Dr. Mahalingam College of Engineering and Technology

(An Autonomous Institution)

Pollachi - 642 003

Curriculum and Syllabus

B.E. COMPUTER SCIENCE AND ENGINEERING

SEMESTER I to VIII

REGULATIONS 2014

DR MAHALINGAM

MCET

COLLEGE OF ENGINEERING AND TECHNOLOGY

Enlightening Technical Minds

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
2014 REGULATION
Revised Curriculum for B.E Computer Science and Engineering
From Semester I to VIII

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**

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SEMESTER III

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS0301	Digital System Design	3	0	0	3	100
141CS0302	Engineering Mathematics - III	4	0	0	4	100
141CS0303	Principles of Communication Engineering	3	0	0	3	100
141CS0304	Operating Systems	3	0	0	3	100
141CS0305	Data Structures and Algorithm Analysis - I	3	0	0	3	100
141CS0306	Object Oriented Programming	3	0	2	4	100
PRACTICAL						
141CS0307	Data Structures and Algorithm Analysis - I Laboratory	0	0	4	2	100
141CS0308	Digital System Design Laboratory	0	0	4	2	100
141CS0309	Personal Effectiveness	0	0	2	1	100
XXXX	One Credit Course	0	0	2	1	100
	TOTAL	**19**	**0**	**14**	**26**	**1000**

SEMESTER IV

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS0401	Database Systems	3	0	0	3	100
141CS0402	Probability and Queuing Theory	4	0	0	4	100
141CS0403	Computer Architecture	3	0	0	3	100
141CS0404	Software Engineering	3	0	0	3	100
141CS0405	Data Structures and Algorithm Analysis - II	3	0	0	3	100
141CS0406	Java Programming	3	0	2	4	100
PRACTICAL						
141CS0407	Data Structures and Algorithm Analysis - II Laboratory	0	0	4	2	100
141CS0408	Database Systems Laboratory	0	0	4	2	100
141CS0409	Ethical and Moral Responsibility	0	0	2	1	100
XXXX	One Credit Course	0	0	2	1	100
	TOTAL	**19**	**0**	**14**	**26**	**1000**

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SEMESTER V

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS0501	Data Warehousing and Mining	3	0	0	3	100
141CS0502	Formal Languages and Automata Theory	3	0	0	3	100
141CS0503	Microprocessor and Microcontroller	3	0	2	4	100
141CS0504	Computer Networks	3	0	0	3	100
141CS0505	Open Source Software Development	3	0	0	3	100
XXXX	Elective I	3	0	0	3	100
PRACTICAL						
141CS0506	Computer Networks Laboratory	0	0	4	2	100
141CS0507	Open Source Software Development Laboratory	0	0	4	2	100
141CS0508	Teamness and Inter-Personal Skills	0	0	2	1	100
XXXX	One Credit Course	0	0	2	1	100
	TOTAL	**18**	**0**	**14**	**25**	**1000**

SEMESTER VI

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS0601	Artificial Intelligence	3	0	0	3	100
141CS0602	Big Data	3	0	0	3	100
141CS0603	Object Oriented Analysis and Design	3	0	2	4	100
141CS0604	Web Technologies	3	0	0	3	100
XXXX	Elective II	3	0	0	3	100
PRACTICAL						
141CS0605	Big Data Laboratory	0	0	4	2	100
141CS0606	Web Technologies Laboratory	0	0	4	2	100
141CS0607	Campus to Corporate	0	0	2	1	100
XXXX	One Credit Course	0	0	2	1	100
	TOTAL	**15**	**0**	**14**	**22**	**900**

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SEMESTER VII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS0701	Cloud Technology	3	0	0	3	100
141CS0702	Graphics and Visualization	3	0	0	3	100
141CS0703	Environmental Studies	3	0	0	3	100
XXXX	Elective III	3	2	0	4	100
XXXX	Elective IV (Open Elective)	3	0	0	3	100
PRACTICAL						
141CS0704	Cloud Technology Laboratory	0	0	4	2	100
141CS0705	Graphics and Visualization Laboratory	0	0	4	2	100
141CS0706	Innovative and Creative Project	0	0	8	4	100
	TOTAL	**15**	**2**	**16**	**24**	**800**

SEMESTER VIII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
XXXX	Elective V	3	0	0	3	100
XXXX	Elective VI	3	0	0	3	100
XXXX	Elective VII	3	0	0	3	100
PRACTICAL						
141CS0801	Project	0	0	20	10	200
	TOTAL	**9**	**0**	**20**	**19**	**500**

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ELECTIVES

SEMESTER V

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS9111	Python Programming	3	0	0	3	100
141CS9112	Advanced Data Structures and Algorithms	3	0	0	3	100
141CS9113	Mobile Application Development	3	0	0	3	100

SEMESTER VI

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS9114	Compiler Design	3	0	0	3	100
141CS9115	Network Security	3	0	0	3	100
141CS9116	Mobile Computing	3	0	0	3	100

SEMESTER VII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS9117	Software Quality Assurance and Testing	3	2	0	4	100
141CS9118	Machine Learning Techniques	3	2	0	4	100
141CS9119	Advanced Computer Architecture	3	2	0	4	100

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SEMESTER VIII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141CS9120	High Speed Networks	3	0	0	3	100
141CS9121	Information Retrieval Techniques	3	0	0	3	100
141CS9122	Business Intelligence	3	0	0	3	100
141CS9123	Adhoc & Sensor Networks	3	0	0	3	100
141CS9124	Software Project Management	3	0	0	3	100
141CS9125	Principles of Management	3	0	0	3	100
141CS9126	User Interface Design	3	0	0	3	100
141CS9127	Multimedia Systems and Applications	3	0	0	3	100
141CS9128	Agile Software Development	3	0	0	3	100

OPEN ELECTIVES

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
141OE0917	Human Computer Interface Design	3	0	0	3	100
141OE0918	Cyber Security and Computer Forensics	3	0	0	3	100
141OE0919	Green Computing	3	0	0	3	100

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SEMESTER I

Course Code: 141CS0101	Course Title: COMMUNICATION SKILLS – I (Common to CSE and IT)	
Core	L : T : P : C	2: 0: 2: 3
Type: Theory & Practical	Total Contact Hours:	60

Course Objectives

The Course is intended to:

1. Write grammatically correct sentences.
2. Listen to the conversations and comprehend.
3. Speak about a process or a thing.
4. Read and infer to the passages.
5. Write short pieces of business correspondence.

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.

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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.

Course Outcomes

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

1. Write grammatically correct sentences in English.
2. Listen to conversations comprehend, make notes and answer questions.
3. Speak about a process, things, about oneself and others.
4. Read passages, infer and respond to the question.
5. Write short pieces of business correspondence such as emails, letters and 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.

Reference Books:

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

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Course Code: 141CS0102	Course Title: ENGINEERING MATHEMATICS-I (Common to CSE and IT)	
Core	L : T : P : C	3: 1: 0: 4
Type: Theory	Total Contact Hours:	60

Course Objectives

The course is intended to:

1. Understand the basic matrices concepts.
2. Calculate Eigen values and Eigen vectors.
3. Evaluate the matrix inversion.
4. Realize the basic sequence concepts.
5. Evaluate the infinite series concepts.

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.

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Course Outcomes

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

1. Understand the basic concepts of Matrices.
2. Calculate Eigen values and Eigen vectors of given matrix.
3. Evaluate the inverse of given matrix.
4. Realize the basic concepts of sequence.
5. Evaluate the concepts of infinite series.

Text Book:

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

Reference Books:

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 References:

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

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Course Code: 141CS0103	Course Title: ENGINEERING PHYSICS (Common to CSE and IT)	
Core	L : T : P : C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Explain the properties of light and colors.
2. Illustrate the laser characteristics, principles and applications.
3. Explain the mode of propagation and attenuation.
4. Demonstrate the semiconductors nature.
5. Describe the concept of luminescence.

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.

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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.

Course Outcomes

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

1. Explain the properties of light and colors based on electronic display devices.
2. Illustrate the characteristics, principles and applications of laser.
3. Explain the mode of propagation and attenuation in optical fibers.
4. Demonstrate the nature of semiconductors.
5. Describe the concept of luminescence in various electronic display devices.

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.

Reference Books:

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 .

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Course Code: 141CS0104	Course Title: ENGINEERING CHEMISTRY (Common to CSE and IT)	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Describe the theoretical aspects of polymer chemistry.
2. Identify the latest applications of specialty polymers.
3. Determine the analytical testing methods.
4. Explain the fundamentals of electrochemistry and corrosion.
5. Select the type of battery and fuel cell.

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– Molding of plastics (injection molding)-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).

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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).

Course Outcomes

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

1. Describe the theoretical aspects of polymer chemistry and its applications.
2. Identify the latest applications of specialty polymers.
3. Determine the analytical testing methods for various substances.
4. Explain the fundamentals of electrochemistry and corrosion.
5. Select the type of battery and fuel cell for specific applications.

Text Book:

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

Reference Books:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 16th Ed., DhanpatRai 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

BoS Chairman

Course Code: 141CS0105	Course Title: FUNDAMENTALS OF PROGRAMMING (Common to CSE and IT)	
Core	L : T : P : C	3: 0: 2: 4
Type: Theory & Practical	Total Contact Hours:	75

Course Objectives

The course is intended to:

1. Develop a flow chart.
2. Comprehend the process of program development.
3. Construct repetition structures programs.
4. Solve searching and sorting problems.
5. Create a modular program.

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 Array - 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.

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LAB COMPONENT 30

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

Course Outcomes

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

1. Develop flow charts for simple problems.
2. Comprehend the process of language independent program development.
3. Construct programs using suitable selection and repetition structures.
4. Solve searching and sorting problems using arrays.
5. Create modular programs using functions.

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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)

Reference Books:

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

BoS Chairman

Course Code: 141CS0106	Course Title: BASICS OF CIVIL AND MECHANICAL ENGINEERING (Common to CSE and IT)	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Select the best material and suitable foundation.
2. Impart basic knowledge about the components.
3. Explain the various alternate energy sources.
4. Explain different manufacturing processes.
5. 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.

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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.

Course Outcomes

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

1. Select the best material and suitable foundation for the required construction.
2. Impart basic knowledge about the components of structures.
3. Explain the various alternate sources of energy and components of a power plant.
4. Explain different manufacturing processes like casting, forming, welding and machining operations.
5. Discuss the construction and working of IC engines and refrigerators

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.

Reference Books:

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 Hill Publishing Co., New Delhi, 2003.
3. Srinivasan. S, "Automotive engineering" Tata McGraw Hill Publishing Co., New Delhi, 2003.

Web References:

Civil

1. http://nptel.ac.in/courses/105102088/2
2. http://nptel.ac.in/course.php?disciplineId=105

Mechanical

3. www.electrical4u.com/steam-boiler-working-principle-and-types-of-boiler/
4. www.thelibraryofmanufacturing.com/
5. https://www.swtc.edu/ag_power/air_conditioning/.../basic_cycle.htm

BoS Chairman

Course Code: 141CS0107	Course Title: ENGINEERING PHYSICS AND CHEMISTRY LABORATORY (Common to CSE and IT)	
Core	L : T : P : C	0: 0: 2: 1
Type: Practical	Total Contact Hours:	30

Course Objectives

The course is intended to:

1. Measure optical parameters of laser and optical fiber.
2. Estimate electrical properties of metal and semiconductor.
3. Evaluate magnetic properties of a soft magnetic material.

LIST OF EXPERIMENTS

PHYSICS

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

Course Outcomes

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

1. Measure optical parameters of laser and optical fiber.
2. Estimate electrical properties of metal and semiconductor.
3. Evaluate magnetic properties of a soft magnetic material.

Reference:

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

BoS Chairman

CHEMISTRY

Course Objectives

The course is intended to:

1. Measure corrosion rate of a mild metal.
2. Verify photo physical law.
3. Determine concentration of a solution.

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

Course Outcomes

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

1. Measure corrosion rate of a mild metal.
2. Verify photo physical law.
3. Determine concentration of a solution through electrical method.

References:

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

BoS Chairman

Course Code: 141CS0108	Course Title: ENGINEERING PRACTICES LABORATORY (Civil and Mechanical) (Common to CSE and IT)	
Core	L: T: P: C	0: 0: 2: 1
Type: Practical	Total Contact Hours:	30

Course Objective

The course is intended to:

1. Exposure to the students with hands- on various basic engineering practices.

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.

Course Outcome

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

1. Provide exposure to the students with hands- on various basic engineering practices in Civil and Mechanical Engineering

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.

BoS Chairman

Course Code: 141CS0109	Course Title: SPORTS FOR WELLNESS (Common to CSE and IT)	
Core	L : T : P : C	0: 0: 2: 1
Type: PS	Total Contact Hours:	30

Course Objectives

The course is intended to:

1. Explain the significance of physical fitness.
2. Maintain physical fitness.
3. 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.

BoS Chairman

Course Outcomes

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

1. Explain the significance of physical fitness for healthy living.
2. Maintain physical fitness through exercises.
3. Exhibit mental agility.

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.

BoS Chairman

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

END OF SEMESTER I

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BoS Chairman

SEMESTER II

Course Code: 141CS0201	**Course Title:** COMMUNICATION SKILLS- II (Common to CSE and IT)	
Core	**L : T : P : C**	2: 0: 2: 3
Type: Theory & Practical	Total Contact Hours:	**60**

Prerequisites: The student should have undergone the course(s):
141CS0101 Communication Skills- I

Course Objectives

The course is intended to:

1. Write concisely and ensure accuracy.
2. Listen to lectures and presentations.
3. Use appropriate non-verbal skills to present ideas.
4. Use various reading techniques.
5. Write effectively the 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.

BoS Chairman

Course Outcomes

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

1. Write concisely and ensure accuracy through proof reading.
2. Listen to lectures and presentations, comprehend and respond.
3. Use appropriate non-verbal skills to present ideas and participate in discussions.
4. Use various reading techniques, make notes and respond.
5. Write effectively for various professional situations.

Text Books:

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.

Reference Books:

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

BoS Chairman

Course Code: 141CS0202	**Course Title:** ENGINEERING MATHEMATICS-II (Common to CSE and IT)	
Core	**L : T : P : C**	3: 1: 0: 4
Type: Theory	Total Contact Hours:	**60**

Prerequisites: The student should have undergone the course(s):
141CS0102 Engineering Mathematics-I

Course Objectives

The course is intended to:

1. Analyze the basic concepts of Relations and Maps.
2. Evaluate the A.M, G.M and H.M.
3. Calculate Permutation and Combination.
4. Understand the basic concepts of Divisibility.
5. 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.

BoS Chairman

Course Outcomes

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

1. Analyze the basic concepts of Relations and Maps.
2. Evaluate the A.M, G.M and H.M.
3. Calculate Permutation and Combination.
4. Understand the basic concepts of Divisibility.
5. Realize the concepts of Congruence.

Text Books:

1. Kenneth H Rosen, "Discrete Mathematics and its Applications", Eight Edition, Tata McGraw Hill,2006.(Unit-I,II &III)
2. Thomas Koshy, "Elementary Number Theory with Applications", Second Edition, Elsevier Publications,2002. (Unit-IV &V)

Reference Books:

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

BoS Chairman

Course Code: 141CS0203	**Course Title:** MATERIAL SCIENCE (Common to CSE and IT)	
Core	**L : T : P : C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Prerequisites: The student should have undergone the course(s):
141CS0103 Engineering Physics

Course Objectives

The course is intended to:

1. Interpret the Conducting material's behavior.
2. Explain the semiconductor devices functioning.
3. Identify a suitable fabricating integrated circuits (ICs) technique.
4. Choose the suitable magnetic and dielectric materials.

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.

BoS Chairman

Course Outcomes

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

1. Interpret the fundamental behavior of conducting materials
2. Explain the functioning of semiconductor devices
3. Identify a suitable technique for fabricating integrated circuits (ICs)
4. Choose suitable magnetic and dielectric material for specific engineering application

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.

Reference Books:

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://www.physicscentral.com/
5. http://www.physicsclassroom.com/

BoS Chairman

Course Code: 141CS0204	**Course Title:** C PROGRAMMING (Common to CSE and IT)	
Core	**L : T : P : C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Prerequisites: The student should have undergone the course(s):
141CS0105 Fundamentals of Programming

Course Objectives

The course is intended to:

1. Choose and specify appropriate programming constructs.
2. Construct programs using arrays and functions.
3. Formulate suitable structure or union.
4. Apply the concept of pointers in dynamic memory allocation.
5. Write program using Files and 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.

BoS Chairman

Course Outcomes

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

1. Choose and specify appropriate programming constructs for a given problem.
2. Construct programs using arrays and functions for a given problem.
3. Formulate suitable structure or union for a given scenario.
4. Apply pointers for effective dynamic memory access in a given application.
5. Write program using Files and Pre-processor directives for a given scenario.

Text Book:

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

Reference Books:

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/

BoS Chairman

Course Code: 141CS0205	Course Title: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common to CSE and IT)	
Core	L : T : P : C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Apply basic DC circuit's laws.
2. Comprehend basic AC circuits.
3. Differentiate and specify electrical machines.
4. Identify suitable basic electronic and display devices.
5. Categorize opto-electronic devices and transducers.

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.

BoS Chairman

Course Outcomes

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

1. Apply basic laws to study simple DC circuits.
2. Comprehend basic AC circuits and their phasor representation.
3. Differentiate and specify electrical machines like motor, generator and transformer.
4. Identify suitable basic electronic and display devices for simple applications.
5. Categorize opto-electronic devices and transducers for real time entities.

Text Book:

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

Reference Books:

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:

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

BoS Chairman

Course Code: 141CS0206	Course Title: ENGINEERING GRAPHICS (Common to CSE and IT)	
Core	L : T : P : C	1: 3: 0: 4
Type: Theory	Total Contact Hours:	60

Course Objectives

The course is intended to:

1. Sketch the different curves.
2. Prepare the orthographic projections.
3. Draw the solid projections.
4. Draw the sectioned solids projections.
5. Draw the development of surfaces of simple solids.

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.

BoS Chairman

Course Outcomes

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

1. Sketch different curves and explain its application.
2. Prepare orthographic projection from pictorial views and models
3. Draw the projection of solids
4. Draw the projection of sectioned solids
5. Draw the development of surfaces of simple solids with cuts and slots

Text Book:

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

Reference Books:

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

BoS Chairman

Course Code: 141CS0207	Course Title: C PROGRAMMING LABORATORY (Common to CSE and IT)	
Core	L : T : P : C	0: 0: 2: 1
Type: Practical	Total Contact Hours:	30

Course Objectives

The course is intended to:

1. Select and model data using primitive and structured types.
2. Use different operators, formatting input and outputs.
3. Design programs involving decision making, loops and functions.
4. Implement the effective usage of pointers.
5. Construct programs using advanced features in C.

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.

Course Outcomes

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

1. Select and model data using primitive and structured types for a given problem.
2. Use different operators, formatting inputs and outputs in designing a program.
3. Develop programs to solve problems using decision making, loops and functions.
4. Implement pointers for a given scenario with effective usage.
5. Construct programs with advanced features in C like preprocessor, macros, files and DMA.

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.

BoS Chairman

Course Code: 141CS0208	Course Title: ENGINEERING PRACTICES LABORATORY (Electrical and Electronics) (Common to CSE and IT)	
Core	L : T : P : C	0: 0: 2: 1
Type: Practical	Total Contact Hours:	30

Course Objectives

The course is intended to:

1. Implement the basic Dc and Ac circuits concepts.
2. Interpret various characteristics of basic electronic components
3. Exhibit connections on electrical machining
4. Recite the working of few home appliances

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

BoS Chairman

Course Outcomes

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

1. Implement the basic concepts of DC and AC circuits
2. Interpret various characteristics of basic electronic components
3. Exhibit connections on electrical machining
4. Recite the working of few home appliances

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.

BoS Chairman

Course Code: 141CS0209	Course Title: PROMOTION OF STUDENTS' WELLNESS (Common to CSE and IT)	
Core	L : T : P : C	0: 0: 2: 1
Type: PS	Total Contact Hours:	30

Course Objectives

The course is intended to:

1. Maintain physical wellbeing.
2. Maintain mental wellbeing.
3. Maintain social wellbeing.

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.

Course Outcomes

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

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

BoS Chairman

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)

Reference Books:

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

END OF SEMESTER II

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BoS Chairman

SEMESTER III

Course Code: 141CS0301	**Course Title:** DIGITAL SYSTEM DESIGN	
Core	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

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

141CS0103 Engineering Physics
141CS0205 Basics of Electrical & Electronics Engineering

Course Objectives

The course is intended to:

1. Illustrate the number systems and Boolean postulates.
2. Explain combinational logic circuits.
3. Design synchronous sequential logic circuits.
4. Describe memory organization and transistor logic.
5. Develop VHDL programs.

Unit I - NUMBER SYSTEMS AND BOOLEAN ALGEBRA **9**

Review of binary, octal and hexadecimal number systems - Conversion methods- 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 de-multiplexer.

Unit III - SYNCHRONOUS SEQUENTIAL LOGIC **9**

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

Unit IV - MEMORY ORGANIZATION AND TRANSISTOR LOGIC **9**

Memory Organization: Main Memory - ROM, RAM and its types - Programmable memory (PLA and PAL).Sequential Programmable Devices-TTL and ECL.

BoS Chairman

Unit V - HARDWARE DESCRIPTION LANGUAGE 9

Introduction to VHDL-Behavioral Modeling - Structural Modeling - HDL description of Combinational Circuit- HDL description of Sequential Logic Circuits:-Flip Flops, Counters.

Course Outcomes

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

1. Illustrate the number systems and Boolean postulates used in digital design.
2. Explain combinational logic circuits using logic gates.
3. Design synchronous sequential logic circuits.
4. Describe the memory organization and transistor logic for programmable devices.
5. Develop VHDL programs for combinational and Sequential circuits.

