Dr. Mahalingam College of Engineering and Technology

(An Autonomous Institution)

Pollachi - 642 003

Curriculum and Syllabi

B.Tech Information Technology

SEMESTER I TO VIII

REGULATIONS 2016

DR MAHALINGAM MCET

COLLEGE OF ENGINEERING AND TECHNOLOGY

Enlightening Technical Minds

Dr. Mahalingam College of Engineering and Technology, Pollachi-03

(An Autonomous Institution affiliated to Anna University)

Department of Information Technology

Regulations 2016

Curriculum and Syllabus

SEMESTER I

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
16ENT11	Communication Skills – I	2	0	2	3	100
16MAT15	Engineering Mathematics – I	3	2	0	4	100
16PHT14	Engineering Physics	3	0	0	3	100
16GET16	Fundamentals of Computing and Programming	3	0	2	4	100
16GET17	Basics of Electrical and Electronics Engineering	3	0	0	3	100
PRACTICAL						
16PHL11	Engineering Physics Laboratory	0	0	4	2	100
16EPL12	Engineering Practices Laboratory	0	0	4	2	100
PROFESSIONAL SKILLS						
16PSL12	Sports for Wellness	0	0	2	1	100
TOTAL		**14**	**2**	**14**	**22**	**800**

Total Hours in a Week: 30

SEMESTER – II

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
16ENT21	Communication Skills – II	2	0	2	3	100
16MAT25	Engineering Mathematics – II	3	2	0	4	100
16PHT24	Material Science	3	0	0	3	100
16GET26	C Programming	3	0	0	3	100
16GET27	Introduction to Engineering	3	0	0	3	100
PRACTICAL						
16CPL21	C Programming Laboratory	0	0	4	2	100
16EGL21	Engineering Graphics	1	0	4	3	100
PROFESSIONAL SKILLS						
16PSL22	Promotion of Students Wellness	0	0	2	1	100
TOTAL		**15**	**2**	**12**	**22**	**800**

Total Hours in a Week: 29

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SEMESTER – III

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
16MAT35	Discrete Mathematics	3	2	0	4	100
16ITT31	Basic Communication Engineering	3	0	0	3	100
16ITT32	Computer Organization	3	0	2	4	100
16ITT33	Software Engineering	3	0	2	4	100
16ITT34	Data Structures	3	0	0	3	100
16ITT35	Object Oriented Programming using Java	3	0	0	3	100
PRACTICAL						
16ITL31	Data Structures Laboratory	0	0	4	2	100
16ITL32	Object Oriented Programming using Java Laboratory	0	0	4	2	100
ONE CREDIT COURSE & PROFESSIONAL SKILLS(PS)						
XXXX	One Credit Course	0	0	2	1	100
16PSL31	Personal Effectiveness	0	0	2	1	100
TOTAL		18	2	16	27	1000

Total Hours in a Week: 36

SEMESTER – IV

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
16MAT45	Probability and Statistics	3	2	0	4	100
16ITT41	Fundamentals of Digital Signal Processing	3	2	0	4	100
16ITT42	Microprocessor and Microcontrollers	3	0	2	4	100
16ITT43	Design and Analysis of Algorithms	3	0	0	3	100
16ITT44	Operating Systems	3	0	0	3	100
16ITT45	Database Management Systems	3	0	0	3	100
PRACTICAL						
16ITL41	Operating Systems Laboratory	0	0	4	2	100
16ITL42	Database Management Systems Laboratory	0	0	4	2	100
ONE CREDIT COURSE & PROFESSIONAL SKILLS(PS)						
XXXX	One Credit Course	0	0	2	1	100
16PSL41	Ethical and Moral Responsibility	0	0	2	1	100
TOTAL		18	4	14	27	1000

Total Hours in a Week: 36

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SEMESTER – V

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
16ITT51	Information Coding Techniques	3	2	0	4	100
16ITT52	Compiler Engineering	3	0	2	4	100
16ITT53	Python Programming	3	0	2	4	100
16ITT54	Computer Networks	3	0	0	3	100
16ITT55	Web Technology	3	0	0	3	100
XXXX	Professional Elective I	2	0	2	3	100
PRACTICAL						
16ITL51	Computer Networks Laboratory	0	0	4	2	100
16ITL52	Web Technology Laboratory	0	0	4	2	100
ONE CREDIT COURSE & PROFESSIONAL SKILLS(PS)						
XXXX	One Credit Course	0	0	2	1	100
16PSL51	Teamness and Interpersonal Skills	0	0	2	1	100
TOTAL		**17**	**2**	**18**	**27**	**1000**

Total Hours in a Week: 37

SEMESTER – VI

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
16ITT61	Data Mining and Analytics	3	0	2	4	100
16ITT62	Cryptography and Network Security	3	0	2	4	100
16ITT63	Mobile Application Development	3	0	0	3	100
16ITT64	Object Oriented Analysis and Design	3	0	0	3	100
XXXX	Professional Elective II	3	0	0	3	100
PRACTICAL						
16ITL61	Mobile Application Development Laboratory	0	0	4	2	100
16ITL62	CASE Tools Laboratory	0	0	4	2	100
ONE CREDIT COURSE & PROFESSIONAL SKILLS(PS)						
XXXX	One Credit Course	0	0	2	1	100
16PSL61	Campus to Corporate	0	0	2	1	100
TOTAL		**15**	**0**	**16**	**23**	**900**

Total Hours in a Week: 31

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SEMESTER – VII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
16ITT71	Internet of Things	3	0	0	3	100
16ITT72	Cloud Computing	3	0	0	3	100
16CET73	Environmental Studies	3	0	0	3	100
XXXX	Professional Elective III	2	0	2	3	100
XXXX	Open Elective	3	0	0	3	100
PRACTICAL						
16ITL71	Cloud Computing Laboratory	0	0	4	2	100
16ITL72	Distributed Component Laboratory	0	0	4	2	100
16ITL73	Innovative and Creative Project	0	0	8	4	100
TOTAL		**14**	**0**	**18**	**23**	**800**

Total Hours in a Week: 32

SEMESTER – VIII

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
THEORY						
XXXX	Professional Elective IV	3	0	0	3	100
XXXX	Professional Elective V	3	0	0	3	100
XXXX	Professional Elective VI	3	0	0	3	100
PRACTICAL						
16ITL81	Project	0	0	20	10	200
TOTAL		**9**	**0**	**20**	**19**	**500**

Total Hours in a Week: 29

Total Credits=190

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PROFESSIONAL ELECTIVES

	Course Code	Course Title	Hours/Week			Credits	Marks
			L	T	P		
Networking	16ITE01	Mobile Communication	3	0	0	3	100
	16ITE02	Cyber Law and Information Security	3	0	0	3	100
	16ITE03	Wireless Sensor Networks	3	0	0	3	100
	16ITE04	Information Storage and Management	3	0	0	3	100
	16ITE05	TCP/IP Protocols	3	0	0	3	100
Computational Techniques	16ITE06	Digital Image Processing	3	0	0	3	100
	16ITE07	Soft Computing	3	0	0	3	100
	16ITE08	Natural Language Processing	3	0	0	3	100
	16ITE09	Human Computer Interaction	3	0	0	3	100
	16ITE10	Artificial Intelligence and Expert Systems	3	0	0	3	100
	16ITE11	Sensing Techniques and Sensors	3	0	0	3	100
	16ITE12	Social Network Analysis	3	0	0	3	100
	16ITE13	Virtual Reality	3	0	0	3	100
	16ITE14	Machine Learning Techniques	3	0	0	3	100
	16ITE41	Robotic Process Automation	3	0	0	3	100
	16ITE47	Advanced Problem Solving using C	3	0	0	3	100
	16ITE48	Advanced Problem Solving using Java	3	0	0	3	100
	16ITE49	Advanced Problem Solving using Python	3	0	0	3	100
Cloud and Big Data	16ITE15	Cloud Architecture	3	0	0	3	100
	16ITE16	Public Cloud Services	3	0	0	3	100
	16ITE17	Service Oriented Architecture	3	0	0	3	100

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	16ITE18	Business Intelligence	3	0	0	3	100
	16ITE19	Big Data and Analytics	3	0	0	3	100
	16ITE20	Text Mining	3	0	0	3	100
Quality Assurance and Management	16ITE21	Total Quality Management	3	0	0	3	100
	16ITE22	Software Project Management	3	0	0	3	100
	16ITE23	Agile Software Development	3	0	0	3	100
	16ITE24	Software Quality and Testing	3	0	0	3	100
	16ITE25	E-Commerce	3	0	0	3	100
	16ITE26	User Interface Design	3	0	0	3	100
	16ITE27	Engineering Economics and Financial Management	3	0	0	3	100
	16ITE28	Principles of Management	3	0	0	3	100
Elective Laboratories	16ITE29	Arduino Programming	2	0	2	3	100
	16ITE30	.Net Programming	2	0	2	3	100
	16ITE31	Linux System Administration and Programming	2	0	2	3	100
	16ITE32	Advanced Java Programming	2	0	2	3	100
	16ITE33	Graphics and Multimedia	2	0	2	3	100
	16ITE34	Data Analytics using R	2	0	2	3	100
	16ITE35	XML and Web Services	2	0	2	3	100
	16ITE36	Distributed Databases	2	0	2	3	100
	16ITE37	Embedded System Programming	2	0	2	3	100
	16ITE38	Game Programming	2	0	2	3	100
	16ITE45	Distributed Processing	2	0	2	3	100
	16ITE46	Block Chain Technologies	2	0	2	3	100
Science and Humanities	16ITE39	Professional Ethics	3	0	0	3	100
	16ITE40	Disaster Management	3	0	0	3	100
	16MAE01	Numerical Methods	3	0	0	3	100

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	16MAE02	Resource Management Techniques	3	0	0	3	100
	16MAE03	Graph Theory	3	0	0	3	100
	16MAE04	Algebra and Number Theory	3	0	0	3	100

OPEN ELECTIVES

Course Code	Course Title	Hours/Week			Credits	Marks
		L	T	P		
16OET22	Open Source Technologies	3	0	0	3	100
16OET23	Enterprise Resource Planning	3	0	0	3	100
16OET24	Multimedia Systems and Applications	3	0	0	3	100

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SEMESTER I

Course Code: 16ENT11	Course Title: COMMUNICATION SKILLS I (Common to all B.E/B.Tech Programmes)	
Core	L : T : P : C	2: 0 : 2 :3
Type: Theory	Total Contact Hours:	60 Hours

Course Objectives

The course is intended 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 letters.

Unit I - LISTENING 12

Short conversations/monologues - numbers and spelling (dates, prices, percentages, figures, etc.) - and locate specific information - longer monologue and guided note taking - gap filling - Understanding the gist and extracting the main idea.

Unit II - SPEAKING 12

Answering questions about oneself, agreeing and disagreeing, expressing preferences - mini-presentation on a business theme (Oral) - Giving information and expressing opinions - discussion on business related topics – initiate a conversation and respond appropriately -business vocabulary - collocation.

Unit III - READING 12

Read short texts and understand the main message (signs, messages, postcards, notes, emails, labels) - Read and find specific information - Interpreting visual information - Comprehend detailed factual information - gather gist – cloze test

Unit IV - WRITING 12

Internal written communication - short messages to colleagues -note, message, memo, email- External communication -letter, email, notice - set phrases for letters and e-mails- Discourse markers, sign post words.

Unit V - GRAMMAR 12

Types of sentences – Declarative, interrogative, imperative and exclamatory – Usage of tenses (Simple and continuous forms) - Voices – Concord (Subject and verb) - Auxiliary - Infinitive and Gerunds –Article - Preposition - Comparative and superlative adjectives.

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Course Outcomes

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

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

Text Books:

1. Whitby Norman, Business Benchmark Pre-intermediate to Intermediate Students' Book CUP Publications, 2nd Edition, 2014
2. Wood Ian, Williams Anne, Cowper Anna, Pass Cambridge BEC Preliminary, Cengage Learning, 2nd edition, 2015.

Reference Books:

1. BEC-Preliminary - Cambridge Handbook for Language Teachers, 2nd Edition, CUP 2000
2. Hewings Martin - Advanced Grammar in use - Upper-intermediate Proficiency, CUP, Third Edition, 2013

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: 16MAT15	Course Title: ENGINEERING MATHEMATICS-I (For B.Tech IT only)	
Core	L : T : P : C	3 : 2 : 0 : 4
Type: Theory	Total Contact Hours:	75 Hours

Course Objectives

The course is intended to:

1. Apply the basic concepts of Matrices.
2. Solve Eigen values and Eigen vectors of Matrices.
3. Evaluate the inverse of a Matrix.
4. Determine the basic concepts of sequence.
5. Evaluate the concepts of infinite series.

Unit I - MATRICES **9+6**

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

Unit II - EIGENVALUES AND EIGENVECTORS **9+6**

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+6**

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+6**

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+6**

Series – Infinite Series- Necessary Condition for Convergence- Comparison Test for Convergence –Cauchy's root test, Integral test, 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 students will be able to:

CO1: Apply the basic concepts of Matrices.
CO2: Solve Eigen values and Eigen vectors of given matrix.
CO3: Evaluate the inverse of given matrix.
CO4: Determine the basic concepts of sequence.
CO5: Evaluate the concepts of infinite series.

Text Books:

1. Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, 2015.
2. T.Veerarajan, "Engineering Mathematics", Updated Edition, McGraw Hill, 2013

Reference Books:

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 8th Edition, Laxmi Publications (p) Ltd., 2014.

Web References:

1. http://www.nptel.ac.in/courses/122104018/
2. http://nptel.ac.in/courses/111106053/

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Course Code: 16PHT14	Course Title: ENGINEERING PHYSICS (Common to CSE and IT)	
Core	L : T : P : C	3 :0 :0:3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

1. Explain the properties of light and colors.
2. Identify the laser characteristics, principles and applications.
3. Analyze the mode of propagation and attenuation.
4. Examine the nature of semiconductors.
5. Apply the concept of luminescence.

Unit I - LIGHT 9

Nature of Light- Laws of reflection and refraction - 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- de Broglie 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 - INTEGARATED CIRCUITS (ICs) 9

Advantages of Integrated circuits (ICs) over discrete components- IC classification- Basic plannar processes – Silicon wafer preparation- Epitaxial growth & Oxidation- Photolithography- Diffusion – Isolation, base and emitter diffusion - Aluminium metallization – IC Assembly processing and packaging.

Unit V - DISPLAY DEVICES 9

Optical Emissions: Luminescence, photoluminescence, cathode luminescence- electroluminescence -Injection electro Luminescence- Working principles of displays: Plasma display, LED display, Liquid crystal display (LCD) and Numeric display.

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Course Outcomes

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

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

Text Books:

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

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.
5. D. Roy Choudhry, Shail Jain, Linear Integrated Circuits, 3rd Edition New Age International Pvt. Ltd, 2010.

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: 16GET16	Course Title: FUNDAMENTALS OF COMPUTING AND PROGRAMMING (Common to CSE and IT)	
Core	L : T : P : C	3 :0 :2: 4
Type: Theory	Total Contact Hours:	75 Hours

Course Objectives

The course is intended to:

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

Overview of Engineering Education (Not included for assessment) 3

Expectation and Aspirations of engineering students, Graduate Engineering Attributes, Outcome based Engineering Curriculum, Engineering Skills – Technical and Professional. Courses, Course map, Concepts and Theories of Learning – Higher order Thinking Skills, Multiple Intelligences.

Unit I - INTRODUCTION TO PROGRAMMING 8

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 8

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 8

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

Unit IV - ARRAYS, SORTING AND SEARCHING 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

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Variable - Functions: Built-in Functions - User Defined Functions - Applications of Functions

LAB COMPONENT **30**

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

1. Experiments using MS-Office package
   i. Create resume using MS-Word
   ii. Generation of marksheet of a student using MS-Excel
   iii. Generation of Electricity Bill using MS-Excel
   iv. Create presentation for Product Marketing
2. 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
3. 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
4. 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
5. Programs using Sorting and Searching
   i. Bubble Sort
   ii. Selection Sort
   iii. Linear Search
   iv. Binary Search
6. Programs using Function
   i. Area of Circle
   ii. CGPA calculation
   iii. Simple Interest Calculation
   iv. Fibonacci Series

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Course Outcomes

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

CO1: Develop flow charts for simple problems
CO2: Determine the process of language independent program development
CO3: Construct programs using suitable selection and repetition structures
CO4: Solve searching and sorting problems using arrays
CO5: Create modular programs using functions

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/

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Course Code: 16GET17	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 Hours

Course Objectives

The course is intended to:

1. Apply basic DC circuit's laws.
2. Comprehend basic AC circuits.
3. Compare 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– Active and Passive elements – 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

Magnetic circuits: Definition of magnetic quantities – Law of electromagnetic induction - Generation of single phase 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 of shunt and series motor – Single phase Transformer: Construction, working principle – Three phase and single phase induction motor: Construction, Working Principle.

Unit IV - SEMICONDUCTOR DEVICES 9

Theory of semiconductor: PN junction diode, Forward Bias Condition, Reverse Bias Condition, V-I Characteristics – Bipolar Junction Transistor: Operation of NPN and PNP Transistor, Types of configuration: Common Emitter – 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 photo conductive cell, photo voltaic cell,

S. Ramesh

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solar cell – Display Devices: Light Emitting Diode, Liquid Crystal Display - Transducers: Capacitive and Inductive transducer, Thermistors, Piezoelectric and Photoelectric transducer.

Course Outcomes

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

CO1: Apply basic laws to study simple DC circuits.
CO2: Explain basic AC circuits and their phasor representation.
CO3: Compare electrical machines like motor, generator and transformer.
CO4: Identify suitable basic electronic and display devices for simple applications.
CO5: Categorize opto-electronic devices and transducers for real time entities.

Text Book:

1. Muthusubramanian R &Salivahanan S, "Basic Electrical, Electronics and Computer Engineering", Tata McGrawHill 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. SimonHaykin,"CommunicationSystems",4thEdition,JohnWiley&Sons,NewYork(US),2001.

Web References:

1. www.auupdates.com/
2. www-inst.eecs.berkeley.edu/
3. https://www.cengagebrain.co.nz/
4. www.allaboutcircuits.com
5. www.electrical4u.com

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Course Code: 16PHL11	Course Title: ENGINEERING PHYSICS LABORATORY (Common to CSE and IT)	
Core	L : T : P : C	0 :0 :4:2
Type: Practical	Total Contact Hours:	60 Hours

Course Objectives

The course is intended to:

1. Design 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(Any ten)

1. Air wedge- Thickness of thin material
2. Determination of wavelength of Laser light – Laser diode
3. Determination of particle size of given powder using Laser diode
4. Determination of Acceptance angle and Numerical aperture of an optical fiber – Laser diffraction method
5. Determination of band gap of semi conducting materials – Thermistor (Germanium)
6. Determination of specific resistance of a given wire - Carey Foster's Bridge
7. Determination of thermal conductivity of bad conductor- Lees disc method
8. Light Illumination characteristics of Light dependent resistor (LDR)
9. Current- Voltage characteristics of semiconductor solar cell
10. To study the truth tables of various basic logic gates (AND, OR, NOT, NAND, NOR)
11. Magnetic hysteresis- Determination of Hysteresis losses in a ferromagnetic material.
12. Conductivity, Resistivity – Four Probe method

Course Outcomes

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

CO1: Design optical parameters of Laser and optical fiber.
CO2: Estimate electrical properties of metal and semiconductor.
CO3: Evaluate magnetic properties of a soft magnetic material.

Reference Book:

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

BoS Chairman

Course Code: 16EPL12	Course Title: ENGINEERING PRACTICES LABORATORY (Common to CSE and IT)	
Core	L : T : P : C	0 :0 :4:2
Type: Practical	Total Contact Hours:	60 Hours

Course Objectives

The course is intended to:

1. Design the basic concepts of DC and AC circuits.
2. Explain the characteristics of basic electronic components.
3. Design the connections on electrical machining.
4. Compare the working of few home appliances.

LIST OF EXPERIMENTS

Electrical & Electronics **30**

1. Symbols of Electrical and Electronic components.
2. Identification of Resistor and Capacitor Values.
3. Soldering practice of simple circuits and checking the continuity.
4. Verification of Ohms law.
5. Verification of Kirchhoff's current & voltage law.
6. Fluorescent tube, Stair case and House wiring

Civil & Mechanical **30**

1. Make a wooden Tee joint to the required dimension.
2. Assemble the pipeline connections with different joining components for the given layout.
3. Make a tray in sheet metal to the required dimension.
4. Make a "V" fitting to the required dimension using fitting tools.
5. Weld a butt joint using welding process to the required dimension.
6. Demonstration on hand forging and sand moulding process.

BoS Chairman

Course Outcomes

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

CO1. Design the basic concepts of DC and AC circuits.
CO2. Explain various characteristics of basic electronic components.
CO3. Design the connections on electrical machining.
CO4. Compare the working of few home appliances.

Reference Books:

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", SreeSai Publication, 2002.
3. Kannaiah.P&Narayana.K.L, "Manual on Workshop Practice", Scitech Publications,1999
4. MCET - Engineering Practices Laboratory Manual.

BoS Chairman

Course Code: 16PSL12	Course Title: SPORTS FOR WELLNESS (Common to all B.E/B.Tech Programmes)	
Core	L : T : P : C	0 :0 :2:1
Type: PS	Total Contact Hours:	30 Hours

Course Objectives

The course is intended to:

1. Explain the significance of physical fitness.
2. Relate 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 students will be able to:

CO1: Explain the significance of physical fitness for healthy living.
CO2: Relate physical fitness through exercises.
CO3: Exhibit mental agility.

Reference Books:

1. Tony Buzan, Harper Collins, The Power of Physical Intelligence (English)
2. Student reading material and workbook prepared by PS team of the college.

OPERATIONAL MODALITIES:

Orientation programme

Special lectures by invited resource persons at semester beginning

3 lectures x 4 hours = 12 hours

Follow-up practice

12 weeks x 2 hours/week = 24 hours

Evaluation

Continuous evaluation:

Physical Exercises	= 40 marks
Assessment of students workbook	= 20 marks
Total	= 60 marks

Semester end examination:

Written test (MCQ and short answers)	= 30 marks
Physical exercises	= 50 marks
Viva-voce	= 20 marks
Total	= 100 marks

End semester mark out of 100 is reduced to 40 marks

The student should get a total of 50 marks put together for a pass.

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

BoS Chairman

SEMESTER II

Course Code: 16ENT21	Course Title: COMMUNICATION SKILLS- II (Common to all B.E/B.Tech Programmes)	
Core	L : T : P : C	2 : 0 : 2 : 3
Type: Theory	Total Contact Hours:	60 Hours

Course Objectives

The course is intended 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.

Unit I - LISTENING **12**

Listening to monologues or dialogues and noting specific information - Listening to identify topic, context, and function -Listening for details and main ideas - Gap filling and matching job descriptions and titles.

Unit II - SPEAKING **12**

Giving personal information -Talking about present circumstances, past experiences and future plans, expressing opinions, speculating -mini-presentation on a business theme -Giving information and expressing and justifying opinions -discussion on a business-related topic -Expressing and justifying opinions, speculating, comparing and contrasting, agreeing and disagreeing, etc. – negotiating and persuading.

Unit III - READING **12**

Reading - skimming for gist and scanning for specific information (Newspaper and magazine articles, reports, advertisements, letters, messages, brochures, guides, manuals) -Reading and understanding text structure – Comprehension –Reading for vocabulary and structure -understanding sentence structure and finding errors.

Unit IV - WRITING **12**

Internal written communication - Writing a message, memo or an email: giving instructions, explaining development, asking for comments, requesting information, agreeing to requests -External Communication (e.g. explaining, apologizing, reassuring, complaining), reports (e.g. describing, summarizing) or proposals (e.g. describing, summarizing, recommending, persuading and negotiating).

Unit V - GRAMMAR **12**

Conditional sentences – Modals and their usage- common errors - Linkers and discourse markers – concord (pronoun and antecedent)

BoS Chairman

Course Outcomes

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

CO1: Write concisely and ensure accuracy through proof reading.
CO2: Listen to lectures and presentations, comprehend and respond.
CO3: Use appropriate non-verbal skills to present ideas and participate in discussions
CO4: Use various reading techniques, make notes and respond.
CO5: Write effectively for various professional situations.

Text Book:

1. Whitby Norman, Business Benchmark Upper Intermediate Students' Book CUP Publications, 2nd Edition, 2014

Reference Books:

1. Cambridge BEC Vantage - Practice Tests, Self-study Edition, Cambridge University Press, 2002
2. Hewings Martin, Advanced Grammar in use - Upper-intermediate Proficiency, CUP, Third Edition, 2013

Web References:

1. www.cambridgeenglish.org/exams/business.../business-preliminary/
2. http://www.examenglish.com/BEC/BEC_Vantage.html
3. www.splendid-speaking.com/exams/bec_speaking.htmlhtml

BoS Chairman

Course Code: 16MAT25	Course Title: ENGINEERING MATHEMATICS-II (For B.Tech. IT only)	
Core	L : T : P : C	3 : 2 : 0 : 4
Type: Theory	Total Contact Hours:	75 Hours

Course Objectives

The course is intended to:

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

Unit I - SET THEORY AND MAPPINGS **9+6**

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+6**

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- Binomial Expansion of integers, rational index

Unit III - PERMUTATION AND COMBINATION **9+6**

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- Recurrence relation.

