of Recursion. URL: http://www.animatedrecursion.com/
- Stephen Cook, The P versus NP problem, URL: http://www.claymath.org/millennium/P vs NP/pvsnp.pdf
- Algorithmic Puzzles. URL: http://www.cut-the-knot.org/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√	√	√	√		√					√
CO3	√	√	√	√	√							√
CO4	√	√	√	√	√							√
CO5	√	√	√	√	√		√		√	√	√	√

Course Code: 140CS0404	**Course Title:** DATABASE SYSTEMS
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Outline the different data models and basic concepts of a database
CO2. Impart knowledge on database creation, manipulation and posing complex SQL queries of relational databases.
CO3. understand the data storage and query processing details with different data structures
CO4. Create an understanding of transaction processing and the manner in which database systems support ACID properties.
CO5. Provide familiarity in the concepts related to advanced and recent databases and applications

Course Content:

UNIT I INTRODUCTION AND CONCEPTUAL MODELING 8

Introduction to File and Database systems- Database system structure - Data Models - ER model - Relational Model - Relational Algebra and Calculus.

UNIT II RELATIONAL MODEL 9

SQL - Data definition- Queries in SQL- Updates- Views - Integrity and Security- Embedded SQL- Relational Database design - Functional dependences and Normalization for Relational Databases (up to BCNF).

UNIT III DATA STORAGE AND QUERY PROCESSING 9

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques - Index Structure for files -Different types of Indexes- B-Tree – B^+ Tree- Query Processing.

UNIT IV TRANSACTION MANAGEMENT 10

Transaction Processing - Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules - Concurrency Control - Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control - Recovery Techniques - Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT V CURRENT TRENDS 9

Object Oriented Databases - Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogeneous- Distributed data Storage –Distributed Transactions- Data Mining and Data Warehousing.

TEXT BOOK:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- "Database System Concepts", 6th Edition, McGraw-Hill, 2010.

REFERENCES:

1. RamezElmasri and Shamkant B. Navathe, "Fundamental Database Systems", 3rd Edition, Pearson Education, 2003.
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
3. Hector Garcia-Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000.
4. Peter Rob and Corlos Coronel- "Database System, Design, Implementation and Management", Thompson Learning Course Technology- 5th edition, 2003.

WEB REFERENCES:

- Database System Concepts EBook -www.db-book.com/ and codex.cs.yale.edu/avi/db-book
- www.w3schools.com/sql/
- http://www.eazynotes.com/pages/database-management-system/transaction management.html
- http://www.comptechdoc.org/independent/database/basicdb/dataobject.html

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√		√	√					√	√	√
CO2	√	√	√	√	√	√					√	√
CO3	√	√	√	√	√						√	√
CO4	√		√	√	√	√	√				√	√
CO5	√	√	√	√	√	√	√	√			√	√

Course Code: 140CS0405	**Course Title:** UNIX INTERNALS
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
140CS0306 – OPERATING SYSTEMS

Course Outcomes:

At the end of the course the student should be able to:
CO1. Determine the components of Unix architecture and system structure.
CO2. Outline the buffer cache and demonstrate the working of i-node process.
CO3. Identify the various system calls for the specific task.
CO4. Illustrate the techniques for process control and process states.
CO5. Demonstrate the process scheduling, swapping and illustrate I/O subsystems.

Course Content:

UNIT I GENERAL OVERVIEW OF THE SYSTEM 9

History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel: Architecture of the UNIX operating system – Introduction to system concepts – Kernel data structures – System administration – Summary and Preview.

UNIT II BUFFER CACHE 9

Buffer headers – Structure of the buffer pool – Advantages and disadvantages of the buffer cache. Internal representation of files: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Other file types.

UNIT III SYSTEM CALLS FOR FILE SYSTEM 9

Open – Read – Write – File and record locking – Adjusting the position of file I/O –LSEEK – Close – File creation – Creation of special files – Pipes – Dup – Mounting and unmounting file systems

UNIT IV THE STRUCTURE OF PROCESSES 9

Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process. Process Control: Process creation – Signals – Process termination– Awaiting process termination – Invoking other programs – The shell – System boot and the INIT process.

UNIT V PROCESS SCHEDULING AND MEMORY MANAGEMENT POLICIES 9

Process Scheduling – Memory Management Policies: Swapping – A hybrid system with swapping and demand paging. The I/O Subsystem: Driver Interfaces– Disk Drivers-Terminal Drivers.

TEXT BOOK:

1. Maurice J. Bach, “The Design of the Unix Operating System”, Prentice Hall of India, 2004.

REFERENCES:

1. Uresh Vahalia, “Unix Internals: The New Frontiers”, Pearson Education Inc, 2003.
2. John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications, 2004.
3. Daniel P. Bovet & Marco Cesati, “Understanding the Linux Kernel”, O’REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000.
4. Beck et al. M., “Linux Kernel Programming”, Pearson Education Asia, 2002.

WEB REFERENCES:

- Maurice J. Bach, “The Design of the Unix Operating System”, Prentice Hall of India, 2004. URL:https://robot.bolink.org/ebooks/Design%20of%20the%20Unix%20Operating%20System%20By%20Maurice%20Bach.pdf
- Unix System calls. URL:https://www.youtube.com/watch?v=xHu7qI1gDPA
- Using a named pipe. URL:https://www.youtube.com/watch?v=sP50GHDmfhY
- http://www.tutorialspoint.com/unix/unix-getting-started.htm

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√							√		√
CO2	√	√	√	√					√	√		√
CO3	√	√	√									√
CO4	√	√	√	√					√	√		√
CO5	√	√	√	√					√	√		√

Course Code: 140CS0406	**Course Title:** PRINCIPLES OF SOFTWARE ENGINEERING
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Compare and choose a life cycle model for software engineering projects.
CO2. Determine the software requirements for a system by applying appropriate requirements engineering processes.
CO3. Analyze and build efficient design and architecture for a variety of software systems.
CO4. Plan and prepare testing strategies and techniques for software systems.
CO5. Understand managing software projects and using CASE tools by applying various management concepts including cost estimation, project scheduling, and maintenance.

Course Content:

UNIT I SOFTWARE PROCESS 9

Introduction -S/W Engineering Paradigm - life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering - computer based system - verification - validation - life cycle process - development process -system engineering hierarchy.

UNIT II SOFTWARE REQUIREMENTS 9

Functional and non-functional - user - system -requirement engineering process - feasibility studies - requirements - elicitation - validation and management - software prototyping - prototyping in the software process - rapid prototyping techniques - user interface prototyping -S/W document. Analysis and modeling - data, functional and behavioral models - structured analysis and data dictionary.

UNIT III DESIGN CONCEPTS AND PRINCIPLES 9

Design process and concepts - modular design - design heuristic - design model and document. Architectural design - software architecture - data design - architectural design - transform and transaction mapping - user interface design - user interface design principles. Real time systems - Real time software design - system design - real time executives - data acquisition system - monitoring and control system. SCM - Need for SCM - Version control - Introduction to SCM process - Software configuration items.

UNIT IV TESTING 9

Taxonomy of software testing - levels - test activities - types of s/w test - black box testing - testing boundary conditions - structural testing - test coverage criteria based on data flow mechanisms - regression testing - testing in the large. S/W testing strategies - strategic approach and issues - unit testing - integration testing - validation testing - system testing and debugging.

UNIT V SOFTWARE PROJECT MANAGEMENT 9

Measures and measurements - S/W complexity and science measure - size measure - data and logic structure measure - information flow measure. Software cost estimation - function point models –
COCOMO model- Delphi method.- Defining a Task Network - Scheduling - Earned Value Analysis - Error Tracking - Software changes - program evolution dynamics - software maintenance - Architectural evolution. Taxonomy of CASE tools.

TEXT BOOK:

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 5th edition, 2001.

REFERENCES:

1. Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
3. James F Peters and Witold Pedryez, "Software Engineering - An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
4. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.

WEB REFERENCES:

- Software Engineering: A Practitioner's Approach, 5th Edition. URL: http://www.mhhe.com/engcs/compsci/pressman/
- Software Engineering 10th Edition. URL: http://iansommerville.com/software-engineering-book/
- Software Engineering Institute. URL: http://www.sei.cmu.edu/
- The differences between life cycle models- Advantages and Disadvantages. URL: https://narbit.wordpress.com/2012/06/10/the-differences-between-life-cycle-models-advantages-and-disadvantages/
- NPTEL : Computer Science and Engineering - Software Engineering (Video Tutorials). URL: http://www.nptel.ac.in/courses/106101061/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√				√					
CO2	√	√	√									
CO3	√	√	√									
CO4	√		√									
CO5	√		√		√	√	√	√			√	√

Course Code: 140CS0407	Course Title: MICROPROCESSOR SYSTEMS AND INTERFACING LAB
Core/Elective: Core	Credits (L : T : P : C : M) – 0 : 0 : 3 : 2 : 100
Type: Practical	Total Contact Hours: 45

Course Outcomes:

At the end of the course the student should be able to:
CO1. Understand and apply the fundamentals of assembly level programming of basic microcontrollers
CO2. Knowledge of the 8051 instruction set and ability to utilize it in programming
CO3. Understand basic knowledge in programming the ARM LPc2148
CO4. Acquire the solid foundation on interfacing external devices to processors

Course Content:

SIMPLE PROGRAMS (Using ARM processor and 8051 Microcontroller)

- 16 bit Addition, Subtraction, Multiplication and Division
- Largest and Smallest number
- Ascending and Descending numbers
- Sum of Series

INTERFACING

- Stepper motor interface using 8051
- Implementation of Interrupts.
- Implementation of Real Time Timer.
- Implementation of 4x4 Keyboard Control Systems.
- Implementation of 8 Segment LED Display.
- Implementation of Characters on LCD Display.
- Communication interface

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 140CS0408	**Course Title:** DESIGN AND ANALYSIS OF COMPUTER ALGORITHMS LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

At the end of the course the student should be able to:
CO1. Perform empirical analysis to identify the efficient searching and sorting techniques.
CO2. Choose the suitable algorithm design strategy for solving the given problem.
CO3. Develop efficient programs for solving various graph problems.
CO4. Employ Backtracking, Branch and Bound approaches for solving combinatorial problems.

List of Experiments:

1. Implementation of Sorting Algorithms
2. Implementation of Binary Search Algorithm
3. Implementation of Minimum Spanning Tree Algorithm
4. Implementation of Knapsack Algorithm
5. Implementation of Multistage Graphs
6. Implementation of All pair shortest Path Algorithm
7. Implementation of Eight Queens Problem
8. Implementation of Graph Coloring
9. Implementation of Dijkstra's algorithm
10. Implementation of Traveling Salesman Problem

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 140CS0409	**Course Title**: DATABASE SYSTEMS LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

At the end of the course the student should be able to:
CO1: Understand the need of SQL concepts
CO2: Understand the High-level language extension of cursors and triggers
CO3: construct simple applications using Front and Back end
CO4: impart knowledge on embedded SQL programs

List of Experiments:

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. PL/SQL Programs
4. Procedures and Functions
5. High-level language extension with Cursors.
6. High level language extension with Triggers
7. Embedded SQL.
8. Design and implementation of Payroll Processing System.
9. Design and implementation of Banking System
10. Design and implementation of Library Information System.

Mapping of Course Outcomes to Programme Outcomes:

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

Regulation – 2011

Curriculum and Syllabus for B.E Computer Science and Engineering

SEMESTER I

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CO101	Technical English	2	0	2	3	100
11CO102	Engineering Mathematics - I	3	1	0	4	100
11CO103	Engineering Physics	3	0	0	3	100
11CO104	Engineering Chemistry	3	0	0	3	100
11CO105	C Programming	3	0	0	3	100
11AU106	Basics of Electrical and Electronics Engineering	3	0	0	3	100
PRACTICAL						
11CO108	Engineering Practices Laboratory (Electrical, Electronics and PC hardware)	0	0	3	2	100
11CO210	Engineering Physics and Chemistry Laboratory (Annual Pattern)	0	0	3	-	-
11CO109	Engineering Graphics	2	0	3	3	100
11CO110	C Programming Laboratory	0	0	3	2	100
	TOTAL	**19**	**1**	**14**	**26**	**900**

SEMESTER II

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CO201	Communication Skills	2	0	2	3	100
11CO202	Engineering Mathematics – II	3	1	0	4	100
11CO203	Material Science	3	0	0	3	100
11CO204	Environmental Science	3	0	0	3	100
11CS205	Object Oriented Programming Concepts	3	0	0	3	100
11CS206	Basics of Civil and Mechanical Engineering	3	0	0	3	100
PRACTICAL						
11CO207	Engineering Practices Laboratory	0	0	3	2	100
11CO210	Engineering Physics and Chemistry Laboratory (Annual Pattern)	0	0	3	2	100
11CS210	Object Oriented Programming Laboratory	0	0	3	2	100
	TOTAL	**17**	**1**	**11**	**25**	**900**

SEMESTER III

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11AU301	Engineering Mathematics– III	3	1	0	4	100
11CS301	Digital System Design	3	0	0	3	100
11CS302	Principles of Communication Engineering	3	0	0	3	100
11CS303	Data Structures	3	0	0	3	100
11CS304	Java Programming	3	0	0	3	100
11CS306	Operating Systems	3	0	0	3	100
PRACTICAL						
11CS307	Digital Design Laboratory	0	0	3	2	100
11CS308	Data Structures Laboratory	0	0	3	2	100
11CS309	Operating Systems Laboratory	0	0	3	2	100
	TOTAL	**18**	**1**	**9**	**25**	**900**

SEMESTER IV

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS401	Discrete Mathematics	3	1	0	4	100
11CS402	Microprocessor Systems and Interfacing	3	0	0	3	100
11CS403	Design and Analysis of Computer Algorithms	3	0	0	3	100
11CS404	Database Systems	3	0	0	3	100
11CS405	UNIX Internals	3	0	0	3	100
11CS406	Principles of Software Engineering	3	0	0	3	100
PRACTICAL						
11CS407	Microprocessor Systems and Interfacing Laboratory	0	0	3	2	100
11CS408	Design and Analysis of Computer Algorithms Laboratory	0	0	3	2	100
11CS409	Database Systems Laboratory	0	0	3	2	100
	TOTAL	**18**	**1**	**9**	**25**	**900**

SEMESTER V

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS501-R	Computer Networks	3	0	0	3	100
11CS502	Formal Languages and Automata Theory	3	0	0	3	100
11CS503	System Software Design	3	0	0	3	100
11CS504	Computer Architecture	3	0	0	3	100
11CS505	Web Technologies	3	0	0	3	100
11CS506	Data warehousing and Mining	3	0	0	3	100
PRACTICAL						
11CS507	Computer Networks Laboratory	0	0	3	2	100
11CS508	System Software Design Laboratory	0	0	3	2	100
11CS509	Web Technologies Laboratory	0	0	3	2	100
	TOTAL	**18**	**0**	**9**	**24**	**900**
LIST OF ONE CREDIT COURSES OFFERED						
Cloud Computing						
Communication and Image Processing Using Matlab						
Business Intelligence and Data Analytics						
Server Side Scripting using Python						

SEMESTER VI

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS601	Artificial Intelligence	3	0	0	3	100
11CS602	Compiler Design	3	0	0	3	100
11CS603	Software Quality Assurance and Testing	3	0	0	3	100
11CS604	Object Oriented System Design	3	0	0	3	100
XXX	Elective – I	3	0	0	3	100
XXX	Elective – II	3	0	0	3	100
PRACTICAL						
11CS607	Compiler Design Laboratory	0	0	3	2	100
11CS608	Object Oriented System Design Laboratory	0	0	3	2	100
11CS610	Mini Project	0	0	3	2	100
	TOTAL	**18**	**0**	**9**	**24**	**900**
LIST OF ONE CREDIT COURSES OFFERED						
Mobile Application Development using Windows						
Data Analytics using R tool						
Mobile Application development using jQuery						

ELECTIVES I & II

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS961	TCP/IP	3	0	0	3	100
11CS962	Multimedia Systems and Applications	3	0	0	3	100
11CS963	Advanced Data Structures	3	0	0	3	100
11CS964	Network Security	3	0	0	3	100
11CS965	Big Data	3	0	0	3	100
11CS966	Probability and queuing theory	3	0	0	3	100