Text Book:

1. M. Morris Mano and Michael D.Ciletti, "Digital Design", Fourth Edition, Pearson Education, 2008.

Reference Books:

1. John F. Wakerly, "Digital Design Principles and Practices", Fourth Edition, Pearson Education, 2007.
2. Charles H. Roth Jr, "Fundamentals of Logic Design", Fifth Edition, Jaico Publishing House, Mumbai, 2003.
3. Donald D. Givone, "Digital Principles and Design", Tata MCGraw Hill, 2003.
4. G. K. Kharate, "Digital Electronics", Oxford University Press, 2010.

Web References:

1. Digital System Design URL:http://nptel.ac.in/courses/117105080/
2. Introduction to Digital Circuits and Systems URL:http://nptel.ac.in/video.php/subjectId=117106086/
3. Digital Logic URL:http://freevideolectures.com/Course/2319/Digital-Systems-Design/3/.

BoS Chairman

Course Code: 141CS0302	Course Title: ENGINEERING MATHEMATICS - III	
Core	L: T: P: C	4 : 0 : 0 : 4
Type: Theory	Total Contact Hours:	60

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

141CS0102 Engineering Mathematics I

Course Objectives

The course is intended to:

1. Describe the basic concepts of vector spaces.
2. Apply inner product of vectors.
3. Apply the concept of diagonalization.
4. Compute the Fourier series expansion.
5. Calculate the Fourier transform.

Unit I - VECTOR SPACES **12**

Vector spaces, Subspace of a vector space, Basis and dimension of vector space, Linear combination and spanning sets of vectors, Linear independence and linear dependence of vectors, Row space, Column space and Null space, Rank and nullity of subspaces, Inner product of vectors, Length of a vector, Distance between two vectors.

Unit II - ORTHOGONALITY AND INNER PRODUCT SPACES **12**

Orthogonality of vectors, Orthogonal projection of a vector, Gram-Schmidt process to produce orthogonal and orthonormal basis, Inner product spaces, Fourier approximation of continuous functions using inner product spaces.

Unit III - SYMMETRIC MATRICES AND QUADRATIC FORMS **12**

Diagonalization of symmetric matrices, Spectral Theorem, Spectral Decomposition, Quadratic forms, constrained optimization, Singular Value Decomposition.

Unit IV - FOURIER SERIES **12**

Fourier series, Dirichlet's condition, Half range sine and cosine series, Parseval's identity, Harmonic analysis.

Unit V - FOURIER TRANSFORMS **12**

Fourier transforms, Fourier Cosine and Sine transforms, Inverse transforms, Convolution theorem, Parseval's identity for Fourier transforms

BoS Chairman

Course Outcomes

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

1. Describe the basic concepts of vector spaces.
2. Apply inner product of vectors to produce an orthonormal basis.
3. Apply the concept of diagonalization in singular value decomposition of a matrix.
4. Compute the Fourier series expansion for a given periodic function.
5. Calculate the Fourier transform of a periodic function.

Text Books:

1. David C. Lay, "Linear algebra and its Applications", Third Edition, Pearson education, 2003.
2. Srimanta Pal, Subodh C. Bhunia. Engineering Mathematics, First edition, 2015, Oxford University Press.

Reference Books:

1. Venkataraman M.K, "Engineering Mathematics Vol 4", National Publishing Company, 2004.
2. Ramana .B.V, "Higher Engineering Mathematics" Tata McGraw Hill publishing company limited, New Delhi, 2007.
3. Howard Anton and Chris Rorres, "Elementary Linear Algebra", Tenth Edition, John Wiley & Sons, 2005.

Web References:

1. http://nptel.ac.in/courses/111106051/
2. http://nptel.ac.in/downloads/111102011/
3. http://nptel.ac.in/downloads/111108066/
4. http://nptel.ac.in/courses/111103021/15
5. http://www.nptel.ac.in/courses/117101055/downloads/Lec-15.pdf

BoS Chairman

Course Code: 141CS0303	Course Title: PRINCIPLES OF COMMUNICATION ENGINEERING	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0205 Basics of Electrical and Electronics Engineering

Course Objectives

The course is intended to:

1. Compare various analog modulation techniques.
2. Compare analog and digital modulation techniques.
3. Describe pulse modulation techniques.
4. Explain the Concepts on satellite and optical communication.
5. Explain wireless communication concepts.

Unit I - 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).Frequency Modulation, Equation of FM wave, Effect of Noise in FM Noise, 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 Transmitter and Receiver, phase shift keying – binary phase shift keying, QPSK, Quadrature Amplitude modulation - Principle, transmitter and Receiver (block diagram only).

Unit III - DIGITAL TRANSMISSION 9

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

Unit IV - SATELLITE AND OPTICAL COMMUNICATION 9

Satellite communication systems - Kepler's law – LEO, MEO and GEO orbits - GPS System - Footprint - Link model- Optical communication systems-Elements of optical fiber transmission link - Types – Losses.

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Unit V - MOBILE COMMUNICATION 9

Multiple access techniques: TDMA, FDMA, CDMA- Advanced Mobile Phone System (AMPS) - Cellular Concept and Frequency Reuse - Channel Assignment and Hand off – GPRS - Global System for Mobile Communications (GSM) – 2G -3G - 4G-5G systems

Course Outcomes

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

1. Compare various analog modulation techniques for communication systems.
2. Compare analog and digital modulation techniques.
3. Describe pulse modulation techniques for transmission.
4. Explain the concepts related to satellite and optical communication.
5. Explain wireless communication concepts.

Text Books:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", Sixth Edition, Pearson Education, 2007.
2. Rappaport T.S, "Wireless Communications: Principles and Practice", Second Edition, Pearson Education, 2009.

Reference Books:

1. Simon Haykin, "Communication Systems", Fourth Edition, John Wiley & Sons. 2001.
2. Lathi. B.P., "Modern Analog and Digital Communication systems", Third Edition, Oxford University Press, 2007.
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2012.
4. Dennis Roddy and John Coolen," Electronic Communications", Fourth Edition, Pearson Education India, 2012.
5. B.Sklar, "Digital Communication Fundamentals and Applications", Second Edition Pearson Education 2007.

Web References:

1. Basics schemes of modern communication URL: http://www.nptel.ac.in /course.php? disciplineId =106.
2. Multiple Access URL: http://ocw.mit.edu/courses/electrical-engineering-and-computerscience/6-450-principles-of-digital-communications-i-fall-2006.

BoS Chairman

Course Code: 141CS0304	Course Title: OPERATING SYSTEMS	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0105 Fundamentals of Programming
141CS0204 C Programming

Course Objectives

The course is intended to:

1. Describe the essential components of operating systems.
2. Choose appropriate process and disk scheduling algorithms.
3. Provide solutions for various synchronization problems.
4. Compare different memory management techniques.
5. Explain the various file system structures and their implementation.

Unit I - OPERATING SYSTEM – COMPONENTS AND SERVICES 9

Operating systems - Definition - Views of OS - Main frame Systems, Desktop Systems – Multiprocessor Systems -Distributed Systems – Clustered Systems – Real Time systems – Hand held Systems. Functionalities of operating system - Program execution, I/O operation, File system manipulation, error detection - OS Services – System Calls – System Utilities.

Unit II - PROCESS SCHEDULING AND DISK SCHEDULING 9

Process concepts - Process scheduling - Short term, long term and medium term scheduling -Preemptive and non-preemptive algorithms - CPU scheduling algorithms - FCFS, SJF, Priority and round robin - Basic disk structure and operation - Disk scheduling algorithms - FCFS, SSTF, LOOK, SCAN, C-SCAN, C-LOOK - selection of the best disk scheduling algorithm.

Unit III - PROCESS SYNCHRONIZATION 10

Inter-process communication techniques - message passing, shared memory, Synchronization- critical section problem-Peterson's solution, synchronization hardware, Synchronization tool- Semaphores, Classic Problems of Synchronization-Reader Writer Problem, Bounded buffer, Dining Philosopher's problem. Deadlock-characteristics, Deadlock handling methods –Deadlock prevention, Deadlock detection, Deadlock Avoidance, Deadlock Recovery.

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Unit IV - MEMORY MANAGEMENT **10**

Memory concept- Swapping, Contiguous memory allocation, Fragmentation, Paging – Hierarchical Paging, Hashed Page Tables, Inverted Page Tables, Segmentation-Paging with Segmentation, Virtual memory - Demand paging, Page-replacement algorithms-FIFO, Optimal Page Replacement, LRU, LFU, MFU.

Unit V - FILE MANAGEMENT **7**

File structures: File concept, File Type, Access methods, Directory structure -Single level directory, two level and Tree structure. File system implementation-FCB, Virtual File system, Directory System Implementation- linear list, hash table implementation.

Course Outcomes

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

1 Describe the essential components of operating systems by tracing the evolution of OS.
2. Choose appropriate process and disk scheduling algorithm for various scenarios.
3. Provide solutions for various synchronization and deadlock problems in cooperating process.
4. Compare different memory management techniques in operating systems.
5. Explain the various file system structures and their implementation for storage systems.

Text Book:

1. Avi Silberschatz, Galvin. P.B., Gagne. G. "Operating System Concepts", Eighth Edition, John Wiley & Sons, 2008.

Reference Books:

1. Pradeep K.Sinha, "Distributed Operating System: Concepts and Design", IEEE Computer Society Press, PHI, 2004.
2. Andrew S. Tanenbaum, "Modern Operating Systems", PHI, Second Edition, 2001.
3. Charles Crowley, "Operating systems A Design oriented Approach", Second Edition, Irwin Professional Publication, 1996.

Web References:

1. NPTEL Course Content on OS URL: http://nptel.ac.in/courses/106108101/
2. Operating Systems Book PPT URL: https://edurev.in/studytube/Notes-Introduction--System-Structures-Operating-Sy/7c9a5bae-816e-4804-9afa9941b7b24ae1_p
3. Critical Section Problem Video Tutorial URL: https://www.youtube.com/watch?v=A9CCDS3Jizc& list= PLLDC 70 psjvq5hIT0kfr1sirNuees0NIbG&index=7.

BoS Chairman

Course Code: 141CS0305	Course Title: DATA STRUCTURES AND ALGORITHM ANALYSIS -I	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0105 Fundamentals of Programming

Course Objectives

The course is intended to:

1. Describe the importance of data structures and asymptotic notations.
2. Perform operations on linear data structures.
3. Determine the complexity of algorithms.
4. Compare the efficiency of brute force & divide and conquer techniques.
5. Apply hashing and string matching techniques.

Unit I - BASIC CONCEPTS OF ALGORITHMS **9**

Introduction - Classification of Data Structures - Abstract data type - Algorithm properties - Fundamentals of algorithmic Problem solving - Fundamentals of analysis framework- Efficiency classes - Asymptotic notations.

Unit II - LINEAR STRUCTURES **10**

List - Array implementation - Linked List implementation - Singly, Doubly and Circular Linked list - Applications of List – Stack – Implementation – Applications – Queue – Implementation - Applications.

Unit III - MATHEMATICAL ASPECTS AND ANALYSIS OF ALGORITHMS **8**

Mathematical analysis of non-recursive algorithms - Mathematical analysis of recursive algorithms - Empirical analysis of algorithms - Algorithm visualization.

Unit IV - SIMPLE ALGORITHMIC DESIGN TECHNIQUES **10**

Brute force approach - Exhaustive Search - Divide and Conquer technique - matrix multiplication -Strassen's algorithm –Searching - Linear search - Binary search – Sorting - Selection sort - Bubble sort - Merge sort - Quick sort - Insertion sort.

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Unit V - HASHING AND STRING MATCHING 8

Hashing - Separate chaining - Open addressing - Double hashing – Rehashing - Extendible hashing - String matching - Naive approach - KMP algorithm.

Course Outcomes

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

1. Describe the need for data structures and the notations used in algorithm analysis.
2. Perform operations on linear data structures for various applications.
3. Determine the complexity of recursive and non-recursive algorithms using mathematical analysis.
4. Compare the efficiency of brute force & divide and conquer techniques for problem solving.
5. Apply suitable methods for efficient data access through hashing and string matching.

Text Books:

1. Mark A. Weiss., "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2013.
2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Pearson Education, Third Edition, 2011.

Reference Books:

1. Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", Second Edition, Universities Press, 2005.
2. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", Second Edition, John Wiley & Sons, 2010.
3. Cormen.T.H.,Leiserson.C.E., Rivest. R.L. and Stein.C., "Introduction to Algorithms", PHI Pvt. Ltd., 2001.

Web References:

1. Animation of Various Data Structures URL:http://visualgo.net/
2. NPTEL Course Content URL: http://nptel.ac.in/courses/106102064/
3. The Animation of Recursion URL: http://www.animatedrecursion.com/

BoS Chairman

Course Code: 141CS0306	Course Title: OBJECT ORIENTED PROGRAMMING	
Core	L: T: P: C	3: 0: 2: 4
Type: Theory & Practical	Total Contact Hours:	75

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

141CS0105 Fundamentals of Programming
141CS0204 C Programming

Course Objectives

The course is intended to:

1. Compare object and procedural oriented Programming.
2. Examine various Programming paradigms.
3. Implement various principles of object oriented programming.
4. Choose appropriate input and output operators for file manipulations.
5. Apply advanced features of OOP.

Unit I - FEATURES OF OBJECT ORIENTED PROGRAMMIMG 9

Structured Programming Concepts and Modules - Pros and Cons - Object Oriented Programming – Concepts and Paradigm – Need for OOP approach - Analysis of Structural and OOP approaches – Classes and Objects - Declaration and Object Creation - Access Specifiers.

Unit II - CONTROL FLOW & MEMORY MANAGEMENT 9

Function declaration - Call by value and Call by reference - Friend functions - Accessing functions between classes - Dynamic Memory Allocation – Constructors – Destructors – Realloc - Operator Overloading.

Unit III - OOP PRINCIPLES 9

Inheritance - Types of Inheritance – Polymorphism: Function overloading - Virtual functions – Abstraction - Abstract Class and Virtual base class - Encapsulation and Data Hiding.

Unit IV - I/O OPERATORS 9

C++ I/O System basics - C++ Stream classes - Formatted I/O - Overloading << and >> - Opening & Closing; Reading and Writing Text Files - Unformatted and Binary I/O - Random Access - Status of I/O and Customization.

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Unit V - ADVANCED CONCEPTS 9

Generic functions - Generic class - Exception types and Handling - Applying Exception Handling - Run Time Type Identification (RTTI) - Type Casting operations - Namespaces - Creating conversion functions.

Lab Component **Total: 30**

Implement the following concepts using suggested list of applications:

1. Implementation of Selection and Iteration statements
2. Program using Classes and Objects
3. Implementing function call by reference, call by value and friend functions
4. Implement memory management techniques in C++
5. Program using Inheritance
6. Implementing Polymorphism in C++
7. Working with file operations
8. Implementing random access in files
9. Implementing generic classes and templates
10. Program to implement exception handling

Suggested list of applications:

1. Online Course Registration System.
2. Hospital Management System
3. Online Examination Management System
4. Library Management System
5. Payroll system for a company
6. Travel management System
7. Hotel management System
8. Student Information System
9. Online Polling System
10. Inventory Control system

Course Outcomes

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

1. Compare various features of Structured and Object Oriented Programming languages.
2. Examine various control flows and memory management techniques for the given problems.
3. Implement various principles of object oriented programming for real time scenarios.
4. Choose appropriate input and output operators for file manipulations for the given problems
5. Apply advanced features of OOP in real world applications.

BoS Chairman

Text Book:

1. Herbert Schildt, "The Complete Reference: C++", McGraw- Hill Companies, Fourth Edition, 2003.

Reference Books:

1. Bjarne Stroustrup, "The C++ Programming Language", Addison Wesley, Fourth Edition, 2013.
2. Jana Debasish, "C++ and Object - Oriented Programming Paradigm" PHI Learning; Third Edition, 2014.
3. E.Balagurusamy, "Object Oriented Programming with C++", McGraw- Hill Companies, Sixth Edition, 2013.

Web References:

1. http://people.cs.aau.dk/~torp/Teaching/E03/OOP/handouts//
2. https://drive.google.com/file/d/0B_9nttbyYh5MRW1QS1FOODJaZFk/view?pref=2&pli=1
3. http://people.cs.aau.dk/~normark/oop-csharp/html/notes/intro-oop-book.html

BoS Chairman

Course Code: 141CS0307	**Course Title:** DATA STRUCTURES AND ALGORITHM ANALYSIS – I LABORATORY	
Core	**L: T: P: C**	0: 0:4: 2
Type: Practical	Total Contact Hours:	**60**

Course Objectives

The course is intended to:

1. Develop recursive and non-recursive algorithms
2. Implement applications of linear data structures
3. Compare the efficiency of Brute-Force and Divide & Conquer approaches.
4. Implement Hashing and String matching techniques.

LIST OF EXPERIMENTS:

1. Implementation of simple recursive and non-recursive algorithms.
2. Implementation of List application.
3. Implementation of Stack application.
4. Implementation of Queue application.
5. Empirical analysis of Searching techniques.
6. Empirical analysis of Sorting techniques.
7. Visualization of Searching& Sorting Algorithms.
8. Implementation of Closest Pair and Convex Hull problems.
9. Implementation of Hashing & String Matching algorithms.

Course Outcomes

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

1. Develop recursive and non-recursive algorithms for solving simple problems.
2. Implement linear data structures using array and linked list representations and use these in various applications.
3. Compare the efficiency of Brute-Force and Divide & Conquer approaches for Searching, Sorting and Geometric problems.
4. Implement Hashing and String matching techniques for efficient data access.

BoS Chairman

Course Code : 141CS0308	Course Title : DIGITAL SYSTEM DESIGN LABORATORY	
Core	L : T : P: C	0 : 0 : 4 : 2
Type: Practical	Total Contact hours:	60

Course Objectives

The course is intended to:

1. Design combinational logic circuits.
2. Design counters using sequential logic circuits.
3. Construct different types of shift registers.
4. Write VHDL programs for sequential and combinational circuits.

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.

Course Outcomes

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

1. Design combinational circuits using logic gates.
2. Design counters and implement them using sequential logic.
3. Construct different types of shift registers.
4. Write VHDL programs for designing combinational and sequential circuits.

BoS Chairman

Course Code : 141CS0309	Course Title : PERSONAL EFFECTIVENESS	
Core	L : T : P: C	0 : 0 : 2 : 1
Type: PS	Total Contact hours:	30

Course Objectives

The course is intended to:

1. Identify the strengths, weaknesses and opportunities.
2. Set goals for academics, career, and personal aspirations.
3. Establish the road map for goals.
4. Apply time management techniques.
5. Create time and pursue activities of self-interest.

UNIT I THE IMPORTANCE OF ENVISIONING **8**

Importance of positive self-perception – Principle of dual creation (Everything gets created twice – Envisioning) - Understanding vision and mission statements - Writing personal mission statements – 'Focus' as a way of life of most successful people – Importance of goal setting –Importance of planning and working to time.

UNIT II FUNDAMENTAL PRINCIPLES OF GOAL SETTING AND WORKING TO TIME **8**

Clarifying personal values, interests and orientations – Awareness of opportunities ahead – Personal SWOT analysis - Principles driving goal setting: Principle of response and stimuli, Circle of influence and circle of concern, what you see depends on the role you assume.

UNIT III GOAL SETTING AND ACTION ORIENTATION **6**

Potential obstacles to setting and reaching your goals - Five steps to goals setting: SMART goals, Inclusive goals, Positive stretch, Pain vs. gain, Gun-point commitment – Importance of action orientation - Converting goals to actionable tasks – Establishing road map – Using Gantt chart for planning and progress.

UNIT IV TIME MANAGEMENT - TOOLS AND TECHNIQUES **8**

Pareto 80-20 principle of prioritization – Time quadrants as a way to prioritize weekly tasks – The glass jar principle - Handling time wasters – Assertiveness, the art of saying 'NO' – Managing procrastination.

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No. of hours & credits:

Enablement through learning workshops	Trained Internal faculty	2 days7 hours each	14 hours
Progress monitoring (face to face interaction with student and checking workbook/Journal)	Internal faculty	1 hour per week	10 hours
Mid semester reinforcement-workshop	Trained Internal faculty	1 day	6 hours
		Total	30 hours
		No. of credits	1

Course Outcomes

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

1. Identify the strengths, weaknesses and opportunities.
2. Set well-articulated goals for academics, career, and personal aspirations.
3. Establish the road map to realize the goals.
4. Apply time management techniques to complete planned tasks on time.
5. Create time and pursue activities of self-interest that add value.

END OF SEMESTER III

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BoS Chairman

UNIT V PUTTING INTO PRACTICE 8

Practicals: Using the weekly journal – Executing and achieving short term goals – Periodic reviews.