Unit IV - DIVISIBILITY AND CANONICAL DECOMPOSITIONS **9+6**

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

Unit V - CONGRUENCE'S **9+6**

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

BoS Chairman

Course Outcomes

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

CO1: Analyze the basic concepts of Relations and Maps.
CO2: Evaluate the A.M, G.M and H.M.
CO3: Construct Permutation and Combination.
CO4: Utilize the basic concepts of Divisibility.
CO5: Solve the concepts of Congruence.

Text Book:

1. Kenneth H Rosen, "Discrete Mathematics and its Applications", Eight Editions, Tata McGraw Hill, 2006.

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://people.umass.edu/partee/NZ_2006/Set%20Theory%20Basics.pdf
2. http://nptel.ac.in/courses/106108051/
3. http://home.iitk.ac.in/~peeyush/102A/Lecture-notes.pdf
4. http://nptel.ac.in/courses/111103020/

BoS Chairman

Course Code: 16PHT24	Course Title: MATERIAL SCIENCE (Common to CSE and IT)	
Core	L : T : P : C	3 :0 :0:3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

1. Interpret the fundamental behavior of conduction.
2. Recognize the semiconductors nature.
3. Identify suitable technique for fabricating integrated circuits.
4. Choose suitable magnetic and dielectric material.

Unit I - CONDUCTING MATERIALS 9

Basics of Electrical Conduction- 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- Sources of resistivity – Low and high resistive materials

Unit II - SEMICONDUCTING MATERIALS 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 coefficient- Applications: Hall multiplier-Hall effect sensor.

Unit III - SEMICONDUCTING DEVICES 9

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

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

Classification of dielectric materials- Dielectric constant - Polarization – Electronic, ionic, orientation and space charge polarization –Internal field- Claussiusmosotti relation- Frequency and temperature dependence of polarization- Dielectric loss- Dielectric breakdown- Applications : Capacitors, transformers, and capacitive touch screens.

BoS Chairman

Course Outcomes

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

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

Text Books:

1. Avadhanulu M.N. and Kshirsagar P G, "Text Book of Engineering Physics", S. Chand & Company Ltd., New Delhi, 2013.(Unit-I,II,IV,V)
2. S.O. Kasap, "Principles of Electronics Materials and Devices", McGraw Hill Higher Education, New Delhi, 2006. (Unit-III)

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.

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: 16GET26	Course Title: C PROGRAMMING (Common to CSE and IT)	
Core	L : T : P : C	3 :0 :0:3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

1. Choose appropriate programming constructs.
2. Construct programs using array and pointer.
3. Formulate suitable structure or union.
4. Apply the concepts of pointers for dynamic memory access.
5. Build programs using preprocessor directives and Files.

Unit I - DATA TYPES, OPERATORS AND STATEMENTS 9

Overview of C – C Character set - Identifier and keywords - Data types –Storage classes- typedef – Type Casting - Variables and Constants –Structure of C program – Executing a C program - Operators and Expressions – Statements: Input and Output statements –Decision Making - Branching and Looping

Unit II - ARRAYS AND POINTERS 9

Arrays: Declaration – Initialization –Single dimensional arrays- Multidimensional arrays– Dynamic memory allocation- Pointers: Declaration of Pointer variable - Operations on Pointers - Relationship between Arrays and Pointers – Array of Pointers – Pointer to a Pointer – Pointer to an Array.

Unit III - STRINGS AND FUNCTIONS 9

Strings: Character arrays –Reading string input - String library functions – List of strings functions-Functions: Types - Declaration - Definition - Function call - Returning functions – Pass by value – Pass by reference – Passing arrays to functions– Recursion - Pointer to function.

Unit IV - STRUCTURES AND UNION 9

Structure: Definition – Declaration – Operations on Structures –Pointer to Structures - Array of Structures - Structure within a Structure —Functions and Structures – Union: Definition - Declaration – Operations on Union – Enumerations – Bit-Fields

Unit V - PREPROCESSOR DIRECTIVES AND FILES 9

Preprocessor Directives: Types – Macros – File inclusion - Conditional compilation directives - Files: Streams – I/O using Streams – File type - File operations - Command line arguments – Graphics functions.

BoS Chairman

Course Outcomes

At the end of the course students will be able to

CO1: Choose appropriate programming constructs for a given problem.
CO2: Construct programs using arrays and functions for a given problem.
CO3: Formulate suitable structure or union for a given scenario.
CO4: Apply pointers for effective dynamic memory access in a given application.
CO5: Build program using Files and Pre-processor directives for a given scenario.

Text Book:

1. Ajay Mittal "Programming in C- A practical Approach", Pearson Education, 2015.

Reference Books:

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. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
4. K.N.King, "C Programming A modern Approach", Second Edition, W.W.Norton and Company, 2008.
5. E.Balagurusamy, "Programming in ANSI C ", Sixth Edition, 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: 16GET27	Course Title: INTRODUCTION TO ENGINEERING (Common to CSE and IT)	
Core	L : T : P : C	3 :0 :0:3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

1. Select the best material and suitable foundation.
2. Infer basic knowledge about the components.
3. Categorize the various alternate energy sources.
4. Compare different manufacturing processes.
5. Design the 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 - MANUFACTURINGPROCESSES 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 students will be able to:

CO1: Select the best material and suitable foundation for the required construction.
CO2: Infer basic knowledge about the components of structures.
CO3: Categorize the various alternate sources of energy and components of a power plant.
CO4: Compare different manufacturing processes like casting, forming, welding and machining operations.
CO5: Design the IC engines and refrigerators.

Text Books:

1. Jayagopal.L.S & Rudramoorthy.R, "Elements of Civil and Mechanical Engineering", Vikas Publishing House, NewDelhi, 2010.
2. Shanmugam. GandPalanichamy.M.S, "Basic Civil and Mechanical Engineering", Tata McGrawHill Publishing Co., NewDelhi, 1996.

Reference Books:

1. Bindra.S.PandArora.S.P,"The text book of Building construction",Dhanpat Rai Publications(P)Ltd., NewDelhi,2011.
2. Anantha narayanan.P," Basic Refrigeration and Air Conditioning", Tata McGraw Hill Publishing Co., NewDelhi,2003.
3. Srinivasan.S, "Automotive engineering" Tata Mc Graw Hill Publishing Co., NewDelhi, 2003.

Web References:

1. www.electrical4u.com/steam-boiler-working-principle-and-types-of-boiler/
2. www.thelibraryofmanufacturing.com/
3. www.swtc.edu/ag_power/air_conditioning/.../basic_cycle.htm

BoS Chairman

Course Code: 16CPL21	Course Title: C PROGRAMMING LABORATORY (Common to CSE and IT)	
Core	L : T : P : C	0 :0 :4:2
Type: Practical	Total Contact Hours:	60 Hours

Course Objectives

The course is intended to:

1. Select data using primitive and structured types.
2. Design programs using different operators, formatting inputs and outputs
3. Develop programs to solve problems using decision making, loops and functions.
4. Construct programs using pointers.
5. Construct program using preprocessor directives, macros, files and graphics.

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 arrays and pointers
5. Program for string manipulation
6. Program using functions
7. Program using structures and union
8. Program using preprocessor directives and macros
9. Program on basic file operations
10. Program using graphics functions

Course Outcomes

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

CO1: Select data using primitive and structured types for a given problem.
CO2: Design programs using different operators, formatting inputs and outputs.
CO3: Develop programs to solve problems using decision making, loops and functions.
CO4: Construct programs using pointers for a given scenario with effective usage.
CO5: Build programs with advanced features in C like preprocessor, macros, files, and DMA.

Reference Books:

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.

S. Ramakrishna

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3. E.Balagurusamy, "Programming in ANSI C", Sixth Edition, Tata McGraw Hill, 2012.

BoS Chairman

Course Code: 16EGL21	Course Title: ENGINEERING GRAPHICS (Common to CSE and IT)	
Core	L : T : P : C	1 :0 :4:3
Type: Practical	Total Contact Hours:	75 Hours

Course Objectives

The course is intended to:

1. Design the different curves.
2. Create the orthographic projections.
3. Build the solid projections.
4. Build the sectioned solids projections.
5. Construct the development of surfaces of simple solids.

Unit I - CURVES USED IN ENGINEERING PRACTICES **13**

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 **18**

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 **18**

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 **13**

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 **13**

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 students will be able to:

CO1: Design different curves and explain its application.
CO2: Create orthographic projection from pictorial views and models.
CO3: Build the projection of solids.
CO4: Build the projection of sectioned solids.
CO5: Construct 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 McGrawHill 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: 16PSL22	Course Title: PROMOTION OF STUDENTS WELLNESS (Common to all B.E/B.Tech Programmes)	
Core	L : T : P : C	0:0 :2:1
Type: PS	Total Contact Hours:	30 Hours

Course Objectives

The course is intended to:

1. Identify steps to maintain physical wellbeing.
2. Plan actions that maintain mental wellbeing.
3. Apply actions that improve 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 students will be able to:

CO1: Identify steps to maintain physical wellbeing - grooming, BMI, flexibility, muscle strength, body compositions (vatha, pitha, kapa).

CO2: Plan actions that maintain mental wellbeing - perceptions, attention/concentration, memory, gunas.

BoS Chairman

CO3: Apply actions that improve social wellbeing - etiquettes, emotional and psychological aspects, stress management, morality and values.

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

Orientation programme

Theory and practice demonstration

3 days - 7 hours /day for syllabus coverage

Follow-Up Practice

12 weeks x 2 hours/week: 24 hours

Evaluation:

Continuous evaluation:

Physical Exercises, Kaya kalpa practice, meditation	= 40 marks
Introspection (assessment of students workbook)	= 20 marks
Total	= 60 marks

Semester end examination:

Written test (MCQ and short answers)	= 30 marks
Physical exercises, meditation	= 50 marks
Viva-voce	= 20 marks
Total	= 100 marks

End semester mark out of 100 is reduced to 40 marks

The student should get a total of 50 marks put together for a pass.

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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

BoS Chairman

SEMESTER – III

Course Code: 16MAT35	Course Title: DISCRETE MATHEMATICS	
Core	L : T : P : C	3: 2: 0: 4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16MAT15 Engineering Mathematics- I
- 16MAT25 Engineering Mathematics -II

Course Objectives

The course is intended to:

1. Utilize the concepts of propositional logic
2. Apply the theory of predicate calculus
3. Compare the algebraic structures
4. Classify different types of graphs
5. Construct different types of trees

Unit I - PROPOSITIONAL LOGIC **9+6**

Propositions – Logical Connectives – Tautologies and Contradictions – Contra Positive – Logical Equivalences and Implications – Normal Forms – Principal Conjunctive and Disjunctive Normal Forms – Rules of Inferences

Unit II - PREDICATE CALCULUS **9+6**

Predicates – Quantifiers – Free and Bounded variables – Universe of Discourse – Rules of Universal Specification and Generalization – Validity of arguments.

Unit III - GROUPS **9+6**

Algebraic Systems – Properties – Semigroups – Monoids – Homomorphism - Subsemigroups and Submonoids– Cosets and Lagrange's Theorem – Normal Subgroups – Codes and group codes.

Unit IV – GRAPHS **9+6**

Basic Definitions – Degree of Vertex –Matrix Representation of a Graphs - Paths Cycles and Connectivity – Eulerian and Hamiltonian Graphs.

Unit V – TREES **9+6**

Introduction to Trees – Spanning Tree – Minimum Spanning Tree – Binary Trees – Rooted and Binary Trees– Tree Traversal – Expression Trees.

BoS Chairman

Course Outcomes

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

CO1: Utilize the concepts of propositional logic in programming languages.
CO2: Apply the theory of predicate calculus to test the validity of arguments.
CO3: Compare the concept of various algebraic structures.
CO4: Classify several types of Graphs its algorithms in computer programs.
CO5: Construct different types of trees.

Text Book:

1. T.Veerarajan, "Discrete Mathematical Structures with Graph Theory and Combinatorics", Tata McGraw–Hill Education Private Limited, New Delhi, 2011.

Reference Books:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Special Indian edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2007.
2. Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2007
3. Seymour Lipschutz and Mark Lipson, "Discrete Mathematics",2nd Edition, Schaum's Outlines, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2007.

Web References:

1. http://nptel.ac.in/courses/111104026/
2. http://nptel.ac.in/courses/106106094/
3. http://nptel.ac.in/video.php?subjectId=106106094

BoS Chairman

Course Code: 16ITT31	Course Title: BASIC COMMUNICATION ENGINEERING	
Core	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16GET17 Basics of Electrical and Electronics Engineering

Course Objectives

The course is intended to:

1. Analyze the behavior of analog modulation schemes
2. Select the digital modulation techniques
3. Compare the performance of different digital communication systems
4. Examine the operation of spread spectrum and multiple access schemes
5. Infer the working of Satellite and Optical Communication Systems

Unit I - ANALOG COMMUNICATION 9

Basic Scheme of Communication System - Need of Modulation - Principles of Amplitude Modulation - AM Transmitter- Super Heterodyne Receiver. - Angle Modulation - FM and PM Waveforms - Frequency Analysis of Angle Modulated Waves- Bandwidth Requirements for Angle Modulated Waves.

Unit II - DIGITAL COMMUNICATION 9

Information Capacity -Amplitude Shift Keying (ASK) - Frequency Shift Keying-Phase Shift Keying: Binary Phase Shift Key-Quadrature Phase Shift Keying- Quadrature Amplitude Modulation (QAM) - Pulse Modulation –Types (PCM, DPCM, DM, ADM).

Unit III - CELLULAR COMMUNICATION 9

Mobile Telephone Service-Cellular Telephone – Frequency Reuse – Interference – Cell Splitting- Sectoring-Segmentation and Dualization – Cellular System Topology – Roaming and Handoffs – Call Processing -IS-95- GSM

Unit IV - MULTIPLE ACCESS AND SPREAD SPECTRUM TECHNIQUES 9

Multiple Access Techniques: FDMA- TDMA- CDMA – Direct Sequence Spread Spectrum – Frequency Hopping Spread Spectrum – Source Coding of Speech for Wireless Communication.

Unit V - SATELLITE AND OPTICAL COMMUNICATION 9

Satellite Communication Systems –Kepler's Law - Satellite Orbits - Geosyncronous Satellite – GPS - Optical Fiber Communication Systems - Optical Fiber Types – Light Propagation – Configuration and Classification - Sources and Detectors.

BoS Chairman

Course Outcomes

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

CO1: Analyze the behavior of analog modulation schemes in time and frequency domains
CO2: Select the appropriate digital modulation techniques
CO3: Compare the performance of different digital communication systems
CO4: Examine the operation of spread spectrum and multiple access schemes
CO5: Infer the working of Satellite and Optical Communication Systems

Text Book:

1. Wayne Tomasi, "Electronic Communication Systems Fundamentals through Advanced", 5th Edition, Pearson Education, 2011.

Reference Books:

1. Louis E. Frenzel Jr, "Principles of Electronic Communication Systems", 3rd Edition, Mc Graw Hill, 2008.
2. Simon Haykin, "Communication Systems",5th Edition, John Wiley & Sons., 2011.
3. B.P.Lathi, "Modern Analog and Digital Communication systems", 3rd Edition, Oxford University Press, 2007.
4. Dennis Roddy and John Coolen, "Electronic Communications", Pearson Education India, 2008.

Web References:

1. http://nptel.ac.in/video.php?subjectId=117102059
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-450-principles-of-digital-communications-i-fall-2006/

BoS Chairman

Course Code: 16ITT32	Course Title: COMPUTER ORGANIZATION	
Core	L : T : P : C	3: 0 :2: 4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16GET17 Basics of Electrical and Electronics Engineering

Course Objectives

The course is intended to

1. Determine Combinational, sequential digital circuits and counters
2. Analyze the knowledge of information architecture on basis of functional units
3. Discover the basic instruction set of the computer
4. Examine Hardware and Software implications of pipelining
5. Illustrate the functionality of memory hierarchy

Unit I - DIGITAL FUNDAMENTALS 9

Number Systems – Boolean Algebra – Logic Gates – Synthesis of Logic Functions: Karnaugh Map Method for Simplifying Expressions – Implementation of Logic Gates – Design using NAND and NOR Gates.

Unit II - LOGIC CIRCUITS 9

Adder/ Subtractor – Comparator – Flip Flops – Registers and Shift Registers – Binary and BCD Counters – Encoders / Decoders – Multiplexers / Demultiplexers.

Unit III - BASIC STRUCTURE OF COMPUTERS & INSTRUCTION SET 9

Functional Units – Basic Operational Concepts – Performance - Memory Location and Addressing - Instructions and Instruction Sequencing - Risc & Cisc – Addressing Modes.

Unit IV - BASIC PROCESSING & PIPELINING 9

Basic Processing Fundamental Concepts - Instruction Execution - Hardwired Control - Micro Programmed Control. Pipeline Organization - Pipelining Issues - Data Dependencies - Memory Delays – Branch Delays.

Unit V - MEMORY & I/O SYSTEM 9

Memory Technology – Semiconductor RAM Memories – Read Only Memories - Cache Memories - Virtual Memory - Accessing I/O Devices – Interrupts - Direct Memory Access.

BoS Chairman

LAB COMPONENT 30

1. Verification of Boolean theorems using digital logic gates
2. Implementation of combinational circuits using basic gates for arbitrary functions
3. Implementation of Boolean expressions using NAND and NOR gates
4. Implementation of half adder and subtractor, full adder and subtractor.
5. Implementation of 4-bit binary adder / subtractor using basic gates
6. Implementation of MUX, DEMUX, Comparator.
7. Implementation of binary/BCD counters
8. Trouble shooting the components of CPU

Course Outcomes

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

CO1: Determine Combinational and sequential digital circuits and counters
CO2: Analyze the knowledge of information architecture on basis of functional units of modern computers
CO3: Discover the functional components required for sequence of instruction execution
CO4: Examine Hardware and Software implications of pipelining
CO5: Illustrate the functionality of Memory hierarchy

Text Books:

1. Morris Mano, Michael Ciletti, "Digital Design", 4th Edition, Pearson Publication, New Delhi, 2013.(Unit I,II)
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th Edition, Tata McGraw Hill, 2011.(Unit III, IV, V)

Reference Books:

1. Charles H.Roth, Jr. "Fundamentals of Logic Design", 7th Edition, Jaico Publishing House, New Delhi, 2014.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", 4th Edition, Elsevier, New Delhi 2010.
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", 9th Edition, Pearson Education, New Delhi 2012

Web References:

1. www.ee.surrey.ac.uk/Projects/Labview/boolalgebra/index.html
2. www.ee.surrey.ac.uk/Projects/Labview/Sequential/Course/06-FlipFlops/
3. www.technolamp.co.in/2011/04/computer-organization-carl-hamacher.html
4. www.nptel.ac.in/courses/106106092/

BoS Chairman

Course Code: 16ITT33	Course Title: SOFTWARE ENGINEERING	
Core	L : T : P : C	3 :0 :2 :4
Type: Theory	Total Contact Hours:	75 Hours

Course Objectives

The course is intended to:

1. Identify the suitable software process model
2. Analyze the relevant requirement model
3. Construct the software architecture
4. Apply the selected testing strategy
5. Illustrate the concepts of software quality and configuration management

Unit I - SOFTWARE ENGINEERING – INTRODUCTION 9

Scope of Software Engineering – Process Models: Process Framework - Water Fall- Incremental- Evolutionary Process Model: Prototyping- Spiral Model- Object Oriented Model –Introduction to Agile Process- Agile Methods- Development Techniques – Scaling Agile Methods.

Unit II - REQUIREMENT ENGINEERING 9

Requirement Engineering Task– Groundwork – Eliciting Requirements – Building the Requirement Model - Negotiating and Validating Requirements – Requirement Analysis Modeling: Scenario-Based Modeling-Data Modeling- Class Based Modeling-Behavioral Modeling-Functional Modeling.

Unit III - SOFTWARE DESIGN 9

Design Process and Concepts – Modular Design – Design Model - Architectural Design- Architectural Styles – Agility and Architecture - Component Level Design: Class Based Components-Designing Traditional Components – User Interface Analysis and Design- Interface Analysis- Interface Design Steps.

Unit IV - SOFTWARE TESTING 9

Strategic Approach to Software Testing: Verification & Validation –Software Testing Strategy-Strategic Issues- Unit Testing - Integration Testing – Validation Testing - System Testing– White- Box Testing-Basis Path Testing – Control Structure Testing-Black- Box Testing-Graph-Based Testing-Equivalence Partitioning-Boundary Value Analysis.

Unit V - SOFTWARE QUALITY AND PROJECT MANAGEMENT 9

Software Quality Assurance: Elements of SQA- SQA Tasks- Goals and Metrics - Software Reliability – Software Configuration Management- SCM Repository- Process –Configuration Management for Web and Mobile Applications-Agile Project Management.

BoS Chairman

LAB COMPONENT 30

1. Identify suitable software development model for the specific scenario and demonstrate it.
2. Identify the requirements from specific scenario and categories the functional and non-functional requirements.
3. Create the Software requirement specification document for identified scenario.
4. Manage the requirements using test link requirement management tool and validate the requirement coverage for specific scenario.
5. Select appropriate test cases, prioritize the test case execution and report the failed test execution using test link.
6. Generate the test execution report and test coverage report using test link.

Course Outcomes

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

CO1: Identify the suitable software process model for specific scenario.
CO2: Analyze the relevant requirement model for software.
CO3: Construct the software architecture using appropriate design models.
CO4: Apply the selected testing strategy to developed software.
CO5: Illustrate the concepts of software quality and configuration management for the project.

Text Book:

1. Roger S. Pressman, Bruce.R.Maxim, "Software Engineering – A Practitioner's Approach", 8th Edition, McGraw-Hill International Edition, New Delhi, 2015

Reference Books:

1. Ian Sommerville, "Software engineering", 10th Edition, Pearson Education Asia, 2015.
2. Shari Lawrence Pfleeger, Joanne M Atlee, "Software Engineering –Theory and Practice" ,4th Edition, Pearson Education Asia,2012
3. Mark C.Layton,"Agile Project Management for Dummies", John Wiley & Sons,2012
4. Aggarwal.K.K and Yogesh Singh, "Software Engineering", 3rd Edition, New Age International Publishers, 2014.

Web References:

1. http://nptel.ac.in/video.php?subjectId=106101061.
2. http://freevideolectures.com/Course/2318/Software-Engineering.

BoS Chairman

Course Code: 16ITT34	Course Title: DATA STRUCTURES	
Core	L : T : P : C	3: 0 :0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16GET26 C Programming

Course Objectives

The course is intended to:

1. Infer the concepts of abstract data types and analyze the algorithms
2. Design linear data structures such as List, Stack and Queue
3. Construct non-linear data structures such as tree
4. Develop non-linear data structure such as graph
5. Apply suitable algorithms for sorting, searching and hashing

Unit I - LINEAR DATA STRUCTURES 9

Algorithm Analysis - Abstract Data Types - List ADT: Array and Linked List Implementation – Doubly Linked List – Circularly Linked List -Stack ADT: Stack Model – Array and Linked List Implementation of Stack - Applications – Queue ADT: Queue Model – Array and Linked List Implementation of Queue - Applications.

Unit II - NON-LINEAR DATA STRUCTURES: TREES 9

Trees: Implementation of Trees - Tree Traversals – Binary Trees: Implementation – Expression Trees – Binary Search Tree: Implementation– AVL Trees: Single Rotation – Double Rotation – Implementation – Binary Heap – Applications of Trees.

Unit III - NON LINEAR DATA STRUCTURES: GRAPH 9

Graphs: Definitions – Representation of Graphs – Graph Traversals: Breadth First Search –Depth First Search -Topological Sort – Shortest Path Algorithms: Unweighted Shortest Paths - Dijkstra's Algorithm - All Pairs Shortest Path -Minimum Spanning Tree: Prim's Algorithm – Krushkal's Algorithm.

Unit IV - SORTING 9

Simple Sorting Algorithms – Bubble Sort - Insertion Sort – Shell Sort – Heap Sort - Merge Sort – Quick Sort – Sorting Large Structure - Bucket Sort – External Sorting: Simple Algorithm - Multiway Merge.

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BoS Chairman

Unit V - SEARCHING AND HASHING

Linear Search – Binary Search – Hashing: Hash Functions – Separate Chaining – Open Addressing – Linear Probing – Quadratic Probing – Double Hashing – Rehashing – Extendible Hashing.

Course Outcomes

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

CO1: Infer the concepts of abstract data types and analyze the algorithms
CO2: Design linear data structures such as List, Stack, Queue and its applications
CO3: Construct non-linear data structure such as Trees and its applications
CO4: Develop non-linear data structure such as graph and its applications
CO5: Apply suitable algorithms for sorting, searching and hashing.

Text Book:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia, New Delhi, 2011

Reference Books:

1. Sahni, "Data Structures Using C, The McGraw-Hill, New Delhi, 2006.
2. Michael.T.Goodrich, "Data Structures and Algorithm Analysis in C", Wiley student Edition, New Delhi, 2007.
3. Thomas H.Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, "Introduction to Algorithms", MIT Press, England, 2009.

Web References:

1. https://www.coursera.org/specializations/data-structures-algorithms
2. http://www.csse.monash.edu.au/~lloyd/tildeAlgDS
3. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms
4. http://nptel.ac.in/courses/106102064

BoS Chairman

Course Code: 16ITT35	Course Title: OBJECT ORIENTED PROGRAMMING USING JAVA	
Core	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16GET26 C Programming

Course Objectives

The course is intended to:

1. Utilize Integrated Development Environment (IDE) for Java application development.
2. Apply inheritance and packages concepts
3. Construct java application involving multi- threading concepts
4. Recognize the significance of exception handling mechanism
5. Design Graphical User Interface (GUI)

Unit I - INTRODUCTION 9

Java Features - Comparison with C And C++ -Java Program Structures -Java Tokens –Java Statements -Java Virtual Machine -Command Line Arguments - Constants –Variables -Data Types - Scope of Variables –Operators - Defining a Class -Adding Variables and Methods -Creating Objects - Accessing Class Members - Constructors –Method Overloading -Static Members - Garbage Collection - Arrays.