SEMESTER VII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS701	Engineering Economics & Cost Analysis	3	0	0	3	100
11CS702-R	Open Source Software Development	3	0	0	3	100
11CS703	Graphics and Visualization	3	0	0	3	100
XXX	Elective – III	3	0	0	3	100
XXX	Elective – IV	3	0	0	3	100
PRACTICAL						
11CS706-R	Open Source Software Development Lab	0	0	3	2	100
11CS707	Graphics and Visualization Lab	0	0	3	2	100
11CS810	Project Work (Annual Pattern)	0	0	3	-	100
	TOTAL	**15**	**0**	**9**	**19**	**800**

SEMESTER VIII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS801	Principles of Management	3	0	0	3	100
XXX	Elective – V	3	0	0	3	100
XXX	Elective – VI	3	0	0	3	100
PRACTICAL						
11CS810	Project Work (Annual Pattern)	0	0	12	8	200
	TOTAL	**9**	**0**	**12**	**17**	**500**

ELECTIVES III & IV

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS970	Professional Ethics	3	0	0	3	100
11CS971	High Speed Networking	3	0	0	3	100
11CS972	User Interface Design	3	0	0	3	100
11CS973	Neural Network and Fuzzy Logic	3	0	0	3	100
11CS974	Digital Image Processing	3	0	0	3	100
11CS975	Optimization Techniques	3	0	0	3	100
11CS976	Virtualization	3	0	0	3	100
11CS977	Social Network Analysis	3	0	0	3	100
11CS979	Agile Software Development	3	0	0	3	100

ELECTIVES V & VI

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
11CS981	Distributed Systems Design	3	0	0	3	100
11CS982	Mobile and Pervasive Computing	3	0	0	3	100
11CS983	Information Retrieval Techniques	3	0	0	3	100
11CS984	Graph Theory	3	0	0	3	100
11CS985	Cyber Security and Cyber Laws	3	0	0	3	100
11CS986	Business Intelligence	3	0	0	3	100
11CS987	Information Visualization	3	0	0	3	100
11CS988-R	Cloud Technology	3	0	0	3	100

SEMESTER V

Course Code: 11CS501-R	**Course Title:** COMPUTER NETWORKS
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS306 – OPERATING SYSTEMS

Course Outcomes:

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

CO1. Comprehend the concepts of data communications and Computer Networks.
CO2. Demonstrate functionalities of different layers.
CO3. Describe IEEE standards employed in computer networking and implement routing protocols.
CO4. Design different protocols and network components.
CO5. Illustrate the security over the network and design different application.

Course Content:

UNIT I FOUNDATIONS OF NETWORKS 7

Requirements – Network Architecture – Implementing Network Software – Bandwidth and Latency –Delay X Bandwidth product –Application Performance needs.

UNIT II LINK LAYER 9

Perspectives on Connecting – Encoding (NRZ, NRZI, Manchester, 4B/5B) – Framing (Bit and Byte Oriented Protocols) – Error Detection (Parity, Internet Checksum, CRC) – Reliable transmission – Ethernet and Multiple Access Networks – Wireless

UNIT III INTERNETWORKING 10

Internet Protocol (IP) – Service Model - Global Addresses - Datagram Forwarding in IP – Subnetting and Classless Addressing – ARP – DHCP – ICMP – Routing protocols: RIP and OSPF – IPv6 – Challenges for Mobile Networking – Mobile IP

UNIT IV END-TO-END PROTOCOLS 10

UDP – TCP: Segment Format, Connection Establishment and Termination- Sliding Window Protocol – TCP Extensions – TCP Congestion Control – Congestion Avoidance Mechanisms.

UNIT V SECURITY & APPLICATIONS 9

Cryptographic Building Blocks – Symmetric vs Public-Key Ciphers – Key Management - Transport layer Security – SSL – HTTPS – IPSec – Wireless Security – Firewalls – SMTP – World Wide Web (HTTP) – Web Services – DNS – SNMP

TEXT BOOK:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks – A Systems Approach", 5th Edition, The Morgan Kaufmann Publishers, 2011.

REFERENCES:

1. James F. Kurose, Keith W. Ross, "Computer Networking – A top down Approach Featuring the Internet", 4th Edition, Pearson Education, 2006
2. William Stallings, "Data and Computer Communication", 6th Edition, Pearson Education, 2000.
3. Jochen Schiller, "Mobile Communication", Addison Wesley, 2000

WEB REFERENCES:

- Larry L. Peterson and Bruce S. Davie, "Computer Networks – A Systems Approach", Fifth Edition, The Morgan Kaufmann Publishers, 2011 URL: http://booksite.elsevier.com/9780123850591/
- OPNET Tool :URL: http://www.opnet.com/university_program/itguru_academic_edition
- Lecture Notes. URL: http://nptel.ac.in/courses/IIT-MADRAS/Computer_Networks/
- http://nptel.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Computer%20networks/New_index1.html/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									√
CO2	√	√	√						√	√		√
CO3	√	√	√	√	√							√
CO4	√	√	√	√	√				√	√		√
CO5	√	√	√	√	√			√	√	√	√	√

Course Code: 11CS502	**Course Title:** FORMAL LANGUAGES AND AUTOMATA THEORY
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS403 DESIGN AND ANALYSIS OF COMPUTER ALGORITHMS

Course Outcomes:

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

CO1. Design a machine for recognizing Regular Languages
CO2. Construct an automaton for recognizing context free languages
CO3. Understand the concepts of computability theory and design a Turing machine
CO4. Analyze the Time Complexity for Class NP Problems
CO5. Examine the Space Complexity of automaton

Course Content:

UNIT I REGULAR LANGUAGES 9

Automata, Computability and Complexity – Regular Languages: Finite Automata – Nondeterminism – Regular Expressions – Non regular Languages

UNIT II CONTEXT-FREE LANGUAGES 7

Context-Free Grammars – Pushdown Automata – Non Context-Free Languages

UNIT III COMPUTABILITY THEORY 11

Turing Machines – Variants of Turing Machines – Decidability: Decidable Languages –Undecidability – Reducibility: Undecidable Problems from Language Theory – Post Correspondence Problem – Mapping Reducibility

UNIT IV TIME COMPLEXITY 9

Measuring Complexity – The Class P – The Class NP – NP-completeness – Additional NP-complete Problems

UNIT V SPACE COMPLEXITY 9

Savitch's Theorem – The Class PSPACE – PSPACE-completeness – The Classes L and NL –NL-completeness – NL equals coNL – Approximation Algorithms – Probabilistic Algorithms

TEXT BOOK:

1. Michael Sipser, "Introduction to the Theory of Computation", Cengage Learning, Thomson Asia, 3rd Edition, 2013.

REFERENCES:

1. E.Hopcroft, J.D.Ullman, "Introduction to Automata Theory, Languages and Computation",Pearson, Education Publishers, 3rd Edition, 2008.
2. Kamala Krithivasan and R. Rama, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education, Delhi, 1st Edition, 2009.

WEB REFERENCES:

- Formal languages and automata theory. URL: http://www.ics.uci.edu/~goodrich/teach/cs162/notes/
- http://nptel.ac.in/courses/106106049/
- JFLAP tool -Home. URL: www.jflap.org/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√		√							
CO2	√	√	√		√							
CO3	√	√	√	√								√
CO4	√	√		√								√
CO5	√	√		√								√

Course Code: 11CS503	**Course Title:** SYSTEM SOFTWARE DESIGN
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS402-MICROPROCESSOR SYSTEMS AND INTERFACING

Course Outcomes:
At the end of the course the student should be able to:
CO1. Identify the relationship between system software and machine architecture.
CO2. Design and implement the different type of assemblers
CO3. Design and implement the linkers and loaders
CO4. Construct a macro processors and illustrate software tools
CO5. Inspect and characterize the architecture of Virtual Machines.

Course Content:

UNIT I MACHINE ARCHITECTURE 8
Evolution of the components of a Programming system - General Machine Architecture - Machine Language - Assembly language – Language Processors

UNIT II ASSEMBLERS 9
Elements of an Assembly Language Programming- Simple Assembly Scheme- Pass structure of Assemblers- Design of a two pass assembler – A single pass Assembler-Case study: IBM PC

UNIT III LOADERS AND LINKERS 10
Loader Schemes- Design of an absolute loader- Design of a direct linking loader – Relocation and linking concepts – Design of a linker – Self Relocating Programs- Linking for overlays.

UNIT IV MACROPROCESSORS & SOFTWARE TOOLS 9
Macro Definition and Call- Macro Expansion- Nested Macro Calls- Advanced Macro facilities-Design of a Macro processor. Software tools for Program development- Editors- Debug monitors – Programming Environments- User Interfaces

UNIT V VIRTUAL MACHINES 9
Introduction to Virtual Machines (VM) – Pascal P-Code VM – Object-Oriented VMs – Java VMArchitecture

TEXT BOOKS:

1. Dhamdhere D M, "Systems Programming and Operating Systems", Tata McGraw HillPublishing Company, New Delhi, 2nd revised edition 2009.
2. John J Donovan, "Systems Programming", Tata McGraw Hill Publishing CompanyLimited, New Delhi, 2009.
3. James E.Smith and Ravi Nair, "Virtual Machines", Elsevier, 2005

REFERENCES:

1. Leland L Beck, "System Software- An Introduction to System Programming", PearsonEducation, New Delhi, 3rd edition, (6th Impression) 2007.
2. J.Nithyashri, "System Software", Tata Mc-graw Hill Publishing Company Limited, New Delhi, 2nd Edition 2010.

WEB REFERENCES:
- System software and Design. URL: elearning.vtu.ac.in/CS51.html

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									√
CO2	√	√	√	√								√
CO3	√	√	√	√								√
CO4	√	√	√		√		√			√		√
CO5	√	√		√		√						√

Course Code: 11CS504	**Course Title:** COMPUTER ARCHITECTURE
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS402 -MICROPROCESSOR SYSTEMS AND INTERFACING

Course Outcomes:

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

CO1. Describe the organization, addressing and architectural components of a computer
CO2. Compare the functionality and performance of various processor families
CO3. Infer the characteristics of multiprocessing and parallel processing systems
CO4. Illustrate the concept of pipelining and address the crosscutting issues
CO5. Demonstrate Instruction Level Parallelism with dynamic scheduling

Course Content:

UNIT I INTRODUCTION 9

Basic structure of computers - machine instruction - memory allocation and address -instructions, sequencing. Accessing I/O devices - interrupts - DMA Buses - Interface Circuits -Standard I/O interfaces.

UNIT II BASIC PROCESSING UNIT AND PROCESSOR FAMILIES 9

Fundamental concepts - multiple bus organization - superscalar operation - Ultra SPARC II.Embedded system - processor chips – microcontroller - programming considerations.Processor families - overview of ARM Family and Intel Family.

UNIT III LARGE COMPUTER SYSTEM 9

Parallel processing - Array Processor - Structure of General Purpose Multiprocessors -Interconnection Networks - Parallelism & shared variable - Multi computers – Programmersview of shared memory & Message passing - Amdahl's Law.

UNIT IV PIPELINING 9

Introduction - The Major Hurdle of pipelining - pipeline Hazards - Pipelining Implementation -Extending the MIPS pipeline to handle multicycle operations - Overview of MIPS R4000Pipeline - crosscutting issues.

UNIT V INSTRUCTION - LEVEL PARALLELISM 9

Concepts and Challenges - Basic Compiler Techniques for Exposing ILP - Reducing BranchCosts with Prediction - Overcoming Data Hazards with Dynamic Scheduling - Examples andthe Algorithm - Hardware Based Speculation - Exploiting ILP Using Multiple Issue and StaticScheduling, Dynamic Scheduling and Speculation.

TEXT BOOKS:

1. Carl Hamacher, Zvonok Vranesic Safwat Zaky, "Computer Organization", 5th edition, McGraw Hill, 2002.
2. John L. Hennessey and David A. Patterson, "Computer Architecture: A Quantitative Approach", 5th Edition, Elsevier, 2011.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture -Designing for Performance", Pearson Education, 9th Editi on, (Hardcover Revised) 2012.
2. David A. Patterson and John L. Hennessey, "Computer Organization and design, The Hardware/Software Interface", 4th Edition, Morgan Kaufmann, 2009.
3. John P.Hayes, "Computer Architecture and Organization", 3rd edition, McGraw Hill, 2002.
4. B.Govindarajalu, "Computer Architecture and Organization", 2nd edition, McGraw Hill, 2010.

WEB REFERENCES:

- Carl Hamacher, Zvonok Vranesic Safwat Zaky, "Computer Organization", 5th edition, McGraw Hill, 2002. URL: http://www.technolamp.co.in/2011/04/computer-organization-carl-hamacher.html
- Carl Hamacher, Zvonok Vranesic Safwat Zaky, "Computer Organization", 5th edition, McGraw Hill,2002.URL:http://www.cse.iitk.ac.in/users/karkare/courses/2011/cs220/html/notes.html
- John L. Hennessey and David A. Patterson, "Computer Architecture: A Quantitative Approach", 5th Edition,Elsevier,2011.URL:https://books.google.co.in/books/about/Computer_Architecture.html?id=v3-hVwHnHwC&hl=en
- NPTEL: Computer Science and Engineering- "Computer Architecture". URL: http://www.nptel.ac.in/courses/106102062/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√		√			√	√	√		√
CO2	√	√	√		√	√			√	√	√	√
CO3		√	√	√	√				√	√	√	√
CO4	√	√	√	√	√		√		√	√	√	√
CO5		√	√	√	√			√	√	√	√	√

Course Code: 11CS505	**Course Title:** WEB TECHNOLOGIES
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS304 – JAVA PROGRAMMING

Course Outcomes:

At the end of the course the student will be able to:
CO1. Create web pages with various XHTML concepts and JavaScript features.
CO2. Construct web pages using dynamic scripting languages.
CO3. Outline the concepts of XML and apply its features in web.
CO4. Demonstrate the JSP and ASP scripting language.
CO5. Illustrate Servlets along with its features.

Course Content:

UNIT I XHTML - JAVA SCRIPT 8

Internet and World Wide Web – XHTML –Lists- Forms- Cascading style sheets-JAVA Script –Memory Concepts- Control Statements – Functions – Arrays – Objects.

UNIT II DYNAMIC HTML 9

Object Referencing- Collections- Dynamic Style- Dynamic Position- Event Model– Form Processing – Event Bubbling – Filters and Transitions – Flip Filters –Shadows –Gradients – Data Binding – Record Set

UNIT III XML 9

XML Markup- Namespaces-Document Type Definitions-Schema-Document Object Model-XML Path Language –Extensible Style Sheet Language – XLink- XPointer - XInclude – Xbase.

UNIT IV JSP-ASP 10

JSP - Objects – Scripting – Standard Actions – Directives - ASP – Page Objects – File System Objects – Session Tracking and Cookies – ADO –Active-X Components – Form Navigation –Posting Messages.

UNIT V SERVLETS 9

HTTP Servlet – Servlet Life Cycle –Caching- Retrieving Information- HTML Information –Session Tracking-URL Rewriting-Cookies-Security-Applet Servlet Communication - Collaboration.

TEXT BOOK:

1. Deitel & Deitel, Goldberg, "Internet and World Wide Web – How to Program", Pearson Education Asia, 3rd Edition (Reprint) 2005.
2. Deitel & Deitel ,Nieto , Lin ,Sadhu, "XML: How To Program", Pearson Education Asia, 2nd Edition 2009.
3. Jason Hunter, William Crawford,"Java Servlet Programming",O'Reilly Publication, 2nd Edition 2010

REFERENCES:

1. Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and JAVA", Prentice Hall of India – QUE, Platinum Edition, 2001.
2. Ramesh Bangia, Web Technology (including HTML, CSS, XML, ASP, JAVA), Firewall Media, 1st Edition (Reprint) 2008.