Course handouts (compiled by PS team, MCET)

1. Learner's workbook
2. Personal efficiency Journal
3. Reading material for Personal Effectiveness

Further Reading:

1. Stephen R Covey, "First things first", Simon & Schuster, Aug 1997.
2. Sean Covey, "Seven habits of highly effective teenagers", Simon & Schuster, 2004.
3. College student's guide to time management (e-book)
4. Michael S Dobson, Susan B Wilson, "Goal setting" (e-book)

Modality on Tests and Examinations

S.No	Test/Examination	Criterion		Reduced to marks	Remarks
1	Knowledge test (KT)	Best out of 'n' tests (each conducted for 20 marks) Minimum two tests to be conducted		20 marks	After initial orientation
2	Scenario based knowledge test (SKT)	Best out of the two tests (Maximum for each test is 80 marks)		20 marks	Immediately before and after Reinforcement Workshop
3	Comprehensive Examination	Work book Journal work Viva voce	= 20 marks = 40 marks = 40 marks	60 marks	Conducted at the End of semester by a panel of Internal faculty members
		Total	= 100 marks		
		Mark will be entered in Examination Portal for 100 marks			
		Total marks for the course		100 marks	
		Condition for passing the course		50 marks as a whole	

BoS Chairman

SEMESTER IV

Course Code: 141CS0401	Course Title: DATABASE SYSTEMS	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0302 Engineering Mathematics - III
141CS0305 Data Structures and Algorithm Analysis - I

Course Objectives

The course is intended to:

1. Describe the functions and architecture of database management system
2. Design a relational database using ER model and normalization
3. Write SQL Queries using DDL, DML and DQL commands
4. Explain the concurrency control and recovery mechanisms
5. Describe the features of distributed and object oriented databases

Unit I - INTRODUCTION TO DBMS 9

File System-Database System-File System Vs DBMS-Roles in DBMS Environment-Data Models and Conceptual Modeling-Functions of DBMS-Components of DBMS-Multiuser DBMS architecture.

Unit II - RELATIONAL MODEL, ER MODEL AND NORMALIZATION 9

Relational Model: Terminology- Integrity Constraints – Views-Relational Algebra-ER Modeling: Concepts-Relationship Types – Attributes-Structural Constraints-Problems with ER Model-Normalization: Data Redundancy and update anomalies-Functional Dependencies-1NF, 2NF, 3NF.

Unit III - SQL & QUERY PROCESSING 9

SQL: Terminology -Data Manipulation-Data Types-Data Definition – Views-Access Control-Query Processing: Decomposition-Heuristical approach to query optimization-Cost Estimation-Query Optimization in Oracle.

Unit IV - TRANSACTION AND CONCURRENCY CONTROL 9

Transaction: Properties-Concurrency Control: Locking methods, Deadlock, Timestamp ordering, Multi-version timestamp ordering-optimistic techniques-Database Recovery: Transaction and recovery-Recovery facilities, Recovery Techniques- Concurrency control and recovery in Oracle.

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Unit V - DISTRIBUTED AND OBJECT ORIENTED DBMS 9

Distributed DBMS (DDBMS): Concepts- Homogenous and Heterogeneous DDBMS-Functions of DDBMS-Architecture of DDBMS-Date's twelve rules for a DDBMS-Distributed Transaction Management-Distributed concurrency control-Distributed Database Recovery-Object Oriented DBMS: Introduction- Issues in OODBMS-Advantages and Disadvantages of OODBMS.

Course Outcomes

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

1. Describe the functions and architecture of database management system with its components.
2. Design a relational database using ER model and normalization for real world problems.
3. Write SQL Queries using DDL, DML and DQL commands for efficient retrieval of data from databases.
4. Explain the concurrency control and recovery mechanisms for managing multiple transactions in transaction management component.
5. Describe the features of distributed databases and object oriented using its functions and architecture.

Text Books:

1. Thomas Connolly, Carolyn Begg, "Database Systems: A practical approach to design, Implementation and Management", Pearson, New Delhi, 2014.
2. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", Sixth Edition McGraw-Hill, New Delhi, 2010.

Reference Books:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson, New Delhi, 2010.
2. C.J. Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.

Web References:

1. http://www.cs.utexas.edu/~mitra/csSpring2009/cs327/lectures/
2. https://www.cse.iitb.ac.in/~sudarsha/db-book/slide-dir/
3. http://nptel.ac.in/courses/106106093/18

BoS Chairman

Course Code: 141CS0402	**Course Title:** PROBABILITY AND QUEUEING THEORY	
Core	**L: T: P: C**	4 : 0 : 0 : 4
Type: Theory	Total Contact Hours:	**60**

Prerequisites: The student should have undergone the course(s):
141CS0102 Engineering Mathematics I
141CS0202 Engineering Mathematics II
141CS0302Engineering Mathematics III

Course Objectives

The course is intended to:

1. Use basic laws of Probability.
2. Calculate the moments of random variables.
3. Apply the discrete and continuous probability distributions.
4. Use sample mean and variance.
5. Calculate characteristics of queuing systems.

Unit I - PROBABILITY THEORY **9+3**

Probability theory, Introduction, Axioms of probability, Conditional probability, Baye's theorem.

Unit II - RANDOM VARIABLES **9+3**

Random Variables, Discrete random variables, Probability mass function, Cumulative distribution function, Expectations, Variances and moments of discrete random variables, Continuous random variables, Probability density functions, Expectations and variances of continuous random variables, Moment generating function.

Unit III - STANDARD DISTRIBUTIONS **9+3**

Discrete Distributions- Binomial, Poisson and Geometric distributions, Properties, Moment generating functions.
Continuous Distributions - Normal, Uniform and Exponential distributions, Properties, Moment generating functions.

Unit IV - TEST OF HYPOTHESES **9+3**

Sampling distributions, Estimation of parameters, Statistical hypothesis, Large sample test based on Normal distribution for single mean and difference of means, Tests based on t, Chi-square and F distributions for mean, variance and proportion, Contingency table (test for independent), Goodness of fit.

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Unit V - QUEUING THEORY **9+3**

Markovian models, Infinite capacity single server, Infinite capacity multiple Server, Finite capacity single server, Finite capacity multiple server, Little's formula.

Course Outcomes

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

1. Use basic Probability laws.
2. Calculate the moments of the discrete and continuous random variables.
3. Apply the discrete and continuous probability distributions to real life phenomena.
4. Use sample mean and variance to test small and large samples.
5. Calculate characteristics of different queuing systems.

Text Books:

1. J. Ravichandran, "Probability and Statistics for Engineers", Wiley India Publication, 2010.
2. T. Veerarajan, "Probability, Statistics and Random Process" Tata McGraw Hill, 2006.

Reference Books:

1. R.E. Walpole, R.H. Myers, S.L. Myers, and K. Ye, "Probability and Statistics for Engineers and Scientists", Eighth Edition, Pearson Education, Asia, 2007.
2. Murray R Spiegel, John J Schiller and R AluSrinivasan, "Schaum's Outlines of Probability and Statistics", Fourth Edition, Tata McGraw Hill, 2004.

Web References:

NPTEL Course Content URLs:

1. http://nptel.ac.in/downloads/111101004/
2. http://nptel.ac.in/courses/111105041/10
3. http://nptel.ac.in/courses/111104079/

BoS Chairman

Course Code:141CS0403	Course Title: COMPUTER ARCHITECTURE	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0301 Digital System Design

141CS0304 Operating Systems

Course Objectives

The course is intended to:

1. Describe the memory organization and various addressing modes.
2. Explain the various components of the processing unit and bus organization.
3. Illustrate the role of pipeline techniques.
4. Apply various solutions to overcome the data hazards.
5. Explain the architecture of Parallel Processing Models and Embedded Systems.

Unit I - MEMORY ORGANIZATION AND ADDRESSING 9

Basic Processor Architecture - Operational concepts –Performance -Memory Allocation –Memory Operations –Instructions and sequencing-Addressing modes.

Unit II - INPUT / OUTPUT AND BUS ORGANIZATION 9

Accessing I/O devices - Interrupts – DMA- Buses - Interface Circuits - Standard I/O interfaces - Single Bus Organization- Multiple Bus Organization - Superscalar operation.

Unit III - PIPELINING 9

Pipelining Concept - Pipeline Hazards - Pipelining Implementation -Extending the MIPS pipeline to handle Multicycle Operations - Overview of MIPS R4000 Pipeline

Unit IV - INSTRUCTION - LEVEL PARALLELISM 9

ILP Concepts and Challenges - Basic Compiler Techniques for Exposing ILP - Reducing Branch Costs with Prediction - Overcoming Data Hazards with Dynamic Scheduling – Tomasulo's Approach - Hardware Based Speculation - Exploiting ILP: Multiple Instruction Issues- Static Scheduling- Dynamic Scheduling

Unit V - PARALLEL PROCESSORS AND EMBEDDED SYSTEMS 9

Parallel processing - Array Processor - Structure of General Purpose Multiprocessors- Program Parallelism and shared variable - Processor families: overview of ARM Family and Intel Family - Embedded Systems: Microwave oven- Digital camera- Embedded processor chips – Microcontrollers for Embedded systems

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Course Outcomes

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

1. Describe the memory organization and various addressing modes with example.
2. Explain the various components of the processing unit and bus organization for instruction execution.
3. Illustrate the role of pipeline techniques in designing high performance processors.
4. Apply various solutions to overcome the data hazards in Instruction Level Parallelism.
5. Explain the architecture of Parallel Processing Models and Embedded Systems with real time examples.

Text Books:

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

Reference Books:

1. William Stallings, "Computer Organization and Architecture -Designing for Performance", Pearson Education, Ninth Edition, (Hardcover Revised) 2012.
2. S.S.S.P.Rao, "Basics of Computer Organization and Architecture: Problems and Solutions", Alpha Science International Ltd, 2014.
3. David A. Patterson and John L. Hennessey, "Computer Organization and design, The Hardware/Software Interface", Fourth Edition, Morgan Kaufmann, 2009.

Web References:

1. Book Material URL:
   http://www.technolamp.co.in/2011/04/computer-organization-carl-hamacher.html
2. Computer Organization Notes URL:

a. http://www.cse.iitk.ac.in/users/karkare/courses/2011/cs220/html/notes.html

3. NPTEL Course Content URL: http://www.nptel.ac.in/courses/106102062/

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Course Code:141CS0404	Course Title: SOFTWARE ENGINEERING	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Impart the knowledge on Software Life cycle models
2. Derive the requirements for a Software system
3. Select appropriate architecture and principles to design Software systems
4. Develop test plan for verifying and validating requirements
5. Elaborate on project management and current trends in Software Engineering

Unit I - SOFTWARE LIFE CYCLE MODELS 9

Software Engineering as a discipline, Software processes, Software Specification, Software design and implementation, Software evolution, Software prototyping, Waterfall Model, Incremental Model, Spiral Model, Agile Software Development, Case Study.

Unit II - REQUIREMENTS ENGINEERING AND ANALYSIS 9

User and system requirements, Functional and non-functional requirements, Requirements engineering processes, Software requirements document, Requirements elicitation and analysis, Requirements validation, Requirements management, Activity diagrams, Use case diagrams, Sequence diagrams, Class diagrams, State diagrams, UML, Context models, Interaction models, Structural models, Behavioral Models, Model-driven engineering.

Unit III - SOFTWARE DESIGN 9

Design process, Design Concepts - Abstraction, Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Cohesion, Coupling, Object-Oriented Design Concepts, Design Classes, Dependency Inversion - Architectural design and decisions, Architectural views, Layered architecture, Repository (data-centric) architecture, Client-server architecture, Pipe and filter architecture, Object-oriented design, Design Patterns, Transaction processing systems, Information Systems, Language processing systems.

Unit IV - DESIGN OF SPRINGS 9

Verification, Validation, Strategic approach to software testing, Strategic issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Testing OOA and OOD Models, Object-Oriented Testing Strategies, Object-Oriented Testing Methods, Testing Methods Applicable at the Class Level, Interclass Test-Case Design, Test Strategies for Web & Mobile Apps, Validation testing, System Testing, Debugging process, White box testing- Black box testing.

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Unit V - ADVANCED TOPICS AND SOFTWARE MANAGEMENT 9

Software Reuse, CBSE, Service Oriented Architecture, Aspect-oriented Software Engineering, Software Risk Management, Software Scheduling, Software Configuration Management (SCM).

Course Outcomes

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

1. Impart the knowledge on Software Life cycle models for Software development process.
2. Derive the requirements for a Software system through Requirement Engineering process.
3. Select appropriate architecture and principles to design Software systems among different Software design concepts
4. Develop test plan for verifying and validating requirements using Software Testing Methodologies
5. Elaborate on project management and current trends in Software Engineering using Software Management Strategies

Text Books:

1. Roger S.Pressman and Bruce Maxim, "Software engineering- A practitioner's Approach", McGraw-Hill International Edition, Eighth edition, 2014.
2. Ian Sommerville, "Software Engineering", Pearson Education Asia, Ninth edition, 2011.

Reference Books:

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

Web References:

1. Roger S.Pressman online learning Center URL:http://www.mhhe.com/engcs/compsci/pressman/
2. Ian Sommerville's book website URL:http://iansommerville.com/software-engineering-book/
3. NPTEL Lecture Videos URL:http://www.nptel.ac.in/courses/106101061/

BoS Chairman

Course Code: 141CS0405	Course Title: DATA STRUCTURES AND ALGORITHM ANALYSIS -II	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0305 Data Structures and Algorithm Analysis -I

Course Objectives

The course is intended to:

1. Perform various operations on Binary trees and Heaps.
2. Implement operations on Search tree structures.
3. Perform operations on Graphs and Sets.
4. Apply Greedy strategy & Dynamic Programming techniques.
5. Compare the working of Backtracking & Branch and Bound techniques.

Unit I – TREE STRUCTURES **8**

Tree – Preliminaries - Binary trees - Tree traversal – Application - Expression tree – Decision tree - Game tree - Binary heap - Heap sort.

Unit II - SEARCH TREE STRUCTURES **9**

Binary search tree - AVL tree - B-Trees - k-d Tree – Tries.

Unit III - GRAPH **8**

Graph – Definitions – Representation - Topological sort -Breadth-first traversal - Depth-first traversal – Biconnectivity - Euler circuits – Sets - Representation – Operations.

Unit IV - GREEDY METHOD AND DYNAMIC PROGRAMMING **10**

Greedy technique -Dijikstra's algorithm - Prim's and Kruskal's algorithm - Huffman tree - Dynamic Programming - Binomial Coefficient - Floyd's and Warshall's algorithm – Multistage Graph - Optimal Binary Search Tree.

Unit V - BACKTRACKING & BRANCH AND BOUND **10**

Limitations of Algorithm Power: P, NP and NP- Complete Problems.
Backtracking: n-Queens problem - Hamiltonian Circuit - Subset-Sum problem.
Branch and Bound: Assignment problem - Knapsack problem -Travelling salesman problem.

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Course Outcomes

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

1. Perform various operations on Binary trees and Heaps for real world applications.
2. Implement operations on search tree structures for efficient storage and retrieval of data.
3. Perform operations on Graphs and Sets by using suitable storage organizations.
4. Apply Greedy strategy & Dynamic Programming techniques for solving optimization problems.
5. Compare the working of Backtracking & Branch and Bound techniques and choose the suitable technique for problem solving.

Text Books:

1. Mark A. Weiss., "Data Structures and Algorithm Analysis in Java", Third Edition, Pearson Education, 2011.
2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Third Edition, Pearson Education, 2011.

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Galgotia Publications, 2010.
2. Adam Drozdek, "Data Structures and Algorithms in C++", Fourth Edition, Cengage Learning, 2013.
3. Cormen.T.H., Leiserson.C.E., Rivest. R.L. and Stein.C, "Introduction to Algorithms", PHI Pvt. Ltd., 2001.PHI Pvt. Ltd., 2001.

Web References:

1. http://nptel.ac.in/courses/106101060/
2. http://www.animatedrecursion.com/
3. http://www.claymath.org/millennium/P Vs NP/pvsnp.pdf
4. http://www.cut-the-knot.org/

BoS Chairman

Course Code: 141CS0406	Course Title: JAVA PROGRAMMING	
Core	L: T: P: C	3: 0: 2: 4
Type: Theory & Practical	Total Contact Hours:	75

Prerequisites: The student should have undergone the course(s):
141CS0105 Fundamentals of Programming
141CS0204 C Programming

Course Objectives

The course is intended to:

1. Identify the distinct properties and features of Object Orientation.
2. Illustrate name spaces, concurrency and handle exceptional conditions.
3. Employ Java standard library functions.
4. Apply utility and input/output functions.
5. Develop java based applications.

Unit I - INTRODUCTION 9

Overview of Java – Data types, operators, control flows –Class fundamentals, objects and constructors –Method overloading- argument passing, Returning objects, recursion – Method Overriding and Dynamic Method dispatch- Abstract class.

Unit II - PACKAGES, EXCEPTIONS AND THREADS 9

Packages and access protection – Interfaces and extending interfaces – Exception fundamentals and types – Try, catch, throw, throws and finally; Chained Exceptions – Thread model, Creating threads and thread priorities – Synchronization – Interthread communication.

Unit III - JAVA UTILITIES 9

String Handling – String Buffer class and functions – Library Functions – Math – Process – Clone – System Functions.

Unit IV - COLLECTIONS AND I/O STREAMS 9

Collections – Classes and Interfaces – Iterators and User defined collections – String Tokenizer – Java I/O classes and Interfaces - Streams – Byte Streams - Character Streams – File concepts.

Unit V - EXPLORING SWING 9

Java Swing – Features –Components and Containers – Event handling – Exploring Swing – Menus – Java Database Connectivity.

Lab Component **Total: 30**

Implement the following concepts using Java for any scenario in the given list of applications:

1. Program using control flow and function overloading
2. Implementing method overriding and abstraction
3. Creating packages and user-defined exceptions
4. Implementing synchronization and inter thread communication
5. Working with String operations
6. Using Library and System functions

BoS Chairman

7. Working with Collection classes and Iterators
8. Accessing files using I/O methods in java
9. Creating GUI using java Swing
10. Implementing database connectivity using java

The suggested applications are:

1. Online Course Registration System.
2. Hospital Management System
3. Online Examination Management System
4. Library Management System
5. Payroll system for a company
6. Travel management System
7. Hotel management System
8. Student Information System
9. Online Polling System
10. Inventory Control system

Course Outcomes

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

1. Identify the distinct properties and features of object orientation using java.
2. Illustrate name spaces, concurrency and handle exceptional conditions in programs.
3. Employ Java standard library functions for solving complex problems.
4. Apply Java utility, input/output functions for operating with file manipulators.
5. Develop Java based applications using user interfaces and database connectivity.

Text Books:

1. Herbert Schildt, "Java the Complete Reference", Mcgraw Hill Education, Ninth Edition, 2014.
2. Mahmoud Parsian, "JDBC Metada, MySQL and Oracle Recipes: A Problem-Solution Approach", Apress Publications, 2006.

Reference Books:

1. Bart Baesens, Aimee Backiel, Seppe Vanden Brocke, "Beginning Java Programming: The Object Oriented Approach", John Wiley & Sons, 2015.
2. Daniel Liang, "Introduction to Java Programming, Comprehensive Version", Pearson Education, Ninth Edition, 2014.

Web References:

1. Oracle, Java tutorials URL: https://docs.oracle.com/javase/tutorial/java/index.html
2. Java Beginners Tutorial URL: http://javabeginnerstutorial.com/core-java/
3. W3Schools, Java Programming URL: http://www.w3schools.in/java-tutorial/

BoS Chairman

Course Code: 141CS0407	**Course Title:** DATA STRUCTURES AND ALGORITHM ANALYSIS -II LABORATORY	
Core	**L: T: P: C**	0: 0:4: 2
Type: Practical	Total Contact Hours:	**60**

Course Objectives

The course is intended to:

1. Implement the tree data structure and its variants.
2. Implement graph traversal algorithms.
3. Develop algorithms using Greedy and Dynamic programming technique.
4. Devise algorithms using Backtracking, Branch and Bound approaches.

LIST OF EXPERIMENTS:

1. Implementation of Expression tree
2. Implementation of Heap sort
3. Implementation of Tree structure for dictionary search
4. Implementation of Graph traversal applications
5. Implementation of Greedy algorithms
6. Implementation of Dynamic programming algorithms
7. Implementation of Backtracking algorithms
8. Implementation of Branch and Bound algorithms
9. Mini Project

Course Outcomes

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

1. Implement the tree data structure and its variants and use these in various applications.
2. Implement graph traversal algorithms and deploy a suitable approach for solving graph problems.
3. Develop algorithms using Greedy and Dynamic programming technique for solving optimization problems.
4. Devise algorithms using Backtracking, Branch and Bound approaches for solving combinatorial problems.

BoS Chairman

Course Code: 141CS0408	Course Title: DATABASE SYSTEMS LABORATORY	
Core	L: T: P: C	0 : 0 : 4 : 2
Type: Practical	Total Contact Hours:	60

Course Objectives

The course is intended to:

1. Design an ER diagram for a given application
2. Write SQL queries to create and modify the table.
3. Construct the PL/SQL programs to retrieve the required data.
4. Develop a real time application with database connectivity

List of Experiments:

Implement the following concepts for the applications suggested below:

1. ER diagrams
2. DDL, DCL commands
3. SUB QUERY and COMPLEX QUERY using DML commands
4. Functions and Procedures
5. Cursors and Triggers

The suggested applications are (not limited to):

1. Library Management System
2. College Management System
3. Hospital Management System
4. Railway Reservation System
5. Hotel Management System
6. Employee Management System

Course Outcomes

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

1. Design an ER diagram for a given application by finding entities and its attributes using appropriate notations.
2. Write SQL queries to create and modify the table using DDL/DML/DCL commands for real world problems.
3. Construct the PL/SQL programs to retrieve the required data from the data base.
4. Develop a real time application with database connectivity using suitable frontend.

BoS Chairman

Course Code: 141CS0409	Course Title: ETHICAL AND MORAL RESPONSIBILITY	
Core	L: T: P: C	0 : 0 : 2 : 1
Type: PS	Total Contact Hours:	30

Course Objectives

The course is intended to:

1. Articulate the importance of ethical and moral responsibilities.
2. Explain the fundamental aspects of ethics and morality.
3. Validate one's appropriate and inappropriate behaviors.
4. Elaborate code of conduct.
5. Explain the importance of professional practices.