Unit II - INHERITANCE, PACKAGES AND INTERFACES 10

Inheritance: Extending a Class -Overriding Methods -Basics- Super Keyword- Multilevel Hierarchy-Final Variables and Methods - Final Classes. Abstract Classes and Methods - Interfaces- Extending Interfaces - Implementing Interfaces - Hiding Classes - Packages - Importing Packages - Visibility Control - String Class -String Buffer.

Unit III - EXCEPTION HANDLING AND THREAD 8

Exception Types -Uncaught Exceptions -Using Try Catch -Multiple Catch -Nested Try -Throw- Throws- Finally -Built in Exceptions- Using Exceptions- Thread- Extending the Thread Class - Thread Life Cycle -Multithreading-Thread Exception - Thread Priority -Thread Model.

Unit IV - STREAMS AND BUILT IN CLASSES 9

Introduction to File & Operations - Introduction to Stream - Byte

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Streams- Datainput / Outputstream – Bufferedinput / Outputstream –Fileinput / Outputstream) - Character Streams (Reader/Writer-Bufferedreader/Writer-Filereader/Writer) - Stringtokenizer - Calendar-Date

Unit V - GUI PROGRAMMING 9

Introduction to Swing Hierarchy- JApplet - JFrame - Layout Managers - Event Handling –Swing Components: JLabel- JButton - JTextField - JRadioButton - JCheckBox - JList - JPanel

Course Outcomes

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

CO1: Utilize Integrated Development Environment (IDE) for Java application development.
CO2: Apply inheritance and packages in order to attain code minimization and reusability.
CO3: Construct java application involving multi- threading concepts
CO4: Recognize the significance of exception handling mechanism to improve the efficiency
CO5: Design Graphical User Interface (GUI) by using JApplet and Swing.

Text Book:

1. Schildt. H., "Java - The complete Reference", 9th Edition, McGraw Hill Education, 2014

Reference Books:

1. Deitel and Deitel," Java How to Program", Prentice Hall, 10th Edition, 2014
2. Marc Loy, Robert Eckstein, Dave Wood, James Elliot, Brian cole,"JAVA Swing", Second Edition, 2012
3. By Kathy Sierra, Bert Bates, "Head First Java", Second Edition, O'Reilly Media, New Delhi, 2005
4. Bruce Eckel, "Thinking In Java", 4th Edition, Pearson, 2008

Web References:

1. http://docs.oracle.com/javase/7/docs/api/
2. http://www.tutorialspoint.com/java/
3. http://www.programmingsimplified.com/java-source-codes
4. http://www.coderanch.com/forums/f-33/java

BoS Chairman

Course Code: 16ITL31	Course Title: DATA STRUCTURES LABORATORY	
Core	L : T : P : C	0: 0 :4 :2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16GET26 C Programming

Course Objectives

The course is intended to:

1. Design the linear data structures.
2. Design the non-linear data structures
3. Apply the sorting and searching techniques

LIST OF EXPERIMENTS

1. Array based implementation of List ADT
2. Array based implementation of Stack ADT and Queue ADT
3. Linked list implementation of List ADT
4. Linked list implementation of Stack ADT and Queue ADT
5. Implementation of Binary Tree traversals
6. Implementation of Binary Search Tree
7. Implementation of Graph traversals
8. Implementation of All pair shortest path Algorithms
9. Implementation of Sorting Techniques
10. Implementation of Linear and Binary Search

Course Outcomes

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

CO1: Design linear data structures using array and linked list
CO2: Design non-linear data structures such as Trees and Graphs
CO3: Apply sorting and searching techniques

BoS Chairman

Course Code: 16ITL32	Course Title: OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY	
Core	L : T : P : C	0: 0 :4: 2
Type: Practical	Total Contact Hours:	60 Hours

Course Objectives

The course is intended to:

1. Apply an object oriented approach to programming and identify its benefits potential benefits
2. Apply object-oriented concepts in real world applications
3. Use Integrated Development Environment (IDE) for Java application development
4. Develop simple GUI based applications

LIST OF EXPERIMENTS

1. Programming in Java Environment
2. Creation of classes and use of different types of functions (inclusive static methods)
3. Programs using inheritance
4. Programs using method overloading & overriding
5. Interfaces & Abstract classes
    a. Developing user-defined interfaces
    b. Use of abstract classes and methods
6. Simple Package creation
    a. Developing user defined packages
    b. Import of user defined packages
7. Exception Handling Mechanism in Java
    a. Handling pre-defined exceptions
    b. Creating user-defined exceptions
8. Threading
    a. Creation of thread in Java applications
    b. Multithreading
9. Programs using Files & Streams

BoS Chairman

10. Programs using JApplet
11. Programs using Swing Components

Course Outcomes

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

CO1: Apply an object oriented approach to programming and identify potential benefits of object-oriented programming over other approaches
CO2: Apply object-oriented concepts in real world applications
CO3: Use Integrated Development Environment (IDE) for Java application development
CO4: Develop simple GUI based applications using Java JApplet and Swing

BoS Chairman

Course Code: 16PSL31	Course Title: PERSONAL EFFECTIVENESS (Common to all B.E/B.Tech Programmes)	
General	L : T : P : C	0 : 0 : 2 :1
Type: PS	Total Contact Hours:	30 Hours

Course Objectives

The course is intended to:

1. Identify the strengths, weaknesses and opportunities
2. Design goals for academics, career, and personal aspirations
3. Identify 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

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

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

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

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

Unit V - PUTTING INTO PRACTICE

Practical's: Using the weekly journal – Executing and achieving short term goals – Periodic reviews

BoS Chairman

Course Outcomes

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

CO1: Identify the strengths, weaknesses and opportunities
CO2: Design well-articulated goals for academics, career, and personal aspirations
CO3: Identify the road map to realize the goals
CO4: Apply time management techniques to complete planned tasks on time
CO5: Create time and pursue activities of self-interest that add value

Course handouts (compiled by PS team, MCET)

1. Learner's workbook
2. Personal effectiveness journal
3. Reading material for Personal Effectiveness

Further Reading:

1. Stephen R Covey, "First things first", Simon & Schuster Uk, Aug 1997.
2. Sean Covey, "Seven habits of highly effective teenagers", Simon & Schuster Uk, 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

Sl. No.	Evaluation	Criterion	Total marks		Remarks
1	Continuous Evaluation	KT – Best out of 'n' tests SKT – Best out of 2 tests 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	

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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 ESE.		

BoS Chairman

SEMESTER IV

Course Code: 16MAT45	Course Title: PROBABILITY AND STATISTICS	
Core	L : T : P : C	3: 2 :0: 4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16MAT15 Engineering Mathematics I
- 16MAT25 Engineering Mathematics II

Course Objectives

The course is intended to:

1. Illustrate the basic probability concepts
2. Analyze expectations and variances of random variables.
3. Apply the concepts of standard distributions
4. Apply the notion of sampling distributions and statistical techniques
5. Classify the systematic problem solving techniques

Unit I - PROBABILITY THEORY 9+6

Probability Theory – Introduction- Axioms of Probability- Conditional Probability- Independent Event-Baye's Theorem.

Unit II - RANDOM VARIABLES 9+6

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.

Unit III - STANDARD DISTRIBUTIONS 9+6

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+6

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.

Unit V - DESIGN OF EXPERIMENTS 9+6

Aim of Design Of Experiments- Basic Principles of Experimental Design –Completely Randomized Design (C.R.D)- Analysis of Variance (ANOVA) - Analysis of Variance for One Factor of Classification – Randomized Block Design(R.B.D) – Latin Square Design (L.S.D) – Comparison of RBD and LSD

BoS Chairman

Course Outcomes

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

CO1: Illustrate the concepts of basic probability

CO2: Analyze expectations and variances of discrete and continuous random variables.

CO3: Apply the concepts of standard distributions which can describe real life phenomena

CO4: Apply the notion of sampling distributions and statistical techniques used in engineering problems

CO5: Classify the systematic problem solving techniques using design of experiments.

Text Book:

1. T.Veerarajan, "Probability, Statistics and Random process",2nd Edition, Tata McGraw–Hill, New Delhi, 2009.

Reference Books:

1. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", 8th Edition Pearson Education, Asia, 2007.
2. M.R. Spiegel, J. Schiller and R.A. Srinivasan, "Schaum's Outlines Probability and Statistics", Tata McGraw Hill edition, 2004.
3. Johnson and C.B. Gupta, "Miller and Freund's Probability and Statistics for Engineers", 7th Edition, Pearson Education, Asia, 2007
4. Dr.J.Ravichandran, "Probability and Statistics for Engineers", 1st Edition, Wiley-India, Reprint 2012.

Web References:

1. http://nptel.ac.in/courses/111105041/
2. http://nptel.ac.in/downloads/111105041/
3. http://nptel.ac.in/courses/111105090/

BoS Chairman

Course Code: 16ITT41	Course Title: FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING	
Core	L : T : P : C	3: 2 :0:4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16ITT32 Computer Organization
- 16 ITT31 Basic Communication Engineering

Course Objectives

The course is intended to:

1. Classify the systems by performing basic operations on signals
2. Analyze the discrete-time systems using Z-transform
3. Design the IIR filters structures
4. Design the FIR filters structures
5. Analyze the Discrete Fourier Transform (DFT)

Unit I - BASICS **9+6**

Representation Signals- Basic Operations on Signals- Linearity- Time Invariance- Causality and Stability-System Representation by Differential Equations- Difference Equations and Impulse Response.

Unit II - Z TRANSFORMS **9+6**

Z Transforms and its Properties-Inverse Z-Transform-Analysis of LSI Systems using Z-Transform- Stability and Causality - Block Diagram Representation of DT Systems.

Unit III - DESIGN OF IIR FILTERS **9+6**

Design Techniques for Analog Low Pass Filters- Frequency Transformation- Properties of IIR Filters-IIR Filter Design- Structures for IIR- Finite Length Effects in Realization of IIR Filters.

Unit IV - DESIGN OF FIR FILTERS **9+6**

Sampling Theorem- Effect of Under Sampling-Aliasing Error-Characteristics of FIR Filters with Linear Phase- Design of FIR Filters using Window Functions-Structures for FIR- Finite Length Effect in Sampling of Analog Signals and Realization of FIR Filters.

Unit V - DISCRETE FOURIER TRANSFORM & FFT ALGORITHM **9+6**

Discrete Fourier Transform (DFT)- Definition- Properties-Introduction to Radix-2 Fast Fourier Transform (FFT)-Decimation in Time FFT- Decimation in Frequency FFT.

BoS Chairman

Course Outcomes

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

CO1: Classify the systems by performing basic operations on signals
CO2: Analyze the discrete-time systems using Z-transform
CO3: Design IIR filters and structures for IIR filters
CO4: Design FIR filters and structures for FIR filters
CO5: Analyze the discrete-time systems using Discrete Fourier Transform

Text Book:

1. Oppenheim A.V, Schaffer R.W., "Discrete-time Signal Processing", 3rd Edition, Pearson Education, 2014.

Reference Books:

1. John Proakis. G., Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", 4th Edition, PHI, 2014.
2. Mitra. S.K., "Digital Signal Processing- A Computer based approach", 4th Edition, Tata McGraw-Hill, New Delhi, 2013.
3. Alan V Oppenhiem, Alan S Wilsky., and Hamid Nawab S., "Signals and Systems", 2nd Edition,Prentice Hall of India, New Delhi,2015.
4. Feachor, E. I., "Digital Signal Processing: A Practical Approach", 2nd Edition, Prentice Hall, 2012
5. Johnny R.Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 2014.

Web References:

1. http://mathfaculty.fullerton.edu/mathews/c2003/ztransformintromod.html
2. http://ocw.mit.edu/resources/res-6-008-digital-signal-processing-spring-2011/video-lectures/lecture-7-z-transform-properties/
3. http://dspguru.com/dsp/faqs/fir/basics
4. http://www.tutorialspoint.com/digital_signal_processing/index.htm

BoS Chairman

Course Code: 16ITT42	Course Title: MICROPROCESSOR AND MICROCONTROLLERS	
Core	L : T : P : C	3 : 0 : 2 : 4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16ITT32 Computer Organization

Course Objectives

The course is intended to:

1. Demonstrate the programming concepts of 8086 microprocessor
2. Utilize the peripherals and interfacing concepts with 8086 Microprocessor
3. Build the 8051 microcontroller with programming concepts
4. Apply the peripherals and interfacing concepts with 8051 Microcontroller
5. Examine the Arduino programming application

Unit I - 8086 MICROPROCESSOR 9

Evolution of Microprocessors – 8086 Microprocessor – Architecture – Minimum and Maximum Mode – Addressing Modes – Instruction Set – Assembler Directives – Assembly Language Programming – Interrupts and Interrupt Service Routines

Unit II - MULTIPROCESSOR CONFIGURATIONS 9

Coprocessor Configuration – Closely Coupled Configuration – Loosely Coupled Configuration – 8087 Numeric Data Processor – Data Types –Architecture – 8089 I/O Processor – Architecture – Communication Between CPU and IOP

Unit III - 8051 MICROCONTROLLER 9

Introduction to Microcontroller – Architecture – SFRs – Memory Organization – Counters and Timers – Interrupts and it's Types – Addressing Modes – Instruction Set – Assembly Language Programming.

Unit IV - INTERFACING TECHNIQUES WITH 8086 AND 8051 9

8086 Interfacing: Memory Interfacing – I/O Interfacing – Programmable Peripheral Interfacing (PPI) – Timer/Counter Interfacing. 8051 Interfacing: Keyboard/Display Interfacing – ADC and DAC Interfacing

Unit V - ARDUINO PROGRAMMING 9

Introduction to the Arduino – Arduino IDE – Arduino Shields – Arduino Programs – Interfacing Arduino with Analog devices – Interrupts – Communication Device: Serial port – Applications: Interfacing of motor – LCD interfacing.

BoS Chairman

LAB COMPONENT **30**

1. Arithmetic Operations using 8085 Microprocessor
2. Arithmetic Operations using 8086 Microprocessor
3. Interfacing of stepper motor with 8086 Microprocessor
4. Arithmetic Operations using 8051 Microcontroller
5. Interfacing of ADC/DAC/DISPLAY with 8051 Microcontroller
6. Interfacing of LED with Arduino board
7. Interfacing of Touch sensor/Resistor based sensors with Arduino board

Course Outcomes

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

CO1: Demonstrate the 8086 microprocessor with programming concepts
CO2: Utilize the peripherals and interfacing concepts with 8086 Microprocessor
CO3: Build the 8051 microcontroller with programming concepts
CO4: Apply the peripherals and interfacing concepts with 8051 Microcontroller
CO5: Examine the Applications of the Arduino.

Text Books:

1. Ray.A.K. & Bhurchandi.K.M, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", 2nd Edition, Tata Mc Graw Hill, 2009. (Unit I, II, III and IV)
2. James A. Langbridge "Arduino Sketches: Tools and Techniques for Programming Wizardry", Wiley publication, 1st Edition, 2015. (Unit V)

Reference Books:

1. Mohamed Ali Mazidi, Janice Gillispie Mazidi, " The 8051 microcontroller and embedded systems using Assembly and C", 2nd Edition, Prentice hall of India, 2011.
2. Kenneth J. Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", 2nd Edition, Delmar Publishers, 2007.
3. Douglas V Hall, "Microprocessors and Interfacing, Programming and Hardware" TMH, 2006.

Web References:

1. https://www.arduino.cc/en/Tutorial/Homepage
2. http://www.control.aau.dk/~jdn/edu/doc/arduino/litt/ArduinoTutorials.pdf

S. Ramachandram

BoS Chairman

Course Code: 16ITT43	Course Title: DESIGN AND ANALYSIS OF ALGORITHMS	
Core	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT34 Data Structures

Course Objectives

The course is intended to:

1. Apply the fundamental principles of algorithm analysis
2. Analyze the algorithm efficiencies
3. Analyze the different problem types
4. Compare on the different algorithmic solutions
5. Apply the concept of computational intractability

Unit I - ANALYSIS OF ALGORITHMS 9

Introduction: Algorithm Specifications - Performance Analysis – Space Complexity – Time Complexity - Asymptotic Notations & it's Properties - Basic Efficiency Classes – Mathematical Analysis of Non-Recursive Algorithms - Mathematical Analysis of Recursive Algorithms – Important Problem Types-Sorting: Selection Sort - Bubble Sort. Searching: Sequential Search-Binary Search

Unit II - DIVIDE-AND-CONQUER & GREEDY TECHNIQUES 9

Divide & Conquer: The General Method - Finding Maximum and Minimum Element - Strassen's Matrix Multiplication - Greedy: The General Method - Knapsack Problem - Tree Vertex Splitting - Job Sequence With Deadlines - Optimal Storage on Tapes - Huffman Trees - Brute Force : Brute-Force String Matching

Unit III - DYNAMIC PROGRAMMING 9

The General Method - Multistage Graphs - All Pair Shortest Path - Optimal Binary Search Tree - 0/1 Knapsack Problem - Traveling Salesman Problem - Flow Shop Scheduling.

Unit IV - BACKTRACKING 9

The General Method - Eight Queens Problem - Sum of Subsets - Graph Coloring – Hamiltonian Cycles - Knapsack Problem.

Unit V - BRANCH AND BOUND TECHNIQUES 9

The General Method – FIFO Branch & Bound - LC Branch & Bound - 0/1 Knapsack Problem - Traveling Salesman Problem - Assignment Problem - NP Hard and NP Complete Problems.

BoS Chairman

Course Outcomes

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

CO1: Apply the fundamental principles of algorithm analysis for various problems
CO2: Analyze the effective algorithm for problems by estimating the best, average & worst case behavior.
CO3: Analyze the different problem types using various design techniques
CO4: Compare on the different algorithmic solutions to the same problem
CO5: Apply the concept of computational intractability for solving real world problems.

Text Book:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "
2. of Computer Algorithms", 2nd Edition, Galgotia Publications, New Delhi 2008

Reference Books:

1. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 3rd Edition Pearson Education, New Delhi, 2012.
2. Thomas H. Cormen,Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, MIT Press and McGraw-Hill Publications,2009
3. Aho. A.V., Hopcroft. J. E. and Ullman. J. D., "The Design and Analysis of Computer Algorithms", 3rd Edition, Pearson Education Asia 2003.
4. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", 3rd Edition, Pearson Education Asia 2003.

Web References:

1. http://webpages.uncc.edu/ras/ITCS2215.html
2. http://www.pearsoned.co.in/prc/book/anany-levitin-introduction-design-analysis algorithms-2e-2/9788131718377
3. https://vtucsenotes.wordpress.com/fourth-sem/design-and-analysis-of-algorithms/

BoS Chairman

Course Code: 16ITT44	Course Title: OPERATING SYSTEMS	
Core	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT32 Computer Organization

Course Objectives

The course is intended to:

1. Demonstrate the working of an operating system and its components
2. Categorize various process management concepts.
3. Explain the concepts of memory management schemes
4. Compare the various file system interface and its implementation
5. Identify the device and I/O management functions

Unit I - OVERVIEW OF OPERATING SYSTEM 9

Operating System Structures: Operating-System Services-User and Operating-System - Interface - System Calls – System Programs. Processes: Process Concept – Process Scheduling – Operations on Processes – Interprocess Communication. Threads: Multi-Threading Models – Threading Issues

Unit II - PROCESS SYNCHRONIZATION AND SCHEDULING 9

Synchronization: The Critical Section Problem –Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Monitors. CPU Scheduling: Scheduling Criteria – Scheduling Algorithms – Multiple-Processor. Process Deadlock: System Model – Deadlock Characterization –Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance –Deadlock Detection – Recovery from Deadlock

Unit III - MEMORY MANAGEMENT 9

Memory Management: Background – Swapping – Contiguous Memory Allocation – Segmentation- Paging – Structure of the Page Table. Virtual Memory: Background Demand Paging – Page Replacement.

Unit IV - FILE MANAGEMENT 9

File-System Interface: File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing - Protection. File-System Implementation: Directory Implementation – Allocation Methods – Free-Space Management.

Unit V - I/O SYSTEMS 9

I/O Systems – I/O Hardware – Application I/O Interface – Kernel I/O Subsystem – Transforming I/O to Hardware Operations-STREAMS – Performance. Mass-Storage

BoS Chairman

Structure: Disk Structure- Disk Scheduling – Disk Management – Swap-Space Management – RAID Structure– Disk Attachment – Stable Storage Implementation – Tertiary Storage Structure

Course Outcomes

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

CO1: Demonstrate the working of an operating system and its components
CO2:Categorize various process management using Synchronization, CPU Scheduling and Deadlocks
CO3: Explain the concepts of memory management including virtual memory
CO4: Compare the various file system interface and its implementation
CO5: Identify the device and I/O management functions in operating systems

Text Book:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", 9th Edition, Wiley India Edition, New Delhi 2015.

Reference Books:

1. Andrew S. Tanenbaum, "Modern Operating Systems", 4th Edition, Pearson Education/PHI, New Delhi 2014
2. Gary Nutt, "Operating Systems", 3rd Edition, Pearson Education, New Delhi, 2009.
3. Harvey M. Deital, "Operating Systems", 3rd Edition, Pearson Education, New Delhi, 2009.
4. Charles Crowley," Operating Systems A Design –Oriented Approach", Tata McGraw Hill edition, New Delhi,2002

Web References:

1. http://codex.cs.yale.edu/avi/os-book/OS9
2. http://fivedots.coe.psu.ac.th/~cj/os/slides/slide-ppt.html
3. http://www.wiley.com/college/silberschatz6e/0471417432/
4. http://engineeringppt.blogspot.in/2009/07/operating-system-concepts-8th-edition.html

BoS Chairman

Course Code: 16ITT45	Course Title: DATABASE MANAGEMENT SYSTEMS	
Core	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT34 Data Structures

Course Objectives

The course is intended to:

1. Design the entity-relationship diagrams
2. Build entity-relationship diagrams into relational tables
3. Analyze the database design methodology
4. Analyze the basic database storage structures and access techniques.
5. Build online transactions and control concurrency

Unit I - INTRODUCTION 9

Introduction – View of Data- Data Models- Database Users and Administrators- Database System Structure-Entity – Relationship Model-ER Diagram.

Unit II - RELATIONAL MODEL 9

Relational Model - Concepts – Keys – Integrity Constraints– The Relational Algebra - SQL- Basic Structure- DDL- DML- DCL- TCL- Embedded SQL- Dynamic SQL– Domain Constraints- Assertions-Triggers.

Unit III - RELATIONAL DATABASES DESIGN

Functional Dependencies-Decomposition- Desirable Properties of Decomposition- First Normal Form-Second Normal Form- BCNF-Third Normal Form-Fourth Normal Form.

Unit IV - INDEXING AND QUERYING 9

Indexing and Hashing – Basic Concepts- Ordered Indices, B+ Tree Index Files– Static Hashing-Dynamic Hashing. Query Processing – Overview- Measures of Query Cost- Selection Operation - Query Optimization Overview.

Unit V - TRANSACTION AND CONCURRENCY CONTROL 9

Transaction Concept- Simple Transaction Model-Transaction Atomicity and Durability- Transaction Isolation- Serializability- Lock Based Protocols-Timestamp Based Protocols-Validation Based Protocols.

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Course Outcomes

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

CO1: Design the entity-relationship diagrams to represent simple database application scenarios

CO2: Build relational tables into entity-relationship diagram, populate a relational database and formulate SQL queries on the data

CO3: Analyze database design methodology.

CO4: Analyze the basic database storage structures and access techniques: file and page organizations, indexing methods including B- tree, and hashing.

CO5: Build online transactions and control concurrency.

Text Book:

1. Silberschatz, Korth, Sudarshan, "Database System Concepts", 6th Edition, McGrawHill International Edition, New Delhi 2014.

Reference Books:

1. Date C.J., Kannan A, Swaminathan S, "An introduction to database systems", 8th Edition, Pearson Education, New Delhi, 2012.
2. Elmasri, R., Navathe, S.B., "Fundamentals of database systems", 6th Edition, Pearson Education, New Delhi, 2013.
3. Raghu Ramakrishnan, Johannes Gehrke. "Database Management Systems", 3rd Edition, McGrawHill International Edition, New Delhi 2013
4. Jefrey D.Ulman and Jenifer Widom, "A First Course in Database Systems", 3rd Edition, Prentice-Hall, New Delhi, 2012.