WEB REFERENCES:

- http://xwiki.usc.edu/groups/instructionalmaterials/weblog/e5657/XHTML_and_CSS_tutorial.html
- http://www.w3schools.com/html/html_xhtml.asp
- https://www.ischool.utexas.edu/technology/tutorials/webdev/xml_dtds/xml.pdf

- http://www.ceng.metu.edu.tr/~e1195288/JSP_tutorial.pdf
- http://www.java-programming.info/tutorial/pdf/csajsp2/02-Servlet-Basics.pdf
- http://www.nptel.ac.in/courses/106105084/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√				√	√	√		√
CO2	√	√	√	√				√	√	√		√
CO3	√	√	√	√				√	√	√		√
CO4	√	√	√	√	√			√	√	√		√
CO5	√	√	√	√	√			√	√	√		√

Course Code: 11CS506	**Course Title:** DATA WAREHOUSING AND DATA MINING
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS404 - DATABASE SYSTEMS

Course Outcomes:

At the end of the course the student should be able to:
CO1. Determine the components of data warehouse and OLAP techniques.
CO2. Apply the Data Pre-processing techniques and demonstrate the association rule mining process.
CO3. Analyze the different methods and issues in Classification Techniques.
CO4. Illustrate the techniques for clustering the data and detection of outliers
CO5. Identify the techniques for mining heterogeneous data sources such as Text, Multimedia and Spatial data.

Course Content:

UNIT I DATA WAREHOUSING 8
Basic Concepts, Modeling: Data cube and OLAP, Design and Usage, Implementation, Data Generalization by Attribute-Oriented Induction.

UNIT II DATA PREPROCESSING AND ARCHITECTURE 8
Overview of data mining, Patterns, Technologies, Issues in data mining, Data Objects and Attribute Types,
Preprocessing: Cleaning, Integration, Reduction, Transformation, Discretization

UNIT III ASSOCIATION RULE MINING 9
Association Rule Mining: Basics, Frequent Itemset Mining Methods, Pattern Evaluation Methods. Pattern Mining in Multilevel, Multi-Dimensional Space, Constraint–based Frequent Pattern Mining

UNIT IV CLASSIFICATION 10
Basics, Decision Tree Induction, Bayesian Classification, Rule Based Classification, Model Evaluation and Selection, Classification by back propagation, Other Classification Methods

UNIT V CLUSTERING 10
Cluster Analysis, Partitioning methods, Hierarchical methods, Outlier Analysis and Detection Methods
RECENT TRENDS- Spatial Data Mining, Multimedia Data Mining, Text Mining, Data Mining Applications.

TEXT BOOK:
1. Jiawei Han, MichelineKamber and Jian Pei, "Data Mining Concepts and Techniques", 3rd Edition, Elsevier, 2012.

REFERENCES:
1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education 2004.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, 10th Reprint 2007.

3. David Hand, HeikkiMannila, Padhraic Smyth, "Principles of Data Mining", PHI 2004.
4. W.H.Inmon, "Building the Data Warehouse", 3rd Edition, Wiley, 2003.

WEB REFERENCES:

- Han and Kamber: Data Mining --- Concepts and Techniques, 2nd ed., Morgan Kaufmann, 2006. URL: http://web.engr.illinois.edu/~hanj/bk3/bk3_slidesindex.htm
- DATA MINING CLASSIFICATION. URL: http://courses.cs.washington.edu/courses/csep521/07wi/prj/leonardo_fabricio.pdf

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√							
CO2	√	√	√	√	√							√
CO3	√	√		√	√							√
CO4	√	√	√		√	√	√					√
CO5	√		√		√		√					√

Course Code: 11CS507	**Course Title:** COMPUTER NETWORKS LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

At the end of the course the student should be able to:
CO1: Design various LAN topologies and evaluate the performance
CO2: Implement socket programming
CO3: Develop various routing protocols
CO4: Design and Monitor a computer Network.

List of experiments:

The following experiments are to be implemented/ simulated using any of the following tools

- Network Simulator (latest version) and OPNET

1. Simulation of IEEE LAN topologies
2. Building a network topology with proper connectivity
3. TCP and UDP Socket programming
4. Remote Method Invocation and Remote Procedure Call.
5. Implementation of Routing Protocols
6. Study of router configuration
7. Dynamic Host Configuration Protocol.
8. Sliding Window Protocol
9. TCP Congestion Control algorithms
10. Implementation of SNMP protocol.

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 11CS508	**Course Title:** SYSTEM SOFTWARE DESIGN LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

At the end of the course the student should be able to:
CO1: Design a single pass and two pass assembler
CO2: Implement a Macro processor
CO3: Design absolute and re-locatable loader
CO4: Implement a text editor.

List of Experiments:

1. Implementation of a symbol table.
2. Design of a two pass assembler.
3. Design of a one pass assembler.
4. Design of a macro processor.
5. Implementation of an absolute and relocating loader.
6. Implement pass one and pass two of a direct-linking loader.
7. Implementation of a simple text editor.

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 11CS509	**Course Title:** WEB TECHNOLOGIES LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

At the end of the course the student should be able to:
CO1. Construct the dynamic websites with all kinds of tags.
CO2. Illustrate the various concepts of XML.
CO3. Demonstrate with example the concepts of objects using JSP &ASP, components of the Active X objects and HTTP Servlets.
CO4. Develop a project by applying web application technologies and services

List of Experiments

1. Create a website using HTML tags and Cascading style sheets.
2. Implement the java script functions and objects.
3. Implement the Client Side Scripting for Validating the Web Form Controls using DHTML
4. Implement the concepts of XML Schema and DTD
5. Implement the concepts of XML Style Sheet and XLink
6. Implement the concepts of JSP Objects
7. Implement the concepts of ASP objects
8. Implement the Active X components
9. Implement the HTTP Servlets

Mapping of Course Outcomes to Programme Outcomes:

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

SEMESTER VI

Course Code: 11CS601	**Course Title:** ARTIFICIAL INTELLIGENCE
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):

11CS403 DESIGN AND ANALYSIS OF COMPUTER ALGORITHMS

Course Outcomes:

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

CO1. Understand the fundamental concepts of Artificial Intelligence.
CO2. Apply efficient search techniques for Problem Solving
CO3. Devise Knowledge Representation scheme and apply Inference rules
CO4. Interpret the working of various Learning methods
CO5. Apply Artificial Intelligence techniques in Real world systems

Course Content:

UNIT I INTELLIGENT AGENTS 9

Artificial Intelligence: Definition – History – Intelligent Agents – Problem Solving Agents – Toy Problems and Real-world Problems – Searching for Solutions - Uninformed Search Strategies

UNIT II PROBLEM SOLVING 9

Informed Search Strategies: Greedy best-first search – A* search – Heuristic functions – Local search Algorithms and Optimization problems – Online Search Agent – Constraint Satisfaction Problems – Adversarial Search

UNIT III KNOWLEDGE REPRESENTATION 9

Propositional Logic – Reasoning Patterns in Propositional Logic – First Order Logic – Inference in First Order Logic

UNIT IV LEARNING 9

Learning from Observations – Forms of Learning – Learning Decision – Ensemble Learning – A Logical Formulation of Learning – Knowledge in Learning – Explanation Based Learning – Learning using Relevance Information – Inductive Logic Programming

UNIT V PLANNING AND APPLICATIONS 9

The Planning Problem – Planning with State-Space Search – Partial-Order Planning – Conditional Planning. Applications: Communication as action – Formal grammar for English – Information Retrieval – Information Extraction – Speech Recognition

TEXT BOOK:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Prentice Hall, 3rd Edition, 2010.

REFERENCES:

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, 2nd Edition 2003.
2. Patrick Henry Winston, "Artificial Intelligence", Pearson Education / PHI, 2004.

WEB REFERENCES:

- Tool:SWI-Prologhttp://www.swi-prolog.org/downloadhttp://www.swi-prolog.org/pldoc/man?section=quickstart
- AIMA (Artificial Intelligence: A Modern Approach) http://aima.cs.berkeley.edu/ - TEXT BOOK: followedhttp://aima.cs.berkeley.edu/code.html - online code repository C++, Java, Python, LISP
- E Learning courses from IITs and IIIShttp://nptel.ac.in/video.php?subjectId=106105079 – Video Lecture by Prof P. Dasgupta
- MITOPENCOURSEWARE http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/ - Video Lecture by Prof. Patrick Henry Winston
- Learn and explore the concepts in AI –AIspace tool developed at Laboratory of computational Intelligence at University of British Columbia.http://www.aispace.org/index.shtml

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√								
CO2	√	√	√	√								
CO3	√	√	√	√	√		√					
CO4	√	√	√									√
CO5	√	√	√				√			√		√

Course Code: 11CS602	**Course Title:** COMPILER DESIGN
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):

11CS502- FORMAL LANGUAGES AND AUTOMATA THEORY

Course Outcomes:

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

CO1. Describe the phases of compilers, tools and working of a compiler.
CO2. Design and implement a lexical analyzer
CO3. Analyze and develop different types of parsers
CO4. Choose schemes to develop intermediate code and memory space allocation.
CO5. Validate various techniques of code optimization and generation.

Course Content:

UNIT I INTRODUCTION 9

Structure of a Compiler - Applications of Compiler Technology. A Simple Syntax – Directed Translator - syntax definition, syntax-directed translation, Parsing, A translator for simple expressions, Symbol Tables.

UNIT II LEXICAL ANALYSIS 9

The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of Tokens, Finite Automata, Regular expression to an Automata, Optimization of DFA- Based Pattern Matchers.

UNIT III SYNTAX ANALYSIS 9

Context-free grammars, Top-Down Parsing, Bottom-up parsing, Introduction to LR parsing, Powerful LR Parsers.

UNIT IV INTERMEDIATE CODE GENERATION 9

Variants of Syntax Trees, Three – Address Code, Types and Declarations, Translation of Expressions, control flow, Back patching, Switch Statement. **Run-time environments:** Storage organization, stack-allocation of space.

UNIT V OPTIMIZATION &CODE GENERATION 9

Machine-Independent Optimization: The principal sources of optimization, Loops in flow graph

Code Generation: Issues in the design of a code generator, Target Language, Address in the Target code, Basic Block and flow graph. DAG representation of Basic Blocks, A simple code generator, Peephole Optimization. Register allocation and Assignment.

TEXT BOOK:

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D Ullman – Compiler Principles, Techniques and Tools, 2nd Edition, Pearson Education – 2012.

REFERENCES:

1. Keith Cooper, Linda Torczon – "Engineering a Compiler" - Elsevier ,2nd Edition , 2012
2. Steven S. Muchnick – Advanced Compiler Design & Implementation – Harcourt Asia, Morgan Kaufmann – 2010.
3. J. P. Bennet - Introduction to Compiling Techniques- Tata McGraw-Hill Publishing- 2002.

WEB REFERENCES:

- Introduction to Machine Independent Optimization URL: http://nptel.ac.in/courses/106108052/17
- The Static Single Assignment Form URL: http://nptel.ac.in/courses/106108052/31

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									√
CO2	√	√	√	√	√							√
CO3	√	√	√		√							√
CO4	√	√	√	√								√
CO5	√		√	√								√

Course Code:11CS603	**Course Title:** SOFTWARE QUALITY ASSURANCE AND TESTING
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS406 PRINCIPLES OF SOFTWARE ENGINEERING

Course Outcomes:

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

CO1. Identify and explain various models, tools, and approaches for software quality control
CO2. Describe quality related activities such as quality tasks, planning, documentation, reviews and audits for software processes
CO3. Design and execute various Software testing techniques
CO4. Compare and evaluate various levels and types of software testing
CO5. Illustrate and explain various types of object oriented software testing activities

Course Content:

UNIT I SOFTWARE QUALITY AND CONTROL 10

Software Quality – Hierarchical models of Boehm and McCall – Quality measurement –Metrics measurement and analysis – Gilb's approach – GQM Model. Tools for Quality – Ishikawa's basic tools – CASE tools.

UNIT II SOFTWARE QUALITY ASSURANCE 10

SQA versus software quality control - Various Components of SQA system-overview -Quality tasks – SQA plan – Teams – Documentation control– Reviews and Audits.

UNIT III TESTING STRATEGIES AND METHODS FOR TEST CASE DESIGN 9

Introduction to test case design strategies, Black box approach - Random testing, equivalence class partitioning, boundary value analysis, cause effect graphing, state transition testing, White box approach - white box approach to test design, test adequacy criteria, coverage and control flow graphs, covering code logic, data flow and white box test design, loop testing, mutation testing.

UNIT IV LEVELS OF TESTING 8

Levels of testing: Need for testing levels, Unit test, Integration testing, System Testing- Functional testing, Performance testing, Stress testing, Configuration testing, Security testing Recovery testing, Regression testing, Alpha, Beta and Acceptance tests

UNIT V OBJECT ORIENTED TESTING 8

Issues in object oriented testing, Class testing, object oriented integration testing, GUI Testing and Object oriented system testing.

TEXT BOOKS:

1. Allan C. Gillies, "Software Quality: Theory and Management", Thomson Computer press, 2nd Edition, 2003.
2. Stephen H.Kan, "Metrics and models in software quality Engineering", Addison –Wesley, 2nd Edition, 2003.
3. Daniel Galin, "Software Quality Assurance: From Theory to Implementation", Addison-wesley, 2009.
4. Ilene Burstein "Practical Software testing- A process oriented approach", 8th Indian reprint 2010.

REFERENCES:

1. Paul C. Jorgensen "Software Testing, A Craftsman's Approach", 3rd Edition, 4th Indian reprint 2012.
2. Allan C. Gillies, "Software Quality: Theory and Management", Thomson Computer press, 3rd Edition, 2011.

WEB REFERENCES:

- Software Testing Concepts: http://www.tutorialspoint.com/software_testing/
- Testing Levels: http://www.cs.uky.edu/~paulp/CS499/CS499testingnotes.html

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√				√					√	√	√
CO2	√					√				√	√	
CO3	√	√									√	
CO4	√	√	√		√						√	
CO5	√	√	√		√						√	

Course Code: 11CS604	**Course Title:** OBJECT ORIENTED SYSTEM DESIGN
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS406 - PRINCIPLES OF SOFTWARE ENGINEERING

Course Outcomes:

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

CO1. Describe the essence of object-oriented software processes and outline the usage of general purpose modeling language in the field of software Engineering

CO2. Illustrate Object Oriented Analysis and to analyze the functional requirements for a system

CO3. Construct UML diagrams to model various aspects of the systems

CO4. Relate object oriented concepts to all stages of the software development life cycle

CO5. Develop software using object oriented approach (modeling objects from the real world and then using the model to build a language independent design.)

Course Content:

UNIT I INTRODUCTION TO OBJECT ORIENTATION 9

Software related problems, software Engineering concepts, development activities, Introduction to Object Orientation - Development – Themes - Evidence for Usefulness of OO Development-OO modeling history.

UNIT II MODELING CONCEPTS 9

Modeling -Abstraction-The ThreeModels-ClassModeling-State Modeling, Interaction Modeling

UNIT III ADVANCED MODELING CONCEPTS 9

Advanced Class Modeling, Advanced State Modeling, Advanced Interaction Modeling

UNIT IV ANALYSIS AND DESIGN 10

Process overview, System conception, Domain Analysis, Application Analysis, System Design, Class Design

UNIT V IMPLEMENTATION 8

Implementation Modeling – OO languages, Databases, Programming Style

Case Study: ARENA System

TEXT BOOKS:

1. Bernd Bruegge and Allen H. Dutoit, "Object-Oriented Software Engineering: Using UML, Patterns and Java", 3rd Edition, Pearson Education Asia, 2010.
2. Michael Blaha, James Rumbaugh "Object-Oriented Modeling and Design with UML", 2nd Edition, Pearson Education, 5th impression 2009

REFERENCES:

1. Ali Bahrami, "Object Oriented System Development" , Tata McGraw-Hill , 2nd Reprint 2008.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The unified Modeling language user guide", 2nd Edition, Pearson Education, 4th Reprint 2008.
3. James Rumbaugh,Ivar Jacobson, Grady Booch, "The Unified Modeling Language Reference Manual", Second Edition Pearson Education , 4th Reprint 2009.