UNIT I ETHICAL PRACTICES – IMPORTANCE **8***

Why ethical practices; The current day scenario of ethical practices – parents, society, politics & business; Awareness of skewedness of information – news, advertisements and other media; The need for ethical and moral responsibility on a personal level; Handling oneself amidst peer pressure and societal pressure;

UNIT II ETHICAL PRACTICES – FUNDAMENTALS **6***

Morality & Ethics; Moral issues, inquiry, moral dilemmas; Moral autonomy – Kohlberg's theory and Gilligan's refinement; Theories on "right action" – virtue ethics, utilitarianism, duty ethics, rights ethics – resolving moral dilemmas; justifying moral obligations;

UNIT III CODES OF CONDUCT **8***

Importance of code of conduct and its role; Evolving draft Code of conduct for different roles – son/daughter, student, future employee & citizen; Reflection on real time incidences at the college.

Engineers as responsible experimenters; Faith of the Engineer (ABET); Pledge and Code of ethics as per National Society of Professional Engineers (NSPE); Code of Ethics of Institution of Engineers (India); Case studies and discussions in professional context

UNIT IV PROFESSIONAL PRACTICES AT WORK **8***

Transition from a student to a professional; Importance of professional practices at work; Integrity as the topmost virtue of a professional; Self-awareness: Where competence ends and professionalism takes over; Professional qualities;

Need to align oneself to culture & values of organizations; Need to embrace diversity in organizations.

*- Includes review sessions

Course handouts (compiled by PS team, MCET)

1. Instructor's Manual (for the faculty)
2. Learner's workbook (for the student)

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References:

1. Mike W Martin & Roland Schinzenger, "Ethics in Engineering", Latest Edition, Tata McGraw-Hill
2. Code of conduct document, MCET student handbook.
3. Gail D Baura, "Engineering Ethics – an industrial perspective", Academic Press, Elsevier,
4. Subrato Bagchi, "The professional – Defining the new standard of Excellence at work", Penguin Books India.

Assessments:

S.No	Test/ Examination	Criterion	Reduced Marks	Remarks
1	Continuous evaluation	Work book entry & self-analysis = 40 % Test (KT &SKT) = 20 % Evaluation of class response = 40 %	60 %	Test conducted just after CCET 3
2	Comprehensive Examination	Test (KT & SKT) = 50 marks Viva – voce = 50 marks	40 %	Conducted at the end of semester by the Execution Faculty member and another senior faculty involved in the course.
		Condition for clearing the course	50%	

No. of hours & credits:

Enablement through class room lecture, case discussions and group presentations	Conducted by trained internal faculty	30 hours – 1 credit
At least two guest lectures	Delivered by senior people from Industries/Government organizations	

Course Outcomes:

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

1. Articulate the importance of ethical and moral responsibilities.
2. Explain the fundamental aspects of ethical practices.
3. Validate one's appropriate and inappropriate behaviours in various roles.
4. Elaborate code of conduct of professional bodies.
5. Explain the importance of professional practices as a future employee/entrepreneur.

END OF SEMESTER IV

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BoS Chairman

SEMESTER V

Course Code:141CS0501	Course Title: DATA WAREHOUSING AND MINING	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0401 Database Systems

Course Objectives

The course is intended to:

1. Apply the Data Pre-processing techniques.
2. Demonstrate various schemas and OLAP operations.
3. Generate Association rules using rule mining.
4. Construct classification models and evaluate their performance.
5. Illustrate the techniques for clustering the data.

Unit I - DATA PREPROCESSING AND ARCHITECTURE 9

KDD Process - Data - Patterns - Technologies - Applications - Issues in Data Mining - Data Objects and Attribute Types -Preprocessing: Cleaning - Integration - Reduction - Transformation- Discretization.

Unit II - DATA WAREHOUSING 9

Data Warehouse & Operational Database Systems -Multitier Architecture -Data Warehouse Models -Modeling: Data Cube and OLAP -Data Generalization by Attribute-Oriented Induction - Date Warehouse Design and Usage- Implementation.

Unit III - ASSOCIATION RULE MINING 9

Market Basket Analysis -Frequent Itemsets - Closed Itemsets and Association Rules - Frequent Itemset Mining Methods- Apriori Algorithm- FP Growth Algorithm - Vertical Data Format - Pattern Mining in Multilevel -Multi-Dimensional Space – Constraint - Based Frequent Pattern Mining.

Unit IV - CLASSIFICATION 9

General Approach to Classification - Decision Tree Induction -Bayes Classification -Rule Based Classification -Classification by Back Propagation - Other Classification methods - Model Evaluation and Selection: Metrics for Evaluating Classifier Performance - Hold Out Method and Subsampling - Cross Validation -Bootstrapping.

Unit V - CLUSTERING 9

Cluster Analysis -Requirements for cluster Analysis -Partitioning methods - Hierarchical methods -Types of Outliers -Challenges of Outlier Detection - Outlier Detection Methods. Recent Trends: Spatial Data Mining - Multimedia Data Mining -Data Mining Applications

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Course Outcomes

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

1. Apply the Data Pre-processing techniques for various data mining functionalities.
2. Demonstrate various schemas and OLAP operations in Data warehousing.
3. Generate Association rules using different types of rule mining process for interesting relations.
4. Construct classification models and evaluate their performance for data categorization.
5. Illustrate the techniques for clustering the data and detection of outliers for various types of data.

Text Book:

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

Reference Books:

1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2006.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw Hill Edition, 2008.
3. W.H.Inmon, "Building the Data Warehouse", Fourth Edition, Wiley, 2005.

Web References:

1. http://web.engr.illinois.edu/~hanj/bk3/bk3_slidesindex.htm
2. http://courses.cs.washington.edu/courses/csep521/07wi/prj/leonardo_fabricio.pdf
3. https://www.ibm.com/developerworks/library/ba-data-mining-techniques

BoS Chairman

Course Code: 141CS0502	**Course Title:** Formal Languages and Automata Theory	
Core	**L: T: P: C**	**3: 0: 0: 3**
Type: Theory	Total Contact Hours:	**45**

Prerequisites: The student should have undergone the course(s):
141CS0405 Data Structures Algorithm and Analysis - II

Course Objectives

The course is intended to:

1. Identify the types of formal languages.
2. Construct Finite Automata from regular expressions.
3. Design Pushdown Automata for accepting context free languages.
4. Construct a Turing Machine for recognizing recursive languages.
5. Classify decidable and undecidable languages.

Unit I - FINITE AUTOMATA 9

Automata – Computability - Complexity - Chomsky hierarchy of languages - Finite Automata – Non-determinism – Finite Automata with Epsilon transitions – Equivalence of NFA and DFA – Minimization of DFA.

Unit II - REGULAR LANGUAGES 9

Regular Grammars - Regular Languages and Operations - Regular Expressions - Equivalence of Finite Automata and Regular Expressions: Thompson Construction – State Elimination Method - Closure Properties of Regular Languages - Non regular Languages.

Unit III - CONTEXT FREE LANGUAGES 9

Context Free Grammars - Derivations, Parse Tree and Ambiguity -Pushdown Automata - Equivalence of Pushdown Automata and CFG -Closure Properties of Context Free Languages - Non Context Free Languages.

Unit IV - TURING MACHINE 10

Turing Machine – Language Acceptance – Techniques for Turing Machine Construction – Variants of Turing Machines - Equivalence of single tape and multi-tape Turing Machine – Universal Turing Machine.

Unit V - COMPUTABILITY THEORY 8

Decidability: Decidable Languages - Undecidability - Reducibility: Undecidable Problems from Language Theory - Halting Problem - Post Correspondence Problem.

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Course Outcomes

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

1. Identify the types of formal languages by analyzing their structure.
2. Construct Finite Automata from regular expressions for identifying regular languages.
3. Design Pushdown Automata for accepting context free languages.
4. Construct a Turing Machine for recognizing recursive languages.
5. Classify decidable and undecidable languages by using Reducibility.

Text Books:

1. John E.Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, "Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson Education Publishers, 2012.
2. Michael Sipser, "Introduction to the Theory of Computation", Third Edition, Cengage Learning, 2013.

Reference Books:

1. Kamala Krithivasan, R. Rama, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education, 2009.
2. K. L. P. Mishra, N. Chandrasekaran, "Theory of Computer Science: Automata, Languages and Computation", Third Edition, PHI, 2006.

Web References:

1. Course Material URL: http://www.ics.uci.edu/~goodrich/ teach/cs162/notes/
2. NPTEL Course Content URL: http://nptel.ac.in/courses/106106049/
3. JFLAP tool -Home URL: www.jflap.org/

BoS Chairman

Course Code:141CS0503	Course Title: MICROPROCESSOR AND MICROCONTROLLER	
Core	L: T: P: C	3: 0: 2: 4
Type: Theory	Total Contact Hours:	75

Prerequisites: The student should have undergone the course(s):
141CS0204 C- Programming
141CS0301 Digital System Design

Course Objectives

The course is intended to:

1. Describe the components and architecture.
2. Write 8051 Microcontroller programs.
3. Describe the Programmer Model and its architecture.
4. Explain the instruction sets of ARM Processor.
5. Demonstrate various applications with Microcontroller boards.

Unit I - 8051 MICROCONTROLLER 9

8051 Architecture - I/O pins and Ports, External Memory - Timers and Counters – serial data communication- Interrupts - Instruction set - Addressing modes.

Unit II - INTRODUCTION TO EMBEDDED C PROGRAM 9

Data types and time delay- I/O programming - logical operations - Data conversion - data serialization - programming to interface: LED- LCD- Keyboard - Timer - Serial communication.

Unit III - ARM ARCHITECTURE 9

ARM Processor Fundamentals-Registers-Current Program Status Register -Pipeline-Exceptions, Interrupts and the Vector Table - Core Extensions - ARM7 CPU organization

Unit IV - ARM INSTRUCTION SETS 9

Addressing Modes - ARM Instruction Set -Thumb instruction set – Data Processing Instruction – Branch Instruction- Load Store Instruction – Software Interrupt Instruction

Unit V - MICROCONTROLLERS BOARDS AND APPLICATIONS 9

Introduction to Raspberry pi – installation setup- Embedded python programming- GPIO - LED interfacing- buzzer interfacing - sensor interfacing – IR sensor-Ultrasonic sensor-Relay interfacing - Wi-Fi applications.

LAB COMPONENT: **30 Hours**

Embedded C programming

8051:

1. Introduction to keil IDE
2. Interfacing LED and Switch
3. Interfacing LCD and Keyboard
4. Timer

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5. Serial Communication
6. Interrupt

Raspberry pi:

1. Introduction to embedded python programming
2. Interfacing LED and Switch
3. Interfacing Sensors

a. Ultrasonic Sensor
b. IR Sensor

4. Interfacing Relay
5. Wifi Application

Course Outcomes

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

1. Describe the components and architecture of 8051 Microcontroller
2. Write 8051 Microcontroller programs using Embedded C.
3. Describe the ARM Processor's Programmer Model and its architecture
4. Explain the instruction setsof ARM Processor using simple programs.
5. Demonstrate various applications with Microcontroller boards for interfacing circuits.

Text Books:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay "The 8051 Microcontroller and Embedded Systems using Assembly and C", Second Edition, Eastern Economy Edition, 2006.
2. Andrew N Sloss, Dominic Symes, Chris Wright "ARM System Developer's Guide Designing and Optimizing System Software", Morgan Kaufmann Publisher, Elsevier-2004.
3. Tim Cox, "Raspberry Pi for Python Programmers Cookbook" Second Edition, Packt Publishing, 2016.

Reference Books:

1. Kenneth J.Ayala, "The 8051 Microcontroller Architecture, Programming and Applications" Fourth Edition, Penram International, 2008.
2. Steve Furber, "ARM System –On –Chip architecture", Addison Wesley, 2000.

Web References:

1. https://www.raspberrypi.org
2. http://nptel.ac.in/downloads/106108100/
3. http://www.nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/New_index1.html

BoS Chairman

Course Code:141CS0504	Course Title: COMPUTER NETWORKS	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0303 Principles of Communication Engineering
141CS0304 Operating Systems

Course Objectives

The course is intended to:

1. Characterize the functionalities of network layers.
2. Differentiate various encoding and medium access coordination services.
3. Design a network with appropriate addressing.
4. Illustrate the functionalities of transport layer protocols.
5. Demonstrate the working principles of application layer protocols and security algorithms.

Unit I - FOUNDATIONS OF NETWORKS 8

Network Requirements –Components -Architecture – Socket implementation – Bandwidth and Latency –Delay X Bandwidth product –Application Performance needs.

Unit II - LINK LAYER 9

Perspectives on Connecting – Encoding (NRZ, NRZI, Manchester, 4B/5B) –Error Detection (Parity, Internet Checksum, CRC) – Reliable transmission – Media access control – Framing: Ethernet – Wireless Network.

Unit III - NETWORK LAYER 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 – Mobile IP.

Unit IV - TRANSPORT LAYER 9

UDP: Segment format, Applications – TCP: Segment Format, Connection Establishment and Termination– TCP Congestion Control – Congestion Avoidance Mechanisms.

Unit V - APPLICATION LAYER AND SECURITY 9

Electronic Mail: SMTP, MIME, IMAP – World Wide Web: HTTP – Web Services – Infrastructure Services: DNS, SNMP - Security: Firewalls – Cryptographic Building Blocks – Symmetric vs Public-Key Ciphers – Key Management.

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Course Outcomes

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

1. Characterize the functionalities of various layers in network architecture.
2. Differentiate various encoding and medium access coordination services for node-to-node data transmission
3. Design a network with appropriate addressing using subnetting and routing algorithms.
4. Illustrate the functionalities of transport layer protocols for reliable data transmission.
5. Demonstrate the working principles of application layer protocols and security algorithms for end-to-end communication.

Text Book:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks – A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2012.

Reference Books:

1. James F. Kurose, Keith W. Ross, "Computer Networking – A Top Down Approach Featuring the Internet", Seventh Edition, Pearson Education, 2017.
2. William Stallings, "Data and Computer Communication", Tenth Edition, Pearson Education, 2013.

Web References:

1. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-829-computer-networks-fall-2002/
2. http://nptel.ac.in/courses/106105080/
2. http://nptel.ac.in/courses/106105081/
3. http://nptel.ac.in/courses/106106091/

BoS Chairman

Course Code: 141CS0505	Course Title: OPEN SOURCE SOFTWARE DEVELOPMENT	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0306 Object Oriented Programming
141CS0401 Database Systems

Course Objectives

The course is intended to:

1. Outline the open source licenses and legal issues.
2. Design an open source Database for any applications.
3. Develop the Groovy OOP concepts.
4. Create web application through Grails.
5. Build a web application using AngularJS.

Unit I - OPEN SOURCE SOFTWARE & DATABASE DESIGN 9

OPEN SOURCE SOFTWARE: Open Source Initiatives – definition-Open Source Licenses- Legal Issues-Contractual Protections - MYSQL: Data types –Stored Programs querying- MongoDB : Schemaless Database, collections, documents, fields, Establish relationships - Create, retrieve, update and delete documents

Unit II - GROOVY- I 9

Groovy as extension of Java - Datatypes, control structures, special loops & operators- List, Map, String, Date – Closure- Object Oriented groovy-Builders, Meta Programming

Unit III - GRAILS- I 9

Essence of Grails- Dynamic and Static scaffolding –Domain classes, GORM, controllers- Views

Unit IV - GRAILS – II 9

REST services–Ajax--Services –Configuration – Grails Build systems –Plugins

Unit V - AngularJS 9

AngularJS Directives and Controllers- Unit Testing- Forms, Inputs, and Services- AngularJS Services- Server Communication- Working with Filters

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Course Outcomes

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

1. Outline the open source licenses and contractual issues.
2. Design an open source Database for an application.
3. Develop the features of dynamic programming using Groovy.
4. Create web application using Grails framework.
5. Build a single page robust web application using AngularJS.

Text Books:

1. Michael R.Overly, "The Open Source Handbook", First Edition, BNA Company, 2003.
2. Paul Dubios, "MYSQL – Developers Library", Fourth Edition, Addison-Wesley Professional, 2008.
3. Kristina Chodorow, Michael Dirolf, "MongoDB: The Definitive Guide Powerful and Scalable Data Storage", Second Edition, O'Reilly Publication, 2010.
4. Bashar Jawad, "Groovy and Grails Recipes", First Edition, APress Publication, 2008.
5. Brown, Jeff Scott, Rocher, Graeme, "The Definitive Guide to Grails 2", First Edition, Apress, 2013.
6. Shyam Seshadri & Brad Green, "AngularJS Up & Running", First Edition, O'Reilly Publication, 2015.

Reference Books:

1. Andrey Adamovich and Luciano Fiandesio, "Groovy 2 Cook Book", 2nd Edition Packt Publishing, 2013.
2. Burt Beckwith, "Programming Grails", O'Reilly Media, Inc., First Edition, 2013.
3. Kyle Banker, Peter Bakkum, Shaun Verch, Tim Hawkins, Doug Garrett, "MongoDB in Action",Second Edition, Manning Publications Company, 2015.
4. Chandermani,"AngularJS by Example", First Edition, Packt Publishing Ltd, 2015.

Web References:

1. MongoDB: http://www.w3resource.com/mongodb/introduction-mongodb.php
2. Groovy on Grails: http://grails.asia/grails-tutorial-for-beginners-setup-your-windows-development-environment.

BoS Chairman

Course Code:141CS0506	Course Title: COMPUTER NETWORKS LABORATORY	
Core	L: T: P: C	0: 0: 4: 2
Type: Practical	Total Contact Hours:	60

Course Objectives

The course is intended to:

1. Design various LAN topologies.
2. Implement client server communication.
3. Implement routing protocols and congestion control techniques.
4. Demonstrate network monitoring and secured data transmission.

List of Experiments

The following experiments are to be implemented in JAVA or simulated using network simulator tools

1. Simulation of IEEE LAN topologies.
2. TCP socket programming.
3. UDP socket programming.
4. Remote Method Invocation and Remote Procedure Call.
5. Study of router configuration.
6. Implementation of routing protocols.
7. Dynamic host configuration protocol.
8. TCP congestion control algorithms.
9. Implementation of SNMP protocol.
10. Implementation of encryption and decryption algorithms.

Course Outcomes

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

1. Design various LAN topologies for network analysis.
2. Implement client server communication using socket programming.
3. Implement routing protocols and congestion control techniques for reliable data transmission.
4. Demonstrate network monitoring and secured data transmission using SNMP and security algorithms.

BoS Chairman

Course Code: 141CS0507	**Course Title:** OPEN SOURCE SOFTWARE DEVELOPMENT LABORATORY	
Core	**L: T: P: C**	0 : 0 : 4 : 2
Type: Practical	Total Contact Hours:	**60**

Course Objectives

The course is intended to:

1. Develop a Database for an application.
2. Implement the concepts of OOP using Groovy.
3. Develop an application using MVC architecture in Grails Framework.
4. Implement web application through MVC using AngularJS.

List of Experiments:

1. Develop a database for a real time applications using MYSQL.
2. Implementation of Database using MONGO.
3. Implement text parsing and regular expressions using Groovy.
4. Create a simple web application using Grails framework.
5. Create a single web application using AngularJS

Course Outcomes

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

1. Create a database for real time applications using MYSQL and MongoDB.
2. Implement the OOP principles using GROOVY.
3. Develop an application in GRAILS framework.
4. Implement web application through MVC using AngularJS

BoS Chairman

Course Code: 141CS0508	**Course Title:** TEAMNESS AND INTER-PERSONAL SKILLS (Common to all Branches)	
Core	**L: T: P: C**	0 : 0 : 2 : 1
Type: PS	Total Contact Hours:	**30**

Course Objectives:

The course is intended to:

1. Be aware of attitudinal, behavioral and emotional aspects of self.
2. Learn continuously and be in harmony with self.
3. Understand others' preferences, values, roles & contexts.
4. Identify barriers to harmonious relationships.
5. Work collaboratively as a team.

Unit I - HARMONY WITH SELF

Importance of learning about self continuously; Approaches to learn about self: introspection, being open to feedback, critical incidences as opportunities; Understanding life stages and challenges associated with them; Healthy ways of handling self in response to life's challenges;

Instruments/inventories to understand self and others: A) Know your temperament, B) Mayer Briggs Type Indicator, C) Interpersonal Needs Inventory

Unit II - HARMONY WITH OTHERS

Importance of living in harmony with others; What it takes to live in harmony with others; Understanding preferences, values, roles and contexts of others; Approaches to navigating through differences between self and others;

Barriers to harmonious relationships - Perceptions, Judgments, and Emotional instability; Ways to handle each of the barriers; Importance of reaching-out to others

Unit III - GROUP DYNAMICS AND CONFLICTS RESOLUTION

Group dynamics: overt and covert processes at micro and macro levels; Understanding the basis of conflicts; Understanding one's own conflict handling style; Methods to handling conflicts effectively.

Unit IV - WORKING IN TEAMS

Effectiveness in communication; Forming – storming – norming and performing model; Competition vs collaboration – impact of both on team tasks; TEAM Questionnaire – components of a healthy team and approaches to improving them.

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Mode of delivery:

1. A 2-day learning workshop
    1. Activities (experiential learning)
    2. Audio visuals (affective learning)
    3. Case discussions (cognitive learning)
    4. Instruments/questionnaires (reflective learning)

Guided by Learner's workbook.

2. Continuous learning guided by learning journal, and reviews by faculty
3. Half-day reinforcement session towards the end of the semester

Evaluation:

Sl. No.	Evaluation	Criterion	Total marks		Remarks
1	Continuous Evaluation	KT SKT Evaluation during workshop Weekly review of journal	KT SKT Work book Journal	- 10 marks - 15 marks - 20 marks - 30 marks	KT=Knowledge Test SKT=Scenario based Knowledge Test
			Total	- 75 marks	
2	End semester Evaluation	Comprehensive Examination and Viva voce	KT & SKT, short questions Viva voce	- 10 marks - 15 marks	Conducted for 25 marks
			Total	- 25 marks	
		Total marks for the course	100 marks		
		Condition for clearing the course	50 marks as a whole; but student should have attended the ESE.		