Web References:

1. www.codex.cs.yale.edu/avi/db-book/db6
2. www.db-book.com
3. http://highered.mheducation.com/sites/0073523321

BoS Chairman

Course Code: 16ITL41	Course Title: OPERATING SYSTEMS LABORATORY	
Core/Elective	L : T : P : C	0: 0 :4: 2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16GET26 C Programming

Course Objectives

The course is intended to:

1. Build the shell programs
2. Compare the performance of various CPU Scheduling Algorithm
3. Solve the process synchronization and deadlock.
4. Analyze the performance of the various page replacement algorithms
5. Develop file organization and disk scheduling strategies

LIST OF EXPERIMENTS

Implement the programs using C

1. Practice and Implement some Basic UNIX commands.
2. Practice some Shell commands, develop shell scripts and simulate a shell
3. Implement any two CPU scheduling algorithms, simulate and record the process state using SOsim
   a) FCFS
   b) SJF
   c) Priority
   d) Round Robin
4. Implement Bankers Algorithm for Dead Lock Avoidance
5. Implement Semaphore for Producer Consumer Problem
6. Implement any two of the following page replacement algorithms
   a) FIFO
   b) LRU
   c) LFU
7. Implement Paging memory management techniques
8. Implement any two of the following file organization Techniques
   a) Single level directory structure
   b) Two level directory structure
   c) Tree structure
   d) Acyclic graph structure

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9. Implement the following file allocation strategies
    a) Sequential
    b) Indexed
    c) Linked
10. Implement a few Disk Scheduling Algorithms

Course Outcomes

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

CO1: Build the shell programs
CO2: Compare the performance of various CPU Scheduling Algorithm
CO3: Solve the process synchronization and deadlock avoidance
CO4: Analyze the performance of the various page replacement algorithms
CO5: Develop the file organization and disk scheduling strategies

BoS Chairman

Course Code: 16ITL42	Course Title: DATABASE MANAGEMENT SYSTEMS LABORATORY	
Core	L : T : P : C	0: 0 :4: 2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented Programming using java

Course Objectives

The course is intended to:

1. Analyze DDL, DML and DCL statements to perform different operations
2. Design principles for logical design of databases
3. Apply PL/SQL blocks
4. Build a simple database system and demonstrate competence with the fundamental tasks

LIST OF EXPERIMENTS

(Experiments are to be carried out in Oracle/MySQL for RDBMS and MongoDB for NoSQL with required front end software)

1. Creating Database
   - Creating a database
   - Creating a table
   - Specifying relational data types
   - Specifying constraints
   - Creating indexes
2. Table and Record Handling
   - INSERT statement
   - Using SELECT and INSERT together
   - DELETE, UPDATE, TRUNCATE statements
   - DROP, ALTER statements
3. Retrieving Data from a Database
   - The SELECT statement
   - Using the WHERE clause
   - Using Logical Operators in the WHERE clause
   - Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING clause
   - Using Aggregate Functions
   - Combining Tables Using JOINS

BoS Chairman

- Sub queries

4. Database Management
    - Creating Views
    - Creating Column Aliases
    - Creating Database Users
    - Using GRANT and REVOKE

5. Write a program to implement stored procedures.
6. Write a program to implement functions.
7. Write a program to implement triggers.
8. Working with NoSQL Databases (MongoDB).
9. Application: Develop an application using experiments 1 to 4 (But not limited to following)
    - Library Information System
    - Students' Information System
    - Ticket Reservation System
    - Hotel Management System
    - Hospital Management System
    - Inventory Control
    - Retail Shop Management
    - Employee Information System
    - Payroll System

Course Outcomes

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

CO1: Analyze common SQL Statements including DDL, DML and DCL statements to perform different operations

CO2: Design principles for logical design of databases, including the E-R method and normalization approach

CO3: Apply PL/SQL blocks using Functions and Triggers

CO4: Build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS

BoS Chairman

Course Code: 16PSL41	Course Title: ETHICAL AND MORAL RESPONSIBILITY (Common to all B.E/B.Tech Programmes)	
Core	L : T : P : C	0 : 0 :2 :1
Type: PS	Total Contact Hours:	30 Hours

Course Objectives

The course is intended to:

1. Demonstrate the importance of ethical and moral responsibilities
2. Explain the fundamental aspects of ethics and morality
3. Analyze one's appropriate and inappropriate behaviors.
4. Illustrate code of conduct
5. Explain the importance of professional practices as a future employee/entrepreneur

Unit I - ETHICAL PRACTICES – IMPORTANCE

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

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

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

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.

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At least one lecture by senior people from Industries/Government organizations/reputed institutions to be conducted.

Course Outcomes

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

CO1: Demonstrate the importance of ethical and moral responsibilities
CO2: Explain the fundamental aspects of ethical practices
CO3: Analyze one's appropriate and inappropriate behaviors in various roles
CO4: Illustrate code of conduct of professional bodies
CO5: Explain the importance of professional practices as a future employee/entrepreneur

Course handouts (compiled by PS team, MCET)

1. Learner's workbook
2. Learner's journal
3. Reading material

Reference Books:

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

Sl. No.	Evaluation	Criterion	Total marks		Remarks
1	Continuous Evaluation	KT – Best out of 'n' tests SKT – Best out of 2 tests 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
			Total	- 75 marks	

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					Test
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 ESE.		

BoS Chairman

SEMESTER – V

Course Code: 16ITT51	Course Title: INFORMATION CODING TECHNIQUES	
Core	L : T : P : C	3 : 2 : 0 : 4
Type: Theory	Total Contact Hours:	75 Hours

Prerequisites: The student should have undergone the course:

- 16ITT31 Basic Communication Engineering

Course Objectives

The course is intended to:

1. Explain the fundamentals
2. Evaluate the text coding.
3. Compare the concepts of image coding.
4. Apply subband coding and wavelets.
5. Analyze audio and video coding techniques.

Unit I – INTRODUCTION **9+6**

Introduction to Information Theory – Average Information – Uniquely Decodable Codes – Prefix Codes – Kraft Mcmillan Inequality – Algorithmic Information Theory – Minimum Description Length Principle - Huffman Coding: Algorithm, Minimum Variance, Optimality, Length – Adaptive Huffman Coding: Encoding and Decoding Procedure – Applications of Huffman Coding.

Unit II - TEXT CODING **9+6**

Arithmetic Coding: Introduction-Coding a Sequence, Generating and Deciphering a Tag – Comparison of Huffman and Arithmetic Coding – Adaptive Arithmetic Coding – Applications – Dictionary Technique: Static Dictionary – Diagram Coding – Adaptive Dictionary – LZ Approach – LZW Algorithm: Encoding and Decoding.

Unit III - IMAGE CODING **6+6**

Lossless Compression: Introduction- JPEG Standards – Multiresolution Approaches – Progressive Image Transmission – Facsimile Encoding – Run Length Coding – Transform Coding: Introduction – Linear Transforms – KL Transform – DCT Transform – Quantization and Coding of Transform Coefficients – Application to Image Compression.

Unit IV - SUBBAND CODING AND WAVELETS **9+6**

Subband Coding: Introduction-Filters used in Subband Coding-Basic Subband Coding

BoS Chairman

Algorithm – Design of Filter Banks – Polyphase Decomposition – Bit Allocation – Application: G.722 – Wavelet Based Compression: Introduction – Wavelets – Multiresolution Analysis and the Scaling Function – Image Compression using Wavelets – EZW and SPHIT.

Unit V - AUDIO AND VIDEO CODING **12+6**

Audio Coding: Spectral Masking – Temporal Masking – Psychoacoustic Model – MPEG Audio Coding: L1, L2 and MP3 – Dolby AC3 – Speech Compression: Vocoders – LPC – CELP – Sinusoidal Coders - MELP – Wideband Speech Compression – Video Compression: Introduction, Motion Compensation – Video Signal Representation – H.261 – MPEG-4 Video Standards – H.263.

Course Outcomes

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

CO1: Explain the fundamentals of information coding theory.

CO2: Evaluate the arithmetic and dictionary coding.

CO3: Compare the concepts of image coding using lossless compression and transform coding.

CO4: Apply subband coding and wavelets in image compression.

CO5: Analyze various audio and video coding techniques and its effectiveness.

Text Book:

1. Khalid Sayood, "Introduction to Data Compression", Elsevier - Morgan Kaufmann, Fourth Edition, 2012.

Reference Books:

1. Simon Haykin, "Communication Systems", John Wiley & Sons, Inc., Fifth Edition 2009.
2. Fred Halsall, "Multimedia Communications, Applications Networks Protocols & Standards", Pearson education, 2008.
3. David Salomon, "Data Compression: The Complete Reference", Springer, Fourth Edition, 2011.
4. Ranjan Bose, Information Theory, Coding and Cryptography, McGraw-Hill Education, 2008.

Web References:

1. http://nptel.ac.in/courses/117101053/
2. https://github.com/gabrieldiego/tg/blob/master/ref/Introduction%20to%20Data%20Compression%20(4th%20Edition).pdf

BoS Chairman

Course Code: 16ITT52	Course Title: COMPILER ENGINEERING	
Core	L : T : P : C	3: 0 :2: 4
Type: Theory	Total Contact Hours:	75 Hours

Prerequisites: The student should have undergone the course:

- 16ITT32 Computer Organization
- 16ITT34 Data Structures

Course Objective

The course is intended to:

1. Explain the purpose of compiler.
2. Apply the efficient parser.
3. Examine the intermediate code creation.
4. Create an intermediate code.
5. Compare the machine independent optimization.

Unit I - INTRODUCTION TO COMPILERS & LEXICAL ANALYSIS 9

Phases of Compilation- Cousins of Compiler- Application of Compiler Technology- Lexical Analysis - Specification and Recognition of Tokens- Finite Automata- From Regular Expressions to Automata- Optimization of DFA-Based Pattern Matchers- Lexical Analyzer Generator.

Unit II - PARSER 9

Types of Grammar- Context Free Grammar- Writing a Grammar-Top Down Parsing- Bottom Up Parsing- LR Parsing(SLR,CLR, LALR)-Parser Generators.

Unit III - INTERMEDIATE CODE GENERATION 9

Variants of Syntax Trees- Three Address Code- Type Checking- Control Flow-Back Patching- Switch Statements- Stack Allocation of Space- Access to Non-Local Data on The Stack- Heap Management.

Unit IV - CODE GENERATION 9

Issues in the Design of a Code Generator-Target Language- Basic Blocks and Flow Graphs-Optimization of Basic Blocks-A Simple Code Generator-Peephole Optimization

Unit V - MACHINE INDEPENDENT OPTIMIZATIONS 9

The Principal Sources of Optimization-Data Flow Analysis-Constant Propagation-Partial Redundancy Elimination- Loops in Flow Graphs- Code-Scheduling Constraints- Basic Block Scheduling.

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LAB COMPONENT 30

1. Implementation of LEX & YACC Tool.
2. Implementation of Scanner phase of compiler.
3. Implementation of Parser phase of compiler.
4. Implementation of Semantic Analysis phase of compiler.
5. Implementation of Code Generation phase of compiler.

Course Outcomes

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

CO1: Explain the purpose of different phases of Compiler.
CO2: Apply the efficient parser for the given grammar.
CO3: Examine the creation of Intermediate Code.
CO4: Create a code for the given Intermediate Code.
CO5: Compare the different Optimization Techniques.

Text Book:

1. Alfred Aho, Monical S. Lam, Ravi Sethi, Jeffery D. Ullman, "Compilers Principles, Techniques and Tools", 2nd Edition, Pearson Publications, New Delhi 2014.

Reference Books:

1.Keith D. Cooper & Linda Torczon, "Engineering a Compiler", 2nd Edition, Elsevier Publications, 2012.
2.Dick Grune, Henri E.bal, Ceriel J.h. Jacobs, Keon G. Langendeon, "Modern Compiler Design", 2nd Edition,Wiley, New Delhi, 2012.
3.Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", McGraw Hill, New Delhi, 2005.
4.John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computation", 3rd Edition, Pearson Education, New Delhi, 2014.

Web References:

1. http://web.cs.wpi.edu/~kal/courses/compilers/project/index.html
2. https://www.tutorialspoint.com/compiler_design/

BoS Chairman

Course Code: 16ITT53	Course Title: PYTHON PROGRAMMING	
Core	L : T : P : C	3:0 :2 :4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16ITT35 Object Oriented programming using Java

Course Objectives

The course is intended to:

1. Build a console application.
2. Develop a data structure application.
3. Apply object oriented programming concepts.
4. Design data management application.
5. Create a web based application.

Unit I - INTRODUCTION TO PYTHON 9

Variables, Expressions and Statements – Functions - Case Study: Interface Design-Conditionals and Recursion - Fruitful Functions- Iteration.

Unit II - DATA STRUCTURES IN PYTHON 9

Strings - Case Study: Word Play – Lists – Dictionaries - Tuples-Case Study: Data Structure Selection - Files.

Unit III - OOPS CONCEPTS IN PYTHON 9

Classes and Objects - Classes and Functions - Classes and Methods – Inheritance - Tkinter: GUI - Buttons and Callbacks - Canvas Widgets-Coordinate Sequences - More Widgets - Packing Widgets - Menus and Callable – Binding.

Unit IV - MANAGING DATA IN PYTHON 9

Storing Data Using Python - Analyzing Data with Python - Managing Data using SQL - Migrating LendyDB to an SQL Database - Exploring Other Data Management Options.

Unit V - WEB APPLICATIONS IN PYTHON 9

Python on the Web - Web Programming with Python - Python and the Web – Using Python Across the Wire - Exploring Python's Frontiers: Drawing Pictures with Python - Doing Science with Python - Playing Games with Python - Integrating with Other Languages.

BoS Chairman

LAB COMPONENT **30**

1. Write a python program using variables, expressions & statements.
2. Create a python program using List, Tuple, and Dictionary.
3. Implement the File Handling operations in python.
4. Create a python program to demonstrate OOP'S concepts.
5. Design a GUI programming with Tkinter with database connection.
6. Develop a web application using web2py/Django framework.

Course Outcomes

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

CO1: Build a console application using variables, expressions & functions.
CO2: Develop an application using list, tuple and dictionary.
CO3:Apply object oriented programming concepts to develop console applications.
CO4: Design an application using Tkinter and database packages.
CO5: Create web based application using Model View Controller.

Text Books:

1. Allen Downey, "Think Python",2nd Edition, Green Tea Press, 2012 (Unit I,II,III).
2. Laura Cassell, Alan Gauld, "Python Projects", Wrox Publication, 2015 (Unit-IV,V).

Reference Books:

1. Jeffrey Elkner, Chris Meyers Allen Downey, "Learning with Python" , 4th Edition Dream Tech Press Publication,2015.
2. Mark Summerfield,"A Complete Introduction to the Python Language", 2nd Edition Addison-Wesley Professional,2014.
3. Ryan Mitchell, "Web Scraping with Python: Collecting Data from the Modern Web", O'Reilly Media, Inc, 2016.
4. Richard Lawson, "Web Scraping with Python", 1st Edition, Packet Publishing Limited, 2016.

Web References:

1. https://www.coursera.org/learn/python
2. https://www.fullstackpython.com/databases.html
3. http://fivedots.coe.psu.ac.th/~cj/os/slides/slide-ppt.html
4. http://www.w effbot.org/tkinterbook/tkinter-index.html

BoS Chairman

Course Code: 16ITT54	Course Title: COMPUTER NETWORKS	
Core	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT44 Operating Systems

Course Objectives

The course is intended to:

1. Explain the OSI and TCP/IP layers.
2. Identify the roles of data link control protocols.
3. Analyze the network layers working principles.
4. Analyze the transport layer functionalities.
5. Compare the application layer functionalities.

Unit I - INTRODUCTION 9

Data Communications – Networks - Network Types –Standards and Administration – Protocol Layering – The OSI Model – TCP/IP Protocol Suite - Transmission media - Guided Media - Unguided Media.

Unit II - DATA LINK LAYER 9

Link Layer Introduction – Addressing - Address Resolution Protocol - Block Coding – Cyclic Redundancy Check-Checksum- Data Link Control services - Stop and Wait Protocol – Go Back N ARQ - Selective Repeat ARQ.

Unit III - NETWORK LAYER 9

Network Layer Services-Packet Switching-Network Layer Performance - IPv4 Addresses –Forwarding of IP packets- Internet Protocol –IP Routing Option - ICMPv4- Distance Vector Routing-Link State Routing - IPv6 Protocols.

Unit IV - TRANSPORT LAYER 9

Transport Layer Services – Connectionless and Connection-Oriented Protocols - User Datagram Protocol – Transmission Control Protocol - TCP Services – TCP Features – Segment – TCP Connection Establishment and Termination – TCP Congestion Control.

Unit V - APPLICATION LAYER 9

Client Server Programming - World Wide Web - Hyper Text Transfer Protocols - FTP – Electronic Mail - Telnet – Secure Shell - Domain Name Space.

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Course Outcomes

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

CO1: Explain the layers of OSI and TCP/IP networks.
CO2: Identify the solution for the error control and flow control problems.
CO3: Analyze the working principles of IP layer and its routing algorithms.
CO4: Analyze the functionalities of transport layer protocols and its congestion control mechanism.
CO5: Compare the functionalities of application layer protocols.

Text Book:

1. Behrouz A. Forouzan, "Data communication and Networking", 5th Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi 2014.

Reference Books:

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 6th Edition, Pearson Education, New Delhi 2012.
2. Andrew S. Tanenbaum, "Computer Networks", 5th Edition. Prentice Hall, New Delhi, 2010.
3. William Stallings, "Data and Computer Communication", 10th Edition, Pearson Education, New Delhi 2013.

Web References:

1. http://highered.mheducation.com/sites/0073376221/student_view0/index.html
2. http://nptel.ac.in/courses/106105081/1
3. http://www-net.cs.umass.edu/kurose-ross-ppt-6e/
4. http://iiscs.wssu.edu/drupal/node/4643

BoS Chairman

Course Code: 16ITT55	Course Title: WEB TECHNOLOGY	
Core	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT35 Object Oriented Programming using Java

Course Objectives

The course is intended to:

1. Design a static webpage.
2. Apply the CSS concepts.
3. Develop the DHTML pages.
4. Design a webpage.
5. Create a rich internet application.

Unit I - HTML 9

Introduction to Internet- HTML: Basics - Linking- Images- Text & Block Level formatting- Lists- Tables- Forms – Frames- Page Structure Elements-Media-Graphics.

Unit II - CSS 9

Inline, Embedded and External Style Sheets- Positioning Elements- Backgrounds- Box model and Text Flow- Colors- Shadows (Text and Box)- Image Borders- Transformations and Transitions- Multi column layout.

Unit III - JAVASCRIPT 9

Operators- Control Statements- Functions- Arrays- Objects: (Math, String, Boolean, Number, Date Document)

Unit IV - DOM 9

Introduction to DOM- Modeling a document- Traversing and Modifying a DOM Tree- DOM Collections- Dynamic Styles- Event Handling- Database Access using JSP- AngularJS.

Unit V - XML 9

XML Basics- XML Namespaces- DTD's –XML Schema - XSLT- RIAs with Ajax- XML Http Request Object –XML and DOM- Full Scale Ajax Enabled Application.

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Course Outcomes

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

CO1: Design a static webpage by applying HTML elements.
CO2: Apply CSS concepts for designing HTML web pages.
CO3: Develop DHTML pages by using JavaScript, JQuery with DOM events
CO4: Design a webpage with database connectivity using Java
CO5: Create rich internet application using XML and AJAX.

Text Book:

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, "Internet & World Wide Web: How to Program", 5th Edition, PH Professional Business, 2012.

Reference Books:

1. Thomas Powell, "The Complete Reference HTML and CSS", 5th Edition, Tata McGraw Hill, 2010.
2. Thomas Powell, Fritz Schneider, "The Complete Reference JavaScript 2.0", 3rd Edition, Tata McGraw Hill, 2012.

Web References:

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.html.com
4. www.htmlref.com

BoS Chairman

Course Code: 16ITL51	Course Title: COMPUTER NETWORKS LABORATORY	
Core	L : T : P : C	0: 0: 4: 2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented Programming using Java

Course Objectives

The course is intended to:

1. Analyze packet header format and network traffic.
2. Apply knowledge of the TCP/IP layering model.
3. Design the networking topology for a given problem.

LIST OF EXPERIMENTS

A. Traffic analysis using Wireshark and command line utility

1. Network trouble-shooting and performance monitoring using ipconfig, ping, netstat commands.
2. Visualization of packet flow using Wireshark.
3. Interpret the working principles of address resolution protocol using Wireshark.
4. Examine IP traffic and its routing options using Wireshark.
5. Classify the internet control message protocol messages using Wireshark.
6. Analyze the TCP connection establishment and termination using Wireshark.

B. Implement the following using JAVA

7. Implementation of socket programming using TCP sockets.

C. Topology simulate using GNS3, Riverbed and NS-2

8. Configure the LAN for generating data traffic using GNS3.
9. Configure a topology and analyze traffic using riverbed.
10. Experiment with NS2 to configure LAN for generating data traffic.

BoS Chairman

Course Outcomes

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

CO1: Analyze packet header format and network traffic using Wireshark and command line utility.
CO2: Apply knowledge of the TCP/IP layering model to debug networking problems.
CO3: Design the networking topology for a given problem using simulators.

BoS Chairman

Course Code: 16ITL52	Course Title: WEB TECHNOLOGY LABORATORY	
Core	L : T : P : C	0 :0 :4 :2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented Programming using Java

Course Objectives

The course is intended to:

1. Apply the HTML elements.
2. Design the Web pages.
3. Construct the DHTML pages.
4. Organize the content of a valid XML document.
5. Develop rich internet application.

LIST OF EXPERIMENTS

Develop a mini project for an application by implementing the below listed experiments

1. Develop a webpage by applying HTML Formatting Tags, Lists, Tables, Images, Frames, Forms, Media, and Graphics.
2. Apply Layouts and CSS effects to the web page.
3. Apply JavaScript concepts to validate form fields in web page.
4. Design Drop down lists and navigation bar using JQuery.
5. Programs using DOM.
6. Programs using Angular JS.
7. Introduce XML to store and transfer values to HTML
   a) XML with CSS
   b) XSLT
   c) XML Schema
8. Programs using JSON.
9. Programs using AJAX.
10. Database connectivity with JSP page.

BoS Chairman

Course Outcomes

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

CO1: Apply HTML elements for designing webpages.
CO2: Design the Web pages using CSS methods and properties.
CO3: Construct DHTML pages using the technologies Javascript, DOM, JQuery.
CO4: Organize the content of a valid XML document using XSLT and CSS.
CO5: Develop rich internet application using JSON and AJAX.

BoS Chairman

Course Code: 16PSL51	Course Title: TEAMNESS AND INTERPERSONAL SKILLS (Common to all B.E/B.Tech Programmes)	
General	L : T : P : C	0 : 0 : 2 :1
Type: PS	Total Contact Hours:	30 Hours

Course Objectives

The course is intended to:

1. Realize attitudinal, behavioral and emotional aspects of self.
2. Choose to learn continuously about self and be in harmony with self.
3. Interpret others' preferences, values, roles & contexts.
4. Identify barriers to harmonious relationships.
5. Discover 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.

BoS Chairman

Course Outcomes

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

CO1: Realize the attitudinal, behavioral and emotional aspects of self.

CO2: Choose to learn continuously about self and be in harmony with self.

CO3: Interpret others' preferences, values, roles & contexts and be in harmony with others.

CO4: Identify barriers to harmonious relationships and derive ways to handle them.

CO5: Discover collaboratively as a team to deliver expected outcomes.

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.		

BoS Chairman

SEMESTER VI

Course Code: 16ITT61	Course Title: DATA MINING AND ANALYTICS	
Core	L : T : P : C	3: 0: 2: 4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16ITT45 Database Management Systems

Course Objectives

The course is intended to:

1. Identify the types of data to be pre-processed.
2. Examine the prediction accuracy.
3. Categorize the kinds of discovered patterns.
4. Identify the requirements of a big data analytics system.
5. Analyze the dataset in parallel across multiple machines.

Unit I - INTRODUCTION TO DATA MINING 9

Different Kinds of Data – Kinds of Patterns Mined – Technologies Used – Kinds of Applications – Issues in Data Mining – Attribute Types – Data Visualization. Data Preprocessing: Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data Discretization.

Unit II - CLASSIFICATION 9

Basic Concepts: Decision Tree Induction – Bayes Classification Methods – Rule Based Classification – Model Evaluation and Selection – Techniques to Improve Classification Accuracy. Advanced Methods: Classification by Back propagation – Support Vector Machines – Lazy Learners.

Unit III - ASSOCIATION AND CLUSTERING 9

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods. Cluster Analysis: Partitioning Methods – Hierarchical Methods – Density Based Methods.

Unit IV - INTRODUCTION TO BIG DATA AND HADOOP 9

Introduction to Big Data: Classification of Digital Data – Characteristics, Evolution and Definition of Big data - Challenges with Big Data – Traditional Business Intelligence (BI) vs Big Data – The Big Data Technology Landscape: Hadoop. Introduction to Hadoop: RDBMS versus Hadoop – Distributed Computing Challenges - Hadoop Overview – Hadoop Distributors.

Unit V - HDFS and MAPREDUCE 9

Hadoop Distributed File System – Processing Data with Hadoop – Managing Resources and Applications with YARN. Introduction to MapReduce Programming: Introduction - Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.

BoS Chairman

LAB COMPONENT 30

1. Evaluate the performance of J48 classification algorithm using RapidMiner tool on the given data set.
2. Experiment with weka tool for the given data set using apriori association algorithm.
3. Analyze the given data set using K-Means clustering algorithm by R Programming.
4. Install and Configure the Hadoop environment.
5. Implement MapReduce Program to count the number of occurrences of each word in given data set.

Course Outcomes

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

CO1: Identify the types of data to be pre-processed for the given dataset using the preprocessing technique.
CO2: Examine the prediction accuracy using different classification algorithms for the real world data.
CO3: Categorize the kinds of patterns that are discovered by association rule mining and clustering to the dataset.
CO4: Identify the requirements of a big data analytics system for an organization.
CO5: Analyze the dataset in parallel across multiple machines using Hadoop and MapReduce.

Text Books:

1. Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining: Concepts and Techniques", 3rd Edition, Elsevier, 2012 (Unit I, II, III).
2. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", 1st Edition, Wiley India, 2015 (Unit IV, V).