WEB REFERENCES:

- Michael Blaha, James Rumbaugh "Object-Oriented Modeling and Design with UML", Second Edition, Pearson Education, Fifth impression 2009 https://books.google.co.in/books?id=wirmoiviloYC&pg=PA67&lpg=PA67#v=onepage&q&f=false
- Material: http://people.aub.edu.lb/~ws06/OOCourse.pdf

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√								
CO2	√	√	√	√					√	√		
CO3	√	√	√	√	√				√	√		√
CO4	√	√	√	√					√	√		
CO5	√	√	√	√				√	√	√	√	√

Course Code: 11CS607	**Course Title:** COMPILER DESIGN LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

At the end of the course, the students should able to:
CO1. Design and implementation of the Front end phase of the compiler.
CO2. Construction of Front end phase using LEX and YAAC tool
CO3. Generation of Intermediate code from the Front end phase
CO4. Implementation of Back end phase of the compiler

LIST OF EXPERIMENTS:

1. Construction of NFA from a given regular expression.
2. Construction of minimized DFA from a given regular expression.
3. Lexical Analysis using LEX.
4. Implementation of Shift Reduce Parsing Algorithm.
5. Construction of LR Parsing Table.
6. Syntax Analysis using YACC.
7. Intermediate code generation.
8. Implementation of Code Optimization techniques.
9. Implementation of Code Generation Phase.

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 11CS608	**Course Title:** OBJECT ORIENTED SYSTEM DESIGN LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

At the end of the course the student will be able to:
CO1: Design SRS.
CO2: Construct UML Diagrams and Implement it
CO3: Generate Test cases for the developed system.
CO4: Prepare Requirement, analysis, design and testing documents

For any 2 Applications

I Preparation of SRS and construction of the following diagrams
1. Activity diagram.
2. Use Case diagram.
3. State diagram.
4. Sequence diagram.
5. Collaboration diagram.
6. Class diagram.
7. Deployment diagram.
8. Package diagram.
9. Code generation.
10. Forward and reverse engineering.

II Test Plan, Test case Generation and documentation

Suggested Applications:
Automatic Teller Machine – Library Management System – Inventory Control System – e-shopping system – ARENA System, Ticket Reservation System, Quiz system ,Examination Management system, Course Management system.

Mapping of Course Outcomes to Programme Outcomes:

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

SEMESTER VII

Course Code: 11CS701	**Course Title:** ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Define and describe the basic terminologies and concepts related to economics.
CO2. Outline the various functions of production and analyze using pricing methods.
CO3. Perform cost estimation for material, labor, and different type of jobs.
CO4. Understand and use the various costing methods for operations, processes, and other factors.
CO5. Employ techniques such as balance sheet, average rate of return, payback period, and net present value for accounting.

Course Content:

UNIT I INTRODUCTION 9

Objectives of Managerial Economics, Firm, Cost Estimation, Costing, Cost Accounting, Factors Influencing Managerial Decisions & Theoretical Concepts, Classification and Elements of cost

UNIT II PRODUCTION ANALYSIS AND PRICING 9

Production Function-Least Cost Combination of Inputs-Factor Productivities & Return to Scale-Determinants of Price-Pricing under different objectives and Market Structures-Price Discrimination & Pricing methods in practice

UNIT III ESTIMATION 9

Estimation of Material, Labor and Overhead Cost, Allocation of Overheads. Estimation for different types of jobs

UNIT IV COSTING 9

Job Costing - Operating Costing - Process Costing - Standard Costing (Variance Analysis) GDP

UNIT V ACCOUNTING 9

Balance Sheet - Profit & Loss Statement - Evaluation of Investment decisions – Average Rate of Return-Payback Period-Net Present Value & IRR

TEXT BOOKS:

1. Jawaharlal, Cost Accounting, Tata McGraw-Hill company, 1996.
2. T.P.Banga&S.C.Sharma, Mechancial Estimating and Costing, Khanna Publishers, 1984

REFERENCES:

1. James.C.Van Home, "Fundamentals of fincancial Management", PHI, NewDelhi, 2004.
2. V.L.Mote, Samuel Paul &G.S.Gupta, Managerial Economics-Concepts & Cases, TMH, Co, NewDelhi, 1989.
3. Ramachandran Aryasry&VV.Ramana Murthy, Engg Economics & Financial Accounting, Tata McGraw-Hill company, NewDelhi, 2004

WEB REFERENCES:

- URL: http://web.stevens.edu/ecosys/eng_eco/index.html
- URL: http://www.nptel.ac.in/syllabus/syllabus.php?subjectId=110101003
- URL: http://www.nptel.ac.in/syllabus/syllabus.php?subjectId=110101005

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√				√					√	√
CO2	√	√				√						√
CO3	√	√	√									√
CO4	√	√										√
CO5	√	√			√							√

Course Code: 11CS702-R	**Course Title:** OPEN SOURCE SOFTWARE DEVELOPMENT
Core/Elective: Core	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Outline the open source licenses and contractual issues and also design open source Databases.
CO2. Develop an object oriented program using groovy language
CO3. Combine groovy and grails framework for developing a Mini project.
CO4. Propose an idea for developing a concept using ruby
CO5. Combine ruby and rails framework for developing a Mini project.

Course Content:

UNIT I OPEN SOURCE SOFTWARE & DATABASE DESIGN 9

OPEN SOURCE SOFTWARE: Open Source Initiatives – definition-Open Source Licenses- Legal Issues-Contractual Protections SQL Database : MYSQL- Data types –stored programs NoSQL database :MongoDB – Schema-less, Database, collections, documents, fields, Establish relationships - Create, retrieve, update and delete documents.

UNIT II OPEN SOURCE PROGRAMMING LANGUAGE: GROOVY 9

Groovy as extension of Java - Data types, control structures, special loops & operators- List, Map, String, Date – Closure- Object Oriented groovy-Builders-working with databases

UNIT III OPEN SOURCE PROGRAMMING FRAMEWORK: GRAILS 9

Grails Introduction – commands-Web system evolution – Data Layer- scaffolding – InjectionAttacks-Plugin-Unit and integration testing-Service layer

UNIT IV RUBY 9

Ruby Introduction –variables –objects-numbers and expression-Text and strings-Arrays and List-Ruby application development-Object orientation basics-Databases

UNIT V RAILS 9

Rails on the web-web style-controlling data flow: Controllers and models – scaffolding andREST-Models with forms-model relationships

TEXTBOOKS:

1. Michael R.Overly," The Open Source Handbook", 1st Edition, A BNA Company, 2003
2. Paul Dubios, "MYSQL – Developers Library", 4th Edition,2008
3. Kristina Chodorow, Michael Dirolf, "MongoDB: The Definitive Guide Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Publication, 2010
4. Bashar Jawad, "Groovy and Grails Recipes", 1st Edition, A Press Publication, 2008
5. Peter Cooper," Beginning Ruby: From Novice to Professional", A press Publication, 2009
6. Simon St. Laurent, Edd Dumbill, "Learning Rails", 1st Edition, O'Reilly Publication, 2008

REFERENCES:

1. Jim Shingler, Joseph Faisal Nusairat, Christopher M. Jud, Beginning Groovy and Grails: From Novice to Professional, First Edition, APress Publication, 2008.

WEB REFERENCES:

- Open Source Initiative : http://opensource.org/
- MySQL: https://www.safaribooksonline.com/library/view/mysql-fifth-edition/9780133038552/pref01.html
- Groovy: http://www.groovy-lang.org/
- Grails Framework: https://grails.org/
- Ruby Programming Language: https://www.ruby-lang.org/en/
- Ruby on Rails : http://rubyonrails.org/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√			√				√		
CO2	√	√	√	√	√				√	√	√	√
CO3	√	√	√	√	√				√	√	√	√
CO4	√	√	√	√	√				√	√	√	√
CO5	√	√	√	√	√				√	√	√	√

Course Code: 11CS703	**Course Title:** GRAPHICS AND VISUALIZATION
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CO102 ENGINEERING MATHEMATICS – I
11CO109 ENGINEERING GRAPHICS

Course Outcomes:

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

CO1. Outline the core concepts of Graphics and apply OpenGL API to create Interactive Computer Graphics.
CO2. Illustrate Graphics primitives & attributes and implement it using OpenGL API.
CO3. Distinguish the relationship between 2D and 3D versions of geometrical transformation & clipping algorithms and apply OpenGL API for performing operations.
CO4. Interpret 3D viewing concepts and representation.
CO5. Discriminate visible surface detection methods and select the models for lightning &surface rendering.

Course Content:

UNIT I GRAPHICS SYSTEMS 8

Survey of Computer Graphics – Overview of Graphics Systems–Basic OpenGL Syntax-Related Libraries-Header Files- Complete OpenGL Program- Coordinate Reference Frames-Specifying a Two-Dimensional World Coordinate Reference Frame in OpenGL-OpenGL Point functions- Line functions-Line Drawing Algorithms-Parallel Line Algorithms.

UNIT II GRAPHICS OUTPUT PRIMITIVES AND ATTRIBUTES 9

OpenGL Curve Functions-Circle And Ellipse Generating Algorithm- Fill Area Primitives- Polygon Fill Areas, OpenGL Functions, Attributes Of Output Primitives

UNIT III 2D and 3D GRAPHICS 9

2D Basic Geometric Transformations, Matrix Representation, Composite Transformation, Reflection, Shearing, 2D Viewing and Clipping algorithms, 3D Basic Geometric Transformations.

UNIT IV 3D VIEWING AND REPRESENTATION 10

3D viewing: Concepts, Projection Transformations, Orthogonal Projections, Parallel Projections and Perspective Projections, OpenGL 3D Viewing functions, 3D Object Representation: Polyhedra, OpenGL functions, Curved surfaces, Quadric surfaces, Spline representation, Bezier Curve and surfaces, Octrees, BSP Trees, Fractal Geometry methods

UNIT V VISUALIZATION OF 3D OBJECTS 9

Visible surface detection methods: Classification of algorithms, Back Face Detection, Depth Buffer, A Buffer, Scan Line method, Depth sorting, BSP Tree method, Area subdivision, Octree method-Ray casting, OpenGL functions-**Illumination Models**: Light sources, Surface Lighting methods , Basic Illumination models, Polygon Rendering methods, OpenGL Illumination functions

TEXTBOOK:

1. D. Hearn and M. Pauline Baker, Computer Graphics with OpenGL, Pearson Education, 3rd Edition, 2009

REFERENCES:

1. D. F. Rogers and J. A. Adams, Mathematical Elements for Computer Graphics,2nd Edition 24th reprint, McGraw-Hill International Edition, 2013.
2. F. S. Hill Jr., Computer Graphics using OpenGL, PH, 2007
3. Edward Angel, Interactive Computer GraphicsA Top-Down Approach with OpenGL, 5th Edition, Addison-Wesley, 2008.
4. J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Computer Graphics - Principles and Practice, Second Edition in C, Pearson Education, 2003.
5. Mason Woo, Jackie Neider, Tom Davis, Dave Shreiner ,OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 1.2, Open GL Architecture Review Board, Pearson Education, First Indian Reprint 2000.

WEB REFERENCES:

- OpenGL API
  - https://www.opengl.org/
  - https://www.opengl.org/resources/libraries/glut/ - GLUT downloads
- Tutorials – Game Development
  - http://nehe.gamedev.net/
  - https://www.opengl.org/archives/resources/code/samples/s2001/ - Nate Robins tutorial

- OpenGL Programming Guide
  - http://www.glprogramming.com/red/
- OpenGL Reference Manual
  - http://www.glprogramming.com/blue/
- E Learning Course from IIT and IISC
  - http://nptel.ac.in/courses/106102065/ - Video Lecture notes by Prof Prem K Kalra
- MITOPENCOURSEWARE
  - http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-837-computer-graphics-fall-2012/ - Video Lecture Prof. Wojciech Matusik, Prof. Frédo Durand

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√							
CO2	√	√	√	√								
CO3	√	√	√	√								
CO4	√	√		√	√							
CO5	√	√	√	√	√							

Course Code: 11CS706-R	**Course Title:** OPEN SOURCE SOFTWARE DEVELOPMENT LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Develop web applications with PHP as front end and MongoDB as backend.
CO2. Implement the OOP principles using Groovy
CO3. Write programs in GROOVY and develop applications in GRAILS framework.
CO4. Implement web-based applications in RAILS framework using RUBY.

Areas of Experiments:

- Develop a webpage using PHP and open source databases by validating the certain fields
- Implementation of Database using MONGO
- Groovy text parsing, regular expressions, and SQL
- Framework using Grails
- Ruby OOPs concepts and Databases
- Framework using rails

Mapping of Course Outcomes to Programme Outcomes:

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

Course Code: 11CS707	**Course Title:** GRAPHICS AND VISUALIZATION LABORATORY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:** 45

Course Outcomes

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

CO1. Outline and apply graphics built-in functions in designing and creating simple animation.
CO2. Analyze the algorithms for displaying output primitives and construct complex objects.
CO3. Develop menu driven graphics by combining output primitive algorithms, transformation operations & viewing principles.
CO4. Create projects by conceiving and applying graphics fundamentals.

Areas of Experiments:

1. Implementation of graphics built-in functions
2. Implementation of Line Drawing Algorithms.
3. Implementation of Circle and Ellipse drawing Algorithms
4. Implementation of 2D and 3D Transformation
5. Implementation of 2D clipping
6. Visualizing 3D objects.

Mapping of Course Outcomes to Programme Outcomes:

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

SEMESTER VIII

Course Code:11CS801	**Course Title:** PRINCIPLES OF MANAGEMENT
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Define the concept of management and discuss why organizations are needed, why managers are necessary, and why management is a challenge.

CO2. Explain why planning is needed in organizations and why long-term objectives are necessary for successful planning and Identify the essential characteristics of decision making.

CO3. Differentiate between the various types of organizational structures and patterns. Explain the importance of delegation in organizations and describe the relationship between authority, responsibility and accountability.

CO4. Analyze the leadership function, recognizing leadership as the relationship between a supervisor and subordinates in an organizational environment.

CO5. Recognize the link between planning and controlling, and the various means by which managers measure and compare performance to objectives. Explain why financial controls are used by organizations as the predominant means of control

UNIT I INTRODUCTION 9

Historical developments –approaches to management– Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organization

UNIT II MANAGERS & ENVIRONMENT 9

Social responsibility–Planning – Objectives – Setting Objectives – Process of Managing through Objectives – Strategies- Policies & Planning Premises- Forecasting Techniques – Decision-making

UNIT III FUNCTIONAL AREA ORGANIZATION 9

Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process – Techniques

UNIT IV MOTIVATION & DIRECTIONS 9

Objectives– Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication-Types

UNIT V CONTROLLING STRATEGIES 9

System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology– Computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.

TEXTBOOKS:

1. Harold Koontz & Heinz Weihrich "Essentials of Management"- Tata McGraw- Hill-7th Edition-2007.
2. Tripathy PC and Reddy PN, "Principles of Management"- Tata McGraw-Hill 1999.

REFERENCES:

1. Maheswari S N," Principles of management accounting" Sultan hand&sons 2003
2. Vilas Bagad," Principles of Management", technical publishers,2006.