Course Outcomes:

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

1. Be aware of attitudinal, behavioral and emotional aspects of self.
2. Prefer to learn continuously about self and be in harmony with self.
3. Understand others' preferences, values, roles & contexts and be in harmony with others.
4. Identify barriers to harmonious relationships and derive ways to handle them.
5. Work collaboratively as a team to deliver expected outcomes.

END OF SEMESTER V

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BoS Chairman

SEMESTER VI

Course Code: 141CS0601	**Course Title:** ARTIFICIAL INTELLIGENCE	
Core	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Prerequisites: The student should have undergone the course(s):
141CS0405 Data Structures and Algorithm Analysis - II

Course Objectives

The course is intended to:

1. Describe the agent type and behavior
2. Analyze the efficiency of various searching techniques
3. Apply Inference rules to the given Knowledge Base
4. Choose the appropriate planning technique
5. Explain the application of Artificial Intelligence techniques

Unit I - INTELLIGENT AGENTS **8**

Foundation and History of artificial Intelligence - Agents and Environments – Nature of environments – Structure of Agents

Unit II - PROBLEM AND SEARCHING **10**

Problem Solving agents – Measuring problem solving performance – Uninformed search strategies: BFS, DFS, DLS, IDS, Bidirectional search – Informed Search strategies : Greedy BFS – A* search - Heuristic function – Local search algorithms – Online search agent –Constraint satisfaction Problem –Backtracking search for CSP - Adversarial search

Unit III - KNOWLEDGE AND REASONING **10**

Logical Agents – Propositional Logic – Reasoning patterns – resolution – Forward and Backward chaining – First Order Logic – Syntax and Semantics of FOL – using First Order Logic – Knowledge Engineering in FOL – Inference in FOL- Unification and Lifting – Forward and Backward chaining – Resolution

Unit IV - PLANNING **9**

Classical Planning – Planning as State space search – Planning and acting in Real world and Non deterministic domains - Hierarchical planning - Multiagent planning

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Unit V - APPLICATIONS 8

Natural Language processing – Language Model – Text Classification - Information retrieval - Information extraction – Speech recognition

Course Outcomes

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

1. Describe the type and behavior for a given agent.
2. Analyze the efficiency of various searching techniques for solving a problem.
3. Apply Inference rules to the given Knowledge Base for theorem proving.
4. Choose the appropriate planning technique to solve the given problem.
5. Explain the application of Artificial Intelligence techniques in Real world systems.

Text Book:

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

Reference Books:

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

Web References:

1. Tool : SWI-Prolog
   http://www.swi-prolog.org/download
   http://www.swi-prolog.org/pldoc/man?section=quickstart
2. AIMA (Artificial Intelligence: A Modern Approach)
   http://aima.cs.berkeley.edu/ - Text Book followed
   http://aima.cs.berkeley.edu/code.html - online code repository C++, Java, Python, LISP
3. E Learning courses from IITs and IISC
   http://nptel.ac.in/video.php?subjectId=106105079 – Video Lecture by Prof P. Dasgupta
4. MIT OpenCourseWare
   http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/ - Video Lecture by Prof. Patrick Henry Winston
5. 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

BoS Chairman

Course Code: 141CS0602	Course Title: BIG DATA	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0304 Operating Systems
141CS0401 Database Systems

Course Objectives

The course is intended to:

1. Describe the significance of Big data.
2. Illustrate the basic file system operations in HDFS.
3. Compare Map Reduce and YARN.
4. Use advanced features in Map Reduce.
5. Develop applications using HIVE and HBASE.

Unit I - BIG DATA REVOLUTION 9

Data base Revolutions- Google, Big data and Hadoop: Big data Revolution-Pioneer of Big data- Case Studies.

Unit II - HADOOP 9

Design of Hadoop Distributed File System (HDFS) - HDFS Concepts- CLI- File systems –Interfaces- Basic File System operations-– The Java Interface- Data Flow- Parallel Copying with Distcp- Hadoop Archives- Hadoop I/O: Data Integrity- Compression- Serialization- File-Based Data Structures.

Unit III - MAP REDUCE and YARN 9

Map Reduce: Analysis with Hadoop- Anatomy of Job Run- Scaling Out-Hadoop Streaming-Hadoop Pipes- Classic versus YARN Map Reduce: Failures- Scheduling- Shuffle and Sort- Map Reduce Types and Formats: Types- Input Formats-Output Formats.

Unit IV - MAP REDUCE ADVANCED Features 9

Map Reduce Features –Counters: Built in counters and User defined counters- Sorting: Partial sort- Total sort -Secondary sort- Joins: Map side join- Reduce side Join- Side Data Distribution-Map Reduce Library Classes.

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Unit V - HIVE and HBASE 9

Hive: Comparison with Traditional Databases- HiveQL- Tables- Querying Data- User-defined Functions- HBase: Hbasics- Concepts- HBase versus RDBMS.

Course Outcomes

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

1. Describe the significance of big data with revolutions in databases.
2. Illustrate the basic file system operations in HDFS architecture for working in distributed environment.
3. Compare and YARN for all Internals processes.
4. Use advanced features Map Reduce in Map Reduce for real world problems.
5. Develop applications using HIVE and HBASE for Data Analytics.

Text books:

1. Guy Harrison, "Next Generation Databases- NoSQL, New SQL and Big Data", APress Media, Springer Science and Business Media, 2015.
2. Tom White, "Hadoop: The Definitive Guide", O'Reilly Publication and Yahoo! Press, Fourth Edition, 2015.

Reference Books:

1. Viktor Mayer-Schönberger and Kenneth Cukier, "Big Data: A Revolution That Will Transform How We Live, Work, and Think", Mariner Books Publishers, 2014.
2. ArvindSathi, "Big Data Analytics: Disruptive Technologies for Changing the Game (Paperback)", Mc Press, 2012.
3. "Hadoop in Action" by Chuk Lam, Manning Publications, 2010.

Web References:

1. Amazon S3, URL: http://aws.amazon.com/s3/
2. Welcome to Apache™ Hadoop®! URL: https://hadoop.apache.org/
3. Fay Chang, Jeffrey Dean, "Big table: A Distributed Storage System for Structured data" URL: http://static.googleusercontent.com/media/research.google.com/

BoS Chairman

Course Code:141CS0603	Course Title: OBJECT ORIENTED ANALYSIS AND DESIGN	
Core	L: T: P: C	3 : 0 : 2 : 4
Type: Theory & Practical	Total Contact Hours:	75

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

141CS0306- Object Oriented Programming

Course Objectives

The course is intended to:

1. Apply object oriented concepts.
2. Develop requirement specification of any problem.
3. Analyze classes with appropriate relationships.
4. Design classes, interface and subsystems.
5. Develop functional object-oriented software.

UNIT I OBJECT ORIENTED APPROACH **8**

Need for Object Oriented Approach – OO Concepts – The System life cycle – Methodologies – Engineering the System Requirements – Requirements Elicitation methods – Validation.

UNIT II USE CASE MODELING **9**

Unified Modeling Language – Architecture – Unified Process – Requirements workflow – Defining requirements – Use case Modeling – Actor and Use Case Generalization – Use Case Relationships.

UNIT III ANALYSIS MODELING **10**

The Analysis Workflow – Classes and Objects – Finding Analysis classes – Relationships – Inheritance and Polymorphism – Analysis packages – Use Case Realization – Activity Diagrams.

UNIT IV DESIGN MODELING **9**

The Design workflow – Designing Classes – Refining analysis relationships – Interface and Subsystems – Design realization – Basic and Advanced State Charts .

UNIT V IMPLEMENTATION AND DEPLOYMENT **9**

Implementation workflow – Components – Dealing with Persistent data – Implementing in a Relational Database – Testing object oriented software – Deployment.

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LAB COMPONENT: **30 Hours**

1. Develop requirement specification using object oriented concepts and validate it.
2. Apply Use case modeling for the given requirement specification.
3. Identify the conceptual classes with its relationships and develop a domain model with UML Class diagram.
4. Using the identified scenarios, draw relevant activity diagram.
5. Using the identified scenarios, find the interaction between objects and represent using UML Sequence diagrams.
6. Using the identified scenarios, draw relevant state chart diagram.
7. Develop and validate the User interface.
8. Generate a functional code using UML design
9. Implement the application with database connectivity
10. Deploy and Test the functional software

Suggested Areas for Implementation:

Passport Automation System, Book Bank, Exam Registration, Stock Maintenance System, Online Course Reservation System, E-ticketing, Credit Card Processing, E-book Management System, Recruitment System, Library Management System, Student Information System, etc..,

Course Outcomes

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

1. Apply object oriented concepts for gathering & validating user requirement specifications.
2. Develop requirement specification of any problem using Use Case Modeling..
3. Analyze classes with appropriate relationships in problem statement using activity diagrams.
4. Design classes, interface and subsystems by using Interaction and state charts diagrams.
5 Develop functional object-oriented software with necessary deployment components.

Text Books:

1. Carol Britton, Jill Doake, "Object Oriented Systems Development: A Gentle Introduction", McGraw Hill Publishing Company, 2012.
2. Jim Arlow, IlaNeustadt, "UML2 and The Unified Process: Practical Object Oriented Analysis and Design", Pearson Education, 2015.

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Reference Books:

1. Mike O'Docherty, "Object Oriented Analysis and Design: Understanding System Development with UML 2.0", John Wiley & Sons, 2015.
2. Craig Larman, "Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development", Third Edition, Addison Wesley Professional, 2015.
3. Alan Dennis, Wixom, Tegarden, "Systems Analysis and Design: An Object-Oriented Approach with UML", Fifth Edition, John Wiley, 2015.

Web References:

1. NPTEL Course on Object Oriented Analysis and Design
   URL:http://nptel.ac.in/courses/106105153/
2. IISC Bangalore, System Analysis and Design Course
   URL:http://freevideolectures.com/Course/3432/System-Analysis-and-Design
3. Nancy Conner, UML Course URL: https://www.vtc.com/products/UML_tutorials.html

BoS Chairman

Course Code: 141CS0604	Course Title: WEB TECHNOLOGIES	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0406 Java Programming

Course Objectives

The course is intended to:

1. Create a web application for developing dynamic web pages.
2. Validate web pages using JavaScript.
3. Design the relationship between metadata and XML.
4. Develop the applications using Server side scripting.
5. Implement the server side programs.

Unit I - XHTML **9**

XHTML: Linking - Images – Special Characters and Horizontal rules - Lists – Tables – Forms – Internal Linking – Meta Elements - Cascading style sheets: Inline style sheets – Embedded Style sheets – conflicting styles – External style sheets – CSS drop down menu – User style sheets.

Unit II - JAVA SCRIPT **9**

Memory Concepts – Arithmetic – Decision making - Control Statements – Counter, Sentinel and Nested controlled repetition – Assignment, Increment, Decrement, Logical Operators - Functions – Arrays - Objects.

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 **9**

JSP - Objects – Scripting – Standard Actions – Directives - ASP – Page Objects - File System Objects – ADO –Active-X Components.

Unit V - SERVLETS **9**

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

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Course Outcomes

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

1. Create a web application for developing dynamic web pages using XHTML.
2. Validate web pages using JavaScript for various form control elements
3. Design the relationship between metadata and XML using Schema, Style Sheet & XML Publishing.
4. Develop the applications using Server side scripting through JSP &ASP.
5. Implement the server side programs using servlets.

Text Books:

1. Harvey M. Deitel , Paul J. Deitel,"Internet and World Wide Web – How to Program", Fourth Edition, Pearson Education Asia, 2009.
2. Deitel & Deitel , Nieto,Lin,Sadhu, "XML: How To Program", Second Edition, Pearson Education Asia, 2009.
3. Jason Hunter, William Crawford, "Java Servlet Programming", Second Edition, O'Reilly Publication, 2010

Reference Books:

1. Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and JAVA", Prentice Hall of India – QUE, 2001.
2. John Pollock, "Javascript - A Beginners Guide", Third Edition, Tata McGraw-Hill Edition, 2009.

Web References:

1. http://www.nptel.ac.in/courses/106105084/
2. http://xwiki.usc.edu/groups/instructionalmaterials/weblog/e5657/XHTML_and_CSS_tutorial.html
3. http://www.w3schools.com/html/html_xhtml.asp
4. https://www.ischool.utexas.edu/technology/tutorials/webdev/xml_dtds/xml.pdf
5. http://www.ceng.metu.edu.tr/~e1195288/JSP_tutorial.pdf
6. http://www.java-programming.info/tutorial/pdf/csajsp2/02-Servlet-Basics.pdf

BoS Chairman

Course Code: 141CS0605	**Course Title:** BIG DATA LABORATORY	
Core	**L: T: P: C**	0 : 0 : 4 : 2
Type: Practical	Total Contact Hours:	**60**

Course Objectives

The course is intended to:

1. Implement basic operations in HDFS.
2. Develop applications using Map Reduce features.
3. Implement various data analytics applications.
4. Develop mini project using Hadoop cluster.

List of Experiments:

1. Implementation of simple Commands in HDFS.
2. Implementation of File System Commands in HDFS
3. Implementation of Parallel Copying in HDFS.
4. Implementation of simple programs in Map Reduce.
5. Implementation of advanced concepts (sorting) in Map Reduce.
6. Running basic commands in HIVE.
7. Perform advanced analysis using HIVEQL.
8. Implementation of HBASE for large databases Operations.

Course Outcomes

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

1. Implement basic operations in HDFS for working in distributed environment.
2. Develop applications using Map Reduce features for real world problems.
3. Implement various data analytics applications using HIVE and HBASE.
4. Develop mini project using Hadoop cluster set up for large databases.

BoS Chairman

Course Code: 141CS0606	Course Title: WEB TECHNOLOGIES LABORATORY	
Core	L: T: P: C	0 : 0 : 4 : 2
Type: Practical	Total Contact Hours:	60

Course Objectives

The course is intended to:

1. Create and validate the dynamic websites.
2. Design a real time XML document structure.
3. Develop a server side scripting application.
4. Develop a servlet based applications.

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.
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 ActiveX components.
9. Implement the HTTP Servlets.

Course Outcomes

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

1. Create and validate the dynamic websites using HTML tags and JavaScript.
2. Design a real time XML document structure using Schema and Style sheet.
3. Develop a server sidescripting application throughJSP&ASP technologies.
4. Develop a servlet based applications through client server application.

BoS Chairman

Course Code: 141CS0607	Course Title: CAMPUS TO CORPORATE	
Core	L: T: P: C	0 : 0 : 2 : 1
Type: PS	Total Contact Hours:	30

Course Objectives

The course is intended to:

1. Display gratitude and social responsibility.
2. Understand various business environments.
3. Explain the transition from a campus mindset to corporate mindset.
4. Be prepared to the work culture.
5. Choose to be presentable and agile.

Unit I - GRATITUDE AND SOCIAL RESPONSIBILITY

Importance of gratitude; Finding opportunities to give back to society; Responsible behavior in public places; Volunteerism during calamities; Social relevancy during engineering design and manufacturing – how social issues could be tackled by engineering solutions.

Unit II - THE WORLD OF BUSINESS (get to the specifics of behavioral responses to certain specific contexts)

World of business - Perceptions vs reality; Various business types - B2B, B2C, & other business models; Various industry verticals – fundamentals, dynamics & nuances; Nature of work as per various functions – Sales & Marketing, Service, Research & Development, Production etc; Self-reflective questionnaire to identify the fitment to a particular field/function.

Unit III - TRANSITION FROM A CAMPUS MINDSET TO CORPORATE MINDSET

ROCK as an acronym (Responsibility, Ownership, Contribution, Knowledgeable (continuous learning)); Responsibility – ways in which responsibility should be demonstrated; Ownership – owning one's career, owning mistakes, desisting from complaining; Contribution – focus on creating value, giving more than receiving (salary & perks); Knowledgeable(continuous learning) – learning just begins after campus, aspects of learning mindset, various opportunities to learn and how they can be utilised at work.

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Unit IV - PREPAREDNESS TO ADAPT TO WORK CULTURE

Skills to get through selection process – Interview conversations, resume writing, group discussion & presentation;

Handling Cultural differences; Handling Gender dynamics; Alignment to Ethics and values; Alignment to work processes & code of conduct; Handling multiple (often conflicting) demands; Handling peer influence; Conducting sensitively with subordinates, peers & boss;Managing personal finance; Maintaining work-life balance – work & social life, hobbies etc;

Unit V - PRESENTABLE AND AGILE

Dressing & grooming – Reasons for good dressing & grooming; Professional etiquette – what is etiquette, professional etiquette vs social etiquette, Aspects of professional etiquette; Wellness – Healthy eating habits, Importance of sleep, Importance of fitness; Importance of cleanliness of surroundings – desk, work area, place of stay (5S);

Mode of delivery:

1. A 2-day learning workshop guided by Learner's workbook.
2. Continuous learning guided by learning journal, and reviews by faculty

Assessments and Evaluation:

Assessment	Details	Weightage	Administration	By Whom	When
Workbook record assessment	Assess the necessary elements to be entered in the workbook	20%	Individual workbooks reviewed by the faculty		Immediately after the learning workshop
Initial Knowledge Test and Scenario based knowledge test	Multiple choice questions (20)	25%	Pen and paper,	Internal team	Immediately after the learning workshop
Review of student journal	Student held journal for the whole semester	30%	Individual journals reviewed by the faculty	Trained faculty members	Once in a week.

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Final Knowledge test and Scenario based knowledge test	Multiple choice questions (40)	10%		Internal team	End of semester
Review of student journal by external expert		15%	Student journal comprehensive review	Trained faculty members	End of semester

Course Outcomes

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

1. Display gratitude and social responsibility.
2. Understand various business environments – industry & function wise.
3. Explain the transition from a campus mindset to corporate mindset.
4. Be prepared to adapt to the future work culture.
5. Choose to be presentable and agile.

END OF SEMESTER VI

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BoS Chairman

SEMESTER VII

Course Code: 141CS0701	**Course Title:** CLOUD TECHNOLOGY	
Core	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Prerequisites: The student should have undergone the course(s):
141CS0403 - Computer Architecture
141CS0504 - Computer Networks

Course Objectives

The course is intended to:

1. Describe the core features of Parallel and distributed Computing.
2. Summarize the significance of elastically scalable systems in Cloud Computing.
3. Explain the cloud design principles, architecture and enabling technologies.
4. Illustrate the application of Cloud in business and scientific domains.
5. Outline secure software development for Cloud.

Unit I - DISTRIBUTED AND CLOUD COMPUTING **9**

Defining a Cloud - Cloud Computing Reference Model -Characteristics and Benefits - Building Cloud Computing Environments - Computing Platforms and Technologies - Parallel vs. Distributed Computing - Elements of Parallel Computing - Elements of Distributed Computing - Technologies for Distributed Computing.

Unit II - VIRTUALIZATION AND ARCHITECTURE **10**

Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques - Virtualization and Cloud Computing - Pros and Cons of Virtualization–Types of Virtualization: Full Virtualization and Para Virtualization - Cloud Architectural Model - Types of Clouds.

Unit III - CLOUD PLATFORMS ARCHITECTURE **9**

Data Center Design and Interconnection of networks - Architectural Design of Compute and Storage Clouds - Public Cloud Platforms- Inter-cloud Resource Management.

Unit IV - CLOUD APPLICATIONS **8**

Scientific Applications - Business and Consumer Applications - Energy Efficiency in Clouds - Market Based Management of Clouds - Federated Clouds / InterCloud - Third Party Cloud Services.

Unit V - CLOUD SECURITY **9**

Objectives – Services – Design Principles- Secure Cloud software requirements: Secure development practices, Approaches to Cloud software recommend engineering, Policy implementation, NIST33 security principles – Disaster recovery.

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Course Outcomes

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

1. Describe the core features of Parallel and distributed Computing in Cloud.
2. Summarize the significance of elastically scalable systems in Cloud Computing using virtualization concept.
3. Explain the design principles, architecture and enabling technologies of cloud platform.
4. Illustrate the applications of Cloud in business and scientific domains by exploring various case studies.
5. Outline software development for Cloud using secure software design principles.

Text Books:

1. Dr. Rajkumar Buyya, Dr. Christian Vecchiola, Dr. S Thamarai Selvi, "Mastering Cloud Computing", Tata McGraw Hill Education Private Limited, 2013. (UNIT I,II,IV)
2. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, "Cloud Computing – From Parallel processing to the Internet of Things", Morgan Kaufmann Publishers, 2012 (UNIT III)
3. Ronald L. Krutz, Russell Dean Vines, "Cloud Security A comprehensive guide to secure Cloud Computing", Wiley India Pvt. Ltd, Reprint 2016. (UNIT – V)

Reference Books:

1. Dr. Kris Jamsa, "Cloud Computing: SaaS, PaaS, Iaas, Virtualization, Business Models, Mobile, Security and more", Jones & Bartlett Learning, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach" McGraw-Hill Osborne Media; First edition, 2009.

Web References:

1. http://www.ibm.com/developerworks/library/os-Cloud-virtual1/
2. http://docs.hpCloud.com/pdf/static/Eucalyptus_3.4/faststart-guide-3.4.2.pdf

BoS Chairman

Course Code: 141CS0702	Course Title: GRAPHICS AND VISUALIZATION	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course(s):
141CS0102- Engineering Mathematics
141CS0206- Engineering Graphics

Course Objectives

The course is intended to:

1. Develop interactive computer graphics.
2. Demonstrate the basic principles of implementing graphical output primitives and their attributes.
3. Implement 2D transformation and viewing operations.
4. Design a 3D object and perform transformation and viewing operations.
5. Identify suitable surface detection, lightning and rendering methods.