Reference Books:

1. Jure Leskovec, Anand Rajaraman, Jeffery David Ullman, "Mining of Massive Datasets", 2nd Edition, Cambridge University Press, 2014.
2. Ian H.Witten, Eibe Frank, Mark A.Hall, "Data Mining: Practical Machine Learning Tools and Techniques", 3rd Edition, Elsevier, 2011.
3. EMC Education Services, "Data Science and Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2015.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons 2013.

Web References:

1. http://www.cs.waikato.ac.nz/ml/weka/documentation.html
2. https://cran.r-project.org/manuals.html
3. https://archive.ics.uci.edu/ml/index.html

BoS Chairman

Course Code: 16ITT62	Course Title: CRYPTOGRAPHY AND NETWORK SECURITY	
Core	L : T : P : C	3:0:2:4
Type: Theory	Total Contact Hours:	75 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Examine the strength of classical and modern cipher mechanisms.
2. Identify various number theory functions.
3. Select the various authentication techniques.
4. Analyze wired and wireless security mechanism.
5. Choose the suitable internet security standards.

Unit I - SYMMETRIC KEY CRYPTOGRAPHY 9

OSI Security Architecture - Classical Encryption techniques - Block Cipher Principles – Data Encryption Standard – Modes of Operation – AES Cipher – Triple DES.

Unit II - ASYMMETRIC KEY CRYPTOGRAPHY 9

Introduction to Number Theory – Public Key Cryptography- RSA – Elliptic Curve Cryptography - Elgamal Cryptosystem - Key Management- Diffie-Hellman Key Exchange Algorithm.

Unit III - DATA, USER AND SERVER AUTHENTICATION 9

Message Authentication Code – Hash Functions – Security of Hash Functions and MACs – MD5 - Secure Hash Algorithm – HMAC – Digital Signature Standard- Remote User Authentication- Kerberos – X.509 Authentication Service.

Unit IV – WIRED AND WIRELESS SECURITY 9

Web Security – Secure Socket Layer- Transport Layer Security – HTTPS – SSH - IEEE 802.11i Wireless LAN Security- Wireless Transport Layer Security- WAP End-to-End Security.

Unit V - EMAIL APPLICATION INTERNET SECURITY 9

Pretty Good Privacy- S/MIME – Domain Keys Identified Mail - IP Security Overview- IP Security Policy - Internet Key Exchange - Overview of Intrusion Detection System- Overview of Cloud Computing and its Security.

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LAB COMPONENTS 30

1. Implementation of Classical Encryption Techniques.
2. Implementation of Simplified DES.
3. Study of Cipher Mechanisms using Cryptool.
4. Implementation of RSA for confidentiality and authentication.
5. Implementation of Diffie-Hellman Key Exchange Algorithm.
6. Implementation of Digital Signature Generation & Verification.

Course Outcomes

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

CO1: Examine the strength of classical and modern cipher mechanisms using various cryptanalytic techniques.
CO2: Identify various mathematical functions used in public key encryption techniques for encryption of data.
CO3: Select the techniques for signature generation and verification of web application documents using authentication functions.
CO4: Analyze various security mechanisms of Wired and Wireless devices based on its infrastructure.
CO5: Choose the suitable security standards for an Internet and cloud based applications.

Text Book:

1. William Stallings, "Cryptography and Network Security: Principles and Practices", 6th Edition, Pearson Education, 2014.

Reference Books:

1. Behrouz A Forouzan and Debdeep Mukhopadhyay, "Cryptography and Network Security", 2nd Edition, Tata McGraw Hill Ltd. 2010.
2. Atul Kahate, "Cryptography and Network Security", 3rd Edition, Tata McGraw Hill Ltd, 2013.
3. Douglas R. Stinson, "Cryptography: Theory and Practice", 3rd Edition, CRC Publishers, 2005.
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, "Handbook of Applied Cryptography", CRC Press, 2010.

Web References:

1. https://en.wikipedia.org/wiki/RSA_(cryptosystem)
2. https://en.wikipedia.org/wiki/Digital_Signature_Algorithm
3. http://nptel.ac.in/courses/106105031/
4. http://williamstallings.com/Cryptography/%20Video%20References
5. https://www.coursera.org/learn/crypto

BoS Chairman

Course Code: 16ITT63	Course Title: MOBILE APPLICATION DEVELOPMENT	
Core	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT35 Object Oriented programming using Java

Course Objectives

The course is intended to:

1. Explain mobile apps development platform.
2. Design android mobile apps.
3. Develop mobile app with database connection.
4. Construct the sensors and location services mobile app.
5. Build testing on mobile apps.

Unit I - GETTING STARTED WITH MOBILITY 9

Introduction-Mobility Panorama-Mobile Platforms-App Development Approaches-Andriod Overview- Setting up the Mobile App Development Environment Along with an Emulator-Traversing an Android App Project Structure-Logical Components of an Android App-Android Tool Repository.

Unit II - APP USER INTERFACE DESIGN 9

Introduction- Activity- UI Resources- UI Elements and Events-Interaction Among Activities-Fragments-Action Bar-App Functionality–Threads- Async Task-Services-Notifications- Intents and Intent Resolution-Broadcast Receivers-Telephony and SMS.

Unit III - DATA ACCESS AND GRAPHICS AND ANIMATION 9

Introduction- Flat Files- Shared Preferences-Mobile Databases Such as SQLite Relational Data-Data Sharing Across Apps- Enterprise Data Access (Via Internet/Intranet)-Graphics and Animation-Android Graphics-Android Animation.

Unit IV - MULTIMEDIA AND LOCATION SERVICES 9

Introduction-Audio,Video and Images-Playback,Capture and Storage- Location Services and Maps-Introduction-Goggle Play Services-Location Services-Maps Sensors-Introduction-Sensors in Android-Motion Sensors-Position Sensors-Environment Sensors.

Unit V - TESTING MOBILE APPS 9

Debugging Mobile Apps-White Box Testing-Black Box Testing- Test Automation of

BoS Chairman

Mobile Apps- Junit for Android-Robotium- Versioning- Signing and Packaging Mobile Apps- Distributing Apps on Mobile Market Place.

Course Outcomes

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

CO1: Explain the mobile apps development platform using android studio for apps development.
CO2: Design mobile apps using android as development platform with key focus on user experience design, native data handling and background tasks and notifications.
CO3: Develop mobile app with database connection using SQLite databases.
CO4: Construct mobile app using sensors and location services.
CO5: Build testing on mobile apps using test cases

Text Book:

1. Anubhav Pradhan, Anil V Deshpande,"Composing Mobile Apps", First Edition, Wiley Publication, 2014.

Reference Books:

1. Vedat Coskun, Kerem Ok, Busra Ozdenizci, "Professional NFC Application Development for Android",First Edition , Wiley Publication ,2013.
2. Greg Milette, Adam Stroud ,"Professional Android Sensor Programming",First Edition, Wiley Publication,2012.
3. Greg Nudelman, "Android Design Patterns: Interaction Design Solutions for Developers", First Edition , Wiley Publication,2013.

Web References:

1. https://developer.android.com/training/basics/firstapp/index.html
2. https://www.lynda.com/Android-tutorials/Android-App-Development-Essentials-Create-Your-First-App/518053-2.html
3. https://www.simplifiedcoding.net/android-application-development-tutorial-from-scratch/

BoS Chairman

Course Code: 16ITT64	Course Title: OBJECT ORIENTED ANALYSIS AND DESIGN	
Core	L : T : P : C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Construct the requirement specification document.
2. Apply the structural modeling tool.
3. Classify use cases into object oriented software realizations.
4. Develop the advanced behavioral model.
5. Formulate the patterns and framework.

Unit I - ANALYSIS 9

Overview of Analysis: Problem Statement – Object Modeling – Dynamic Modeling – Functional Modeling – An Overview of the UML. Case Study: ATM System.

Unit II - STRUCTURAL MODELING 9

Classes – Relationships – Notes, Stereotypes-Tagged Values- Constraints - Class Diagrams – Advanced Classes – Advanced Relationships – Interfaces, Types, And Roles – Packages – Instances - Object Diagrams. Case Study: Static Model For ATM System.

Unit III - USE CASE AND BASIC BEHAVIORAL MODELING 9

Interactions – Use Cases – Use Case Diagrams - Interaction Diagrams – Activity Diagrams. Case Study: Interaction Model for Online Registration System.

Unit IV - ADVANCED BEHAVIORAL MODELING 9

Events and Signals - State Machines – Processes and Threads - Modeling Inter Process Communication – Time and Space - Modeling Timing Constraints and Distribution of Objects – State Chart Diagrams - Case Study: Modeling Interprocess Communication.

Unit V - ARCHITECTURAL MODELING 9

Artifacts –Deployment – Collaborations – Patterns and Frameworks - Artifact

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Diagrams – Deployment Diagrams – Case Study: Modeling a Client/Server System-Systems and Models.

Course Outcomes

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

CO1: Construct the requirement specification document for a specific software inline with the standard formats.
CO2: Apply the structural modeling tool for the construction of advanced class diagram with the appropriate notations.
CO3: Classify use cases into object oriented software realizations through UML tools for the real time applications.
CO4: Develop the advanced behavioral model for specific application using state chart diagrams.
CO5: Formulate the patterns and framework for the selected software.

Text Books:

1. James Rumbaugh, Michael Blaha, William Premeralani, Frederick Eddy and William Lorenson, "Object-Oriented Modeling and Design", Pearson Education, 2002 (Unit – I).
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide",2nd Edition, Pearson Education, 2015(Unit II,III,IV,V)

Reference Books:

1. Martin Fowler, "UML Distilled", 3rd Edition, Pearson Education, 2008.
2. Grady Booch, "Object Oriented Analysis and Design with Applications", 3rd Edition, Addison Wesley, New Delhi, 2009.

Web References:

1. http://c2.com/cgi-bin/wiki?CategoryPattern
2. http://www.nptel.ac.in/courses/122105022/27
3. http://www.creativeworld9.com/2011/02/study-videos-of-object-oriented_24.html

BoS Chairman

Course Code: 16ITL61	Course Title: MOBILE APPLICATION DEVELOPMENT LABORATORY	
Core	L : T : P : C	0:0:4:2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented programming using Java

Course Objectives

The course is intended to:

1. Design a mobile app.
2. Construct the multiple activities.
3. Develop the user Interfaces design.

LIST OF EXPERIMENTS

Develop a mobile application by implementing the below listed experiments

1. Install the Android SDK and developer tools and build a test project to confirm that those tools are properly installed and configured.
2. Write a program using a Table Layout for our restaurant data entry form, add a set of radio buttons to represent the type of restaurant.
3. Write a program using activity class to show different events.
4. Write a program to send user from one application to another. (For example redirection to map)
5. Write a program to play audio files.
6. Write a program to play video files.
7. Write a program to capture image using built in camera.
8. Write a program to send SMS.
9. Write a program to convert text to speech.
10. Write a program to call a number.

Course Outcomes

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

CO1: Design mobile app using android studio
CO2: Construct multiple activities in mobile app.
CO3: Develop user Interfaces for the Android platform.

BoS Chairman

Course Code: 16ITL62	Course Title: CASE TOOLS LABORATORY	
Core	L : T : P : C	0 : 0 : 4 : 2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Develop the software requirements analysis.
2. Apply the UML modeling tool.
3. Predict the advanced UML features.
4. Construct the user interface design.

LIST OF EXPERIMENTS

For a specific application, implement the below listed experiments

1. Develop a problem statement and IEEE standard SRS document.
2. Manage the test cases for selected requirements using test link tool
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identity the conceptual classes and develop a domain model with UML Class diagram.
6. Draw UML Advanced Class diagram.
7. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
8. Draw the State Chart diagram.
9. Draw UML Deployment Diagram.
10. Implement the user interface design with suitable front and backend connectivity.

Course Outcomes

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

CO1: Develop the requirements analysis for a software project and fabricate requirement specifications document.

CO2: Apply the UML modeling tool for the construction of models and expressing the appropriate notation associated with each model.

CO3: Predict the advanced UML features for the basic specification model.

CO4: Construct the User Interface for designed models using appropriate software specification.

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Course Code: 16PSL61	Course Title: CAMPUS TO CORPORATE (Common to all B.E/B.Tech Programmes)	
Core	L : T : P : C	0: 0 : 2 : 1
Type: PS	Total Contact Hours:	30 Hours

Course Objectives

The course is intended to:

1. Exhibit gratitude and social responsibility.
2. Infer various business environments.
3. Explain the transition from a campus mindset to corporate mindset.
4. Organize to adapt 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.

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

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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).

Course Outcomes

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

CO1: Exhibit gratitude and social responsibility.
CO2: Infer various business environments – industry & function wise.
CO3: Explain the transition from a campus mindset to corporate mindset.
CO4: Organize to adapt to the future work culture.
CO5: Choose to be presentable and agile.

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

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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.
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

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SEMESTER – VII

Course Code: 16ITT71	Course Title: INTERNET OF THINGS	
Core	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT42 Microprocessor and Microcontrollers
- 16ITT61 Data Mining and Analytics

Course Objectives

The course is intended to:

1. Recognize various levels and Domains in IoT.
2. Compare the Architectural Overview of IoT.
3. Develop a portable IoT application.
4. Design an IoT application using Raspberry pi board.
5. Construct a real time IoT application.

Unit I – INTRODUCTION TO INTERNET OF THINGS 9

Introduction-Physical Design of IoT- Logical Design of IoT - IoT Enabling Technologies-IoT Levels –Domain Specific IoT: Home Automation-Cities-Environment-Energy-Retail-Logistics-Agriculture-Industry-Health & Life Style.

Unit II – IoT AND MACHINE TO MACHINE (M2M) 9

Introduction to IoT and M2M– SDN and NFV for IoT-IoT Systems Management with NETCONF-YANG: Need for IoT System Management-SNMP-IoT System Management with NETCONF-YANG.

Unit III - IoT DESIGN METHODOLOGY 9

IoT Design Methodology -IoT System Logical Design using Python: Introduction-Python Data Types and Data Structures-Control Flow-Functions-Modules-Packages-File Handling-Date/Time Operations-Classes-Python Packages for IoT.

Unit IV – IoT PHYSICAL DEVICES- Raspberry Pi 9

Basic Building Blocks- Raspberry Pi-About the Board- Linux on Raspberry pi-Interfaces-Programming Raspberry pi with Python-IoT Devices: pcDuino-BeagleBoneBlack-Cubieboard- Introduction to Cloud Storage Model and Communication APIs-IoT Design Case Studies on Home Automation.

Unit V – DATA ANALYTICS FOR IoT 9

Introduction-Apache Hadoop-Using Hadoop Mapreduce for Batch Data Analytics-Apache Oozie- ApacheSpark-Apache Strom-Using Apache Strom for Real-Time Data Anaytics.

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Course Outcomes

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

CO1: Recognize various levels and Domains in IoT for application such as home and Industry automation.
CO2: Compare the Architectural Overview of IoT between M2M and IoT.
CO3: Develop a portable IoT application using python programming.
CO4: Design an IoT application using Raspberry pi board for a real time scenario.
CO5: Construct a real time IoT application and connect to the cloud.

Text Book:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.

Reference Books:

1. Adrian Mcewen, Hakin Cassimally, "Designing The Internet of Things",Wiley publications, 2015.
2. Oliver Hersent ,David Boswarthick , Omar Elloumi , "The Internet of Things: Key Applications and Protocols", Wiley publications, 2015.
3. Cuno Pfister , "Getting Started with the Internet of Things", First Edition, Shroff; 2011.

Web References:

1. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
2. https://www.coursera.org/specializations/internet-of-things
3. https://onlinecourses.nptel.ac.in/noc17_cs22/preview

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Course Code: 16ITT72	Course Title: CLOUD COMPUTING	
Core	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Compare the various virtualization techniques.
2. Inspect the internal functionality of virtual machines.
3. Classify the different cloud services.
4. Classify the technology to design storage space.
5. Identify the fundamental aspects of cloud.

Unit I - INTRODUCTION 9

Introduction to Virtual Machines: Computer Architecture - Virtual Machines Basics – Process Virtual Machines - System Virtual Machines – Introduction to Cloud Computing – Cloud Characteristics - Cloud Deployment Models: - Public, Community, Private and Hybrid clouds – Hypervisor – Virtual Machine Monitor.

Unit II – PROCESS VIRTUAL MACHINES 9

Components of server virtualization- Virtual Machine Implementation – Compatibility – State Mapping – Memory architecture Emulation – Instruction Emulation – Exception Emulation – Operating System Emulation – Code Cache Management – System Environment.

Unit III - SaaS, PaaS AND IaaS 9

Cloud Computing Services: Software as a Service - Understanding SaaS and OpenSaaS Solutions - Understanding SOA - Platform as a Service – IT Evolution Leading to the Cloud – Benefits and Disadvantages of PaaS Solutions - Infrastructure as a Service – Understanding IaaS – System and Storage Redundancy – Advantages of IaaS Solutions.

Unit IV – CLOUD DATA STORAGE AND SERVICES 9

Overview – The Basics – Storage as a Service – Providers – Security – Reliability – Advantages – Cloud Storage Providers:- Amazon Simple Storage Service (S3) – Nirvanix Google Bigtable Datastore – MobileMe – Live Mesh – Standard:- Application – Client – Infrastructure –Networks and services in the cloud.

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Unit V – CLOUD APPLICATION DEVELOPMENT 9

Google:- Payment - Force.com and Google - Google Gears - Microsoft:- Live Services - Microsoft SQL Services – Microsoft .NET Services - Microsoft SharePoint Services and Dynamics CRM Services – Development:- Google App Engine – Salesforce.com - Microsoft Windows Azure.

Course Outcomes

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

CO1: Compare the various virtualization techniques in cloud computing platform.
CO2: Inspect the internal functionality of virtual machines in organization.
CO3: Classify the different services offered by cloud.
CO4: Classify the roles of technology to design a storage space.
CO5: Identify the fundamental aspects to develop an application in cloud.

Text Books:

1. Jim E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Morgan Kaufmann, 2013 (Unit I,II)
2. Anthony T .Velte, Toby J.Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw Hill Edition, Fourth Reprint, 2014 (Unit III,IV, V).

Reference Books:

1. Kris Jamsa, "Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and more", Jones & Bartlett Learning Company LLC, 2013.
2. Huseni Saboowala, Muhammad Abid, Sudhir Modali, "Designing Networks and Services for the Cloud: Delivering business-grade cloud applications and services" Cisco Press, 2013.

Web References:

1. https://www.edx.org/course/introduction-cloud-computing-ieeex-cloudintro-x-1
2. https://cloudacademy.com/google/developing-solutions-for-google-cloud-platform-with-app-engine-course/
3. https://www.coursera.org/learn/cloud-computing
4. https://cloud.google.com/sql/docs/
5. https://cloud.google.com/datastore/docs/
6. https://cloud.google.com/appengine/docs

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Course Code: 16CET73	Course Title: ENVIRONMENTAL STUDIES (Common to all B.E/B.Tech Programmes)	
Core	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

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

Unit I - MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES 9

Definition, scope and importance; 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.

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 ;

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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 students will be able to:

CO1: Extend the multidisciplinary nature of environmental studies.
CO2: Explain the importance of ecosystem and biodiversity.
CO3: Identify the causes and propose suitable methods of control for various types of environmental pollution.
CO4: Identify the importance of environmental protection in social and global context.
CO5: Compare the relationship between environment and human beings.

Text Books:

1. Benny Joseph, "Environmental Studies", Tata McGraw Hill, New Delhi, 2006.
2. Mackenzie Davis and Susan Masten, "Principles of environmental engineering and science", Mc-Graw Hill, 3rd 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, Mumbai, 2001.
3. Rajagopalan. R, "Environmental Studies - From Crisis to Cure", Oxford University Press, 2005.

Web Reference:

1. http://nptel.ac.in/courses/122102006

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Course Code: 16ITL71	Course Title: CLOUD COMPUTING LABORATORY	
Core	L : T : P : C	0:0:4:2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented programming using Java

Course Objectives

The course is intended to:

1. Apply the tool kits.
2. Develop the web services/Applications.
3. Construct virtual machines.
4. Design the systems, protocols and mechanisms.

LIST OF EXPERIMENTS

1. Identify the procedure to run the virtual machine of different configuration and examine how many virtual machines can be utilized at particular time using Eucalyptus or OpenNebula or OpenStack.
2. Construct virtual block in virtual machine and check whether it holds the data even after the release of the virtual machine using Eucalyptus or OpenNebula or OpenStack.
3. Write a program to perform the migration of virtual machine based on the load from one node to the other using Eucalyptus or OpenNebula or OpenStack.
4. Write a program to create a datacenter with one host and run one cloudlet on it using cloudsim toolkit.
5. Develop a program to create two datacenters with one host and run two cloudlets on them using cloudsim toolkit.
6. Demonstrate how to pause and resume the simulation, and create simulation entities dynamically in cloudsim toolkit.
7. Create simulation entities in run-time using a globar manager entity (GlobalBroker) using cloudsim toolkit.
8. Implement a MapReduce program to count the occurrence of each word from the file.
9. Demonstration of connecting to and retrieving data from the Google Cloud Monitoring API.
10. Develop a Web Service for dictionary application using web 2.0.

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Course Outcomes

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

CO1: Apply the tool kits for cloud environment.
CO2: Develop the web services/Applications in cloud framework.
CO3: Construct virtual machines to run in different configuration.
CO4: Design the systems, protocols and mechanisms to support cloud computing.

Web References:

1. https://cloud.google.com/appengine/docs/java/samples
2. http://www.cloudbus.org/cloudsim/examples.html

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Course Code: 16ITL72	Course Title: DISTRIBUTED COMPONENT LABORATORY	
Core	L : T : P : C	0:0:4:2
Type: Practical	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented Programming using Java
- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Design client/server communication.
2. Propose SUN-RPC & Microsoft RPC in an application.
3. Compile distributed computing.
4. Create a distributed Computing environment.

LIST OF EXPERIMENTS

1. IPC with Socket Programming using UDP.
2. IPC with Socket Programming using TCP.
3. RPC Programming with SUN-RPC .
4. RPC Programming with Microsoft RPC.
5. Distributed Object Computing with Java RMI.
6. Distributed Programming with Java Beans.
7. Distributed Programming with EJB.
8. Distributed Object Computing with Microsoft COM.
9. Distributed Object Computing with Microsoft DCOM.
10. Mini Project.

Course Outcomes

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

CO1: Design client/server communication using sockets in different platform.
CO2: Propose SUN-RPC & Microsoft RPC in an application for remote procedure call.
CO3: Compile distributed computing using Java RMI, Java Beans & EJB.
CO4: Create a distributed Computing environment using COM and DCOM.

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PROFESSIONAL ELECTIVES

Course Code: 16ITE01	Course Title: MOBILE COMMUNICATION	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT31 Basic Communication Engineering

Course Objectives

The course is intended to:

1. Comprehend the elementary concepts of communication systems.
2. Understand about cellular and modern wireless systems.
3. Outline the emerging mobile computing ideas and best practices.
4. Realize the routing mechanism of mobile networks.
5. Recognize the necessary concepts in Mobility.

Unit I WIRELESS TRANSMISSION AND MEDIUM ACCESS CONTROL 9

Frequencies for Radio Transmission - Antennas – Signal Propagation – Multiplexing – Modulation – Media Access Control Techniques: SDMA, FDMA, TDMA and CDMA-Comparison of S/F/T/CDMA – Spread Spectrum Techniques.

Unit II MOBILE COMMUNICATION SYSTEMS 9

Introduction to Cellular Systems – Frequency Reuse and Management – Handoff – Capacity Improvement – Channel Management – Location Management – Interference in Mobile Networks. Generation of Mobile Communication- GSM, GPRS, UMTS, LTE.

Unit III MOBILE IP LAYER 9

Mobile IP Packet Delivery – Agent Discovery – Registration, Tunneling and Encapsulation – Optimization – Reverse Tunneling – DHCP – Mobile Adhoc Networks: Routing-Destination Sequenced Distance Vector Routing (DSDV) – Dynamic Source Routing (DSR) – Alternative Metrics.

Unit IV MOBILE TRANSPORT LAYER 9

Traditional TCP – Congestion control – Slow start – Fast Retransmit/Fast Recovery – TCP Improvements: Indirect TCP- Snooping TCP-Mobile TCP-Transmission / Timeout Freezing – Selective Retransmission- Transaction Oriented TCP.

Unit V SUPPORT FOR MOBILITY 9

Mobile File Systems- Architecture of Mobile Operating System- Mobile Databases-Mobile Middleware-Wireless Application Protocol- Security in Mobile Computing.

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Course Outcomes

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

CO1: Comprehend the elementary concepts of communication systems using wireless transmission schemes.

CO2: Understand about cellular and modern wireless systems using various Mobile communication technologies.

CO3: Outline the emerging mobile computing ideas and best practices with Mobile IP and routing algorithms in mobile ADHOC network.

CO4: Realize the routing mechanism of mobile networks by comparing Mobile TCP with Traditional TCP.

CO5: Recognize the necessary concepts in Mobility by developing an application on android platform.

Text Book:

1. Jochen H. Schiller, "Mobile Communications", 2nd Edition, Pearson Education, New Delhi, 2009.

Reference Books:

1. William Stallings, "Wireless Communications and Networks", 2nd Edition, Pearson Education, 2009.
2. Raj Kamal, "Mobile Computing", 2nd Edition, Oxford University Press, New Delhi, 2012.
3. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing: Technology, Applications and Service Creation", 2nd Edition, Tata McGraw Hill, 2010.
4. Frank Adelstein, Sandeep K S Gupta, Golden G Richard, Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing",Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2005.