WEB REFERENCES:

- http://catalog.flatworldknowledge.com/bookhub/reader/5?cid=41991&e=carpenter-ch01
- http://www.nios.ac.in/media/documents/VocInsServices/m1-4f.pdf
- http://discovery.bits-pilani.ac.in/dlpd/courses/coursecontent/courseMaterial/mgtszc211/principles_of_management_notes.pdf
- http://faculty.mercer.edu/jackson_r/Ownership/chap02.pdf

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							√	√	√		√	√
CO2			√	√				√				
CO3				√		√		√	√	√	√	
CO4					√	√			√	√		
CO5			√	√	√	√	√					√

ELECTIVES

Course Code: 11CS961	**Course Title:** TCP/IP
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s): 11CS501–COMPUTER NETWORKS

Course Outcomes:

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

CO1. Characterize and interpret the significance of using Internet Protocol and Transmission Control Protocol.
CO2. Demonstrate the functionality of client and server systems using socket programming
CO3. Identify and illustrate various TCP/IP functionalities used in wireless and ATM systems
CO4. Formulate the required TCP functionalities in higher level application layer protocols
CO5. Develop security solutions in various levels of network communication

Course Content:

UNIT I ADDRESSING AND RELIABILITY 11

IP – Addressing – Sub-netting and Super-netting; The TCP/IP Protocol Suite – Versions – Port address – Communication – Services – Flow control – Silly window syndrome – Error control – Timers Congestion control – Connection – Operation and Package

UNIT II SOCKET INTERFACE 7

Client Server Model – Concurrency – Processes – Sockets – Byte Ordering – Address Transformation and Manipulation – System calls – Iterative Server – Concurrent Server – Client and Server programmes

UNIT III TCP/IP OVER WIRELESS & ATM 9

BOOTP and DHCP – Mobile IP – Addressing – Agent Discovery – Registration – Data Transfer – ATM WANS – Cells – Routing Cells – ARP – LIS – Real Time Traffic over Internet

UNIT IV APPLICATION LAYER PROTOCOLS 10

Domain Name System – Telnet – Rlogin – FTP – TFTP – Simple Mail Transfer Protocol - Hyper Text Transfer Protocol

UNIT V INTERNET SECURITY 8

Privacy – Digital Signature – Security in the Internet – Transport Layer security – Security at the IP layer – Firewalls – Private Networks – NAT – IPv6

TEXT BOOK:

1. Behrouz A. Forouzan, "TCP/IP Protocol suite", Tata McGraw Hill, 2010, 4th Edition.

REFERENCES:

1. Douglas E. Comer, "Internetworking with TCP/IP", 4th Edition, Pearson Education Asia, Volume 1,2 2000.
2. Richard Stevens, "TCP/IP Illustrated", Vol. 1,2,3, Pearson Education India, 1996.
3. John Ray, "Using TCP/IP", Prentice Hall of India, 1999

WEB REFERENCES:

- IIT Madras, National Programming on Technology Enabled Learning (NPTEL) – Data Communications – TCP/IP. URL: http://nptel.ac.in/courses/106105082/35
- Virtual and Software Training- TCP/IP for windows course URL: http://www.vtc.com/products/TCP/IP-for-Windows-tutorials.htm
- EPA University - TCP/IP Networking. URL: http://moodle.epfl.ch/course/view.php?id=523

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√			√	√			√	√	√	√
CO2		√	√	√								√
CO3	√	√	√	√	√	√		√		√	√	√
CO4	√	√	√	√	√			√	√	√	√	√
CO5	√	√	√	√	√		√	√	√	√	√	√

Course Code:11CS962	**Course Title:** MULTIMEDIA SYSTEMS AND APPLICATIONS
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Demonstrate a step-by-step approach to multimedia systems design

CO2. Explain in detail multimedia Image compression standards, Lossless and lossy compression algorithms.

CO3. Devise Video Compression Techniques

CO4. Illustrate the issues related to generic multimedia databases, to describe programmingissues at different levels and cover object based and object oriented approaches

CO5. Depict application related issues: media design, general user-interface topics & multimedia learning, discuss on various possible applications and experiment with a case study

Course Content:

UNIT I MULTIMEDIA AUTHORING AND DATA REPRESENTATION 8

Introduction – components of Multimedia- Multimedia and Hypermedia-WWW- Multimedia software tools- Multimedia authoring and Tools- Graphics and Data Representations – Image data types – Popular File formats

UNIT II MULTIMEDIA DATA COMPRESSION 10

Basics of Information theory-Lossless Compression Algorithms – Run Length Encoding- Variable Length Encoding- Dictionary Based Coding- Arithmetic coding – Lossy Compression Algorithms – Distortion Measures – Rate Distortion theory – Quantization – Transform coding- Image Compression standards

UNIT III VIDEO COMPRESSION TECHNIQUE 9

Basic Video compression Techniques- Video compression based on motion compensation- search for motion vectors –H.261 – MPEG Video Coding – MPEG-I and 2

UNIT IV MULTIMEDIA DBMS AND PROGRAMMING 9

Multimedia specific properties of MMDBMS-Data modeling in MMDBMS- Implementation-Abstraction levels – requirement for Programming Languages – Object Oriented Application development – Object Oriented Frameworks and Class Libraries

UNIT V MULTIMEDIA APPLICATION DESIGN 9

Design specific properties of Images – Visualization –symbols- Illustrations-Image production techniques – User Interfaces – Multimedia Learning-Applications: Media preparation- Editing – Integration – Transmission- Usage – Electronic Books and Magazines-Kiosks- Tele-shopping- Entertainment

TEXT BOOKS:

1. Ze-Nian Li Mark S. Drew," Fundamentals of Multimedia", Pearson Education,2007
2. Ralf Steinmetz KlaraNahrstedt," Multimedia Applications", Springer 2007

REFERENCES:

1. John.F. Koegel Buford, "Multimedia Systems ", Pearson Education, 6th Impression 2009.
2. Tay Vaughon, "Multimedia making it works, "McGraw-Hill Education 2010
3. Ralf Steinmetz and Klara Nahrstedt, "Multimedia: Computing, Communications and Applications", Pearson Education, 6th Impression 2009.

WEB REFERENCES:

- Multimedia Systems:http://link.springer.com/book/10.1007%2F978-3-662-08878-4

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									
CO2	√	√	√	√								
CO3	√	√	√		√					√		
CO4	√	√	√							√		
CO5	√	√	√							√		

Course Code: 11CS963	**Course Title:** ADVANCED DATA STRUCTURES
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course:
11CS303–DATA STRUCTURES

Course Outcomes:

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

CO1. Develop algorithms for efficient search using Tree data structures
CO2. Analyze the working of Priority Queue and its variations
CO3. Identify the need for Disjoint Sets and deploy them in real world problems
CO4. Develop Range Search applications using suitable data structures
CO5. Design applications using Geometric Data structures

Course Content:

UNIT I SEARCH DATA STRUCTURES **10**

Top-Down Splay Trees – Red Black Trees - Treaps – Skip Lists – Tries – Suffix Arrays and Trees

UNIT II PRIORITY QUEUE DATA STRUCTURES **8**

Binary Heap – *d*-Heaps – Leftist Heaps – Skew Heaps – Binomial Queues – Fibonacci Heaps

UNIT III DISJOINT SET ADT **9**

Basic Data Structure – Smart Union Algorithms – Path Compression – Analysis – Application

UNIT IV RANGE SEARCH **9**

1-Dimensional Range Searching – kd-Trees – Range Trees – Higher-Dimensional Range Trees

UNIT V GEOMETRIC DATA STRUCTURES **9**

Interval Trees – Priority Search Trees – Segment Trees – Quad Trees

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures & Algorithms in Java", Pearson Education, 3rd Edition, 2012.
2. Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, "Computational Geometry Algorithms and Applications", Springer, 3rd Edition, 2008.

REFERENCES:

1. Peter Brass "Advanced Data Structures", Cambridge University Press, 1st Edition, 2008.
2. Dinesh P.Mehta, Sartaj Sahni, "Handbook of Data Structures and Applications", Chapman & Hall/CRC, 2005.

WEB REFERENCES:

- Adrian Vladu and CosminNegruşeri, Suffix arrays – a programming contest approach, 2005. URL: http://web.stanford.edu/class/cs97si/suffix-array.pdf
- Applications of Computational Geometry – Geometry in Action. URL: https://www.ics.uci.edu/~eppstein/geom.html
- Data Structure Visualizations URLs:https://www.cs.usfca.edu/~galles/visualization/Algorithms.html
- http://visualgo.net/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√		√					√
CO2	√	√		√	√		√			√		√
CO3	√	√	√	√	√				√		√	√
CO4	√	√	√	√	√		√		√		√	√
CO5	√	√	√	√	√				√		√	√

Course Code: 11CS964	**Course Title:** NETWORK SECURITY
Core/Elective: Core	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):

11CS401- DISCRETE MATHEMATICS and 11CS501-R-COMPUTER NETWORKS

Course Outcomes:

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

CO1. Comprehend and describe the OSI Security Architecture X.800 and use classical encryption/decryption techniques.
CO2. Explain the various modes of operation for block ciphers as well as the various types of symmetric key ciphers.
CO3. Apply number theory and explain a variety of public key cryptographic systems.
CO4. Explain the different types of message authentication and cryptographic hash functions.
CO5. Choose and evaluate techniques for enhancing security on the cloud, web, email, and computer network.

Course Content:

UNIT I INTRODUCTION 9

Introduction – Computer Security Concepts – Security Services, Mechanisms and Attacks – OSI Security Architecture - Basic cryptography - Classical Encryption Techniques: Transposition and Substitution, Caesar Cipher.

UNIT II SYMMETRIC CIPHERS 9

Stream Ciphers vs Block ciphers – Block cipher design principles - Modes of operation: Electronic Code Book, Block Chaining, Counter Mode – Data Encryption Standard (DES) and DES Example – AES: Structure and Key Expansion. Contemporary Ciphers: Multiple DES, RC4 and RC5, Blowfish.

UNIT III PUBLIC KEY ENCRYPTION 9

Introduction to number Theory – Fermat's and Euler's Theorem - Primality testing-factorization –Chinese remainder theorem - Discrete logarithms - RSA Cryptosystem - Diffie-Hellman Key Exchange - Rabin Cryptosystem - Elgamal Cryptosystem.

UNIT IV MESSAGE AUTHENTICATION AND HASH FUNCTIONS 9

Message authentication: Requirements and Functions, Security of MACs – Cryptographic Hash Functions —MD5, SHA, HMAC. Digital Signatures: Elgamal, Schnorr – Kerberos - X.509.

UNIT V NETWORK SECURITY AND SYSTEM SECURITY 9

Network Access Control and Cloud Security: Cloud Security Risks and Countermeasures, Data Protection in Cloud, Cloud Security as Service – Web Security: SSL, TLS, HTTPS – e-mail security: PGP, S/MIME – IP Security: Overview, Policy, and ESP.

TEXT BOOK:

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Pearson Education, New Delhi, 6th edition 2013.

REFERENCES:

1. Behrouz A Forouzan, "Cryptography and Network Security", The McGraw-Hill Companies, Special Indian Edition 2007.
2. Roberta Bragg, Mark Phodes - Ousley, Keith Strassberg, "Network Security: The Complete Reference", Tata McGraw-Hill edition 2004.
3. AtulKahate "Cryptography and Network security", Tata McGraw-Hill Publications Company Ltd. New Delhi, 2nd edition, 2009.

WEB REFERENCES:

- Cryptography. URL: http://williamstallings.com/Cryptography/
- Network Security Protocols: A Tutorial - IETF. URL: https://www.ietf.org/proceedings/61/slides/sectut-0/editorstrain.ppt
- X.800 : Security architecture for Open Systems Interconnection for CCITT applications. URL: http://www.itu.int/rec/T-REC-X.800-199103-I/e
- US-CERT Security Trends Report: 2012 in Retrospect. URL: https://www.us-cert.gov/sites/default/files/US-CERT_2012_Trends-In_Retrospect.pdf
- A simple introduction to NS concepts. URL: http://ptgmedia.pearsoncmg.com/images/1587131625/samplechapter/1587131625content.pdf
- NPTEL: Computer Science and Engineering - Cryptography and Network Security (Video Tutorials). URL: http://www.nptel.ac.in/courses/106105031/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√				√				√		√
CO2	√	√	√									
CO3	√	√	√									
CO4	√	√	√									
CO5	√				√	√				√		√

Course Code: 11CS965	**Course Title:** BIG DATA
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS306- OPERATING SYSTEMS and 11CS404- DATABASE SYSTEMS

Course Outcomes:
At the end of the course the student should be able to:
CO1. Define Big Data and identify applications for Big Data
CO2. Describe and explain the HADOOP framework with HDFS architecture.
CO3. Comprehend the anatomy of MapReduce and explain how a MapReduce job runs.
CO4. Run MapReduce jobs on a Hadoop framework.
CO5. Use Hadoop related tools including Pig, Hive, and HBASE for data analytics.

Course Content

UNIT I BIG DATA and ANALYTICS 8
Big Data - Volume, Velocity, Variety, Veracity – Big Data Analytics Applications – Architecture Components: Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting, Data Privacy Protection, Real-time Adaptive Analytics – Google BigTable and BigQuery – Amazon S3.

UNIT II HADOOP AND HDFS 10
Hadoop - Data Storage and Analysis, Comparison with Other Systems, Apache Hadoop, Hadoop Ecosystem, Hadoop Releases. Design of Hadoop Distributed File System (HDFS), HDFS Concepts, CLI, Filesystems and Interfaces, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives. Hadoop I/O - Data Integrity, Compression, Serialization, File-Based Data Structures.

UNIT III MapReduce 10
MapReduce – Weather Dataset: Analysis with Unix Tools and Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes. Classic vs YARN MapReduce: Anatomy of Job Run, Failures, Scheduling, Shuffle and Sort.

UNIT IV ADVANCED MapReduce 9
MapReduce Types and Formats – Types, Input Formats, Output Formats. MapReduce Features – Counters, Sorting, Joins, Side Data Distribution, MapReduce Library Classes.

UNIT V TOOLS 8
Pig: Comparison with Databases, Pig Latin – Hive: Comparison with Traditional Databases, HiveQL, Tables, Querying Data, User-Defined Functions – Hbase: Hbasics, Concepts, HBase Versus RDBMS.

TEXT BOOK:
1. ArvindSathi, "Big Data Analytics: Disruptive Technologies for Changing the Game (Paperback)", Mc Press, 2013.
2. Tom White, "Hadoop: The Definitive Guide, O'Reilly Publication and Yahoo!Press", 2009.

REFERENCES:
1. Viktor Mayer-Schönberger and Kenneth Cukier, "Big Data: A Revolution That Will Transform How We Live, Work, and Think, Eamon Dolan/Houghton Mifflin Harcourt", 2013.

WEB REFERENCES:
- Google BigQuery, URL: https://developers.google.com/bigquery/sign-up?csw=1#queries
- Amazon S3, URL:http://aws.amazon.com/s3/
- Welcome to Apache™ Hadoop®! URL: https://hadoop.apache.org/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√											
CO2	√				√							√
CO3	√				√							√
CO4	√				√							√
CO5	√		√		√							√

Course Code:11CS966	**Course Title:** PROBABILITY AND QUEUEING THEORY
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS401- Discrete Mathematics

Course Outcomes:

At the end of the course the student should be able to:
CO1: Apply the basics concepts of probability in real life problems.
CO2: Apply the concepts standard probability distributions in real time problems.
CO3: Develop the knowledge in handing random variables.
CO4: Solve and formulate the random process by probabilistic model.
CO5: Solve the real time problems using the knowledge queuing theory.

Course Content:

UNIT I PROBABILITY AND RANDOM VARIABLE 9

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

UNIT II STANDARD DISTRIBUTIONS 10

Discrete distributions: Geometric-Negative Binomial - Continuous distributions: Uniform – Exponential –Normal distributions and their properties (Proofs excluded).

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and regression –Transformation of random variables – Central limit theorem.

UNIT IV RANDOM PROCESSES AND MARKOV CHAINS 9

Classification – Stationary process – Markov process – Poisson process – Birth and death process –Markov chains – Transition probabilities.

UNIT V QUEUEING THEORY 8

Markovian models – M/M/1 – M/M/C – finite and infinite capacity (steady state solutions only) – M/G/1 queues – Pollaczek – Khintchine formula.

TEXT BOOKS:

1. Ross S, "A first course in probability", 9th Edition, Pearson Education, 2012.
2. Veerarajan. T, "Probability, Statistics and Random Processes", 2nd Edition, Tata McGraw Hill, 11th reprint 2007.
3. Taha. H. A., "Operations Research-An Introduction", 9th Edition, Pearson Education Edition, 2010.

REFERENCES:

1. S.Karlin and H.M. Taylor., "An Introduction to Stochastic Modeling" Academic Press, 2007.
2. Richard A Johnson, "Probability and Statistics for Engineers", 7th Edition, Pearson Education, 2005.
3. Gross D. and Harris, C.M., "Fundamentals of Queuing Theory", 4th Edition, John Wiley and Sons, 2008.