UNIT I - GRAPHICS SOFTWARE STANDARDS AND PRIMITIVES 8

Coordinate Representations - Graphics Functions - Software Standards - Introduction to OpenGL - Coordinate reference frame - Specifying 2D using OpenGL - OpenGL Point Functions - OpenGL Line Functions - Fill Area Primitives - Polygon Fill Area - OpenGL polygon Fill Area Functions.

UNIT II - OUTPUT PRIMITIVES AND ATTRIBUTES 10

Line Drawing Algorithms - DDA Line Drawing Algorithm - Bresenhams Line Drawing Algorithm- Circle Drawing Algorithm - Ellipse Drawing Algorithm.
Point attributes - Line attributes - Fill Area attributes - Character attributes - OpenGL Functions.

UNIT III - 2D TRANSFORMATION AND VIEWING 9

Basic Transformations - Homogeneous Representation - Composite Transformation - Other Transformations - OpenGL functions.
Viewing Pipeline - Clipping Window - Window to Viewport transformation - OpenGL 2D viewing Functions - Clipping Algorithms: Point Clipping - Line Clipping - Cohen Sutherland Line Clipping Algorithm - Polygon Clipping - Sutherland Hodgeman and Weiler Atherton Method - Text Clipping.

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UNIT IV - 3D TRANSFORMATIONS AND VIEWING 9

3D Object Representation - OpenGL Functions- Quadric and Cubic Surfaces- Bezier and Spline Curves-3D Transformation- OpenGL Functions.

3D Viewing - 3D Viewing Concepts - 3D Viewing Pipeline - Projection Transformations - Orthogonal Projections - Oblique Parallel Projections - Perspective Projections - OpenGL Functions.

UNIT V - VISUALIZATION OF 3D OBJECTS 9

Visible Surface Detection Methods: Classification - Back face detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method - BSP Tree Method - BSP Tree Method - Oct Tree Method - Comparison.

Illumination and Surface Rendering: Light Sources - Surface Lightning Effects - Surface Rendering-OpenGL Functions.

Course Outcomes

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

1. Develop Interactive Computer Graphics using basic OpenGL functions.
2. Demonstrate the basic principles in implementing graphical output primitives and their attributes for the given scenario.
3. Implement 2D Transformations and Viewing operations for the given 2D object.
4. Design a 3D object and perform Transformation and Viewing Operations using OpenGL built-in functions.
5. Identify suitable surface detection, lightning and rendering methods for displaying the real world objects.

Text Book:

1. Donald D. Hearn, M. Pauline Baker, Warren Carithers, "Computer Graphics with OpenGL", Fourth Edition, Sixth Impression, 2016.

Reference Books:

1. D. F. Rogers and J. A. Adams, "Mathematical Elements for Computer Graphics", Second Edition, McGraw-Hill, 2013.
2. F. S. Hill Jr., "Computer Graphics using OpenGL", PH, 2007
3. Edward Angel, "Interactive Computer Graphics A Top-Down Approach with OpenGL", Fifth Edition, Addison-Wesley, 2008.
4. 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", First Indian Reprint, Pearson Education, 2000.

Web References:

1. http://www.glprogramming.com/red/
2. http://nehe.gamedev.net/

BoS Chairman

Course Code: 141CS0703	Course Title: ENVIRONMENTAL STUDIES	
Core	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Describe the multidisciplinary nature of environmental studies.
2. Explain the importance of ecosystem and biodiversity.
3. Identify the causes and propose suitable methods of control for various types of environmetnal pollution.
4. Describe the importance of environmental protection in social and global context.
5. Explain the relationship between environment and human beings.

Unit I - MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES **9**

Definition, scope and imporatnce; Need for public awareness; Natural resources and associated problems - Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources; Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

Unit II - ECOSYSTEMS AND BIODIVERSITY **9**

Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem - Forest, Grassland, Desert, Aquatic; Biodiversity and its conservation: Introduction; Biogeographical classification of India; Value of biodiversity; Biodiversity at global, national and local levels; India as a mega diversity nation; Threats to biodiversity; Endangered and endemic species of india; Conservation of biodiversity : In-situ and Ex-situ conservation.

Unit III - ENVIRONMENTAL POLLUTION **9**

Definition; Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster management : floods, earthquake, cyclone and landslides

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Unit IV - SOCIAL ISSUES AND THE ENVIRONMENT 9

From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Environmental ethics : issues and possible solutions; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air Act; Water Act ; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness.

Unit V - HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth, variation among nations; Population explosion - Family Welfare Programme; Environment and human health; Human Rights; Value Education; HiV/AiDS; Women and Child Welfare; Role of information Technology in Environment and human health; Case studies; Field work – Visit to a local area to document environmental assets – river/forest/grassland/hill/mountain; Visit to a local polluted site – Urban/Rural/Industrial/Agriculture; Study of simple ecosystems – pond, river, hill, slopes, etc.

Course outcomes:

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

1. Describe the multidisciplinary nature of environmental studies.
2. Explain the importance of ecosystem and biodiversity.
3. Identify the causes and propose suitable methods of control for various types of environmetnal pollution.
4. Describe the importance of environmental protection in social and global context.
5. Explain the relationship between environment and human beings.

Text books:

1. Benny Joseph, "Environmental Studies", Tata McGraw Hill, 2006.
2. Mackenzie Davis and Susan Masten, "Principles of environmental engineering and science", McGraw-Hill, Third edition, 2014.

Reference Books:

1. Trivedi R.K. "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
2. Cunningham, W.P.Cooper., T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, 2001.
3. Rajagopalan. R, "Environmental Studies - From Crisis to Cure", Oxford University Press, 2005.

Web References:

1. NPTEL Course Content URL: http://nptel.ac.in/courses/122102006

BoS Chairman

Course Code: 141CS0704	Course Title: CLOUD TECHNOLOGY LABORATORY	
Core	L: T: P: C	0 : 0 : 4 : 2
Type: Practical	Total Contact Hours:	60

Course Objectives

The course is intended to:

1. Implement the core concepts of Cloud Computing.
2. Create elastically scalable systems in Cloud.
3. Compare Cloud Computing solutions provided by the Industry.
4. Demonstrate various applications projects using Cloud Technology.

Area of Experiments:

1. Configure a network adapter connection in Oracle Virtual Box.
2. Installation of Single node / Multi node setup using DevStack.
3. Perform various operations of Cloud using Horizon.
4. Application migration using AWS.
5. Deploying an application using Google App Engine.
6. Creating a Web App using Microsoft Azure.
7. Mini Project

Course Outcomes

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

1. Implement the core concepts of Cloud Computing by configuring network adapter connection.
2. Create elastically scalable systems in Cloud using virtualization concepts.
3. Compare Cloud Computing solutions provided by the Industry through different technologies.
4. Demonstrate various applications projects using Cloud Technology by deploying in the Public Cloud.

BoS Chairman

Course Code: 141CS0705	Course Title: GRAPHICS AND VISUALIZATION LABORATORY	
Core	L: T: P: C	0 : 0 : 4 : 2
Type: Practical	Total Contact Hours:	60

Course Objectives

The course is intended to:

1. Create simple interactive graphics
2. Apply graphics output primitive algorithms.
3. Develop menu driven program by combining output primitives, transformation, operations and viewing principles.
4. Create projects by conceiving graphics principles.

Area of Experiments:

1. Implement OpenGL built-in functions
2. Display complex objects using line drawing algorithms
3. Demonstrate the Circle and Ellipse drawing algorithms.
4. Develop Menu driven program for 2D and 3D transformation.
5. Illustrate Window to viewport transformation using line clipping algorithms.
6. Visualizing 3D objects

Course Outcomes:

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

1. Create simple interactive graphics using basic OpenGL API
2. Apply graphics output primitive algorithms to display complex objects.
3. Develop menu driven program by combining output primitives, transformation, operations and viewing principles for the given problem statement.
4. Create projects by conceiving graphics principles.

BoS Chairman

SEMESTER V

Course Code: 141CS9111	**Course Title:** PYTHON PROGRAMMING	
Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Prerequisites: The student should have undergone the course(s):
141CS0105 Fundamentals of Programming
141CS0406 Java programming

Course Objectives

The course is intended to:

1. Identify various syntax and operators in python programming.
2. Illustrate control flow, library functions and file operations.
3. Implement object oriented features in python.
4. Apply database connectivity technique.
5. Design user interfaces.

Unit I - PROGRAMMING CONSTRUCTS 9

Basics: Data Types – Declaring variables - Usage of Operators- Special functions - Python standards in Coding. Sequential Statements - Control statements - Performing Iterations – Strings - Tuples-Sets - Dictionary.

Unit II - FUNCTIONS 9

Functions: Defining & Calling function- Passing arguments to functions: Mutable & Immutable Data Types - Different types of arguments-Recursion-Scope of variables. Standard Library: Math, String, List, Date & Time Modules. Files: Open- Close- Write-Read.

Unit III - OOPS IN PYTHON 9

Classes - Objects – Modifiers - Method Invocation – Inheritance – Polymorphism - Packages - Scopes and Namespaces - Interface - Exception Handling.

Unit IV - DATABASE PROGRAMMING 9

DBM files - Pickled objects - Shelve files - Object Oriented Database - SQL Database interfaces - Building record dictionaries - loading database tables from files.

Unit V - GUI PROGRAMMING 9

GUI Basics-Using OOP for GUI-Getting input- tkinter: Adding Call backs-Adding multiple widgets-Top level windows-Dialogs-Binding events-Message and entry-Check button – Radio button –Scale-Images-Menus-List Boxes - Scroll bars-Canvas.

BoS Chairman

Course Outcomes

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

1. Identify various syntax and operators in python programming for writing simple programs.
2. Illustrate control flow, library functions and file operations using user-defined and pre-defined functions.
3. Implement object oriented features in python for writing reusable codes.
4. Apply database connectivity technique for real time applications.
5. Design user interfaces using python based GUI components.

Text Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey, and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python", Third Edition, O'Reilly, 2014.
2. MarkLutz,"Powerful Object Oriented Programming Python", Fourth Edition, O'Reilly, 2012.

Reference Books:

1. Mark Lutz, "Learning Python, Powerful OOPs", O'Reilly, 2011.
2. Zelle, John M, "Python Programming: An Introduction to Computer Science", Franklin Beedle & Associates, 2003.
3. Budd, Timothy, "Exploring Python", McGraw-Hill Science, 2009.

Web References:

1. Python tutorial URL:https://docs.python.org/3/tutorial/
2. Advanced Python URL:https://www.learnpython.org/
3. Python basic tutorial URL:www.pyschools.com/

BoS Chairman

Course Code: 141CS9112	Course Title: ADVANCED DATA STRUCTURES AND ALGORITHMS	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Prerequisites: The student should have undergone the course:

141CS0405 Data Structures and Algorithm Analysis-II

Course Objectives

The course is intended to:

1. Develop algorithms for efficient search.
2. Construct range trees and Voronoi diagrams.
3. Construct geometric data structures.
4. Solve problems using Randomized and Approximation Algorithms.
5. Explain the working of Parallel and Online algorithms.

Unit I - SEARCH DATA STRUCTURES 9

Splay Trees - Red Black Trees – Treaps-Suffix Arrays and Trees.

Unit II - RANGE SEARCH 9

1-Dimensional Range Searching – Range Trees – Higher-Dimensional Range Trees – Voronoi diagram.

Unit III - GEOMETRIC DATA STRUCTURES 9

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

Unit IV - RANDOMIZED AND APPROXIMATION ALGORITHMS 9

Randomized Algorithms: Random Number Generators- Skip Lists-Primality Testing Approximation Algorithms: Node cover Problem-Euclidean Traveling salesperson Problem - Bin packing Polynomial Time Approximation Schemes: 0/1 Knapsack Problem.

Unit V - PARALLEL AND ONLINE ALGORITHMS 9

Parallel Algorithms: Parallelism-PRAM-Handling Write Conflicts-Merging and Sorting. Online algorithms: Euclidean Spanning tree-Bipartite matching-Convex hull problem.

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Course Outcomes

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

1. Develop algorithms for efficient search using Tree data structures.
2. Construct range trees and Voronoi diagrams for spatial search.
3. Construct geometric data structures and perform spatial search operations.
4. Solve problems using Randomized and Approximation Algorithms to achieve better efficiency in real time applications.
5. Explain the working of Parallel and Online algorithms for solving various problems.

Text Books:

1. Mark Allen Weiss, "Data Structures & Algorithms in Java", Third Edition, Pearson Education, 2012.
2. R.C.T. Lee,S.S.Tseng, R.C.Chang, Y.T.Tsai, "Introduction to the Design and Analysis of Algorithms A Strategic Approach", Tata McGraw Hill, 2012.
3. Sara Baase,Allen Van Gelder , "Computer Algorithms Introduction to Design and Analysis", Third Edition, Pearson Education, 2003.
4. Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, "Computational Geometry Algorithms and Applications", Third Edition, Springer, 2008.

Reference Books:

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

Web References:

1. Adrian Vladu and Cosmin Negruşeri, Suffix arrays – a programming contest approach, 2005. URL: http://web.stanford.edu/class/cs97si/suffix-array.pdf
2. Applications of Computational Geometry – Geometry in Action.URL: https://www.ics.uci.edu/~eppstein/geom.html.
3. DataStructureVisualizations.URL:https://www.cs.usfca.edu/~galles/visualization/Algorithms.html.
4. MIT Course Content URL: https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-851-advanced-data-structures-spring-2012/

BoS Chairman

Course Code: 141CS9113	Course Title: MOBILE APPLICATION DEVELOPMENT	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0401 Database Systems
141CS0406 Java Programming

Course Objectives

The course is intended to:

1. Explain the requirements for various mobile applications
2. Generate the basic applicationsthrough Android editor
3. Design the application using User Interface concepts.
4. Develop the Android applicationsusing the concepts of Database and content providers.
5. Create applications with Android developer tools and GUI concepts.

Unit I - COMPONENTS FOR APP DEVELOPMENT 9

Mobile application concepts – Embedded systems interface - Market and business drivers – Publishing and delivery – Requirements gathering and validation.

Unit II - ANDROID DEVELOPMENT FRAMEWORK 9

SDK Features-Development Framework –Types of Android Applications- Mobile and Embedded Device development- Android Development Tools – Manifest File Editor – Externalizing Resources – Android Application Life Cycle – Process States- Android Activities.

Unit III - ANDROID UI DESIGN 9

UI design paradigm – Layout: Linear, Relative, Grid - To DO List - Fragments – Widget Toolbox – Customer Views – Adapters.

Unit IV - DATABASES AND CONTENT PROVIDERS 9

Android database concepts - Working with SQLite - Content providers - Searching the application - Searchable Earthquake Content Provider - Native Android Content Providers -notifications.

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Unit V - ANDROID DEVELOPER TOOLS 9

Tools – Views- Accessibility-App creation-Android developer tool window-GUI development –Internationalization-Case study: Tip Calculator - Twitter Search.

Course Outcomes

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

1. Explain the system requirements for mobile application development.
2. Generate applications using Android development framework.
3. Design User Interface for Android Application.
4. Develop Android applications with database connectivity.
5. Create applications with Android developer tools.

Text Books:

1. AnubhavPradhan , Anil V Despande , "Composing Mobile Apps, Learn ,Explore, Apply using Android ", First Edition, Wiley , 2014.
2. Reto Meier, "Professional Android 4 Application Development", Second Edition, Wrox, 2012.
3. Jeff McWherter , Scott Gowell, "Professional Mobile Application Development", Seventh Edition, Goodreads, 2012.

Reference Books:

1. G. Blake Meike, Laird Dornin, Masumi Nakamura, ZigurdMednieks, "Programming Android", Second Edition, O'Reilly, 2011.
2. Mark L. Murphym, "The Busy Coder's Guide to Android Development", Third Edition, Goodreads, 2011.
3. Ian G. Clifton, "Android User Interface Design", First Edition, Addison-Wesley, 2013
4. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", First Edition, DreamTech, 2012.

Web References:

1. Android Fundamentals URL: http://developer.android.com/guide/components/fundamentals.html
2. Android Developer's Blog URL: http://android-developers.blogspot.com/

BoS Chairman

SEMESTER VI

Course Code:141CS9114	**Course Title:** COMPILER DESIGN	
Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

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

141CS0502 Formal Language and Automata Theory

Course Objectives

The course is intended to:

1. Explain the building blocks of System software.
2. Describe the phases of a compiler and the role of Lexical analyzer.
3. Design and implement different types of parsers.
4. Generate intermediate code for the given source code.
5. Produce efficient target code.

Unit I - SYSTEM SOFTWARE **9**

System Software - Basic assembler functions - Program relocation - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Basic loader functions - Design of an Absolute Loader - Relocation – Program Linking - Basic macro processor functions - Macro Definition and Expansion.

Unit II - COMPILER PHASES AND LEXICAL ANALYSIS **9**

Compilers –Phases of a compiler - Analysis of the source program – Grouping of Phases – Compiler construction tools.

Lexical Analysis– Role of Lexical Analyzer – Input Buffering – Specification of Tokens- Recognition of Tokens - LEX -Implementation of lexical analyzer using LEX

Unit III - SYNTAX ANALYSIS **10**

The role of a parser – Context free grammar – Top down Parsing – Bottom up parsing – LR parsers – Construction of a simple SLR, CLR and LALR parsing table - YACC

Unit IV - INTERMEDIATE CODE GENERATION **8**

Intermediate languages – Declarations – Assignment statements – Boolean expressions – Case statements – Back patching – Procedure calls.

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Unit V - CODE GENERATION AND OPTIMIZATION 9

Code Generation: Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs - DAG representation of basic blocks – Generating code from DAGS – A simple code generator.

Code Optimization: Principal Sources of Optimization – Optimization of basic Blocks – Peephole Optimization - Loops in flow graphs.

Course Outcomes

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

1. Explain the building blocks of System software involved in program translation and execution.
2. Describe the phases of a compiler and the role of Lexical analyzer in program compilation.
3. Design and implement different types of parsers for syntax analysis.
4. Generate intermediate code for the given source code using Syntax Directed Translation and Back Patching.
5. Produce efficient target code using code generation and optimization techniques.

Text Books:

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", Third Edition, Addison-Wesley, 2007.
2. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers Principles, Techniques, and Tools", Second Edition, Pearson Education Asia, 2014.

Reference Books:

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Edition, Tata McGraw-Hill, 2000.
2. Steven S. Muchnick, "Advanced Compiler Design & Implementation", Morgan Kaufmann Publishers, 2000.
3. C. N. Fisher and R. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2000.

Web References:

1. Introduction to Machine Independent Optimization URL: http://nptel.ac.in/courses/106108052/17
2. Static Single Assignment Form URL: http://nptel.ac.in/courses/106108052/31.
3. Compiler Design Course Material URL: https://www.cs.cmu.edu/~fp/courses/15411-f08/

BoS Chairman

Course Code: 141CS9115	Course Title: NETWORK SECURITY	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0504 Computer Networks

Course Objectives

The course is intended to:

1. Apply the classical Encryption and Decryption techniques
2. Illustrate the principles of Modern Symmetric Ciphers.
3. Apply the Number Theory concepts.
4. Analyze the need for Message Authentication and Cryptographic Hash functions.
5. Describe the cloud and web security requirements.

Unit I - NETWORK SECURITY BASICS 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.

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Unit V - NETWORK AND INTERNET 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 – Email security: PGP, S/MIME – IP Security: Overview, Policy, and ESP.

Course Outcomes

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

1. Apply the classical Encryption and Decryption techniques for the given scenario.
2. Illustrate the principles of Modern Symmetric Cipher for the given problem.
3. Apply number theory concepts to the public key crypto system.
4. Analyze the need for Message Authentication and Cryptographic Hash functions in network security.
5. Describe the general requirements for cloud and web security

Text Book:

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Sixth Edition, Pearson Education, 2013.

Reference Books:

1. Behrouz A. Forouzan, "Cryptography and Network Security", McGraw-Hill, Special Indian Edition, 2007.
2. Roberta Bragg, Mark Rhodes - Ousley, Keith Strassberg, "Network Security: The Complete Reference", Tata McGraw-Hill, 2008.
3. AtulKahate "Cryptography and Network Security", Second edition, Tata McGraw-Hill, 2009.

Web References:

1. William Stallings, "Cryptography and Network Security: Principles and Practices" URL:http://williamstallings.com/Cryptography/
2. Crypto and Security URL :http://www.freeswan.org/freeswan_trees/freeswan-1.5/doc/links.crypto.html

BoS Chairman

Course Code: 141CS9116	Course Title: MOBILE COMPUTING	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0504 Computer Networks

Course Objectives

The course is intended to:

1. Describe the different modes of radio transmissions.
2. Enumerate the architecture and operations of WLANS.
3. Illustrate the functionalities of Mobile IP and optimizations.
4. Summarize the performance of TCP and WAP protocol.
5. Explain the concept of progressive mobile communications.

Unit I - WIRELESS TRANSMISSION **9**

Frequencies for radio transmission – Signal propagation – Multiplexing – Modulation – Spread spectrum – Cellular Systems – Medium access control: SDMA – FDMA – TDMA – CDMA – Satellite systems – Broadcast systems.

Unit II - WIRELESS LAN **9**

Infrastructure and Adhoc Network – IEEE802.11: Architecture – MAC Management – Newer Developments – HiperLAN – Bluetooth – Sensor Networks – Zigbee Technology.

Unit III - MOBILE IP **9**

Mobile IP – Agent Discovery – Registration – Tunneling – Optimizations – IPV6 for mobile – DHCP – Mobile Adhoc Networks – Routing – Destination Sequence Distance Vector – Dynamic Source Routing – Alternative Metrics.