Web References:

1. https://www.iith.ac.in/~tbr/teaching/docs/introduction.pdf
2. www.cs.uml.edu/~glchen/cs414-564/.../C02-Wireless_Transmission.ppt
3. neerci.ist.utl.pt/neerci_shelf/MERC/...?Mobile_Communications.pdf
4. http://web.cs.wpi.edu/~emmanuel/courses/cs525m/S06/slides/mobile_routing.pdf
5. wiki.icmc.usp.br/images/d/d0/C08-Network_Protocols.pdf
6. https://www.iith.ac.in/~tbr/teaching/docs/transport_protocols.pdf

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Course Code: 16ITE02	Course Title: CYBER LAW AND INFORMATION SECURITY	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Explain the concepts of cybercrime and its legal aspects.
2. Apply the different tools and methods in cybercrime.
3. Explain the concepts of Computer Forensics.
4. Describe the concept of cyber terrorism and issues of Intellectual Property in Cyberspace.
5. Present the real time case study relevant to cybercrime.

Unit I - INTRODUCTION TO CYBERCRIME AND INFORMATION TECHNOLOGY ACT 9

Introduction to cybercrime, Classifications of cybercrimes, Cybercrime: legal perspectives, Indian perspectives, Cybercrime and the Indian ITA 2000, Global perspective on cybercrimes, Cyber offences: Social engineering, Cyberstalking, Cybercafe and cyber.

Unit II - TOOLS AND METHODS USED IN CYBERCRIME 9

Introduction, Proxy servers and anonymizers, Phishing, Password cracking, Key loggers and spywares, virus and worms, Trojen Horses and Backdoors, Stegnography, Dos and DDoS attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

Unit III - UNDERSTANDING COMPUTER FORENSICS 9

Historical background of cyber forensics, Digital Forensics science, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Network Forensics, Computer Forensics and Steganography, Forensics and Social Networking sites, Challenges in computer Forensics, Forensics Auditing, Anti forensics.

Unit IV – CYBERCRIME AND CYBER TERRORISM 9

Intellectual Property in the Cyberspace, Ethical Dimension of Cybercrimes, Psychology, Mindset and Skills of Skills of Hackers and Other Cybercriminals, Sociology of Cybercriminals, Information Warfare, Cyber security : Organizational Implications, Introduction, Cost of Cybercrimes and IPR Issues, Web Threats for organizations, Security and Privacy Implications from Cloud Computing, Social Media marketing.

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Unit V – CYBERCRIME CASE STUDY 9

Indian Case of Online Gambling, Indian case of Intellectual Property Crime, Case of Counterfeit Computer Hardware, Internet used for Murdering, Case of Cyber defamation, Cybersquatting, Financial Frauds in Cyber domain, Digital Signature related Crime Scenarios.

Course Outcomes

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

CO1: Explain the terminologies used in cybercrime and its legal aspects.
CO2: Apply the various tools and methods in cybercrime.
CO3: Explain the concepts of Computer Forensics.
CO4: Describe the cyber terrorism and clarify the Intellectual Property issues in the Cyberspace.
CO5: Present the cybercrime relevant case study applied in real time.

Text Book:

1. Nina Godbole, Sunit Belapure, "Cyber security: Understanding Cybercrime, Computer Forensics and Legal perspectives", Wiley India Pvt. Ltd, 2013.

Reference Books:

1. Aparna Viswanatha, "Cyber Law- Indian And International Perspectives On Key Topics Including Data Security, E-Commerce, Cloud Computing and Cyber Crimes", LexisNexis Publishers, 2012.
2. Rodney D. Ryder, "Guide to Cyber Laws", 2nd Edition, Wadhwa and Company, 2007.

Web References:

1. http://www.cyberlawsindia.net/internet-crime.html
2. http://www.computerforensicsworld.com

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Course Code:16ITE03	Course Title: WIRELESS SENSOR NETWORKS	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Architect sensor networks.
2. Determine suitable medium access protocols and radio hardware.
3. Prototype sensors networks and evaluate the performance of sensor networks.
4. Devise appropriate data dissemination protocols and model links cost.
5. Assess coverage and conduct node deployment planning.

Unit I – SENSOR NETWORK ARCHITECTURE 9

Single Node Architecture: Hardware Components-Energy Consumption- Operating and Execution Environment. Network Architecture: Sensor Networks Scenarios – Optimization Goals - Design Principles for WSN- Operating and Execution Environment.

Unit II – COMMUNICATION PROTOCOLS 9

Physical Layer and Transceiver Design Considerations- Wireless MAC Protocols-Low Duty Cycle Protocol and Wake Up Concepts-Error Control – Framing.

Unit III - INFRASTRUCTURE ESTABLISHING 9

Properties of Localization and Positioning Techniques- Single Hop Localization-Positioning in Multihop Environments –Hierarchical Networks by Clustering.

Unit IV – ROUTING PROTOCOLS 9

Gossiping and Agent Based Unicast Forwarding- Energy Efficient Unicast- Geographic Routing – Mobile Nodes –Data Centric Routing- Data Aggregation.

Unit V – TRANSPORT LAYER AND QoS 9

Qos- Coverage and Deployment- Single Packet Delivery- Congestion Control and Rate Control- Security – Application Specific Support.

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Course Outcomes

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

CO1: Architect sensor networks for various application setups.
CO2:.Determine suitable medium access protocols and radio hardware.
CO3: Prototype sensors networks and evaluate the performance of sensor networks.
CO4: Devise appropriate data dissemination protocols and model links cost.
CO5: Assess coverage and conduct node deployment planning.

Text Book:

1. Holger Karl , Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.

Reference Books:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

Web References:

1. https://en.wikipedia.org/wiki/Wireless_sensor_network
2. https://hal.archives-ouvertes.fr/hal-00563298/document
3. https://www.sciencedirect.com/science/article/pii/S1877705814019171

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Course Code: 16ITE04	Course Title: INFORMATION STORAGE AND MANAGEMENT	
Elective	L : T : P : C	3 :0: 0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT45 Database Management Systems
- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Apply the suitable RAID levels.
2. Design storage networking technologies.
3. Design business continuous plan and replication techniques.
4. Develop the different security solutions and implementation.
5. Create an management activity plan.

Unit I - STORAGE SYSTEM 9

Introduction to Information Storage and Management – Storage System Environment – Data Protection: RAID – Intelligent Storage System – Components.

Unit II - STORAGE NETWORKING TECHNOLOGIES 9

Direct Attached Storage and Introduction to SCSI – Storage Area Networks – Fiber Channel Network Attached Storage – IP SAN – Content Addressed Storage.

Unit III - BUSINESS CONTINUITY 9

Introduction to Business Continuity – Backup and Recovery – Local Replication: Host Based-Storage Array Based – Remote Replication – Network Infrastructure.

Unit IV - STORAGE SECURITY AND MANAGEMENT 9

Securing the Storage Infrastructure – Storage Security Framework – Risk Triad – Storage Security Domains – Security Implementations in Storage Networking: SAN-NAS- IP SAN.

Unit V - MANAGING THE STORAGE INFRASTRUCTURE 9

Monitoring the Storage Infrastructure – Challenges - Storage Management Activities – Developing an Ideal Solution – Enterprise Management Platforms.

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Course Outcomes

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

CO1: Apply the suitable RAID levels for the given applications.
CO2: Design storage networking technologies for user needs.
CO3: Design business continuous plan and replication techniques for end user need.
CO4: Develop the different security solutions and implementation for the storage in an organization.
CO5: Create management activity plan for storage in an organization.

Text Book:

1. EMC Education Services, "Information Storage and Management: Storing, Managing and Protecting Digital Information", 2nd Edition, Wiley Publishing, Inc., India, 2012.

Reference Books:

1. Nigel Poulton "Data Storage Networking", 2nd Edition,Wiley Publishing, 2015.
2. Hitachi Data Systems Academy "Storage Concepts: Storing and Managing Digital Data", HDS Academy, 2012.
3. Volker Herminghaus , Albrecht Scriba, "Storage Management in Data Centers: Veritas Storage Foundation", Springer-Verlag Publishers, Berlin Heidelberg, 2009.
4. Christopher Poelker , Alex Nikitin, "Storage Area Networks for Dummies", Wiley Publishing, Inc., India, 2009.

Web References:

1. http://www.open.ac.uk/postgraduate/modules/m816
2. https://catalog.middlesex.mass.edu/preview_course_nopop.php?catoid=17&coid=21480
3. http://www.pitt.edu/~peterb/2140-003/tools.html
4. https://www.netcomlearning.com/training/information-storage-management-ism/selangor-malaysia.html

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Course Code: 16ITE05	Course Title: TCP/IP PROTOCOLS	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Categorize the networking protocols.
2. Apply TCP/IP troubleshooting commands.
3. Determine the TCP state transition.
4. Classify the functionalities of application layer protocols.
5. Examine the network management and multimedia services.

Unit I - TCP / IP Layering 9

Protocol Layers - TCP/IP Protocol Suite - Wired LANs - Wireless LANs - Point to Point WANs - Switched WANs - Connecting Devices.

Unit II - INTERNET PROTOCOL 9

Internet Protocol Version 4: Datagrams – Fragmentation – Options - IP Over ATM – Security -IP Package - Address Mapping - ARP Protocol – ICMPv4: Messages –Mobile IP.

Unit III - TRANSMISSION CONTROL PROTOCOL 9

TCP Services – TCP Features – Segment - TCP Connection - State Transition Diagram – Windows in TCP - Flow control - Error Control - Congestion Control - TCP Timers – Options.

Unit IV - APPLICATION LAYER 9

DHCP Operations - Host Configuration – TFTP – Electronic Mail: Architecture – User Agent -Message Transfer Agent: SMTP - POP and IMAP – MIME.

Unit V - NETWORK MANAGEMENT AND MUTIMEDIA 9

Network Management: SNMP Management Component – SMI – MIB - Multimedia: RTP – RTCP - Voice over IP - Quality of Service - Integrated Services - Differentiated Services.

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Course Outcomes

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

CO1: Categorize the networking protocols for the TCP/IP layering.
CO2: Apply TCP/IP troubleshooting commands namely arp, ping, ipconfig, and tracert for solving the network problems.
CO3: Determine the TCP state transition using finite state machine.
CO4: Classify the functionalities of application layer protocols for the real time data transmission.
CO5: Examine the network management and multimedia services for the network.

Text Book:

1. Behrouz A.Forouzan, "TCP/IP protocol suite", 4th Edition, Published by McGraw-Hill, 2013.

Reference Books:

1. W. Richard Stevens, "TCP/IP Illustrated" ,Volume 1 Pearson Education, 2003.
2. Kevin R. Fall,W. Richard Stevens, "TCP/IP Illustrated, Volume 1 The Protocols",2nd Edition ,Pearson Education, 2014.

Web References:

1. http://highered.mheducation.com/sites/0073376043/index.html
2. http://ptgmedia.pearsoncmg.com/images/9780321336316/samplepages/0321336313.pdf
3. http://www.cs.newpaltz.edu/~pletcha/NET_PY/the-protocols-tcp-ip-illustrated-volume-1.9780201633467.24290.pdf

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Course Code: 16ITE06	Course Title: DIGITAL IMAGE PROCESSING	
Elective	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT41 Fundamentals of Digital Signal Processing
- 16ITT51 Information Coding Techniques

Course Objectives

The course is intended to:

1. Explain the fundamental image concepts.
2. Analyze Images in the spatial and frequency domain.
3. Evaluate the various image restoration techniques.
4. Apply different image compression methods.
5. Interpret the image segmentation and representation techniques.

UNIT I - FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction-Fundamentals steps in Digital Image Processing-Components of an Image Processing System. Digital Image Fundamentals: Elements of Visual Perception-Image sensing and Acquisition-Sampling and Quantization-Pixel Relationships-Mathematical Tools Used in Digital Image Processing.

UNIT II - IMAGE TRANSFORMATION 9

Spatial Domain Gray Level Transformations –Histogram Processing-Spatial Filtering-Smoothing and Sharpening. Frequency Domain: Discrete Fourier Transform-Properties of DFT-Smoothening and Sharpening Filters- Discrete Cosine Transform – Properties - Haar Transform.

UNIT III- IMAGE RESTORATION 8

Image Degradation Process-Noise Models-Restoration in the Presence of Noise-Periodic Noise Reduction-Inverse Filtering-Wiener Filtering- Constrained Least - Square Filtering.

UNIT IV- IMAGE COMPRESSION 10

Fundamentals-Spatial and Temporal Redundancy-Irrelevant Information-Measuring Image Information-Fidelity Criteria-Image Compression Models-Compression Methods: Huffman Coding-LZW Coding-Bit Plane coding-Block Transform Coding -Predictive Coding.

UNIT V- IMAGE SEGMENTATION AND REPRESENTATION 9

Introduction –Point, Line and Edge Detection- Thresholding- Region-Based Segmentation-Image Representation: Chain Codes- Polygon Approximation-Boundary Descriptors-Regional Descriptors.

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Course Outcomes

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

CO1: Explain the fundamental concepts of Image processing system.
CO2: Analyze Images in the spatial and frequency domain using various transforms.
CO3: Evaluate the various techniques for image restoration.
CO4: Apply different image compression methods for the given image.
CO5: Interpret the segmentation and representation techniques of digital images.

Text Book:

1. Rafael C Gonzalez , Richard E Woods, "Digital Image Processing", 4th Edition, Addition - Wesley, New Delhi, 2018.

Reference Books:

1. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 2009.
2. Rafael C Gonzalez, Richard E.woods and Steven L. Eddins, "Digital Image Processing Using MATLAB", Tata McGraw Hill, New Delhi, 2010.
3. Milan Sonka, Vaclav Hlavac , Roger Boyle, "Image Processing, Analysis, and Machine Vision", Brooks/Cole, Singapore, 2008.

Web References:

1. http://eeweb.poly.edu/~onur/lectures/lectures.html
2. http://www.cs.nmt.edu/~ip/lectures.html /

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Course Code: 16ITE07	Course Title: SOFT COMPUTING	
Elective	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT61 Data Mining and Analytics

Course Objectives

The course is intended to:

1. Apply various soft computing frame works.
2. Design knowledge of Fuzzy Set Theory.
3. Design various neural networks.
4. Discuss on Neuro-Fuzzy Modeling.
5. Analyze the different applications of Neuro-Fuzzy.

Unit I – INTRODUCTION TO NEURO-FUZZY AND SOFT COMPUTING 9

Introduction - Soft Computing Constituents and Conventional Artificial Intelligence: From Conventional AI to Computational Intelligence – Neural Networks –Fuzzy Set Theory – Evolutionary Computation – Neuro-Fuzzy and Soft Computing Characteristics.

Unit II - FUZZY SET THEORY 9

Introduction to Fuzzy Set Theory - Fuzzy sets: Extension Principle and Fuzzy Relations - Fuzzy If-Then Rules and Fuzzy Reasoning Fuzzy Inference Systems: Mamdani Fuzzy Models - Sugeno Fuzzy Models - Tsukamoto Fuzzy Models.

Unit III – NEURAL NETWORKS 9

Introduction to Neural Networks - Adaptive Networks - Supervised Learning Neural Networks - Perceptron Networks – Adaline - Back-Propagation Multilayer Perceptron - Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks.

Unit IV – NEURO-FUZZY MODELING 9

ANFIS: Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Advanced Neuro-Fuzzy Modeling: Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies.

Unit V – ADVANCED APPLICATIONS 9

ANFIS Applications – Fuzzy Filtered Neural Networks – Fuzzy Sets and Genetic Algorithms in Game Playing – Soft Computing for Color Recipe Prediction.

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Course Outcomes

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

CO1: Apply the various soft computing frame works for real time applications.
CO2: Design and carry out the different knowledge of Fuzzy Set Theory.
CO3: Design the ideas of Neural Networks, Adaptive Networks and use of heuristics based on human experience.
CO4: Discuss the concepts of Neuro-Fuzzy Modeling.
CO5: Analyze the different applications of Neuro-Fuzzy and Soft Computing.

Text Book:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson, 2015.

Reference Books:

1. George J. Klir , Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
2. M. Mitchell, "An Introduction to Genetic Algorithms", Prentice-Hall, 1998.
3. James A. Freeman , David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Education, 2003

Web References:

1. http://www.myreaders.info/html/soft_computing.html
2. http://www.vssut.ac.in/lecture_notes/lecture1423723637.pdf

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Course Code: 16ITE08	Course Title: NATURAL LANGUAGE PROCESSING	
Elective	L : T : P : C	3: 0 :0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16MAT45 Probability and Statistics
- 16ITT52 Compiler Engineering

Course Objectives

The course is intended to:

1. Identify the sentiment of the sentence.
2. Categorize words classes and assign the best tag for the word.
3. Examine word sentiment by analyzing its context.
4. Examine semantic role labels and selectional restriction of words
5. Develop a Machine Translation system.

Unit I – REGULAR EXPRESSION, TEXT NORMALIZATION, SENTIMENT ANALYSIS 9

Regular Expression - Text Normalization - Minimum Distance Algorithm – Finite State Transducers - Language Modelling - N-Grams – Smoothing – Noisy Channel Model – Naïve Bayes – Sentiment Analysis.

Unit II – REGRESSION, PART OF SPEECH TAGGING, PARSING 9

Logistic Regression – Neural Language Model – Hidden Markov Model – Part of Speech tagging – Context Free Grammar – Tree Bank – Lexicalized Grammar – Parsing – Types of Parsing.

Unit III - SEMANTICS, CLUSTERING, WORD SENSE 9

Vector Model –Dense Vector Semantic Analysis – Embedding - Brown clustering – Word Sense Disambiguation and types - Word Sense Induction – Lexicons – Sentiment and Affect Extraction – Emotion and other classes.

Unit IV – INFORMATION EXTRACTION, COREFERENCE RESOLUTION 9

Named Entity Recognition – Relation Extraction – Semantic Role Labeling – Selectional Restriction – Primitive Decomposition – Coreference Resolution – Discourse Coherence.

Unit V – MACHINE TRANSLATION, QA & DIALOG SYSTEMS 9

Machine Translation – Statistical MT – Alignment & Types – Training Alignment Models – Question Answering – IR Based QA – Knowledge Based QA – Dialog Systems – Chatbot and Types.

S. Ramachandram

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Course Outcomes

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

CO1: Identify the sentiment of the sentence using a suitable language model.
CO2: Categorize words classes and assign the best tag for the word using suitable probabilistic model.
CO3: Examine word sentiment by analyzing its context utilizing word sense Disambiguation.
CO4: Examine semantic role labels and selectional restriction of words based on predicate event.
CO5: Develop a Machine Translation system using statistical modeling approach.

Text Books:

1. Daniel Jurafsky, James H. Martin, "Speech and Language Processing", 2nd Edition, Prentice Hall, 2008.

Reference Books:

1. Christopher D. Manning , Hinrich Schuetze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
2. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.
3. James Allen, "Natural Language Understanding",2nd Edition, Benjamin /Cummings publishing company, 1995.

Web References:

1. https://www.nltk.org/
2. https://nlp.stanford.edu/

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Course Code:16ITE09	Course Title: HUMAN COMPUTER INTERACTION	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT32 Computer Organization
- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Explain the features of Human computer interactive systems.
2. Identify HCI principles, standards and guidelines.
3. Describe the interactive design process and universal design principles of HCI systems.
4. Design the effective HCI model.
5. Develop the standard formalization for meaningful model interaction.

Unit I - FOUNDATIONS 9

The Human: I/O channels- Memory; The Computer: I/O Devices – Memory - Processing; The Interaction: Models-Frameworks-Styles-Elements- Interfaces -Context; Paradigms for Interaction.

Unit II - BASICS AND STANDARDS OF DESIGN PROCESS 9

Interaction Design Basics: High Level Design (HLD)-User Focus- Scenarios- Stages on Design Process - Interaction and Prototyping; HCI in Software Process: Usability Engineering-Interactive Design and Prototyping; Design Rules: Principles of Support Usability-Standards-Guidelines- Golden Rules and Heuristics-UI Patterns and techniques.

Unit III - IMPLEMENTATION AND EVALUATION OF DESIGN PROCESS 9

Implementation Support: Elements of Windowing Systems-Programming the Application-Using Toolkits; Evaluations Technique: Goals- Evaluation Approaches: Expert Analysis and end-user Participation-Choosing the Evaluation Methods - Evaluation Sites.

Unit IV – COGNITIVE AND COMMUNICATION MODEL 9

Cognitive Models: Goal and Task Hierarchies-Linguistic Models-Physical and Device Models-Cognitive Architectures; Face-to-face communication -Text based Communication-Group Working.

Unit V – MODEL INTERACTION 9

Techniques for task analysis: Task Decomposition-Knowledge-Based Analysis- Using

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task analysis to design - Standard Formalisms-Interaction Models - Richer Models - Status-Event Analysis- Sensor-Based Interaction.

Course Outcomes

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

CO1: Explain the features of Human computer interactive systems using different Paradigms.
CO2: Describe the interactive design process and universal design principles of HCI systems for mapping software engineering principles with HCI system design.
CO3: Describe the interactive design process and universal design principles of HCI systems for evaluation of design process.
CO4: Design effective HCI model for communication.
CO5: Develop the standard formalization for meaningful model interaction using task analysis.

Text Book:

1. Alan Dix, Janet Finlay, Gregory D. Abowd and Russell Beale, "Human-Computer Interaction", 3rd Edition, Pearson Education, 2011.

Reference Books:

1. Andrew sears, Julie A. Jacko, "The Human Computer Interaction Handbook", second edition, Lawrence Erlbaum Association, New York, 2008.
2. Serengul Stnith-Atakan, "Human Computer Interaction", Thomson Learning, 2006.

Web References:

1. http://www.hcibook.com/e3/plain/chapters/intro
2. https://www.interaction-design.org/literature/topics/human-computer-interaction

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Course Code: 16ITE10	Course Title: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT34 Data Structures
- 16ITT45 Database Management Systems

Course Objectives

The course is intended to:

1. Identify problems that are amenable to solution.
2. Explain various knowledge representation methods.
3. Use various knowledge inference methods.
4. Implement basic AI algorithms to machine learning.
5. Demonstrate proficiency in applying scientific method.

Unit I – INTRODUCTION TO AI 9

Introduction to AI: Definitions - AI Problems - the Underlying Assumption and AI Techniques - Level of Model - Criteria for Success – Problems - Problem Space and Search: Defining the Problem as a State Space Search - Production System, Problem Characteristics - Production System Characteristics - Issues in Design of Search Programs.

Unit II - KNOWLEDGE REPRESENTATION 9

Knowledge Representation Issues: Representation and Mapping - Approaches to Knowledge Representation - Issues in Knowledge Representation - the Frame Problem. Knowledge Representation Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and is a Relationships – Resolution.

Unit III - KNOWLEDGE INFERENCE 9

Knowledge Representation - Production Based System - Frame Based System. Inference - Backward Chaining - Forward Chaining - Rule Value Approach - Fuzzy Reasoning -Certainty Factors - Bayesian Theory - Bayesian Network- Dempster -Shafer Theory.

Unit IV – PLANNING AND MACHINE LEARNING 9

Basic Plan Generation Systems- Advanced Plan Generation Systems- Planning with State Space Search – Partial Order Planning Graphs – Planning with Propositional Logic Knowledge Representation- Learning-Machine Learning, Adaptive Learning.

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Unit V – EXPERT SYSTEMS 9

Expert Systems -Architecture of Expert Systems - Roles of Expert Systems -Knowledge Acquisition –Meta Knowledge - Heuristics. Typical Expert Systems -MYCIN, DART, XOON, Expert Systems Shells.

Course Outcomes

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

CO1: Identify problems that are amenable to solution by AI Methods.
CO2: Explain various knowledge representation methods.
CO3: Use various knowledge inference methods.
CO4: Implement basic AI algorithms to machine learning.
CO5: Demonstrate proficiency in applying scientific method to expert systems.

Text Book:

1. Kevin Night ,Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill-2008.

Reference Books:

1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
2. Deepak Khemani.A , "First Course in Artificial Intelligence", McGraw Hill Education(India), 2013.
3. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.

Web References:

1. http://www.myreaders.info/html/artificial_intelligence.html
2. www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_tutorial.pdf
3. http://sbsceducation.org/wp-content/uploads/2014/06/BCA-601.pdf

S. Prasad

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Course Code: 16ITE11	Course Title: SENSING TECHNIQUES AND SENSORS	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16GET17 Basics of Electrical and Electronics Engineering

Course Objectives

The course is intended to:

1. Explain the sensor characteristics and the fundamental principles of sensing.
2. Influence the front stage of electronic signal conditioning circuit in sensors.
3. Choose the applications on motion related sensors and pressure sensors.
4. Apply the principles of acoustic and light detectors.
5. Determine the characteristics of temperature sensors and chemical sensors.

Unit I – PRINCIPLES OF SENSING 9

Sensors in Data Acquisition System – Sensor Characteristics – Principle of Sensing: Electric Charges, Fields, Potentials – Capacitance – Magnetism – Inductance – Resistance – Piezoelectric Effect– Pyroelectric Effect – Hall Effect – Seebeck and Peltier Effects – Sound Waves – Heat Transfer – Light – Dynamic Models of Sensors.

Unit II – INTERFACE ELECTRONIC CIRCUITS 9

Input Characteristics of Interface Circuits – Amplifiers: Operational Amplifiers, Voltage Amplifier, Instrumentation Amplifier and Charge Amplifier – Excitation Circuits – Analog to Digital Converters – Direct Digitization and Processing – Ratiometric Circuits – Bridge Circuits – Data Transmission – Noises in Sensors and Circuits.