WEB REFERENCES:

- http://nptel.ac.in/video.php?subjectId=106106094
- http://nptel.ac.in/syllabus/syllabus.php?subjectId=111104028
- http://nptel.ac.in/syllabus/syllabus.php?subjectId=111106052
- http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html
- http://nptel.ac.in/courses/111103020/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√	√	√							
CO2	√	√		√	√							
CO3		√			√							
CO4	√	√	√	√	√							
CO5	√	√	√		√							

Course Code: 11CS970	**Course Title:** PROFESSIONAL ETHICS
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS201–COMMUNICATION SKILLS

Course Outcomes:

At the end of the course the student should be able to:
CO1. Characterize the fundamental principles and theories in Engineering Ethics
CO2. Define the code of ethics that shape the ethical behavior of the engineer
CO3. Identify the various methods for assessment of Risk Benefit Policies
CO4. Illustrate the significance of societal responsibilities, Loyalty and Professional Rights
CO5. Exhibit professional ethics in society and devise ethical norms for societal and Technological development

Course Content:

UNIT I ENGINEERING ETHICS 9

Senses of Engineering Ethics –The Negative and the Positive face of Engineering Ethics-Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy–The Problems of many Hands–Kohlberg's theory–Gilligan's theory of impediments to Responsible Action–Consensus and Controversy–Professions and Professionalism–Professional Ideals and Virtues –Theories about Right Action-Uses of Ethical Theories

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics –Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – Columbia Space Shuttle Explosion

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

Safety and Risk –Assessment of safety and risk- Social and Value dimensions of Technology- Technology Pessimism –The Perils of Technological Optimism–The Promise of Technology –Computer Technology Privacy and Social Policy–Risk Benefit Analysis– the Three Mile Island and Chernobyl case studies

UNIT IV RESPONSIBILITIES AND RIGHTS 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Whistle Blowing-Employee Rights –Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES 9

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics –Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors– Moral Leadership –Honesty – Integrity and Ingenuity Sample Code of Conduct like ABET, AAES, ASME, ASCE, IEEE, NSPE, Institution of Engineers (India), etc.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", 3rd Edition, McGraw Hill, New York, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics–Concepts and Cases", Thompson Learning, 2000.

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. Gail D.Baura, "Engineering Ethics: An Industrial Perspective", Elsevier Inc, 2006
3. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
4. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

WEB REFERENCES:

- Mike Martin and Roland Schinzinger, "Ethics in Engineering", Third Edition, McGraw Hill, New York, 2005. URL : http://course.sdu.edu.cn/G2S/eWebEditor/uploadfile/20131018102149728.pdf
- Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000 URL:http://www.course.sdu.edu.cn/G2S/eWebEditor/uploadfile/20131017113053223.pdf

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√					√	√	√	√	√		√
CO2	√					√	√	√	√	√		√
CO3	√	√		√	√	√	√	√	√	√	√	√
CO4	√					√	√	√	√	√	√	
CO5	√	√	√	√	√	√	√	√	√	√	√	√

Course Code: 11CS971	**Course Title:** HIGH SPEED NETWORKING
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS501 – COMPUTER NETWORKS

Course Outcomes:

At the end of the course the student should be able to:
CO1. Differentiate the principal services and applications of high speed networking technologies.
CO2. Distinguish the functionalities of various access and traffic control algorithms used in High Speed networks.
CO3. Analyze the properties of packet scheduling and queuing mechanisms
CO4. Characterize the flow and congestion control mechanisms for the applications' desired QoS
CO5. Illustrate the properties of various differentiated services and their applications

Course Content:

UNIT I NETWORK TECHNOLOGIES 8
Network Technologies - QoS Parameters – Control Methods – Deterministic Bound – Call Admission Control for ATM VBR services and Integrated Services Internet

UNIT II TRAFFIC ACCESS CONTROL 9
ATM Traffic Contract and Control Algorithms – Cell delay variation tolerance – Generic Cell Rate Algorithm – Shaping Multiplexer – Integrated Packet Shaper

UNIT III PACKET SCHEDULING AND QUEUING 12
Packet Scheduling Techniques – Packet fair Queuing – RAM –Based Search Engine – General Shaper and Scheduler – Buffer Management

UNIT IV FLOW AND CONGESTION CONTROL 9
Window based Flow Control – Rate-based Flow Control – Predictive Control Mechanism – Flow Control in ATM and TCP/IP Networks – QoS Routing in ATM and Integrated Services

UNIT V DIFFERENTIATED SERVICES 8
SLA and TCA – Architecture – PHB – Conceptual Model – Multiprotocol Labeled Switching – Architecture – Label Distribution and Forwarding Model – Support - Applications

TEXT BOOK:

1. H. Jonathan Chao, XiaoleiGuo, "Quality of Service Control in High-Speed Networks", John Wiley & Sons, Inc, 2002

REFERENCES:

1. James P. G. Sterbenz, Joseph D. Touch, "High Speed Networking – A Systematic Approach to High- Bandwidth Low-Latency Communication", John Wiley Publications, 2002
2. William Stallings, "High Speed Networks and Internets – Performance and Quality of Service", Pearson Education, 2nd Edition.
3. Benny Bing, "High Speed Wireless ATM and LANs", Artech House Publications, 2000

WEB REFERENCES:

- William Stallings, Technical Resources and Course Web Site for High-Speed Networks and Internet. URL: http://www.williamstallings.com/HsNet2e.html
- Classle Learning – High speed Networks-problems and solutions. URL: https://www.classle.net/content-page/high-speed-networks-problems-n-solutions
- Johns Hopkins University, High-Speed Networking Technologies. URL: https://ep.jhu.edu/programs-and-courses/605.473-high-speed-networking-technologies
- A Course on High Speed Networks. URL: https://3cs1101vu.wordpress.com/about/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√									√
CO2		√			√	√						√
CO3	√	√	√	√				√			√	√
CO4		√	√	√	√		√				√	√
CO5		√	√	√		√			√	√		√

Course Code: 11CS972	**Course Title:** USER INTERFACE DESIGN
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS406– PRINCIPLES OF SOFTWARE ENGINEERING

Course Outcomes:

At the end of the course the student should be able to:
CO1. Distinguish various interaction styles
CO2. Comprehend the effect of interfaces on emotions
CO3. Design effective interfaces and evaluate their performance
CO4. Understand various aspects related to mobile interface design
CO5. Design well organized Web interfaces

Course Content:

UNIT I CONCEPTUAL INTERACTION 9

Problem space and Conceptualizing Design – Conceptual Models – Interface Metaphors – Interaction types – Cognitive Aspects – Social Interaction – Conversations – Social Phenomena

UNIT II EMOTIONS AND INTERFACES 9

Emotions and the User Experience – Expressive Interfaces – Frustrating Interfaces – Persuasive Technologies and Behavioral Change – Anthropomorphism and Zoomorphism – Models of Emotion – Interfaces – Natural User Interface

UNIT III INTERACTION DESIGN & EVALUATION 9

The Process of Interaction Design – Issues – Requirements Gathering – Analysis – Interpretation and Presentation -Evaluation Types – The Evaluation Framework – Usability Testing – Experiments – Field Studies

UNIT IV MOBILE HCI 9

Mobile Ecosystem: Platforms–Application frameworks– Types of Mobile Applications– Mobile Information Architecture– Mobile Design–Elements of Mobile Design–Tools.

UNIT V WEB HCI 9

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow, In Page Editing, Static Invitations, Dynamic Invitations.

TEXT BOOKS:

1. Yvonne Rogers, Helen Sharp, Jenny Preece, "Interaction Design: Beyond Human - Computer Interaction", John Wiley & Sons Ltd, 3rd Edition, 2011
2. Brian Fling, "Mobile Design and Development", O'Reilly Media Inc., 1st Edition , 2009
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", O'Reilly, 1st Edition, 2009.

REFERENCES:

1. Jenifer Tidwell, "Designing Interfaces", O'Reilly Publications, 2nd Edition, 2011
2. Wilbert O. Galitz, "An Essential Guide to User Interface Design", John Wiley & Sons Ltd, 3rd Edition, 2007.

WEB REFERENCES:

- User Interface Design and Implementation--- http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-831-user-interface-design-and-implementation-spring-2011/lecture-notes
- Interaction Design. URL: http://www.idc.iitb.ac.in/academics/Interaction-design-course-content.htm

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√					√						
CO2	√			√		√						√
CO3	√		√	√	√	√	√		√	√	√	√
CO4	√					√						√
CO5	√		√		√	√	√		√		√	√

Course Code: 11CS973	**Course Title:** NEURAL NETWORKS AND FUZZY LOGIC
Core/Elective: Elective	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS601 – ARTIFICIAL INTELLIGENCE

Course Outcomes:

At the end of the course the student should be able to:
CO1. Comprehend the concepts related to neural networks and their functioning
CO2. Distinguish between various Supervised and Unsupervised learning neural network architectures and use them in real world problems
CO3. Understand the functioning of Associative Memory Networks
CO4. Distinguish classical and fuzzy set concepts
CO5. Design Fuzzy Reasoning Systems

Course Content:

UNIT I NEURAL NETWORKS 9

Soft Computing Techniques – Neural Networks: Concept & Evolution – Models – Terminologies– McCulloch-Pitts Neuron – Linear Separability – Hebb Network – Supervised Learning Networks: Perceptron – Adaline – Madaline – Back-propagation network – Radial Basis Function network

UNIT II UNSUPERVISED LEARNING NETWORKS 9

Fixed Weight Competitive Nets – Kohonen Self–Organizing Feature Maps – Learning Vector Quantization – Counter propagation Networks – Adaptive Resonance Theory Network

UNIT III ASSOCIATIVE MEMORY NETWORKS 9

Auto-associative and Hetero-associative Memory Networks – Bidirectional Associative Memory– Hopfield Networks – Special Networks: Simulated Annealing Network – Boltzmann Machine

UNIT IV FUZZY LOGIC 9

Classical Sets and Fuzzy Sets – Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations – Membership Functions: Features –Fuzzification – Membership Value Assignment – Defuzzification: Lambda Cuts and Defuzzification Methods

UNIT V FUZZY REASONING 9

Fuzzy Arithmetic – Fuzzy Measures – Measures of Fuzziness – Fuzzy Rule Base and Approximate Reasoning: Fuzzy Propositions – Fuzzy Rules – Fuzzy Reasoning – Fuzzy Inference Systems

TEXTBOOK:

1. S.N. Sivanandam and S.N. Deepa, “Principles of Soft Computing”, Wiley India Ltd., 1st Edition, 2007.

REFERENCES:

1. Laurene Fausette, "Fundamentals of Neural Networks", Pearson Education, New Delhi, 2004.
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Wiley, 3rd Edition, 2010.
3. S.Rajasekaran, G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications”, PHI Learning Pvt. Ltd., 2004.

WEB REFERENCES:

- Kohonen Self Organizing Maps. URL: http://www.ai-junkie.com/ann/som/som1.html
- Boltzmann Machines. URL: http://www.scholarpedia.org/article/Boltzmann_machine
- Classical Sets and Fuzzy Sets. URL: http://www.atp.ruhr-uniochum.de/rt1/syscontrol/node116.html
- Fuzzy arithmetic. URL: http://reference.wolfram.com/applications/fuzzylogic/Manual/9.html

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										√
CO2	√	√	√	√	√		√		√	√	√	
CO3	√	√										
CO4	√	√								√		√
CO5	√	√	√	√	√		√		√		√	√

Course Code:11CS974	**Course Title:** DIGITAL IMAGE PROCESSING
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS962-Multimedia systems and applications

Course Outcomes

At the end of the course the student should be able to:
CO1. Describe the concepts in acquiring, storing and Processing of images
CO2. Illustrate the image quality enhancement techniques.
CO3. Extract the images features and Analyze it.
CO4. Illustrate the techniques for the image compression.
CO5. Demonstrate the case studies of Image Processing

Course Content

UNIT I FOUNDATIONS OF IMAGE PROCESSING 9

Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization –Pixel Relationships – Color Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. Frequency Domain: Filtering in Frequency Domain – DFT, FFT, DCT –Smoothing and Sharpening filters – Homomorphic Filtering.

UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection –Thresholding – Region Based Segmentation – Morphological Watersheds – MotionSegmentation, Feature Extraction and Analysis.

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSION 9

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image Compression: Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

UNIT V APPLICATIONS OF IMAGE PROCESSING 9

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis –Image Fusion – Steganography – Digital Compositing – Mosaics – Color Image Processing.

TEXT BOOK:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2009.

REFERENCES:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", 2nd Edition, Thomson Learning, 2001
2. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 2006.
3. Sanjit K. Mitra, & Giovanni L. Sicuranza, "Non Linear Image Processing", Elsevier, 2007
4. Richard O. Duda, Peter E. HOF, David G. Stork, "Pattern Classification" Wiley Student , 2006.
5. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing Using MATLAB", 2nd Edition, Pearson Education, 2010.

WEB REFERENCES:

- Introduction to Digital Image processing URL: http://nptel.ac.in/courses/106105032/
- http://nptel.ac.in/courses/117105079/,http://nptel.ac.in/courses/117104069/,http://nptel.ac.in/courses/117102060/
- Multimedia processing URL: http://nptel.ac.in/courses/117105083/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									
CO2	√	√	√	√	√							
CO3	√	√	√	√	√							
CO4	√	√	√									
CO5	√	√	√									

Course Code: 11CS975	**Course Title:** OPTIMIZATION TECHNIQUES
Core/Elective: Elective	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11AU301 ENGINEERING MATHEMATICS III and 11CS601 ARTIFICIAL INTELLIGENCE

Course Outcomes:

At the end of the course the student should be able to:
CO1. Formulate and solve Optimization problems using Linear Programming
CO2. Apply PERT/CPM on Activity Network models
CO3. Comprehend about Evolutionary Computation principles
CO4. Apply Evolutionary Optimization techniques to Real world problems
CO5. Understand the working of Swarm Intelligence approaches for Optimization

Course Content:

UNIT I LINEAR PROGRAMMING 9
General linear programming problem - Formulation-Simplex method - General Transportation Problem – Vogel's Approximation method-Transportation algorithm by MODI method

UNIT II NETWORK SCHEDULING BY PERT/CPM 9
Network and basic components - Network construction - Critical path Analysis - PERT computations – Crashing and resource leveling

UNIT III EVOLUTIONARY COMPUTATION 9
Conventional Optimization and Search Techniques - Genetic Algorithms: Biological Background – Simple Genetic Algorithm – Terminology – Encoding – Genetic Operators – Convergence – Working of GA – Fitness Scaling

UNIT IV EVOLUTIONARY OPTIMIZATION 9
Multi-objective Reliability Design – Combinatorial Optimization - Scheduling Problems - Transportation Problems – Network Design and Routing

UNIT V SWARM INTELLIGENCE 9
Particle Swarm Optimization: Background – Operations – Applications. Ant Colony Optimization: Real Ants and Artificial Ants – Characteristics – Algorithms – Applications

TEXTBOOKS:
1. Taha, H. A., "Operations Research-An Introduction", 9th Edition, Pearson Education, 2010.
2. Sivanandam S.N., Deepa S.N., "Introduction to Genetic Algorithms", Springer, 2008.

REFERENCES:
1. KantiSwarup, P.K.Gupta, Man Mohan, "Operations Research", 10th Edition, Sultan Chand & Sons, 2002.
2. Sumathi, S., Surekha, P., "Computational Intelligence Paradigms Theory and Applications using MATLAB", CRC Press, 2010.