Unit IV - MOBILE TCP AND WAP **9**

MOBILE TCP: Traditional TCP – Classical TCP improvements – TCP over 2.5/3G wireless networks – Performance enhancing proxies. Wireless Application Protocol – Architecture – Transport Layer Security – Transaction and Session protocols – Application Environment – WML and Script – Telephony Application – WAP 2.0.

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Unit V - COMMUNICATION TECHNOLOGIES 9

GSM: Architecture: Subsystems – Mobility Management – GPRS – UMTS and HSPA – 4G – Long Term Evolution and LTE-Advanced – 5G System Concept and Architecture.

Course Outcomes

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

1. Describe the different modes of wireless transmission and medium access control techniques.
2. Enumerate the architecture and operational principle of various wireless local area network technologies.
3. Illustrate the functionalities of Mobile IP and optimizations in mobile routing protocols
4. Summarize the improvements in TCP for mobile communication and the architectural components of Wireless Application protocol.
5. Explain the working concept and improvements of progressive generations in mobile communications.

Text Books:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson India, 2009.
2. Martin Sauter, "From GSM to LTE –Advanced", Second Edition, John Wiley & Sons, 2014.

Reference Books:

1. Afif Osseiran, Jose F.Monserrat and Patrick Marsch, "5G Mobile and Wireless Communications Technology", Cambridge University Press, 2016.
2. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing: Technology, Applications and Service Creation", Second Edition, Tata McGraw Hill, 2010.
3. William Stallings, "Wireless Communications and Networks", Second Edition, Pearson, 2009.

Web References:

1. Andrea Goldsmith, Wireless Communications. URL: http://web.stanford.edu/class/ee359/lectures.html
2. Prof. Ranjan Bose, IIT Delhi, Wireless Communication. URL: http://www.nptelvideos.in/2012/12/wireless-communication.html
3. IIT Bombay, Wireless and Mobile Communications, https://www.ee.iitb.ac.in/~bsraj/courses/ee764/

BoS Chairman

ELECTIVES

SEMESTER VII

Course Code: 141CS9117	**Course Title:** SOFTWARE QUALITY ASSURANCE AND TESTING	
Elective	**L: T: P: C**	3: 2: 0: 4
Type: Theory	Total Contact Hours:	**75**

Course Objectives

The course is intended to:

1. Explain various models and approaches involved in Quality Control.
2. Describe quality related activities to ensure software quality.
3. Identify the appropriate software testing strategies for designing test case.
4. Choose a suitable type of software testing at the appropriate stage.
5. Perform various testing activities to enhance the performance.

Unit I - SOFTWARE QUALITY AND CONTROL **9+6**

Software Quality – Views of Quality-Hierarchical models of Boehm and McCall – Measuring Quality – Software Metrics – Metrics cited in the literature – Gilb's Approach – CASE Tools – Quality Management System – Element of a QMS.

Unit II - SOFTWARE QUALITY ASSURANCE **9+6**

Software Quality Assurance – Components of SQA System – Reviews – Supporting Quality Devices – Documentation Control – SQA Unit and other actors in the SQA system.

Unit III - TESTING STRATEGIES FOR TEST CASE DESIGN **10+6**

Introduction to Testing Design Strategies – Black Box Approach: Random Testing, Equivalence Class Partitioning, Boundary Value Analysis, Cause-and-Effect Graphing, State Transition Testing – White Box Approach: 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 **9+6**

Need for Levels of Testing – Unit Test – Integration Test – System Test: Functional Testing, Performance Testing, Stress Testing, Configuration Testing, Security Testing, Recovery Testing – Regression Testing: Alpha, Beta, and Acceptance Tests.

Unit V - TEST PLANNING, DOCUMENTATION & ORGANIZATION **8+6**

Test Plan – Components – Attachments – Locating Test Items – Reporting Test Results – Three Critical Groups in test planning and policy development – Building a Testing Group – Structure of the Test Group – Integrating Testing Activities into the Software Life Cycle.

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Course Outcomes

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

1. Explain various models and approaches involved in Quality Control for measuring software quality.
2. Describe quality related activities to ensure software quality in any software related process.
3. Identify the appropriate software testing strategies for designing test case for any given problem.
4. Choose a suitable type of software testing at appropriate stage for any given application.
5. Perform various testing activities to enhance the performance of any given system.

Text Books:

1. Alan Gilles, "Software Quality: Theory and Management", Third Edition, Thomson Computer Press, 2011 (Unit: I)
2. Daniel Galin, "Software Quality Assurance - From theory to implementation", Pearson Education, 2016 (Unit: II)
3. Ilene Burnstein, "Practical Software Testing - A Process Oriented Approach", Springer, 2010(Unit: III - V)

Reference Books:

1. Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practice", Pearson Education, 2008
2. Aditya P.Mathur, "Foundations of Software Testing", Second Edition, Pearson Education, 2013
3. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Second Edition, Tata McGraw Hill, 2017.

Web References:

1. NPTEL Course Content URL: http://nptel.ac.in/courses/106101061/18
2. Tutorials point Course Content URL: https://www.tutorialspoint.com/software_testing/index.htm

BoS Chairman

Course Code: 141CS9118	Course Title: MACHINE LEARNING TECHNIQUES	
Elective	L: T: P: C	3: 2: 0: 4
Type: Theory	Total Contact Hours:	75

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

141CS0501 Data Warehousing and Mining
141CS0202 Engineering Mathematics - II

Course Objectives

The course is intended to:

1. Describe various machine learning approaches.
2. Utilize regression and classification algorithms.
3. Develop resampling and model selection methods.
4. Model data classification using support vector machines.
5. Make use of neural network and deep learning algorithms.

Unit I – INTRODUCTION **8+4**

Statistical Learning - Function Estimation - Supervised and Unsupervised learning – Classification and Regression – Assessing model accuracy.

Unit II – REGRESSION AND CLASSIFICATION **10+8**

Simple Linear regression - Multiple linear regression – Qualitative Predictors - Extensions of the Linear Model - Basics of Classification - Logistic regression - Linear discriminant analysis.

Unit III – RESAMPLING AND MODEL SELECTION **9+6**

Resampling: Cross Validation, Bootstrapping – Linear Model Selection: Subset Selection, Shrinkage methods, Dimension Reduction methods – High Dimensional data.

Unit IV - SUPPORT VECTOR MACHINES **9+6**

Maximal margin classifier - Support vector classifiers - Support Vector Machines (SVM) - SVMs with more than two classes - Relationship to logistic regression.

Unit V - NEURAL NETWORKS AND DEEP LEARNING **9+6**

Basics of neural networks – Perceptron network – Back propagation networks (BPN) – Deep Networks: Architectural Principles, Building blocks - Convolutional neural networks (CNNs) - Recurrent network.

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Course Outcomes

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

1. Describe various machine learning approaches used in solving complex problems.
2. Utilize regression and classification algorithms for data modelling and prediction.
3. Develop resampling and model selection methods to construct optimal models for high-dimensional data spaces.
4. Model data classification using support vector machines for solving multi-class problems.
5. Make use of neural network and deep learning algorithms for classification and prediction.

Text Books:

1. James G, Witten D, Hastie T and Tibshirani R, "An Introduction to Statistical Learning with Applications in R", Springer, 2013.
2. Josh Patterson and Adam Gibson, "Deep Learning: A Practitioner's Approach", First Edition, O'Reilly, 2017.

Reference Books:

1. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Second Edition, John Wiley & Sons, New Delhi, 2016.
2. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer Verlag, 2011.
3. Alpaydin Ethem, "Introduction to Machine Learning", Second Edition, MIT Press, 2014.

Web References:

1. https://onlinecourses.nptel.ac.in/noc17_cs26
2. http://www.ics.uci.edu/~mlearn/MLRepository.html
3. https://www.kaggle.com/kanncaa1/machine-learning-tutorial-for-beginners

BoS Chairman

Course Code: 141CS9119	Course Title: ADVANCED COMPUTER ARCHITECTURE	
Elective	L: T: P: C	3: 2: 0: 4
Type: Theory	Total Contact Hours:	75

Prerequisites: The student should have undergone the course(s):
141CS0403 Computer Architecture

Course Objectives

The course is intended to:

1. Describe the design principles of Computer architecture
2. Apply virtual memory and cache concepts for optimization and protection
3. Use the pipelining concepts
4. Demonstrate Data level parallelism
5. Illustrate the principles of thread level parallelism

Unit I – FUNDAMENTALS OF COMPUTER DESIGN **9+3**

Classes of Computers – Computer Architecture – Trends – Dependability – Measuring, Reporting, and Summarizing Performance – Quantitative Principles of Computer Design – Instruction Set Principles and Examples – Classifying Instruction Set Architectures – Memory Addressing.

Unit II - MEMORY HIERARCHY DESIGN **9+3**

Introduction – Advanced Optimizations of Cache Performance – Memory Technology and Optimizations – Protection: Virtual Memory and Virtual Machines – The Design of Memory Hierarchies.

Unit III - INSTRUCTION-LEVEL PARALLELISM **9+3**

Pipelining Concepts – Pipeline Hazards – Implementation of Pipelining – ILP : Concepts and Challenges – Basic Compiler Techniques for Exposing ILP – Advanced branch Prediction – Dynamic Scheduling – Hardware-Based Speculation – Exploiting ILP – Advanced Techniques for Instruction Delivery and Speculation – Limitations of ILP.

Unit IV - DATA-LEVELPARALLELISM **9+3**

Vector Architecture – SIMD Instruction Set Extensions for Multimedia – Graphics Processing Units –Detecting and Enhancing Loop-level parallelism – Warehouse Scale Computers: Programming Models, Workloads and Architecture – Physical Infrastructure and costs.

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Unit V - THREAD-LEVEL PARALLELISM **9+3**

Centralized Shared Memory Architectures – Performance of Symmetric Shared Memory Multiprocessors – Distributed Shared Memory and Directory Based Coherence – Synchronization.

Course Outcomes

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

1. Describe the design principles of Computer architecture for Instruction set classification.
2. Apply virtual memory and cache concepts for optimization and protection of Memory Hierarchy.
3. Use the pipelining concepts for solving Instruction level parallelism.
4. Demonstrate Data level parallelism with programming models.
5. Illustrate the principles of thread level parallelism with memory based architectures.

Text Book:

1. John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Fifth Edition, Morgan Kaufmann, 2012.

Reference Books:

1. Kai Hwang, Naresh Jotwani, "Advanced Computer Architecture", Second Edition, Tata McGraw-Hill, 2010.
2. Richard Y. Kain, "Advanced Computer Architecture - A Systems Design Approach", Prentice Hall, 2011.

Web References:

1. Book URL: ttps://users.dimi.uniud.it/~antonio.dangelo/OpSys/materials/Computer_Architecture.pdf
2. NPTEL Course Content URL: http://www.nptel.ac.in/courses/106102062/
3. Computer Organization Notes URL: http://www.cse.iitk.ac.in/users/karkare/courses/2011/cs220/html/notes.html

BoS Chairman

SEMESTER VIII

Course Code: 141CS9120	**Course Title:** HIGH SPEED NETWORKING	
Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

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

141CS0504 Computer Networks

Course Objectives

The course is intended to:

1. Characterize various congestion control techniques.
2. Illustrate the architecture and operational concepts in high speed networks.
3. Describe the technical aspects of mobile technologies.
4. Explain the functionalities of various advanced WLANs and interconnectivity.
5. Describe recent technologies of high speed wireless networks.

Unit I - NETWORK TECHNOLOGIES 9

Frame relay – ATM – Protocol Architecture – Logical Connection – ATM Cells – ATM Adaptation layer – TCP Traffic Control: Flow Control – TCP Congestion Control – Performance of TCP over ATM – Traffic and congestion control in ATM.

Unit II - LTE AND LTE ADVANCED 9

LTE Architecture and Protocols – Control and User plane – Radio resource management – Authentication and Authorization – MAC layer and physical layer – HetNet – Small cell concepts – Femtocell and Picocell architecture – Heterogeneous networks.

Unit III - 5G AND SMALL CELL 9

LTE advanced to 5G – D2D communication – LTE – WiFi integration – 5G Characteristics – LTE Femtocell deployment – Access control strategy – Challenges and Technical issues, Security and privacy challenges – Mobility, The backhaul network – Cognitive radio.

Unit IV - WIRELESS STANDARDS 9

Wireless PAN – IEEE 802.15 – Bluetooth – UWB – WiGig – Advanced Standards: IEEE802.11a, b and g – WiMax: IEEE 802.16e – IEEE 802.16m and h standards – WRAN and Interconnection.

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Unit V - APPLICATIONS 9

Adhoc Networks – Routing – Quality of service in adhoc networks – Mesh network and VANET – Wearable D2D networks – Network virtualization – Mobile Edge Computing.

Course Outcomes

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

1. Characterize various congestion control techniques in TCP and ATM networks.
2. Illustrate the architecture and operational concepts of Long Term Evolution and Advanced-LTE standards.
3. Describe the technical aspects of 5G and small cell technologies.
4. Explain the functionalities of various advanced Wireless LAN standards and their interconnectivity.
5. Describe recent technologies of high speed wireless networks used in real time applications.

Text Books:

1. William Stallings, "High Speed Networks and Internets – Performance and Quality of Service", Second Edition, Pearson Education, 2010.
2. Khaldoun Al Agha, Guy Pujolle, Tara Ali-Yahiya, "Mobile and Wireless Networks", John Wiley & Sons, 2016.

Reference Books:

1. Kwang-Cheng Chen, Ramjee Prasad, "Cognitive Radio Networks", Wiley Publications, 2009.
2. James P. G. Sterbenz, Joseph D. Touch, "High Speed Networking – A Systematic Approach to High-Bandwidth Low-Latency Communication", John Wiley Publications, 2002.
3. Benny Bing, "High Speed Wireless ATM and LANs", Artech House Publications, 2000.

Web References:

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

BoS Chairman

Course Code: 141CS9121	Course Title: INFORMATION RETRIEVAL TECHNIQUES	
Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Course Objectives

The course is intended to:

1. Describe the architecture of a Search Engine.
2. Perform Web crawling and apply text processing operations.
3. Explain the stages involved in Query processing.
4. Evaluate the efficiency of various IR models.
5. Develop Community search, Filtering and Recommendation solutions.

Unit I - SEARCH ENGINE AND INFORMATION RETRIEVAL **7**

Search engine and information retrieval, Search Engine Architecture- Building Blocks: Text Acquisition, Text Transformation, Index Creation, User Interaction, Ranking, Evaluation

Unit II - CRAWLING AND TEXT PROCESSING **10**

Web Crawler-Focused Crawling-Distributed Crawling-Document Feeds-Conversion and storage- Document Parsing: Tokenizing, Stop Word Elimination, Stemming-Document Structure and Mark up-Link Analysis: PageRank, Link Quality-Information Extraction

Unit III - QUERY PROCESSING **9**

Model of Ranking-Inverted Indexes-Compression-Index Construction-Query processing-Query Transformation and Refinement: Query Expansion, Relevance Feedback-Search Interfaces: Result Pages and Snippets, Clustering the Results

Unit IV - INFORMATION RETRIEVAL MODELS **10**

Boolean Retrieval-Vector Space Model-Probabilistic Models-Ranking based on Language Models-Complex Queries and combining Evidence-Search Engine Evaluation: Effectiveness Metrics, Efficiency Metrics

Unit V - APPLICATIONS **9**

Social Search-User Tags and Manual Indexing-Community Search: Finding Communities, Community-Based Question Answering, Collaborative Searching-Filtering and Recommending: Document Filtering, Collaborative Filtering

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Course Outcomes

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

1. Describe the architecture of a Search Engine with an emphasis on the role of each component.
2. Perform Web crawling and apply text processing operations for building an Information store.
3. Explain the stages involved in Query processing for efficient Information retrieval.
4. Evaluate the efficiency of various IR models by using suitable metrics.
5. Develop Community search, Filtering and Recommendation solutions for real world applications.

Text Book:

1. Bruce Croft, Donald Metzler, Trevor Strohman, "Search Engines: Information Retrieval in Practice", Pearson Education, 2011.

Reference Books:

1. Christopher D. Manning and Prabhakar Raghavan, "Introduction to Information Retrieval", Cambridge University Press, 2008.
2. Ricardo Baeza-Yates, Berthier Ribeiro-Neto, "Modern Information Retrieval", Second Edition, Pearson Education, 2011.

Web References:

1. Search Engines: Information Retrieval in Practice
   URL: https://ciir.cs.umass.edu/irbook/
2. Introduction to Information Retrieval URL: http://nlp.stanford.edu/IR-book /html /
3. Modern Information Retrieval URL: http://www.mir2ed.org/

BoS Chairman

Course Code:141CS9122	Course Title: BUSINESS INTELLIGENCE	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0501Data Warehousing and Mining

Course Objectives

The course is intended to:

1. Explain the usage of Business Intelligence systems and technology.
2. Describe the functionalities of various components of Decision Support System.
3. Design Dashboard and Scorecard.
4. Illustrate the characteristics, roles and approaches of Knowledge management.
5. Summarize the impacts of Management Support Systems.

Unit I - INTRODUCTION TO BI 9

Business View of Information Technology Applications-Types of Digital Data - Getting started with BI - BI Component Framework - BI Users- BI Applications-BI Roles and Responsibilities- Best practices in BI/DW-The Complete BI Professional – Tools-Data Profiling.

Unit II - DECISION SUPPORT SYSTEMS (DSS) 9

DSS configuration - Description - Characteristics - Capabilities -Classifications - Components - Data Management Subsystems - Model Management Subsystems - The User Interface (DIALOG) Subsystem - Knowledge Based Management Subsystem - DSS User - Hardware.

Unit III - BUSINESS PERFORMANCE MANAGEMENT (BPM) 9

BPM Cycle - Performance Measurement- BPM Methodologies - Architecture and Applications -Performance Dashboards and Scorecards - Case Study.

Unit IV - KNOWLEDGE MANAGEMENT (KM) 9

Introduction – Organizational Learning and 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 - MANAGEMENT SUPPORT SYSTEMS (MSS) 9

Reality Mining - Virtual Worlds - Web 2.0 Revolution - Virtual Communities - Online Social Networking - Cloud Computing and BI - MSS Impacts on Organization &Individual.

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Course Outcomes

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

1. Explain the usage of Business Intelligence systems and technology to support decision making.
2. Describe the functionalities of various components of Decision Support System in making Business Decisions.
3. Design Dashboard and Scorecard for any given application.
4. Illustrate the characteristics, roles and approaches of Knowledge management for effective functioning of an organization.
5. Summarize the impacts of Management Support Systemson Organization &Individual.

Text Books:

1. R N Prasad, Seema Acharya, "Fundamentals of Business Analytics", Wiley, 2011.
2. Efraim Turban, Ramesh sharda, Dursun Delen "Decision Support and Business Intelligence Systems", Ninth Edition, Pearson Education Inc., 2014

Reference Books:

1. Vicki L. Sauter, "Decision Support Systems for Business Intelligence",Wiley, 2011.
2. David Loshin, "Business Intelligence: The Savvy Manager's Guide", Second Edition, Morgan Kaufman, 2012.
3. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley, 2009.

Web References:

1. http://campusconnect.infosys.com/HomeDownloads/BI_old/BI_Def_Concepts.pdf
2. http://campusconnect.infosys.com/homedownloads/BI/BiFramework.pdf
3. https://www.tutorialspoint.com/management_information_system/decision_support_system.htm

BoS Chairman

Course Code: 141CS9123	Course Title: ADHOC AND SENSOR NETWORKS	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

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

141CS0504 Computer Networks

Course Objectives

The course is intended to:

1. Differentiate the characteristics of various routing protocols.
2. Describe the functionalities of MAC and TCP.
3. Illustrate the working of sensor network.
4. Compare the functionalities of routing algorithms.
5. Use the best solutions for security issues.

Unit I - ROUTING IN ADHOC NETWORKS 9

Mobile Adhoc Networks – Challenges in MANET – Routing: Topology and Position based – QoS Routing – Broadcast Strom – Multicasting and Geo-casting

Unit II - ACCESS CONTROL 9

IEEE802.11: Medium Access control protocols – Enhancement in MAC – Wireless PANS – Enhancement to Bluetooth – Cognitive Radio and Networks – TCP over Adhoc Networks

Unit III - SENSOR NETWORKS 9

Sensor Networks – Applications – Design Considerations – Issues – Clustering of nodes – MAC layer – Self Organizing for WSN

Unit IV - ROUTING IN WSN 9

Routing Layer – Flat and Hierarchical Routing – Operation and Location based Routing – High level Application layer support – Sensor Networks in Controlled Environment and Actuators.

Unit V - SECURITY 9

Security in Adhoc and sensor networks – Key Management – Secure Routing – WSN Security – Intrusion Detection Systems – Integrating MANETs, WLANs and Cellular Networks.

BoS Chairman

Course Outcomes

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

1. Differentiate the characteristics of various routing protocols in Adhoc Networks.
2. Describe medium access control and TCP functionalities over Adhoc Networks.
3. Illustrate the working of sensor network with real time applications.
4. Compare the functionalities of routing algorithms in Sensor networks.
5. Use appropriate solutions for security issues in Wireless Sensor Networks.

Text Book:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2011.

Reference Books:

1. C.Siva Ram Murthy, B.S.Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice Hall Professional Technical Reference, 2008.
2. Feng Zhao, Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication, 2002.
3. Holger Karl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005.
4. Kazem Sohraby, Daniel Minoli, TaiebZnati, "Wireless Sensor Networks-Technology, Protocols and Applications", John Wiley, 2007.