Unit III - MOTION RELATED SENSORS AND PRESSURE SENSORS 9

Microwave Motion Detectors – Capacitive Occupancy Detectors – Triboelectric – Potentiometric Sensors – Gravitational Sensors – Capacitive, Inductive and Magnetic Sensors - Optical Sensors – Ultrasonic Sensors – Radar Sensors - Piezoelectric and Piezoresistive Accelerometers – Thermal Accelerometers – Gyroscopes – Mercury Pressure Sensor – Vrp Sensors – Vacuum Sensors.

Unit IV – ACOUSTIC AND LIGHT DETECTORS 9

Resistive, Condenser, Fiber-Optic, Piezoelectric and Electret Microphones – Solid State Acoustic Detectors - Light Detectors: Photo Diodes – Photo Transistor – Photo Resistor – Cooled Detectors - Thermal Detectors – Gas Flame Detectors.

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Unit V – TEMPERATURE AND CHEMICAL SENSORS 9

Thermo Resistive Sensors – Thermo Electric Contact Sensors – Semiconductor Sensors – Optical Temperature Sensors – Acoustic Temperature Sensors – Piezoelectric Temperature Sensors. Chemical Sensors: Characteristics – Specific Difficulties – Classification of Chemical Sensing Mechanisms – Direct Sensors – Complex Sensors.

Course Outcomes

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

CO1: Describe the sensor characteristics and the fundamental principles of sensing using modern sensor techniques.
CO2: Influence the front stage of electronic signal conditioning circuit to connect a sensor directly with processing and output unit.
CO3: Choose the applications on motion related sensors and pressure sensors.
CO4: Apply the principles of detectors in the field of sound and optics.
CO5: Determine the characteristics of temperature sensors and chemical sensors for the biochemical applications.

Text Book:

1. Jacob Fraden, "Handbook of Modern Sensors: Physics, Designs, and Applications", Fifth Edition, Springer, 2016.

Reference Books:

1. Jon Wilson, "Sensor Technology Handbook", First Edition, Elsevier, 2004.
2. Ian R Sinclair, "Sensors and Transducers", Third Edition, Elsevier, 2011.
3. Youn-Long Lin, Chong-Min Kyung, Hiroto Yasuura, Yongpan Liu, "Smart Sensors and Systems", Springer International Publishing, 2015.

Web References:

1. https://www.nap.edu/read/4782/chapter/1
2. http://nptel.ac.in/courses/112103174/6
3. https://www.electronics-tutorials.ws/io/input-interfacing-circuits.html
4. https://www.intechopen.com/books/progresses-in-chemical-sensor

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Course Code: 16ITE12	Course Title: SOCIAL NETWORK ANALYSIS	
Elective	L : T : P : C	3 :0: 0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT34 Data Structures
- 16ITT54 Computer Networks
- 16ITT61 Data Mining and Analytics

Course Objectives

The course is intended to:

1. Explain basic network science notation and terminology.
2. Implement the community analysis approaches.
3. Analyze the user behavior in social networks.
4. Mine the required data from real world social networks.
5. Apply the right metrics to mine the data.

Unit I - ESSENTIALS OF SOCIAL NETWORKS 9

Introduction to Social Networks –Graph Basics- Representation- Types of Graphs- Spatial Graphs- Network Measures: Centrality- Transitivity and Reciprocity- Balance and Status- Similarity. Network Models: Properties of Real World Networks.

Unit II - COMMUNITY ANALYSIS 9

Data Mining Essentials: Data Preprocessing- Data Mining Algorithms-Supervised Learning-Unsupervised Learning. Community Analysis: Community Detection- Evolution – Evaluation.

Unit III - RECOMMENDATION AND BEAHVIOR ANALYSIS 9

Recommendations in Social Media: Challenges-Classical Recommendation Algorithms-Recommendation Using Social Context- Evaluating Recommendations. Behavior Analytics: Individual Behavior and Collective Behavior.

Unit IV - MINING SOCIAL WEB 9

Mining Twitter: Exploring Twitter API, Analyzing 140 Characters. Mining Facebook: Exploring Social Graph API, Analyzing Social Graph Connections. Mining LinkedIn: Mining The LinkedIn API, Crash Course on Clustering Data.

Unit V - MINING GOOGLE + AND WEB PAGES 9

Mining Google +: Exploring the Google + API- TF-IDF- Querying Human Language Data with TF-IDF. Mining Web Pages: Scraping, Parsing and Crawling the Web-Discovering the Semantics-Entity Centric Analysis.

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Course Outcomes

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

CO1: Explain basic notation and terminology used in network science.
CO2: Implement the approaches used for analyzing the data of social networks.
CO3: Analyze the user behavior in social networks for the recent research in the area.
CO4: Mine the required data from real world social networks using right app.
CO5: Apply the right metrics to mine the data from search engines.

Text Books:

1. Reza Zafarani, Mohammed Ali Abbasi, Huan Liu, "Social Media Mining: An Introduction", 1st Edition, Cambridge University Press, 2014 (Unit-I,II,III).
2. Mathew A. Russel, "Mining the social web", 2nd Edition, O'Reilly Publications, 2013 (Unit-IV,V).

Reference Books:

1. Ian Mc Culloh, Hellen Armstrong, Anthony Johnson, "Social Network Analysis with Applications", 1st Edition, Wiley Publications, 2013.
2. John Scott, "Social Network Analysis", 3rd Edition, SAGE Publications, 2013.
3. Maksim Tsvetovat and Alexander Kouznetsov, "Social Network Analysis for Startups", 1st Edition, O'Reilly Media, 2011.

Web References:

1. http://www.orgnet.com/sna.html
2. http://www.socialnetworks.org/
3. https://en.wikipedia.org/wiki/Social_network_analysis
4. http://www.kstoolkit.org/Social+Network+Analysis

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Course Code: 16ITE13	Course Title: VIRTUAL REALITY	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT55 Web Technology

Course Objectives

The course is intended to:

1. Discuss the basic concepts of Virtual reality.
2. Understand the Virtual Reality architecture.
3. Design of various modeling concepts.
4. Categorize various programming toolkits.
5. Implement a real time VR application.

Unit I – Input & Output Devices 9

Introduction to Virtual Reality – History of Early VR – Early Commercial VR Technology - Virtual Reality becomes an Industry – Five Classic Components of VR System - Input Devices: 3D Position Trackers and its types - Navigation and Manipulation Interfaces – Gesture Interfaces - Output Devices: Graphics Display – Sound Display – Haptic Feedback.

Unit II – Computing Architecture for VR 9

Introduction – Rendering Principle: Graphics and Haptics Rendering – PC Graphics Architecture: PC Graphics Accelerators – Graphics Benchmarks – Workstation Based Architectures: Sun Blade 1000 Architecture – SGI Infinite Reality Architecture – Distributed VR Architectures: Multipipeline Synchronization – Collocated Rendering Pipelines – Distributed Virtual Environments.

Unit III - Types of Modeling in VR 9

Modeling & its Types – VR Modeling Cycle – Geometric Modeling: Virtual Object Shape – Object Visual Appearance – Kinematics Modeling: Homogeneous Transformation Matrices – Object Position – Transformation Invariants – Object Hierarchies – Viewing the 3D World – Physical Modeling: Collision Detection – Surface Deformation – Force Computation – Force Smoothing and Mapping – Behavior Modeling – Model Management: Level-of-Detail Management – Cell Segmentation.

Unit IV – Programming and Human Factors 9

Programming: Toolkits and Scene Graphs – World ToolKit – Java 3D – GHOST – People Shop – Human Factors: Methodology and Terminology – User Performance Studies - VR Health and Safety Issues – VR and Society.

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Unit V – Application 9

Medical Applications of VR – Applications of VR in Robotics – Information Visualization: Oil Exploration and well management, Volumetric Data Visualization – Military VR Applications: Army Use, Navy, Air force Use.

Course Outcomes

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

CO1: Gain an exposure on the basic concepts of Virtual Reality.
CO2: Differentiate the various components utilized in Virtual Reality architecture.
CO3: Design of various modeling concepts for Virtual Reality.
CO4: Categorize various programming toolkits used in Virtual Reality.
CO5: Implement a real time VR application for a given scenario.

Text Book:

1. Grigore C. Burdea, Philip Coiffet, "Virtual Reality Technology", 2nd Edition, Wiley India, 2009.

Reference Books:

1. John Vince, "Virtual Reality Systems", Pearson Education Asia, 2007.
2. Adams, "Visualizations of Virtual Reality", Tata McGraw Hill, 2000.
3. William R.Sherman, Alan B.Craig , "Understanding Virtual Reality – Interface, Application, Design", The Morgan Kaufmann Series, 2003.

Web References:

1. www.vrac.iastate.edu
2. https://stanford.edu/class/ee267/
3. https://www.w3.org/MarkUp/VRML/

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Course Code: 16ITE14	Course Title: MACHINE LEARNING TECHNIQUES	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT61 Data Mining and Analytics

Course Objectives

The course is intended to:

1. Explain the basic concepts and techniques.
2. Apply the appropriate machine learning strategy for a given problem.
3. Explore various classifiers using Bayesian and computational Learning techniques.
4. Discuss on instant based learning algorithms for suitable applications.
5. Modify existing machine learning algorithms to improve classification efficiency.

Unit I - INTRODUCTION 9

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Hypothesis Space Search in Decision Tree Learning.

Unit II - NEURAL NETWORK AND GENETIC ALGORITHM 9

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search in Genetic Algorithm – Genetic Programming – Models of Evaluation and Learning.

Unit III - BAYESIAN AND COMPUTATIONAL LEARNING 9

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Unit IV - INSTANT BASED LEARNING 9

K-Nearest Neighbor Learning: Distance-Weighted Nearest Neighbor Algorithm – Locally weighted Regression – Radial Basis Functions – Case Based Learning – Remarks on Lazy and Eager Learning.

Unit V - ADVANCED LEARNING 9

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation

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Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

Course Outcomes

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

CO1: Explain the basic concepts and techniques of machine learning.
CO2: Apply the appropriate machine learning strategy for a given problem using neural network or genetic algorithm.
CO3: Explore various classifiers using Bayesian and computational Learning techniques.
CO4: Discuss on instant based learning algorithms for suitable applications.
CO5: Modify existing machine learning algorithms to improve classification efficiency using advanced learning algorithms.

Text Book:

1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education (India) Private Limited, Eighteenth Reprint, 2017.

Reference Books:

1. Ethem Alpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)", 3rd Edition, MIT Press, 2014.
2. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", 1st Edition, Wiley, 2014.
3. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", 1st Edition, Cambridge University Press, 2012.
4. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", 2nd Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

Web References:

1. http://see.stanford.edu/see/materials/aimlcs229/handouts.aspx
2. http://www.holehouse.org/mlclass/
3. http://ocw.mit.edu/courses/electrical-engineering-and-computerscience/6-867-machine-learning-fall-2006/lecture-notes/
4. http://cs229.stanford.edu/materials.html

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Course Code: 16ITE41	Course Title: ROBOTIC PROCESS AUTOMATION	
Elective	L : T : P : C	3: 0: 0 :3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT35 Object Oriented Programming using Java
- 16ITT45 Database Management Systems

Course Objectives

The course is intended to:

1. Apply basic Programming concepts and the underlying logic/structure in RPA
2. Develop RPA programs using control flow, loop, data manipulation and file operation
3. Apply automation to Citrix, PDF and Email
4. Implement programs using various events and exception handling
5. Apply various functionalities of orchestrator

Unit I – INTRODUCTION TO RPA 9

Introduction to RPA – Components – RPA Platforms – UiPath Stack: Studio – Types of Robot – Orchestrator. UiPath Studio: User Interface – Task recorder

Unit II – – PROGRAMMING WORKFLOW 9

Activities – Control flow – Various types of loops and decision making. Data Manipulation: Variables and scope – Collections – Arguments – Data table usage – Clipboard management – File operation

Unit III - CONTROLS AND PLUGIN 9

Finding the Control – Techniques for waiting for a control – Act on control – Mouse and Keyboard Activities – Working with UiExplorer – Handling events – SAP Automation – Java plugin – Citrix automation – Mail and PDF plugin – Web integration – Excel and word plugins – Credential management.

Unit IV – MONITORING EVENTS AND EXCEPTION HANDLING 9

Monitoring system event triggers – Monitoring image and element triggers – Common exceptions and way to handle them – Logging and taking screenshots – Debugging techniques – Collecting crash dumps – Error reporting

Unit V – MANAGING, MAINTAINING & DEPLOYING CODE PROJECT 9

Layout for each workflow – Nesting workflows – Reusability workflows – State Machine – Publishing – Orchestration Server: Overview – Control bots – deploy bots – License management – Publishing and managing updates

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Course Outcomes

At the end of the course students will be able to:
CO1: Describe RPA , where it can be applied and how its implemented
CO2: Develop understanding and application of Data Manipulation techniques
CO3: Construct programs using Text and Data Tables Automation in Studio
CO4: Implement programs using various types of Exceptions and strategies
CO5: Implement various module using orchestrator

Text Book:

1. Alok Mani Tripathi, "Learning Robotic Process Automation", First Edition, Packt Publishing, 2018.

Reference Books:

1. Kelly Wibbenmeyer, "The Simple Implementation guide to Robotic Process Automation", Kindle Edition, 2018
2. Richard Murdoch, "Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant", Kindle Edition, 2018.

Web References:

1. https://www.uipath.com/rpa/robotic-process-automation
2. https://www.guru99.com/robotic-process-automation-tutorial.html

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Course Code: 16ITE47	Course Title: ADVANCED PROBLEM SOLVING USING C	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

Pre-requisites

- 16GET26 C Programming

Course Objectives

The course is intended to:

1. Build the various constructs of a programming language with conditional, iteration and recursion
2. Solve problems using control structures
3. Identify the user defined functions and strings
4. Implement collection of elements using arrays and structures
5. Solve problems using pointers and files

Unit I – EXPRESSION EVALUATION AND BRANCHING 9

Input type validation for primary constants - Problems on implicit type conversion and explicit type conversion - Hierarchy of operations - Constants formatting - Condition checking for real time problems using if...else and nested if statements - Multiple option using switch statement - The decision control structure with binary and unary operators

Unit II – CONTROL STRUCTURES 9

Finite and infinite looping problems using 'for', 'while' and 'do...while' - Simulate the need for jumping and continue statement during iteration - Input and output formatting using iteration statements – Output pattern printing using iteration statements

Unit III - FUNCTIONS AND STRINGS 9

Function prototype in C - Return statement vs exit() in main() - Evaluation order of function parameters in C - Return multiple values from a function - Parameter Passing Techniques using derived data types - Backtracking using Recursion -N-queens- GCD of Strings-String operations for real time problems - Swapping of Strings - Counting problems using Strings

Unit IV – ARRAYS AND STRUCTURES 9

Arrays Data Structure in C- Expression evaluation: Postfix, Infix and Prefix - Solving Tower of Hanoi using arrays - Sort an array in ascending and descending order - Find the frequency of each element of an array – Array merging - Structure Member Alignment, Padding and Data Packing - Add two distances (in inch-feet) using structure

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- Add two complex numbers by passing structures to a function - Calculate the difference between two time periods using structure

Unit V – POINTERS AND FILES 9

Pointer operations - Permutation of a string using pointers - Addition of two list using pointers-Sorting of list - Reversing of list - Merging of list - Remove duplicates from a sorted linked list -union and intersection two linked list - File operations - Reading and writing a content from file- Merge contents of two files into a third file - Manipulation real time file contents-Remove specific content from a file – Encryption and decryption of a text file in C

All topics in each unit should tested at least with two test cases

Course Outcomes

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

CO1: Build the various constructs of a programming language with conditional, iteration and recursion for solving real world problems
CO2: Solve problems using control structures for performing iteration
CO3: Identify the user defined functions and strings to solve real time problems
CO4: Implement collection of elements using arrays and structures for solving problems
CO5: Solve problems using pointers and files for real time applications

Text Book:

1. Byron S. Gottfried, "Programming with C", 4th Edition, Schaum's Outline Series McGraw –Hill, 2018

Reference Books:

1. Yashwanth Kanethkar, "Let us C", 13th Edition, BPB Publications, 2015
2. Herbert Schildt, "Complete Reference with C", 4th Edition, Tata McGraw Hill,2000
3. Behrouz A. Forouzan, Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", 3rd Edition, Cengage Learning
4. R.S. Salaria, "Problem Solving and Programming in C", 5th Edition, Khanna Publishing House, 2016

Web References:

1. https://www.geeksforgeeks.org/c-programming-language/
2. http://www.learntosolveit.com/

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Course Code: 16ITE48	Course Title: ADVANCED PROBLEM SOLVING USING JAVA	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

Pre-requisites

- 16ITT35 Object Oriented programming using Java

Course Objectives

The course is intended to:

1. Apply the Arrays and List Concept in Java.
2. Select the appropriate string operations to solve the given problem.
3. Illustrate how Java program can be used to solve Stack and Queue Applications.
4. Write java programs using recursion concepts.
5. Examine the need for Java Collection.

Unit I –ARRAYS AND LISTS 9

Arrays: Introduction-Types-Applications of Arrays: Searching and Sorting. Problems using arrays: merge 'K' sorted arrays, multiply left and right array, array conversion into zigzag type, Arranging elements orderly, Splitting an array, Rotating array, Searching in 2D Matrix, addition of submatrix, Finding distinct element, Rearranging an array based on given criteria, Identifying number of occurrences of given element

Unit II –STRINGS 9

Introduction: String, String Buffer, Built-in string handling functions of String and String Buffer, Stringtokenizer. Problems using Strings: removing characters, rearrange characters, searching a substring in a string, Reversing Binary numbers, longest common subsequence of two strings, Removing duplicates, sorting of strings specific to case, sum of numbers in a string, checking for pangram, pattern printing, counting substring, rearranging a string, splitting a string, Counting Anagrams, reversing each word in a string

Unit III – STACK AND QUEUE 9

Stack: Introduction, Stack operations. Problems using stack: Reverse string , sort the elements ,check for balanced parenthesis, convert infix to postfix notation, check elements in a stack are pairwise consecutive, remove repeated digits in a number

Queue: Introduction, Queue Operations. Problems using Queue: Reverse k elements in Queue, Check Mirror in N-ary tree, Compress the string when lower and upper case are same, Generating binary numbers

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Unit IV – RECURSION 9

Introduction, Benefits of Recursion. Problems in Recursion: Count the possible paths from top left to bottom right of matrix, Pattern Printing, Express as sum of power of natural numbers, printing elements in Recaman's sequence, Decoding the string, print N bit binary numbers, print all N digit numbers in increasing order, permutations of a given string, Replace O's with X's)

Unit V – JAVA COLLECTIONS 9

Collection, Set, List, Queue, Collections Classes – Array List, Hash Set, Tree Set. Accessing a Collection via Iterators. Map Interfaces. Problems using collections: Traverse ArrayList ,Sort ArrayList, checking the existence of element in ArrayList and HashSet, adding elements to the HashMap given key and value, sorting HashMap by keys, Iterate TreeMap

Course Outcomes

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

CO1: Apply the Arrays and List Concept in Java to solve problems.
CO2: Select the appropriate string operations to solve the given concepts.
CO3: Illustrate how Java program can be used to solve Stack and Queue Applications.
CO4: Demonstrate the concepts of Recursion with the given example.
CO5: Examine the need for Java Collection for efficient programming.

Text Book:

1. Elliot B. Koffman, Ursula Wolz, "Problem Solving with Java", Addison-Wesley, 1999.

Reference Books:

1. Nell Dale,Chip Weems,Mark Headington, "Programming and Problem Solving with Java", 2nd Edition, Jones and Bartlett Publishers,2008.
2. Schildt. Herbert., "Java - The complete Reference", 9th Edition, McGraw Hill Education, 2014.
3. Kenneth Alfred Lambert, Martin Osborne , "Java: A Framework for Programming and Problem Solving" ,PWS Pub,1999.

Web References:

1. https://www.w3schools.com/java/
2. https://www.tutorialspoint.com/java/index.htm
3. https://www.geeksforgeeks.org/Java/

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Course Code: 16ITE49	Course Title: ADVANCED PROBLEM SOLVING USING PYTHON	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

Pre-requisites

- 16GET26 C Programming
- 16ITT35 Object Oriented programming using Java

Course Objectives

The course is intended to:

1. Compute expressions and perform tasks using variables, looping and control structures
2. Utilize data structures and perform searching, sorting using modules queue and classes
3. Apply searching and sorting on strings using dictionaries to remove duplications and perform concatenation
4. Solve use cases using Functions, Lambda Functions and Classes
5. Data Persistence using Files & Operations on Date & System using modules

Unit I – PROBLEM SOLVING USING OPERATOR, LOOPING AND CONTROL STRUCTURES 9

Implement multi-way selection in Python- Basic Euclidean algorithms - unique prime factors of a number –Armstrong number- Fibonacci Sequence- area of a Tetrahedron-cube sum of first n natural numbers- Print an Inverted Star Pattern- convert time from 12 hour to 24-hour format- Tower of Hanoi

Unit II – PROBLEM SOLVING USING LIST AND TUPLE 9

Searching the element in the data structure –Identify Positive number –Count and sum the even and odd number- list traversal- sequence operations common to lists, tuples, and strings in Python- Password Encryption/Decryption - Calendar Year Program-Linear Search-Binary Search-Selection Sort-Bubble Sort-Merge sort

Unit III - PROBLEM SOLVING USING STRINGS AND DICTIONARY 9

String Palindrome- String Slicing- matching characters in a pair of string- split and join a string- close matches of input string from a list- Permutation of a given string using inbuilt function- Eliminating duplicate characters in string- Sort python dictionaries by Key or Value- Dictionary and counter in Python to find winner of election- Scraping and Finding Ordered Words in a Dictionary using Python- K^{th} Non-repeating Character in Python using List Comprehension and OrderedDict

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Unit IV – PROBLEM SOLVING USING FUNCTIONS AND CLASSES 9

Programming functions – Arguments & return types - Use cases: (String Uppercase to Lowercase, Unique List of Values from List, String anagram Test)
Lambda Functions usage with List, Tuple, Dictionary, String - Use Cases: (Sorted Elements in List, Tuple & Dictionary)
Classes – Usage of classes Use cases: (Number to Roman conversion, Parentheses check, possible Subsets of an element set, Linked List Implementation using Classes)

Unit V – MODULE: TIME, OS, FILE OPERATIONS 9

Time objects using time Module: Use Cases (Date formatting, n days from current date, week number, Date of specific Day in a year, Days between)
OS objects using os Module (List Current Working Directory, Files in Directory, run system commands)
Working with Files: Use Cases (Read / Write Data in Files, count no of lines, words, Copy one file content to another)

Course Outcomes

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

CO1: Build a console application using operators, looping and control structures.
CO2: Develop an application using list and tuple concepts.
CO3: Design an application using strings and dictionary.
CO4: Apply functions and classes to develop a console application.
CO5: Construct an application using time, OS modules and File operations.

Text Book:

1. Allen Downey, "Think Python" ,2nd Edition, Green Tea Press, 2012
2. Michael H. Goldwasser, Michael T. Goodrich, and Roberto Tamassia, "Data Structures and Algorithms in Python", 1st Edition , Wiley india Pvt. Ltd, 2013

1.

Reference Books:

1. Jeffrey Elkner, Chris Meyers Allen Downey, "Learning with Python" , 4th Edition Dream Tech Press Publication,2015
2. Mark Summerfield, "A Complete Introduction to the Python Language", 2nd Edition Addison-Wesley Professional,2014
3. Jeffrey Elkner, Chris Meyers Allen Downey, "Learning with Python" , 4th Edition Dream Tech Press Publication,2015
4. Mark Summerfield, "A Complete Introduction to the Python Language", 2nd Edition Addison-Wesley Professional,2014

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Web References:

1. https://w3resource.com/python-exercises/
2. https://www.coursera.org/learn/python
3. https://www.w3schools.com/python/
4. https://www.geeksforgeeks.org/python-programming-examples/

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Course Code: 16ITE15	Course Title: CLOUD ARCHITECTURE	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Describe the Enterprise components of cloud computing.
2. Describe the architecture and concept of SOA and service virtualization.
3. Evaluate the consistency of services deployed from a cloud architecture.
4. Evaluate the deployment of cloud integration products and platforms.
5. Analyze the economic benefits delivered by various cloud management services.

Unit I - CLOUD-ENABLED SMART ENTERPRISES AND FRAMEWORK 9

Introduction- IT Trends & Technologies- Enterprise Journey-Service-Oriented Enterprises -The Service Paradigm-Enterprise-Scale Architectural Approaches-Cloud Enterprises-Autonomic Clouds-Federated Clouds-Intercloud--Ambient Cloud-Smart Enterprises -Service Computing-Advanced Analytics-Event-Driven Architecture-Big Data Computing -Cloud EA: Frameworks and Platforms-Zachman Framework-Open Group Architecture Framework-Federal Enterprise Architecture-Oracle EA Framework.

Unit II - CLOUD APPLICATION ARCHITECTURE 9

Introduction.- Services as Enterprise Building Blocks- Amazing Differentiators of SOA-Key Drivers for NG-SOA- Exemplary Enhancements in the Service Paradigm- Process-Centric, Model-Driven, Event-Driven SOA- Service-Oriented BI- Service Virtualization - Exciting Service Capabilities-Dynamic and Converged Service Infrastructures-Direct and Distinct Impacts of NG-SOA.