WEB REFERENCES:
- Particle swarm optimization. URL:http://ci.cs.up.ac.za/chapter16.pdf
- Genetic Algorithms. URL: http://ocw.mit.edu/courses/engineering-systems-division/esd-77-multidisciplinary-system-design-optimization-spring-2010/lecture-notes/MITESD_77S10_lec11.pdf

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√		√		√	√	√	√
CO2	√	√	√	√	√		√		√		√	√
CO3	√	√										√
CO4	√	√	√	√	√		√		√		√	√
CO5	√	√										√

Course Code: 11CS976	**Course Title:** VIRTUALIZATION
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):

11CS503–SYSTEM SOFTWARE DESIGN ;
11CS501-R - COMPUTER NETWORKS ;
11CS504 -COMPUTER ARCHITECTURE

Course Outcomes:

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

CO1. Determine the fundamental concepts of virtualization
CO2. Outline the various methods of server virtualization
CO3. Demonstrate the concepts and issues in various Desktop virtualization
CO4. Illustrate the techniques and design of WAN virtualization and enterprise networks
CO5. Compare and analyze various components of Storage virtualization

Course Content:

UNIT I OVERVIEW OF VIRTUALIZATION 9

Basics of Virtualization - Virtualization Types – Desktop Virtualization – Network Virtualization –Server and Machine Virtualization – Storage Virtualization – System-level of Operating Virtualization – Application Virtualization-Virtualization Advantages – Virtual Machine. Basics – Taxonomy of Virtual Machines - Process Virtual Machines - System Virtual Machines – Hypervisor - Key Concepts.

UNIT II SERVER VIRTUALIZATION 9

Hardware Virtualization – Virtual Hardware Overview - Server Virtualization – Physical and Logical Partitioning - Types of Server Virtualization – Business cases for Server Virtualization –Uses of Virtual server Consolidation – Planning for Development – Selecting server Virtualization Platform – Case Study

UNIT III DESKTOP VIRTUALIZATION 9

Concepts - Desktop Management Issues - Potential Desktop Virtualization Scenarios – DesktopVirtualization Infrastructures - Terminal services – Hosted Desktop - Case Study

UNIT IV NETWORK VIRTUALIZATION 9

Design of Scalable Enterprise Networks - Virtualizing the Campus WAN Design – WAN Architecture - WAN Virtualization - Virtual Enterprise Transport Virtualization–VLANs and Scalability - Theory Network Device Virtualization Layer 2 - VLANs Layer 3 VRF Instances Layer 2 - VFIs Virtual Firewall Contexts Network Device Virtualization.

UNIT V STORAGE VIRTUALIZATION 9

SCSI- Speaking SCSI- Using SCSI buses – Fiber Channel – Fiber Channel Cables –Fiber Channel Hardware Devices – iSCSI Architecture – Securing iSCSI – SAN backup and recovery techniques – RAID – SNIA Shared Storage Model – Classical Storage Model – SNIA Shared Storage Model – Host based Architecture – Storage based architecture – Network based Architecture.

TEXT BOOK:

1. Chris Wolf, Erick M. Halter, "Virtualization: From the Desktop to the Enterprise", A Press 2005.
2. Kumar Reddy, Victor Moreno, "Network Virtualization", Cisco Press, July, 2006.
3. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.

REFERENCES:

1. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
2. Danielle Ruest, Nelson Ruest -"Virtualization: A Beginner's Guide", TMH, 2009.
3. Kenneth Hess , Amy Newman: "Practical Virtualization Solutions: Virtualization from the Trenches", Prentice Hall 2010.

WEB REFERENCES:

- TEXT BOOK: Chris Wolf, Erick M. Halter, "Virtualization: From the Desktop to the Enterprise", A Press 2005 URL:https://books.google.co.in/books?id=qXw9p1nzb9QC&printsec=frontcover&dq=Virtualization:+From+the+Desktop+to+the+Enterprise+A+Press+2005+pdf&hl=en&sa=X&ved=0CCsQ6AEwAGoVChMIh5qg9a6WxgIVAUC8Ch24SgAK#v=onepage&q&f=false
- Intro to Virtualization URL:http://vmwarevideos.com/free-vmware-training/free-intro-virtualization-video-training-course
- Virtualization Essentials URL: http://www.lynda.com/Fusion-tutorials/Virtualization-Essential-Training/163066-2.html

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									√
CO2	√	√	√	√	√	√						√
CO3	√	√	√	√	√							√
CO4	√	√	√		√							√
CO5	√	√	√		√	√						√

Course Code:11CS977	**Course Title:** SOCIAL NETWORK ANALYSIS
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s): 11CS506 DATA WAREHOUSING AND DATA MINING

Course Outcomes:

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

CO1. Formulate and examine the fundamentals of social networks and working with datasets
CO2. Explore various classification methods and know about evolution of social networks
CO3. Be expertise in various modeling techniques and privacy preservation methods.
CO4. Visualize the data, text and tag features of social networks.
CO5. Mine various real time social and web applications.

Course Content:

UNIT I FOUNDATIONS OF SOCIAL NETWORKS 9

Introduction – Static and Dynamic properties – Random walks in Social networks – Algorithms – Applications – Evaluation and datasets. Community discovery – Applications and Methods

UNIT II CLASSIFICATION APPROACHES AND EVOLUTION 9

Local classifiers – Random walk based methods – other approaches and variations – Evolution in social networks – Framework – Challenges – Community tracing. Survey models and algorithms – Social Influence Analysis.

UNIT III MODELING AND PRIVACY PRESERVATION 9

Expert Location in social networks – approaches – location systems. Link prediction – Bayesian probabilistic models – probabilistic relational models – Linear algebraic methods. Privacy in social networks – privacy breaches and preservation mechanisms

UNIT IV MINING AND VISUALIZATION 9

Visualizing social networks – data mining and text mining in social networks – Social tagging – Tag generation models – System design and analysis – tag visualization, recommendations and applications – Tagging problems

UNIT V MINING SOCIAL WEB 9

Mining Twitter – Exploring Twitter API – Analyzing and examining tweets. Mining Facebook – Exploring social graph API – Analyzing graph connections. Mining Google+ - Computing Document similarity – Querying Human Language data with TF-IDF.

TEXT BOOKS:

1. Charu. C.Aggarwal, "Social Network Data Analytics", Springer, 2011
2. Matthew A. Russell, "Mining the Social Web", 2nd Edition, O'Reilly Media Inc., 2013

REFERENCES:

1. Peter Mika, "Social Networks and the Semantic Web", Springer, 1st Edition, 2007
2. BorkoFurht, " Handbook of Social Network Technologies and Applications Springer", 1st Edition, 2010
3. Giles, Mark Smith, John Yen, "Advances in Social Network Mining and Analysis", Springer, 2010.

WEB REFERENCES:

- Social network analysis URL http://ocw.mit.edu/courses/sloan-school-of-management/15-599 workshop-in-it-collaborative-innovation-networks-fall-2011/lecture-notes/
- Introduction to social network methods URL: http://faculty.ucr.edu/~hanneman/nettext/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√	√	√		√	√		√
CO2		√	√	√	√	√	√	√			√	√
CO3		√	√	√	√			√				√
CO4	√	√	√	√	√			√	√	√	√	√
CO5	√	√	√	√	√	√	√	√	√	√	√	√

Course Code: 11CS979	**Course Title:** AGILE SOFTWARE DEVELOPMENT
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS406 – PRINCIPLES OF SOFTWARE ENGINEERING.

Course Outcomes:

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

CO1. Describe the various concepts and activities involved in the Agile Software Development process
CO2. Define SCRUM and illustrate the benefits of using SCRUM.
CO3. Identify various individual roles and explain their responsibilities/activities in SCRUM.
CO4. Explain and analyze the SCRUM Team Structures along with their responsibilities and performances for effective project management.
CO5. Present the SCRUM requirements and specifications effectively.

Course Content:

UNIT I INTRODUCTION 9

Agile Development – Agility – Cost of Change – Agile Process – Principles and Human Factors – Extreme Programming (XP): Values, XP Process, and Industrial XP – Agile Process Models: Adaptive Software Development (ASD) – Scrum – DSDM – Crystal – Feature Driven Development – LSD – Agile Modeling – Agile Unified Process.

UNIT II SCRUM 9

Advantages of Agile Development: Higher Productivity, Lower Costs, Faster Time to Market, Higher Quality – Introduction to SCRUM – Adapting to SCRUM – Awareness – Desire – Ability – Promotion – Transfer – Integrating all Together.

UNIT III SCRUM PRACTICES AND INDIVIDUALS 10

Individual Roles – Scrum Master – Product Owner – Changed Roles: Analysts, Project Managers, Architects, Functional Managers, Programmers, DB Administrators, Testers, User Experience Designers - Technical Practices – Strive for Excellence - Test-driven development – Refactoring – Collective Ownership – Continuous Integration – Pair Programming –Design: Intentional yet Emergent – Guiding the Design.

UNIT IV SCRUM TEAMWORK 8

Team Structures – Small Team Productivity – Feature Teams – Component Teams – Guidelines for Good Team Structure – Team Responsibility – Foster Team Learning – Self-Organizing Team – Influencing Evolution: Selecting Environment, Defining Performance, Manage Meaning, Energizing the System.

UNIT V SCRUM SPECIFICATION 9

Product Backlog – Documents to Discussions – Written Documentation Disadvantages – User Stories -Progressively Refine Requirements – Emergent Requirements – Backlog Iceberg – Refining User Stories – Specify by Example.

TEXTBOOKS:

1. Roger S.Pressman, "Software engineering- A practitioner's Approach", McGraw-Hill International Edition, 7th edition, 2010.
2. Mike Cohn, "Succeeding with Agile: Software Development Using Scrum", Addison-Wesley.

REFERENCE:

1. Ken Schwaber, "Agile Project Management with Scrum (Microsoft Professional)", Microsoft Press, 2004.

WEB REFERENCES:

- Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition.URL: http://highered.mcgraw-hill.com/sites/0073375977/information_center_view0/. Mike Cohn, Succeeding with Agile: Software Development Using Scrum. URL: http://www.succeedingwithagile.com/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										√	√	
CO2										√	√	
CO3										√	√	
CO4										√	√	
CO5										√	√	

Course Code: 11CS981	**Course Title:** DISTRIBUTED SYSTEMS DESIGN
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS306–OPERATING SYSTEMS

Course Outcomes:

At the end of the course the student should be able to:
CO1. Demonstrate the architecture and identify the desirable features of Distributed systems.
CO2. Design the communication mechanisms between processes and objects in a distributed environment.
CO3. Analyze the issues related to distribute shared memory and Synchronization mechanisms.
CO4. Identify the different approaches and issues in Distributed Resource and Process management.
CO5. Apply the file accessing and replication mechanism in Distributed File systems and outline the Naming services.

Course Content:

UNIT I INTRODUCTION 9
Evolution- system models- Issues in the design of distributed systems- Distributed computing environment. Message Passing: Features- Issues in IPC- Synchronization – Buffering- Multi datagram messages – Process addressing- Failure handling

UNIT II REMOTE PROCEDURE CALLS 9
RPC Model – Implementation - Stub generation - RPC messages – Marshaling - server Management - Call semantics - communication protocols for RPC-Client server binding –Exception handling – security- special types – RPC in heterogeneous environments – Lightweight RPC - Optimizations

UNIT III DISTRIBUTED SHARED MEMORY & SYNCHRONIZATION 9
Architecture – Design and Implementation Issues – Consistency models – Clock Synchronization - Event Ordering - Mutual Exclusion – Deadlock - Election algorithms.

UNIT IV RESOURCE AND PROCESS MANAGEMENT 9
Features - Task assignment approach - Load balancing approach - Load sharing approach - Process migration Features – Mechanism -Threads: models, issues, implementation.

UNIT V DISTRIBUTED FILE SYSTEMS 9
Introduction – Features - File Models – File accessing, sharing and caching - File Replication – Fault Tolerance - Atomic transactions **NAME SERVICES**: Features – Name services and DNS

TEXT BOOK:
1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, New Delhi, 2005(reprint).

REFERENCES:
1. George Colouris, Jean Dollimore and Tim Kindberg, "Distributed Systems – Concepts and Design", Pearson Education Private Limited, New Delhi, 4th Edition 2009.
2. MukeshSinghal, NiranjanG.Shivaratri, "Advanced Concepts in Operating Systems: Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2000.
3. Gerard Tel, "Introduction to Distributed algorithms", Cambridge University Press, USA, 2000.

WEB REFERENCES:
- Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design",2005 URL:https://books.google.co.in/books?id=SewHKWac2I4C&pg=PA167&source=gbs_toc_r&cad=3#v=onepage&q&f=false
- NPTEL : Computer Science and Engineering -Distributed Computing Systems URL:http://www.nptel.ac.in/courses/106106107/http://www.nptel.ac.in/downloads/106106107/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√									
CO2	√	√	√	√	√							√
CO3	√				√							√
CO4	√	√	√	√								√
CO5	√	√	√	√								√

Course Code:11CS982	**Course Title:** MOBILE AND PERVASIVE COMPUTING
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS501-R COMPUTER NETWORKS

Course Outcomes:

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

CO1. Confer the Architecture in wireless and mobile networks

CO2. Comprehend and setup a wireless local area network

CO3. Expound and implement the protocols in network and transport layer of wireless network

CO4. Discuss about the computational requirements, security and performance of pervasive computing

CO5. Design a mobile device by following the appropriate technologies and explain how data communication is done

Course Content:

UNIT I WIRELESS AND CELLULAR NETWORKS 9

Cellular Wireless Networks – GSM – Architecture – Protocols – Localization and calling – Handover – Security –GPRS – DECT and UMTS.

UNIT II WIRELESS LAN 9

Wireless LANs and PANs – IEEE 802.11 Standard – Architecture – MAC Management –HiperLAN – Blue Tooth- Wi-Fi – WiMAX

UNIT III HIGHER LAYERS 9

Mobile IP – DHCP – AdHoc Networks. Mobile TCP– WAP – Architecture – WDP – WTLS – WTP – WSP – WAE – WTA Architecture – WML – WMLScripts.

UNIT IV PERVASIVE ARCHITECTURE 9

Context- Aware Computing – Mobile Middleware – Mobile Agents – Middleware for application development – Service Discovery

UNIT V ADHOC AND SENSOR NETWORKS 9

Adhoc networks – Features of Sensor Networks – Applications. Challenges – Resources – Security – Mobility – Protocols.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", PHI, 2nd Edition, 2009
2. F. Adelstein, S.K.S. Gupta, "Fundamentals of Mobile and Pervasive Computing". The McGraw-Hill, 2005.

REFERENCES:

1. Burkhardt, Henn, Hepper, Rintdorff, Schaeck. "Pervasive Computing", Addison Wesley, 2002.
2. Jochen Burkhardt, Horst Henn, Stefan Hepper, Klaus Rindtorff, Thomas Schack, "Pervasive Computing: Technology and Architecture of Mobile Internet Applications", Addison-Wesley, ISBN: 0201722151, 2002
3. Uwe Hansmann, L. Merk, M. Nicklous, T. Stober, U. Hansmann, "Pervasive Computing (Springer Professional Computing) ", Springer Verlag, ISBN:3540002189, 2003

WEB REFERENCES:

- http://www.cse.wustl.edu/~jain/cse574-10/
- http://www.wikihow.com/Create-a-Wireless-Network
- http://web.cse.ohio-state.edu/~prasun/publications/theses/phdthesis.pdf
- https://books.google.co.in/books?isbn=3540398813

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									√
CO2	√	√	√									√
CO3	√	√	√									√
CO4	√	√	√									√
CO5	√	√	√	√	√	√	√	√	√	√	√	√

Course Code:11CS983	**Course Title:** INFORMATION RETRIEVAL TECHNIQUES
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS303 DATA STRUCTURES
11CS505 WEB TECHNOLOGIES

Course Outcomes:

At the end of the course the student should be able to:
CO1. Design User Interfaces for Search
CO2. Comprehend about Information Retrieval Modeling and evaluation methods
CO3. Develop procedures for web indexing and searching
CO4. Understand the working of search engines and develop web crawlers
CO5. Deduce the working of Structured text retrieval systems

Course Content:

UNIT I INTRODUCTION 9

Information Retrieval System – User Interfaces for search: Search Interfaces –Visualization – Design and Evaluation – Trends

UNIT II MODELING AND EVALUATION 9

Modeling: Classic Information Retrieval – Other Models. Retrieval Evaluation: Retrieval Metrics – Reference Collections – User based Evaluation

UNIT III INDEXING AND SEARCHING 9

Query Languages – Query Properties – Indexing and Searching: Inverted Indexes – Signature Files – Suffix Trees and Suffix Arrays –Multi-dimensional Indexing

UNIT IV WEB RETRIEVAL 9

Web Retrieval: Search Engine Architectures – Search Engine Ranking – Managing Web Data – Browsing – Web Crawling: Applications – Taxonomy – Architecture and Implementation

UNIT V STRUCTURED TEXT RETRIEVAL 9

Structured Text Retrieval: Early Text Retrieval Models – XML Retrieval and Evaluation – Query Languages. Case Study: Open Source IR

TEXT BOOK:

1. Ricardo Baeza-Yates, BerthierRibeiro-Neto, "Modern Information Retrieval", Pearson Education, 2nd Edition 2011.

REFERENCES:

1. William B.Frakes, Ricardo Baeza-Yates, BerthierRibeiro-Neto, "Information Retrieval Data Structures and Algorithms", Pearson Education, 2009.
2. Christopher D. Manning and PrabhakarRaghavan, "Introduction to Information Retrieval", Cambridge University Press, 2008.