Web References:

1. NPTEL Course Content. URL: http://nptel.ac.in/courses/108102045/27
2. Libelium Learning. URL: http://www.libelium.com/video-wsn-introduction/
3. Radio Electronic Notes. URL: http://www.radio-electronics.com/info/wireless/wi-fi/ieee-802-11-standards-tutorial.php

BoS Chairman

Course Code: 141CS9124	Course Title: SOFTWARE PROJECT MANAGEMENT	
Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Course Objectives

The course is intended to:

1. Describe the activities of Project Management.
2. Choose the appropriate process model.
3. Estimate the software development effort.
4. Evaluate the overall duration of the project.
5. Devise a work plan, schedule, visualize and assess the state of a project.

Unit I - PROJECT EVALUATION AND MANAGEMENT **9**

Importance of Software Project Management – Types of Project – Contract and Technical Project Management – Activities – Plans, Methods and Methodologies- Categorizing Software Projects – Stakeholders – Setting Objectives- Project Success and Failure –Management Control –Portfolio Management – Evaluation Techniques – Risk Evaluation – Programme Management.

Unit II - PROJECT PLANNING AND SELECTION OF APPROACHES **9**

Stepwise Project Planning–Build or Buy- Choosing Methodologies and Technologies – Software Process and Models – Prototyping – Categorizing Prototypes – Incremental Delivery – Atern/Dynamic System Development –RAD – Agile Methods – Extreme Programming(XP) - SCRUM – Managing Iterative Process – Selecting Appropriate Process Model.

Unit III - SOFTWARE EFFORT ESTIMATION **9**

Estimation – Problems in Estimation – Basis for Estimation – Software Effort Estimation Techniques – Bottom Up Estimating – Top Down Approach and Parametric Models – Expert Judgment – Estimating by Analogy – Albercht Function Point Analysis – Function Points Mark II – COSMIC Full Function Points –Parametric Productivity Model – Capers Jones Estimating Rules Of Thumb.

Unit IV - ACTIVITY PLANNING AND RISK MANAGEMENT **9**

Objectives of Activity Planning– Project Schedules – Project and Activities - Sequencing and Scheduling Activities – Network Planning Model – Forward Pass – The Backward Pass – Activity Float – Project Duration – Critical Activities – Activity on Arrow Networks - Risk – Categories of Risk – Identification – Assessment – Planning – Management – Evaluating Risk – Applying PERT – Monte Carlo Simulation –Critical Chain Concepts.

BoS Chairman

Unit V - RESOURCE ALLOCATION, MONITORING AND CONTROL **9**

Identifying Resource Requirements – Scheduling Resources – Creating Critical Paths – Counting the Cost – Publishing Resource Schedule – Cost Schedules – Scheduling Sequence – Creating Framework – Collecting Data – Visualizing Progress – Cost Monitoring – Earned Value Analysis–Managing Contracts- Types of Contract-Stages in Contract Placement-Contract Management-Acceptance.

Course Outcomes

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

1. Describe the activities of Project Management by classifying projects.
2. Choose the appropriate process model for a project.
3. Estimate the software development effort using various models.
4. Evaluate the overall duration of the project by categorizing and prioritizing risks.
5. Devise a work plan, schedule, visualize and assess the state of a project using resource allocation.

Text Book:

1. Bob Hughes, Mike Cotterell, Rajib Mall, "Software Project Management", Tata McGraw Hill Publishers, Fifth Edition, 2014.

Reference Books:

1. Gopalswamy Ramesh, "Managing Global Software Projects", Tata McGraw Hill Publishers, 2007
2. Watts S Humphery, "Managing Software Process", Addison–Wesley Pearson Education, 2010.
3. Walker Royce, "Software Project Management, A Unified framework", Pearson Education, 2006.

Web References:

1.Project Management URL http://www.inf.ed.ac.uk/teaching/courses/seoc/2006_2007/notes/LectureNote07_ProjectManagement.pdf

2.Software Project Management URL: https://www.classle.net/#!/classle/large-content/software-project-managment-lecture-slides/

3.Project Risk Management URL: http://nptel.ac.in/courses/106101061/38/

BoS Chairman

Course Code: 141CS9125	Course Title: PRINCIPLES OF MANAGEMENT	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Describe the functions of management in a business organization.
2. Analyze different forecasting techniques
3. Identify various types of organizational structures and patterns.
4. Describe various leadership functions and Motivational Techniques.
5. Illustrate the role of Information technology for performance control

Unit I - INTRODUCTION 9

Historical developments –approaches to management– Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol's – 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 and Planning Premises- Forecasting Techniques – Decision making.

Unit III - FUNCTIONAL AREA ORGANIZATION 9

Formal and Informal Organization – Organization Chart – Structure and Process – Departmentalization 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– Harmonizing Objectives – Leadership Types of Leadership Motivation – Hierarchy of needs– Motivational Techniques – 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 – Control of Overall Performance – Direct and Preventive Control –Globalization and Liberalization – International Management and Global theory of Management

BoS Chairman

Course Outcomes

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

1. Describe the functions of management in a business organization and differentiate it with administration.
2. Analyze different forecasting techniques to set objectives and make decisions.
3. Identify various types of organizational structures and patterns for effective management.
4. Describe various leadership functions and Motivational Techniques for performance improvement.
5. Illustrate the role of Information technology for performance control in organizations and impact of globalization.

Text Books:

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

Reference Books:

1. Stephen P.Robins & Mary Coulter, "Fundamentals of Management", Seventh Edition, Pearson Education, 2011.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert, "Management", Sixth Edition, Pearson Education, 2004.

Web References:

1. http://www.managementstudyguide.com/management_principles.html
2. http://study.com/academy/course/principles-of-management-course.html
3. http://www.buisnessmanagementideas.com/management/5-functional-areas-of-management-buisness-management/512
4. http://www.leadership-toolbox.com/characteristic-of-leadership.html
5. http://discovery.bitspilani.ac.in/dlpd/courses/coursecontent/courseMaterial/mgtszc211/principles_of_management_notes.pdf

BoS Chairman

Course Code: 141CS9126	Course Title: USER INTERFACE DESIGN	
Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Course Objectives

The course is intended to:

1. Explain the principles and process of UI design
2. Illustrate the significance of various types of Interfaces and Emotions
3. Describe Interaction design, Evaluation and Testing process
4. Explain about Mobile Information Architecture, Applications and Design elements
5. Designing the webpages by selecting appropriate Interaction methods

Unit I - PRINCIPLES AND PROCESS 9

Characteristics of good design-Graphical User Interface-Direct Manipulation- Web User Interface-Principles of User Interface Design-User Interface Design Process-Human Characteristics in Design

Unit II - EMOTIONS AND INTERFACES 9

Emotions and the User Experience – Expressive Interfaces – Frustrating Interfaces – Persuasive Technologies and Behavioural Change – Anthropomorphism and Zoomorphism – Models of Emotion – Interfaces.

Unit III - DESIGN AND TESTING 9

Process of Interaction Design– Requirements Gathering – Analysis – Interpretation and Presentation -Evaluation Types – The Evaluation Framework – Usability Testing – prototypes-Kinds of Test.

Unit IV - MOBILE HCI 9

Mobile Ecosystem: Platforms–Application frameworks– Types of Mobile Applications– Mobile Information Architecture– Mobile Design–Elements of Mobile Design–Case study: Mobile 2.0.

Unit V - WEB HCI 9

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

BoS Chairman

Course Outcomes

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

1. Explain the principles and process of UI design for developing an Interface.
2. Illustrate the significance of various types of Interfaces and Emotions for designing an user Interface.
3. Describe Interaction design, Evaluation and Testing process to solve Real World Problems.
4. Explain about Mobile Information Architecture, Applications and Design elements for Creating an Application.
5. Designing the webpages by selecting appropriate Interaction methods for building an Application.

Text Books:

1. Wilbert O.Galitz, "The Essential Guide to User Interface Design", Third Edition, John Wiley & Sons Ltd, 2007.
2. Yvonne Rogers , Helen Sharp, Jenny Preece, "Interaction Design: Beyond Human - Computer Interaction", Third Edition, John Wiley & Sons Ltd, 2011.
3. Brian Fling, "Mobile Design and Development", O'Reilly Media Inc., 2009.
4. Bill Scott and Theresa Neil, "Designing Web Interfaces", O'Reilly, 2009.

Reference Books:

1. Jenifer Tidwell, "Designing Interfaces", Second Edition, O'Reilly Publications, 2011.
2. Marc Silver,"Exploring Interface Design", Delmar Cengage Learning, 2005.

Web References:

1. Interaction Design URL:http://www.idc.iitb.ac.in/academics/Interaction-design-course-content.html.
2. User interface design for the mobile web
3. Designing web applications URL:http://nathanbarry.com/webapps/
4. 10 Great Sites for UI Design Patterns URL:https://www.interaction-design.org/literature/article/10-great-sites-for-ui-design-patterns.
5. User Interface Design and Implementation URL:http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-831-user-interface-design-and-implementation spring-2011/lecture-notes.

BoS Chairman

Course Code:141CS9127	Course Title: MULTIMEDIA SYSTEMS AND APPLICATIONS	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Describe the multimedia components, authoring tools and various forms of representing the data.
2. Differentiate the lossless and lossy image compression algorithms.
3. Illustrate the steps involved in video compression techniques.
4. Justify the significance of databases and OO Framework.
5. Demonstrate the components in multimedia application designing.

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

Memory Concepts – Arithmetic – Decision making - Control Statements – Counter, Sentinel and Nested controlled repetition – Assignment, Increment, Decrement, Logical Operators - Functions – Arrays - Objects.

Unit III - VIDEO COMPRESSION TECHNIQUES 9

Basic Video compression Techniques - Video compression based on motion compensation - search for motion vectors - H.261 - MPEG Video Coding – MPEG -1 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.

BoS Chairman

Course Outcomes

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

1. Describe the multimedia components, authoring tools and various forms of representing the data in multimedia systems.
2. Differentiate the lossless and lossy image compression algorithms using various parameters.
3. Illustrate the steps involved in video compression techniques for the given scenario.
4. Justify the significance of databases and OO Framework in multimedia systems.
5. Demonstrate the components in designing multimedia applications.

Text Books:

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

Reference Books:

1. John. F. Koegel Buford, "Multimedia Systems", Pearson Education, 2009.
2. TayVaughon, "Multimedia making it works", McGraw-Hill Education, 2011.
3. Ralf Steinmetz and KlaraNahrstedt, "Multimedia: Computing, Communications and Applications", Pearson Education,2009.

Web References:

1. http://link.springer.com/book/10.1007%2F978-3-662-08878-4
2. http://nptel.ac.in/syllabus/syllabus_pdf/106105035.pdf
3. http://insy.ewi.tudelft.nl/content/image-and-video-compression-learning-tool-vcdemo
4. https://www.w3.org/standards/agents/authoring

BoS Chairman

Course Code: 141CS9128	Course Title: AGILE SOFTWARE DEVELOPMENT	
Elective	L: T: P: C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45

Course Objectives

The course is intended to:

1. Describe the various activities involved in the agile software development process.
2. Illustrate the benefits of Scrum.
3. Explain the different kinds of roles and practices followed in Scrum framework.
4. Analyze the responsibilities and performances of Scrum team structures.
5. Illustrate the User stories in agile software development.

Unit I - AGILE DEVELOPMENT **9**

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 OVERVIEW **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 - Patterns for adopting Scrum.

Unit III - SCRUM PRACTICES AND ROLES **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 –Technical Practices: Strive for Technical Excellence ,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.

BoS Chairman

Unit V - SPRINT AND PRODUCT BACKLOG 9

Sprint - Deliver working software- Deliver something valuable – Prepare for next- Work together- Time boxes - Planning meeting - Review meeting - retrospective -Product Backlog - Documents to Discussions - Written Documentation Disadvantages – User Stories -Progressively Refine Requirements – Emergent Requirements – Backlog Iceberg – Refining User Stories – Specify by Example.

Course Outcomes

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

1. Describe the various activities involved in the agile software development process through various methodologies.
2. Illustrate the benefits of Scrum for measuring the product quality.
3. Explain the different kinds of roles and practices followed in Scrum framework for agile development.
4. Analyze the responsibilities and performances of Scrum team structures for effective software development.
5. Illustrate the User stories in agile software development using sprint and product backlog.

Text Books:

1. Roger S. Pressman, "Software Engineering - A Practitioner's Approach", McGraw-Hill International Edition, Seventh Edition, 2010.
2. Mike Cohn, "Succeeding with Agile: Software Development Using Scrum", Addison-Wesley, 2009.

Reference Books:

1. Ken Schwaber, "Agile Project Management with Scrum (Microsoft Professional)", Microsoft Press, 2004.
2. Thomas Stober, Uwe Hansmann, "Agile Software Development - Best Practices for large Software Development Projects", Springer, 2010.

Web References:

1. http://highered.mcgraw-hill.com/sites/0073375977/information_center_view
2. http://www.slideshare.net/rodrigorac2/succeeding-with-agile-software-development-using-scrum-addisonwesley-2010
3. http://agilemethodology.org
4. http://www.agilosoftware.com

BoS Chairman

Course Code: 141OE0917	Course Title: HUMAN COMPUTER INTERFACE DESIGN	
Open Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Course Objectives

The course is intended to:

1. Describe the fundamental HCI concepts.
2. Apply the various modes of user interactions.
3. Design the user interface prototype.
4. Apply the standards and principles of User Interface.
5. Implement the universal design principles.

Unit I – HCI FOUNDATIONS **9**

Human: Input - Output Channel - Human Memory - Thinking: Reasoning and Problem Solving - Emotion - Psychology - Computer: Text Entry devices-Display Devices-Pointing Devices-Memory-Processing and Networks.

Unit II – INTERACTION AND PARADIGMS **9**

Interaction : Modes of Interaction – Frameworks and HCI – Ergonomics – Interaction Styles – Windows Icon Pointer and Menus Interfaces – Interactivity – Context – Paradigms

Unit III – DESIGN PROCESS **9**

Process of Design - User Focus – Scenarios – Navigation Design – Screen design and Layout – Prototyping – HCI Software Life Cycle – Usability Engineering – Iterative Design and Prototyping – Design Rationale.

Unit IV – IMPLEMENTATION **9**

Principles – Standards – Guidelines – Golden Rules – Patterns – Implementation elements – Programming – Toolkits – UI Management Systems – Evaluation Techniques

Unit V – UNIVERSAL DESIGN AND USER SUPPORT **9**

Universal design Principles – Multimodal Interaction – Designing for Diversity – Requirements and approaches for User Support – Help Systems – Designing user Support systems.

Course Outcomes

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

1. Describe the fundamental HCI concepts for interface design
2. Apply the various modes of user interactions suitable for the given context
3. Design the user interface prototype with appropriate life cycle model
4. Apply the standards and principles for effective implementation of user interface
5. Implement the universal design principles to support effective user experience

BoS Chairman

Text Book:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", Third Edition, Perason Education, 2004

Reference Books:

1. Gerard Jounghyun Kim, "Human Computer Interaction: Fundamentals and Practice", CRC Press, 2015.
2. Julie A.Jacko, "The Human Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications", Third Edition, CRC Press, 2012.

Web References:

1. NPTEL Videos: Human Computer Interaction. URL: http://nptel.ac.in/courses/106103115/
2. MIT Open Course Ware: User Interface Design and Implementation. URL: https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-831-user-interface-design-and-implementation-spring-2011/

BoS Chairman

Course Code: 141OE0918	Course Title: CYBER SECURITY AND COMPUTER FORENSICS	
Open Elective	**L: T: P: C**	3: 0: 0: 3
Type: Theory	Total Contact Hours:	**45**

Course Objectives

The course is intended to:

1. Discuss the cybersecurity evolution and its policy.
2. Describe the cybersecurity metrics and frameworks.
3. Explain the cybersecurity issues faced by decision makers.
4. Describe the knowledge requirement for careers in computer forensics.
5. Identify the different categories of computer forensics.

Unit I - INTRODUCTION **8**

Cyber Security – Cyber Security policy – Domain of Cyber Security Policy: Laws and Regulations, Enterprise Policy, Technology Operations, Technology Configuration - Strategy Versus Policy – Cyber Security Evolution: Productivity, Internet, E-commerce, Counter Measures, Challenges.

Unit II - CYBERSECURITY OBJECTIVES AND GUIDANCE **9**

Cyber Security Metrics – Security Management Goals – Counting Vulnerabilities – Security Frameworks: E-Commerce Systems, Industrial Control Systems, Personal Mobile Devices – Security Policy Objectives – Guidance for Decision Makers - Cyber Security Management – Catalog Approach.

Unit III - CYBERSECURITY ISSUES **9**

Cyber Governance Issues: Net Neutrality, Internet Names, and Numbers, Copyright and Trademarks, Email and Messaging - Cyber User Issues: Malvertising, Impersonation, Appropriate Use, Cyber Crime, Geolocation, Privacy - Cyber Conflict Issues: Intellectual, property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

Unit IV - INTRODUCTION TO COMPUTER FORENSICS **9**

Scope of computer forensics: Introduction, Types of Evidence, Investigator skills, Importance, History of Computer Forensics, Law Enforcement Training-Computer Forensics Lab Requirements.

Unit V - COMPUTER FORENSICS CATEGORY **10**

Network Forensics: Tools, Networking Devices, Understanding the OSI Model, Advanced Persistent Threats, Investigating a Network Attack- Mobile Forensics: Cellular Network, Handset Specifications, Mobile Operating Systems, Standard Operating Procedures for Handling Handset Evidence, Handset Forensics.

BoS Chairman

Course Outcomes

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

1. Discuss the cyber security evolution and its policy for engineering uses.
2. Describe the cybersecurity metrics and frameworks for realizing cyber security policies.
3. Explain the cyber security issues faced by decision makers for understanding cyber security environment.
4. Describe the knowledge requirement for careers in computer forensics.
5. Identify the different categories of forensics in the field of computers.

Text Books:

1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs , Jeffrey Schmidt, Joseph Weiss, "Cyber Security Policy Guidebook", First Edition, John Wiley & Sons, 2012.
2. Darren R. Hayes, "A Practical Guide to Computer Forensics Investigations", First Edition, Pearson, 2014.

Reference Books:

1. Bill Nelson, Amelia Phillips, Christopher Steuart, "Computer Forensics and Investigations", Third Edition, Cengage learning, 2010.
2. Rick Howard, "Cyber Security Essentials", First Edition, Auerbach Publications 2011.
3. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics", Second Edition, Tata McGraw -Hill, 2006.

Web References:

1. http://dst.gov.in/basic-research-cyber-security
2. https://www.sans.org/reading-room/whitepapers/incident/developing-computer-forensics-team-628
3. https://www.cybrary.it/cyber-security/

BoS Chairman

Course Code: 141OE0919	**Course Title:** GREEN COMPUTING	
Open Elective	**L: T: P: C**	**3: 0: 0: 3**
Type: Theory	Total Contact Hours:	**45**

Course Objectives

The course is intended to:

1. Describe the significance of green computing.
2. Explain consumption related issues.
3. Describe energy management and recycling methods.
4. Explain virtualization concepts and their evaluation metrics.
5. Choose various specifications for greening information systems.

Unit I - GREEN IT **9**

Growing Significance of Green IT and Green Data Centers, Basic steps toward Green IT – Organizational Issues in Addressing the Problem - Product End of Life - Asset Disposal - Procurement Policies - Supply-Chain Issues - Important Steps for Green IT - Data Center Energy - Efficiency Considerations.

Unit II - CONSUMPTION ISSUES **9**

Role of electric utilities - Power Problems - Monitoring Power Usage - Reducing Power Use - Low-Power Computers and components – Cooling Costs - Reducing Cooling Costs - Optimizing Airflow - Datacenter Design.

Unit III - ENERGY MANAGEMENT AND RECYCLING **9**

Process Reengineering - Teleworkers and Outsourcing - Paperless Office - Intranets - Electronic Data Interchange - Recycling: Problems - Means of Disposal, Life Cycle, Recycling Companies, Hard Drive Recycling, CDs and DVDs - Hardware Considerations: Energy Star, Servers and Remote Desktop - Power optimization using block chain technology.

Unit IV - VIRTUALIZING IT SYSTEMS AND METRICS **9**

Consolidation and Virtualization - Server Virtualization - Storage Virtualization - Client Virtualization - Creating Virtual Servers - Blade Servers and Virtualization - Impacts of Server Virtualization on Data Storage –Metrics: SPEC, EPA and LEED Green Building Rating System.

Unit V - GREENING INFORMATION SYSTEMS **9**

Initial Improvement Calculations – Changing Business Processes – Technology Infrastructure - Organizational Checkups – Equipment Checkups – Certifications – Case Study: Pacific Gas and Electric Company, Energy Impact of the UPS.

BoS Chairman

Course Outcomes

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

1. Describe the significance of green computing with concerns and policies.
2. Explain consumption related issues based on power and space utility.
3. Describe energy management and recycling methods.
4. Explain virtualization concepts in greening IT systems and their evaluation metrics with examples.
5. Choose various specifications for greening information systems with real time examples for different organizations

Text Books:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Green IT", Tata McGraw Hill, 2008.
2. John Lamb, "The Greening of IT", Pearson Education, 2009.

Reference Books:

1. Alin Galea, Michael Schaefer, Mike Ebbers, "The Green Data Center: steps for the Journey", Shroff Publishers/ IBM Redbooks, 2011.
2. Bhuvan Unhelkar, "Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, June 2011.
3. Carl Speshocky, "Empowering Green Initiatives with IT", John Wiley & Sons, 2010.

Web References:

1. Course Material URL:https://www.techopedia.com/definition/14753/green-computing
2. NPTEL course content
   URL:http://nptel.ac.in/courses/110108056/module5/Lecture28.pdf
3. Projects and Major research output developed by C-DAC
   URL:http://meity.gov.in/content/green-computing.
4. CTS White Paper:https://www.cognizant.com/whitepapers/blockchain-for-power-utilities-a-view-on-capabilities-and-adoption-codex3372.pdf

BoS Chairman