WEB REFERENCES:

- Modern Information Retrieval URL: http://www.mir2ed.org/
- Suffix Trees and Suffix Arrays URL:http://www.inf.fu-erlin.de/lehre/WS05/aldabi/downloads/stringMatching_part2.pdf
- XML Retrieval and Evaluation URL:http://nlp.stanford.edu/IRbook/html/htmledition/xml-retrieval-1.html
- Retrieval Evaluation URL: http://www.ccs.neu.edu/home/jaa/CSG339.06F/Lectures/evaluation.pdf.

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√		√		√		√	√	√	√
CO2	√	√			√		√					√
CO3	√	√	√	√	√		√		√		√	√
CO4	√	√	√	√	√		√		√		√	√
CO5	√	√			√							√

Course Code: 11CS984	**Course Title:** GRAPH THEORY
Core/Elective: Elective	**Credits (L : T : P : C : M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS303 DATA STRUCTURES and
11CS403 DESIGN AND ANALYSIS OF COMPUTER ALGORITHMS

Course Outcomes:

At the end of the course the student should be able to:
CO1. Explain the basic concepts of Graph Theory.
CO2. Identify Fundamental Theorems on Euler graphs.
CO3. Analyze the algorithms on connectedness.
CO4. Comprehend the concepts of tree.
CO5. Study of matrix application in Graph Theory

Course Content:

UNIT I GRAPHS AND SUBGRAPHS 9

Graph – finite & infinite graphs – incidence, degree isolated and pendent Vertices –Isomorphism –sub graphs – walks- Paths and circuits.

UNIT II CONNECTEDNESS AND EULER GRAPHS 10

Connected, disconnected graphs – components – Euler graphs -Operations on Graphs –More on Euler graphs – Hamiltonian paths and circuits- Planar Graphs- chromatic Number

UNIT III ALGORITHMS IN GRAPH THEORY 8

Directed graphs - Undirected graphs- Paths –Reachability- Connectedness- Matrix representation.

UNIT IV TREES AND TYPES 9

Trees – Properties– Pendent vertices in a tree – Distances , centers in a tree –Rooted , Binary trees – Spanning trees –Spanning trees in a weighted graph.

UNIT V MATRICES AND GRAPHS 9

Cut set matrix –adjacency matrix – Chromatic partitioning – Chromatic Polynomial. Graph Theories: theorems, and applications.

TEXTBOOK:

1. Narsingh Deo, "Graph Theory with applications to Engineering & Computer Science", Prentice Hall of India, New Delhi, 2006.

REFERENCES:

1. Dr. S. Arumugam& Dr. S. Ramachandran, "Invitation to Graph Theory", Scitech Publications India Pvt Limited, Chennai, 2001.
2. K.R. Parthasarathy, "Basic Graph Theory", Tata McGraw Hill Publishing Company, New Delhi, 1994.
3. G.T. John Clark, Derek Allan Holten," A First Look at Graph Theory", World Scientific.

WEB REFERENCES:

- Graph Theory. URL: http://nptel.ac.in/courses/106108054/
- Cut set matrix. URL:http://www.academia.edu/4418417/EE-304_Electrical_Network_Theory_Class_Notes4_-_2013

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									
CO2	√	√	√	√					√			√
CO3	√	√	√	√					√			√
CO4	√	√	√	√								
CO5	√	√	√									

Course Code:11CS985	**Course Title:** CYBER SECURITY AND CYBER LAWS
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS964 NETWORK SECURITY

Course Outcomes

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

CO1. Infer the basics of Information Security
CO2. Identify the legal, ethical and professional issues in Information Security and the aspects of risk management
CO3. Outline technological aspects of Information Security
CO4. Comprehend various cyber offences and security challenges
CO5. Discuss various cyber laws and observe various cyber-crime investigation methods.

Course Content

UNIT I INTRODUCTION 9

Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Information Security and Access, the SDLC, the Security SDLC. Need for Security: Business Needs, Threats, Attacks, Secure Software development.

UNIT II SECURITY INVESTIGATION AND SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Controlling Risk, Selecting a Risk Control Strategy. Planning for Security: Information security Policy, Standards and Practices, Information Security Blueprint

UNIT III PHYSICAL DESIGN 9

Security Technology: VPNs, Scanning and Analysis Tools, Access Control Devices, Physical Security, Security and Personnel: Positioning and Staffing the Security Function, Credentials of Information Security Professionals, Privacy and the Security of Personnel Data.

UNIT IV CYBER CRIME ISSUES 9

Cyber Crime and Information Security: Classification, Legal, Cyber offences: Social Engineering, Cyber talking, Cyber cafe, Botnets, Attack Vector, Cloud Computing, Tools & methods: Attacks on Wireless Networks, Mobile &wireless Devices: Mobility, Credit card frauds, Security challenges, Attacks on Mobile Cell phones.

[

UNIT V CYBER LAW 9

Cyber Crime and Cyber Security Legal perspectives: Need for law, Indian IT Act, Challenges, Digital Signatures, Amendments, Punishments, Cyber Law, Technology and Students

TEXT BOOK:

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 4th Edition ,Reprint 2011.
2. SunitBelapure Nina Godbole,"Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives" ,Wiley India Pvt Ltd,2011.

REFERENCES:

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.
3. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi,2009.

WEB REFERENCE

- http://www.cyberlawsindia.net/

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√					√	√					√
CO2	√	√	√	√		√	√	√				√
CO3	√					√	√					√
CO4	√					√	√					√
CO5	√					√	√			√		√

Course Code: 11CS986	**Course Title:** BUSINESS INTELLIGENCE
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS506 - DATA WAREHOUSING AND MINING

Course Outcomes:

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

CO1. Understand the components of BI framework.
CO2. Describe the components of Decision Support System and its characteristics.
CO3. Describe the architecture of BPM technologies and its applications.
CO4. Analyze the characteristics, technologies, roles and approaches of Knowledge management activities
CO5. Practice the new technologies and tools in Business Intelligence.

Course Content:

UNIT I INTRODUCTION 9

Business view of information technology applications –Getting started with BI-Introduction to business analytics - BI component framework-BI users

UNIT II DECISION SUPPORT SYSTEM (DSS) DEVELOPMENT 9

DSS configuration, description, characteristics, capabilities, Components, user, Hardware and classifications – Data management subsystems – Model management subsystems – The user interface (DIALOG) subsystem

UNIT III BUSINESS PERFORMANCE MANAGEMENT (BPM) 9

BPM Overview, Closed Loop Processes - Performance Measurement- BPM Methodologies, architecture and applications- Performance dashboards- Business Activity Monitoring (BAM)

UNIT IV KNOWLEDGE MANAGEMENT (KM) 9

Introduction – Organizational learning & transformation–KM activities, approaches– Information technology and Roles of people in KM– Knowledge management systems implementation – Ensuring the success of knowledge management Efforts

UNIT V NEW TECHNLOGY IN BI 9

BI Applications - Best practices in BI/DW-The complete BI professional, tools –Data Profiling – Balanced scorecard- Dashboards-BI road ahead

TEXTBOOKS:

1. R N Prasad, Seema Acharya, "Fundamentals of Business Analytics", 1st edition, Wiley India, 2011 (Unit 1 & 5)
2. Efraim Turban, Jay E.Aronson, Teng-Peng Liang, Ramesh sharda, "Decision Support and Business Intelligence Systems", 8/E, Pearson education, 2009 (Unit2,3 & 4)

REFERENCES:

1. Daniel J.Power,"Decision Support Systems – Concepts and Resources for Managers", 2002.
2. MarkWhitehorn& Mary Whitehorn "Business Intelligence: The IBM Solution –Data warehousing and OLAP", Springer – verlag London limited, 1999.
3. ViekiL.Sauter, "Decision Support Systems for Business Intelligence", 2nd Edition, Wiley India.

WEB REFERENCES:

- Business Intelligence: http://www-03.ibm.com/software/products/en/category/business-intelligence
- Pentaho:Data Integration | Pentaho Business Analytics Platform.
  URL: http://www.pentaho.com/product/data-integration

Mapping of Course Outcomes to Programme Outcomes:

Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√		√					√		√
CO2	√	√	√					√	√	√	√	√
CO3	√	√		√			√	√	√	√		√
CO4	√	√				√	√	√		√	√	√
CO5	√	√			√		√					√

Course Code: 11CS987	**Course Title:** INFORMATION VISUALIZATION
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Prerequisites: The student should have undergone the course(s):
11CS703–Graphics and Visualization

Course Outcomes:

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

CO1: Investigate on the basic elements necessary for graphics and data visualization
CO2: Explore the various stages in visualizing the data
CO3: Analyze various methodologies and standards used for color management
CO4: Characterize various techniques for identifying static and moving patterns
CO5: Illustrate object recognition phenomenon through diagrams, gestures and animated languages.

Course Content:

UNIT I DATA VISUALIZATION 9

Data Visualization- Info graphics Vs Data Visualization – Informative Vs Visual Art – Ingredients of successful Visualization- Visual Encoding – Layout and Axes- Color- Size-Shape –Lines

UNIT II VISUALIZATION STAGES 9

Stages of visualizing the Data –sketching and scripting –mapping –time series-Axis labels connections and correlations-sophisticated sorting-deployment issues in scatter plot maps

UNIT III COLOR 9

Trichromacy Theory-Color Blindness-Color Measurement-CIE System of Color Standards Opponent Process Theory-Color Appearance-Applications of Color in Visualization

UNIT IV STATIC AND MOVING PATTERNS 9

Gestalt Laws-Contours-Perception of Transparency: Overlapping Data-Perceptual Syntax of Diagrams-Patterns in Motion-Data Selection and Manipulation Loop-Exploration and Navigation

UNIT V VISUAL& DATA OBJECTS AND GESTURES 9

Image and structure based object recognition – Object based diagrams – Surface shapes of objects – Coding Words and Images – visual and spoken Languages – Animated Visual languages

TEXT BOOKS:

1. Noah Iliinsky, Julie Steele, "Designing Data Visualizations: Representing Informational Relationships", O'Reilly Media, Inc.", 2011.
2. Ben Fry, "Visualizing Data: Exploring and Explaining Data with the Processing Environment",Kindle Edition ,2007.
3. Colin Ware, "Information Visualization: Perception For Design" , 2nd Edition, 2004.

REFERENCE:

1. Andy Kirk, "Data Visualization: A Successful Design Process", 1st Edition, 2012.

WEB REFERENCES:

- http://www.infovis-wiki.net/index.php?title=Visualization_Design_Patterns
- http://documents.software.dell.com/Statistics/Textbook/Graphical-Analytic-Techniques

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Course Outcomes	Programme Outcomes											
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CO1	√		√	√	√					√	√	√
CO2	√	√	√	√	√				√	√	√	√
CO3	√		√	√	√	√		√	√	√	√	√
CO4		√	√	√	√	√			√	√	√	
CO5	√		√	√	√	√	√		√	√	√	√

Course Code: 11CS988-R	**Course Title:** CLOUD TECHNOLOGY
Core/Elective: Elective	**Credits (L:T:P:C:M)** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:** 45

Course Outcomes:

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

CO1. Identify and explain the components in cloud architecture and its services.
CO2. Discuss cloud deployment models and their characteristics from different providers.
CO3. Communicate and collaborate using cloud services.
CO4. Illustrate and describe cloud based techniques for implementation.
CO5. Use various methods and tools to collaborate online through cloud services.

Course Content:

UNIT I FOUNDATIONS OF CLOUD COMPUTING 8

Introduction - Cloud Computing – Cloud Architecture – Cloud Storage –Computing in Cloud: Pros and Cons, Cloud and Virtualization, Dynamic Infrastructure, Services Requirements, Computing Characteristics.

UNIT II CLOUD DEPLOYMENT AND OFFERINGS 9

Cloud Characteristics – Measured Service – Cloud Deployment Models – Security in a Public Cloud – Cloud Analytics – Testing under Cloud – Information Security – Virtual Desktop Architecture – Storage Cloud – Amazon Ec2 – Google App Engine – MS Azure.

UNIT III CLOUD SERVICES AND MANAGEMENT 9

Cloud Services: SaaS, IaaS, PaaS – Cloud Ecosystem and Business Process Management – Cloud Service Management – Computing on Demand (CoD) – Service-based Model – Resiliency – Provisioning – Asset Management – HA and Disaster Recovery.

UNIT IV CLOUD IMPLEMENTATION TECHNOLOGIES 10

Cloud Virtualization Technology – Benefits – Server Virtualization – Virtualization for x86 – Infrastructure Requirements – Storage Virtualization and Storage Area Networks – Network-Attached Storage – Virtualization in Datacenter – Cloud and SOA – Cloud Mobility.

UNIT V ONLINE COLLABORATION TOOLS 9

Collaboration using online Scheduling Applications, Planning, and Task Management – Contact Management, CRM, and SFA – Collaborating on Project Management – Web-based Word Processors and Databases - Evaluating Web Conferencing Tools - Collaborating via Social Networks and Groupware

TEXT BOOKS:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Kumar Saurabh, "Cloud Computing – Insights into New Era Infrastructure", Wiley Indian Edition, 2011.

REFERENCES:

1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008.
2. John Ritting house& James Ransome, "Cloud Computing, Implementation, Management and Strategy", CRC Press, 2010.

WEB REFERENCES:

- Peter Mell and Timothy Grance, The NIST Definition of Cloud Computing. URL: http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf
- Alexa Huth and James Cebula, The Basics of Cloud Computing. URL: https://www.us-cert.gov/sites/default/files/publications/CloudComputingHuthCebula.pdf, © 2011 Carnegie Mellon University. Produced for US-CERT, a government organization.
- An Overview of Cloud Computing. URL: https://www.nsa.gov/research/_files/publications/cloud_computing_overview.pdf

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Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√					√						√
CO2	√											√
CO3	√		√		√					√	√	√
CO4	√				√					√	√	√
CO5	√		√		√					√	√	√

8 COURSE ASSESSMENT AND EVALUATION

Course Assessment and Evaluation (2015-16)

Component	2011 Regulations	Internal Assessment Methodology
Theory	• End Semester Exam: 75 marks • Internal Assessment: 25 marks	• Best 2 of 3 CCE Tests (15 marks each) for 30 marks • 3 TQA* components averaged to 10 • Total 40 reduced to 25
Practical	• End Semester Exam: 75 marks • Internal Assessment: 25 marks	• Preparation: 10 • Observation and Results: 15 • Record: 10 • Model Exam and Viva: 15 • Total 50 reduced to 25
Project work	**Phase I (100)** • End Semester Exam: 75 marks • Internal Assessment: 25 marks **Phase II (200)** • End Semester Exam: 150 marks • Internal Assessment: 50 marks	• 3 Reviews in each Phase

***TQA – Tutorial / Quiz / Assignment Component** -In case of Self Study subjects a Test for 25 marks will be conducted in place of 3rd TQA

Component	2014 Regulations	Internal Assessment Methodology
Theory	• End Semester Exam: 60 marks • Internal Assessment: 40 marks	• Best 2 of 3 CCE Tests (15 marks each) for 30 marks • 3 TQA components averaged to 10
Practical	• End Semester Exam: 60 marks • Internal Assessment: 40 marks	• Preparation: 10 • Observation and Results: 10 • Record: 10 • Model Exam and Viva: 10