Unit III - CLOUD TECHNOLOGY ARCHITECTURE 9

Generic Cloud Types-Next-Generation Connected Clouds-Cloud Middleware Deployment-Cloud Brokers-Cloud Reference Architecture-Cloud Service Broker (CSB) Deployment Models : ESB Deployment Styles -Variations in ESB Deployment-Peer-to-Peer ESB Deployment Model-Cloud-Ready Mule ESB-Cloud Appliances: The Deployment Method-Cloud Deployment Strategy.

Unit IV – CLOUD INTEGRATION ARCHITECTURE 9

Cloud Integration: Origin and Evolution-Approaches for Cloud Integration-Cloud Integration Concerns and Challenges- Methodologies and Life Cycle- Cloud Integration Products and Platforms: Jitterbit- Boomi Software- OpenSource Connect- Windows

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Azure AppFabric- Oracle SOA Suite 11g. Cloud Integration Appliances- Cloud Interoperation Methods.- Cloud Integration Services.

Unit V – CLOUD MANAGEMENT ARCHITECTURE 9

Cloud Service Management - IT Service Management - Service Catalog Management and Request - Challenges Involved in CSM- CSM Processes: Changes, Problem Release, Security and Capacity Management- Cloud Management Solutions- BMC Cloud Management- VMware and NetApp- Semantic Technologies for Cloud Information Management- Data Integration- Intelligent Information Access and Analytics- eCloudManager Ontology.

Course Outcomes

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

CO1: Describe the components and framework cloud Enterprise and shows how the business agility in an organization can be created.
CO2: Describe the service oriented architecture and its service Paradigm for different cloud applications.
CO3: Categorize the cloud service broker and deployment model of ESB.
CO4: Identify the methodologies and Life Cycle of cloud architecture Integration of windows Azure.
CO5: Analyze cloud management activities to apply when developing and deploying cloud based applications like VMware,Netapp,Sematic.

Text Book:

1. Pethuru Raj, "Cloud Enterprise Architecture", 1st Edition ,CRC Press, 2013.

Reference Books:

1. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", 1st Edition ,Cambridge University Press, 2010.
2. Dimitris N. Chorafas, "Cloud Computing Strategies", 1st Edition, CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", 1st Edition, McGraw-Hill Osborne Media,2009.

Web References:

1. https://www.cloudcruiser.com
2. https://www.tutorialspoint.com/cloud_computing/cloud_computing_architecture.htm
3. https://apprenda.com/library/architecture/

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Course Code: 16ITE16	Course Title: PUBLIC CLOUD SERVICES	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Articulate the fundamental concepts of Cloud Computing.
2. Analyze appropriate cloud computing solutions.
3. Identify the cloud storage devices.
4. Explain the various cloud technologies.
5. Describe the architecture and infrastructure of cloud computing.

Unit I - CLOUD COMPUTING BASICS 9

Cloud Computing Basics: Overview- Applications- Intranets and the Cloud. Your Organization and Cloud Computing: Benefits- Limitations- Security Concerns. Hardware and Infrastructure: Clients- Security- Network- Services.

Unit II – COMPUTING PLATFORMS 9

Enterprise Computing – The internet as a Platform – Software as a Service and Cloud Computing – Enterprise Architecture. Cloud Computing Platforms: Amazon EC2/S3 - Google App Engine – Microsoft Azure – Cloud Computing Economics.

Unit III - CLOUD STORAGE 9

Overview – Cloud Storage Providers- Standards: Application- Client- Infrastructure- services-Software as a Service: Overview- Driving forces- Company offerings- Industries - Software Plus Services: Overview- Mobile Device- Providers- Microsoft online.

Unit IV – CLOUD TECHNOLOGIES 9

Web services, AJAX and Mashups- Virtualization Technology – Multi-tenant Software- Data in the Cloud – Map Reduce and Extensions.

Unit V – CLOUD SOFTWARE ARCHITECTURE 9

Enterprise Software: ERP, SCM, CRM - Custom Enterprise Applications and Dev 2.0 – Workflow and Business Processes- Enterprise Analytics and Search.

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Course Outcomes

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

CO1: Articulate the fundamental concepts of Cloud Computing in real time application.

CO2: Analyze appropriate cloud computing solutions according to the applications used.

CO3: Identify the cloud storage devices used by service providers.

CO4: Explain the various cloud technologies used in information and web services.

CO5: Describe the architecture and infrastructure of cloud computing for real time application.

Text Books:

1. Anthony T. Velte, Toby J. Velte, Robert C Elsenpeter, "Cloud Computing: A Practical Approach", McGraw-Hill, 2010 (Unit - I,III).
2. Gautam Shroff, "Enterprise Cloud Computing: Technology, Architecture, Applications", Cambridge University Press, USA, 2010 (Unit – II,IV,V).

Reference Books:

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz,"Cloud Computing for Dummies" Wiley India Edition, 2010.
2. Barrie Sosinsky, "Cloud Computing Bible", Wiley Publishing, 2011.

Web References:

1. http://cloud-standards.org/
2. http://www.eucalyptus.com/
3. http://www.virtualbox.org/

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Course Code: 16ITE17	Course Title: SERVICE ORIENTED ARCHITECTURE	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT55 Web Technology

Course Objectives

The course is intended to:

1. Explain the SOA fundamentals and benefits.
2. Interpret the service level functionalities.
3. Apply multiple channel access SOA concepts.
4. Classify the meta data Management.
5. Analyze the impact of web service transactions.

Unit I - INTRODUCTION TO SOA WITH WEB SERVICES 9

SOA and Web Services - SOA Concepts – Service Governance, Processes, Guidelines, and Tools – Key Service Characteristics - SOA: Technical and Business Benefits.

Unit II - SOA AND WEB SERVICES 9

Web Services Platform – Service Contracts – Service Level Data Model – Service Level Security – Service Level Interaction Patterns – Service Level Communication – SOA and Web Services for Integration: Overview – Integration and Interoperability Using XML and Web Services.

Unit III - SOA AND MULTI-CHANNEL ACCESS 9

Business Benefits of SOA and Multi-Channel Access - SOA for Multi-Channel Access-Client/Presentation and Channel Access Tier – Business Process Management Concepts – Combining BPM, SOA and Web Services – Orchestration and Choreography Specifications –Web Services Composition.

Unit IV - METADATA MANAGEMENT 9

Approach to Metadata Management - Metadata Specifications – Policy – Ws meta data exchange – Web Services Security: Core Concepts – Summary of Challenges, Threats and Remedies – Securing the Communications Layer – Message Level Security.

Unit V - ADVANCED MESSAGING 9

Advanced Messaging: Reliable Messaging – Notification - Transaction Processing: Impact of Web Services on Transactions – Protocols and Coordination - Transaction Specifications.

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Course Outcomes

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

CO1: Explain the fundamentals and benefits of web services.
CO2: Interpret the service level functionalities in SOA and Web.
CO3: Apply SOA concepts in multiple channel access.
CO4: Classify the meta data Management in web community.
CO5: Analyze the impact of transactions in web services.

Text Book:

1. Eric Newcomer, Greg Lomow,"Understanding SOA with Web Services", 4th Edition, Pearson Education, New Delhi, 2011.

Reference Books:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Prentice Hall Publication, 2011.
2. Eric Pulier, Hugh Taylor, "Understanding Enterprise SOA", Dreamtech press, New Delhi, 2005.
3. Dan Woods, Thomas Mattern "Enterprise SOA: Designing it for Business Innovation", Shroff publishers, 2006.

Web References:

1. http://www.service-architecture.com/
2. http://www.opengroup.org/standards/soa
3. http://xml.coverpages.org/soa.html

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Course Code: 16ITE18	Course Title: BUSINESS INTELLIGENCE	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT45 Database Management Systems

Course Objectives

The course is intended to:

1. Classify the different types of digital data.
2. Identify the data models for On-Line Transaction Processing and On-Line Analytical Processing.
3. Formulate the data warehouse implementation methodology and project life cycle.
4. Compile the metrics, indicators and make recommendations to achieve the business goal.
5. Create an enterprise dashboard.

Unit I - INTRODUCTION TO BUSINESS INTELLIGENCE 8

Business View of Information Technology Applications – Case Studies – Types of Digital Data: Introduction – Getting into "Good Life Database" – Structured Data – Unstructured Data – Semi Structured Data – Difference between Semi Structured Data and Structured Data.

Unit II - INTRODUCTION TO OLTP AND OLAP 9

On-Line Transaction Processing – On-Line Analytical Processing – Different OLAP Architectures – OLTP and OLAP – Data Models for OLTP and OLAP – Role of OLAP Tools in BI Architecture – OLAP Operations on Multidimensional Data – Leveraging ERP Data Using Analytics – Getting Started with Business Intelligence.

Unit III - DATA INTEGRATIONS 10

BI Concepts: BI Component Framework – Who is BI for? – BI Users – BI Applications – BI Roles and Responsibilities. Basics of Data Integration: Need for Data Warehouse – Data Mart – Ralph Kimball's vs. W.H. Inmon's Approach – Goals of Data Warehouse – Constitutes of Data Warehouse – Extract, Transform, Load – Constitutes of Data Integration – Data Integration Technologies – Data Quality – Data Profiling – Case Study.

Unit IV - MULTIDIMENSIONAL DATA MODELING 9

Data Modeling Basics – Types of Data Model – Data Modeling Techniques – Fact Table – Dimension Table – Typical Dimensional Models – Dimensional Modeling Life Cycle – Measures, Metrics, KPIs and Performance Management.

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Unit V - ENTERPRISE REPORTING 9

Reporting Perspectives – Reporting Standardization and Presentation Practices – Enterprise Reporting Characteristics – Balanced Scorecards – Dashboards – Dashboard Creation – Scorecards vs. Dashboards – BI Road Ahead.

Course Outcomes

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

CO1: Classify the different types of digital data and their differences for Information technology application.

CO2: Identify the data models for On-Line Transaction Processing and On-Line Analytical Processing for the given business application.

CO3: Formulate the data warehouse implementation methodology and project life cycle using ETL operations.

CO4: Compile the metrics, indicators and make recommendations to achieve the business goal for the given business scenario.

CO5: Create an enterprise dashboard that depicts the key performance indicators which helps in decision making.

Text Book:

1. R.N.Prasad and Seema Acharya,"Fundamentals of Business Analytics", 2nd Edition, Wiley India, 2012.

Reference Books:

1. Minelli Michael, Chambers Michael, Dhiraj Ambiga, "Big Data Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", Wiley India, 2014.
2. Turban Efrain, Sharda Ramesh, Delen Dursun, "Decision Support and Business Intelligence Systems", Pearson, 2014.
3. Leblanc Patrick, "Applied Microsoft Business Intelligence", Wiley, 2015.

Web References:

1. https://www.tutorialspoint.com/management_information_system/business_intelligence_system.html
2. http://businessintelligencetutorial.blogspot.in/
3. https://www.ibm.com/support/knowledgecenter/en/SSZJPZ_11.5.0/com.ibm.swg.im.iis.mdbbr.doc/topics/c_BI_metadata.html
4. https://docs.oracle.com/cd/E21764_01/bi.1111/e16364/soa_overview.htm#BIEIT137

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Course Code: 16ITE19	Course Title: BIG DATA AND ANALYTICS	
Elective	L : T : P : C	3: 0: 0: 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT45 Database Management Systems
- 16ITT61 Data Mining and Analytics

Course Objectives

The course is intended to:

1. Explain the concept and challenge of big data analytics and technologies.
2. Design a database for the big data applications.
3. Apply the features of Cassandra.
4. Summarize the various forms of integrated data.
5. Build the reliable, scalable and distributed systems.

Unit I - INTRODUCTION TO BIG DATA ANALYTICS 9

Introduction - Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data – Importance of Big Data Analytics - Data Science - Terminologies Used in Big Data Environment - Other Analytics Tools.

Unit II - INTRODUCTION TO MONGODB 9

Introduction – Features of MongoDB - Terms used in RDBMS and MongoDB - Data Types in MongoDB - CRUD (Create, Read, Update and Delete).

Unit III - INTRODUCTION TO CASSANDRA 9

Apache Cassandra – An Introduction - Features of Cassandra - CQL Data Types – CQLSH – Keyspaces - CRUD – Collections - Using a Counter - Time To Live (TTL) - Alter -Import and Export- System Tables.

Unit IV - INTRODUCTION TO HIVE 9

Features of Hive - Integration and Work Flow – Architecture - Data Types - File Format - Hive Query Language - RCFILE Implementation – SERDE – UDF.

Unit V - INTRODUCTION TO PIG 9

Pig on Hadoop - Pig Latin Overview - Data Types in Pig - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Type - Word Count Example - Pig versus Hive.

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Course Outcomes

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

CO1: Explain the concept and challenge of big data analytics and technologies used to analyze the big data.
CO2: Design a database for the big data applications by incorporating the MongoDB query language.
CO3: Apply the features of cassandra for storing and processing large volumes of data.
CO4: Summarize the various forms of integrated data using hive.
CO5: Build the reliable, scalable and distributed systems with apache hadoop.

Text Books:

1. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", 1st Edition, Wiley India, 2015.

Reference Books:

1. EMC Education Services, "Data Science and Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2015.
2. DT Editorial Services, "Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization", Dreamtech Press, 2016.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2013.
4. Jure Leskovec, Anand Rajaraman, Jeffery David Ullman, "Mining of Massive Datasets", 2nd Edition, Cambridge University Press, 2014.

Web References:

1. https://bigdatauniversity.com/
2. https://www-01.ibm.com/software/data/infosphere/hadoop/what-is-big-data-analytics.html
3. https://www.tutorialspoint.com/big_data_tutorials.htm

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Course Code: 16ITE20	Course Title: TEXT MINING	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT45 Database Management Systems

Course Objectives

The course is intended to:

1. Identify the different features mined from text and web.
2. Classify the text document to retrieve the information.
3. Identify the structure of a document.
4. Determine the text classifiers and cluster the textual data.
5. Implement a text mining system.

Unit I – INTRODUCTION **10**

Overview of Text Mining: Types of Problems- Document Classification- Information Retrieval- Clustering and Organizing Documents- Information Extraction- Prediction and Evaluation-Textual Information to Numerical Vectors: Collecting Documents- Document Standardization- Tokenization- Lemmatization -Vector Generation for Prediction-Sentence Boundary Determination-Part-of-Speech Tagging-Word Sense Disambiguation-Phrase Recognition-Named Entity Recognition-Parsing-Feature Generation.

Unit II – TEXT PREDICTION AND INFORMATION RETRIEVAL **9**

Text for Prediction: Document Classification-Predict From Text-Evaluation of Performance-Applications. Information Retrieval and Text Mining: Keyword Search-Nearest-Neighbor Methods- Measuring Similarity- Web Based Document Search-Matching- Inverted Lists- Evaluation.

Unit III - FINDING STRUCTURE AND INFORMATION EXTRACTION **9**

Clustering Documents by Similarity- Similarity of Composite Documents-Goals of Information Extraction-Finding Patterns and Entities from Text- Core Reference and Relationship Extraction- Template Filling and Database Construction- Applications.

Unit IV – CATEGORIZATION AND CLUSTERING **9**

Text Categorization: Applications – Definition – Document Representation –Approaches to Text Categorization –Unlabeled Data to Improve Classification-Evaluation of Text Classifiers -Clustering :Tasks in Text Analysis-General Clustering Problem-Clustering Algorithms-Clustering of Textual Data.

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Unit V – DATA SOURCES AND CASE STUDIES 8

Data Sources for Prediction: Ideal Models of Data-Practical Data Sourcing-Prototypical Examples-Case Studies-Emerging Directions: Summarization-Active Learning-Learning with Unlabeled Data-Different Ways of Collecting Samples –Distributed Text Mining-Learning to Rank- Question Answering.

Course Outcomes

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

CO1: Identify the different features mined from text and web documents for the given application.
CO2: Classify the text document to retrieve the information from the datasets.
CO3: Identify the structure of a document to extract the patterns.
CO4: Determine the text classifiers and cluster the textual data for the real time application.
CO5: Implement a text mining system that can be used for an application.

Text Book:

1. Sholom Weiss, Nitin Indurkhya, Tong Zhang, "Fundamentals of Predictive Text Mining", Springer, paperback 2015. (Unit - I,II,III,V)
2. Ronen Feldman, James Sanger " The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data" Cambridge University press, 2006.(Unit - IV)

Reference Books:

1. Charu C. Aggarwal ,Cheng Xiang Zhai, "Mining Text Data", Springer; 2012.
2. Manu Konchady "Text Mining Application Programming", Fourth Reprint Cengage Learing, 2009.
3. Thomas W. Miller, "Data and Text Mining-A Business Applications Approach", Second Edition, Prentice Hall, 2011.

Web References:

1. https://www.tutorialspoint.com/data_mining/dm_mining_text_data.htm
2. https://data-flair.training/blogs/text-mining/

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Course Code: 16ITE21	Course Title: TOTAL QUALITY MANAGEMENT	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Describe the fundamentals of total quality management.
2. Choose the appropriate TQM methodologies.
3. Apply traditional tools and techniques.
4. Apply the various performance measures.
5. Identify the quality system standards.

Unit I - INTRODUCTION 9

Introduction - Need for Quality - Evolution of Quality - Definition of Quality - Dimensions of Manufacturing and Service Quality - Basic Concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

Unit II - TQM PRINCIPLES 9

Leadership – Strategic Quality Planning, Quality Statements - Customer Focus – Customer Orientation-Customer Satisfaction- Customer Complaints- Customer Retention - Employee Involvement – Motivation- Empowerment-Team and Teamwork-Recognition and Reward, Performance Appraisal – Continuous Process Improvement – PDSA Cycle, 5s, Kaizen - Supplier Partnership – Partnering- Supplier Selection-Supplier Rating.

Unit III - TQM TOOLS & TECHNIQUES I 9

The Seven Traditional Tools of Quality – New Management Tools – Six-Sigma: Concepts-Methodology-Applications to Manufacturing-Service Sector Including IT – Bench Marking – Reason to Bench Mark-Bench Marking Process – FMEA – Stages-Types.

Unit IV - TQM TOOLS & TECHNIQUES II 9

Quality Circles – Quality Function Deployment (QFD) – Taguchi Quality Loss Function – TPM – Concepts- Improvement Needs – Cost of Quality – Performance Measures.

Unit V - QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements-Documentation-Quality Auditing- QS9000 – ISO 14000 – Concepts-Requirements and Benefits – Capability Maturity Model for Software Industry.

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Course Outcomes

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

CO1: Describe the fundamentals of total quality management based on the TQM principles for the modern organizations.
CO2: Choose the appropriate methods from the TQM principles for managing the organization.
CO3: Apply traditional tools and techniques for identifying customer needs in the software industry.
CO4: Apply the various performance measures for quality improvement.
CO5: Identify the quality system standards for software industry.

Text Book:

1. Dale H. Besterfield, Carol Besterfield-Michna,Glen Besterfield, Mary Besterfield-Sacre, "Total Quality Management", 3rd Edition, Pearson Education Asia, Indian Reprint, 2011.

Reference Books:

1. James R. Evans, William M. Lindsay, "The Management and Control of Quality", 6th Edition ,South-Western (Thomson Learning), 2005.
2. Oakland J.S., "TQM – Text with Cases", Butterworth – Heinemann Ltd., 3rd Edition, Oxford, 2003.
3. Suganthi L, Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. Janakiraman B, Gopal R.K, "Total Quality Management – Text and Cases", Prentice Hall (India)Pvt. Ltd, 2015.

Web References:

1. https://class.coursera.org/analyticalchem-001/lecture/67
2. http://nptel.ac.in/courses/110101010/27
3. http://www.isixsigma.com/tt/fmea/
4. http://management.about.com/cs/benchmarking/a/Benchmarking.html
5. http://www.npd-solutions.com/fmea.html

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Course Code: 16ITE22	Course Title: SOFTWARE PROJECT MANAGEMENT	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Evaluate the selection of appropriate software project approach.
2. Formulate the sequence of project scheduling and risk management activities.
3. Create project plans and risk analysis activities.
4. Compose the need of software estimation techniques and resource allocation.
5. Select appropriate people for the project.

Unit I – INTRODUCTION 9

Introduction- Need for Software Project Management – Software Project Versus Other Projects –Contract Management – Activities - Project Life Cycle Models for Software – Product Versus Process Quality Management –Programme Management - Overview of Project Planning.

Unit II - PROJECT EVALUATION 9

Introduction - Strategic Assessment - Technical Assessment - Cost Benefits Analysis – Cash Flow Forecasting - Cost Benefit Evaluation Techniques - Risk Evaluation – Selection of Appropriate Project Approach.

Unit III - ACTIVITY PLANNING 9

Objectives - Project Schedules – Project and Activities - Sequencing and Scheduling Activities - Network Planning Models – Formulating Network Models - Using Dummy Activities - Identifying Critical Path - Identifying Critical Activities – Activity –on –Arrow Networks - Risk Analysis and Management: Nature of Risk - Managing Risk – Risk Identification - Risk Analysis - Reducing the Risks - Evaluating the Risks - PERT Technique.

Unit IV - SOFTWARE EFFORT ESTIMATION 9

Problems with Over and Under Estimate - The Basis for Software Estimation – Software Estimation Techniques – Bottom-Up & Top-Down Approach - Expert Judgments - Estimating by Analogy - Function Point Analysis - Resource Allocation: Nature – Identifying Resource Requirements - Scheduling Resources –Publishing Schedule – Cost Schedules.

Unit V - MONITORING, MANAGING PEOPLE AND ORGANIZING TEAMS 9

Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring –

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Earned Value – Prioritizing Monitoring. Managing People - Understanding Behavior – Organizational Behaviour: A Background – Selecting the Right Person for the Job – Instruction in the Best Methods – Motivation – Working in Teams.

Course Outcomes

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

CO1: Evaluate the selection of appropriate software project approach for a real time application.
CO2: Formulate the sequence of project scheduling and risk management activities for the development of software.
CO3: Create project plans and risk analysis activities that address the real-world management challenges.
CO4: Compose the need of software estimation techniques and resource allocation for a real world scenario.
CO5: Select appropriate people for the project for understanding organizational behavior.

Text Book:

1. Bob huges, Mike cotterell, "Software Project Management", 5th Edition , Tata McGraw Hill, New Delhi, 2010.

Reference Books:

1. Roger S Pressman, "Software Engineering, A Practitioner's Approach", 7th Edition, McGraw-Hill Higher Education, 2010.
2. Kamna Malik, Praveen Choudary, "Software Quality, a practitioner's Approach", Tata McGraw-Hill Education, 2008
3. Walker Royce,"Software Project Management : a unified framework", Pearson Education, New Delhi, 2005.
4. Pankaj Jalote , "Software Project Management in practice", Pearson Education, New Delhi ,2009.

Web References:

1. http://nptel.ac.in/courses/106101061/29
2. http://freevideolectures.com/Course/2318/Software-Engineering/29
3. http://www.scribd.com/doc/7150545/Software-Project-Study-Material#scribd

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Course Code: 16ITE23	Course Title: AGILE SOFTWARE DEVELOPMENT	
Elective	L : T : P : C	3:0:0:3
Type: Lecture	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Describe the concepts involved in Agile software development.
2. Define the benefits of using SCRUM.
3. Identify various roles and responsibilities in SCRUM.
4. Analyze the scrum team structure with their responsibilities.
5. Present the SCRUM requirements effectively.

UNIT I - INTRODUCTION 9

Agile Development – Agility – Cost of Change – Agile Process – Principles and Human Factors – Extreme Programming (XP): Values, XP Process, and Industrial XP – Agile Process Models: Adaptive Software Development (ASD) – Scrum – DSDM – Crystal – Feature Driven Development – LSD – Agile Modeling – Agile Unified Process.

UNIT II - SCRUM 9

Advantages of Agile Development: Higher Productivity, Lower Costs, Faster Time to Market, Higher Quality – Introduction to SCRUM – Adapting to SCRUM – Awareness – Desire – Ability – Promotion – Transfer – Integrating all Together.

UNIT III - SCRUM PRACTICES AND INDIVIDUALS 10

Individual Roles – Scrum Master – Product Owner – Changed Roles: Analysts, Project Managers, Architects, Functional Managers, Programmers, DB Administrators, Testers, User Experience Designers - Technical Practices – Strive for Excellence - Test-driven development – Refactoring – Collective Ownership – Continuous Integration – Pair Programming –Design: Intentional yet Emergent – Guiding the Design.

UNIT IV - SCRUM TEAMWORK 8

Team Structures – Small Team Productivity – Feature Teams – Component Teams – Guidelines for Good Team Structure – Team Responsibility – Foster Team Learning – Self-Organizing Team – Influencing Evolution: Selecting Environment, Defining Performance, Manage Meaning, Energizing the System.

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UNIT V- SCRUM SPECIFICATION 9

Product Backlog – Documents to Discussions – Written Documentation Disadvantages – User Stories -Progressively Refine Requirements – Emergent Requirements – Backlog Iceberg – Refining User Stories – Specify by Example.

Course Outcomes

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

CO1: Describe the various concepts and activities involved in the Agile Software Development process.
CO2: Define SCRUM and illustrate the benefits of using SCRUM.
CO3: Identify various individual roles and explain their responsibilities/activities in SCRUM.
CO4: Explain and analyze the SCRUM Team Structures along with their responsibilities and performances for effective project management.
CO5: Present the SCRUM requirements and specifications effectively.

Text Books:

1. Roger S.Pressman, "Software engineering- A practitioner's Approach", McGraw-Hill International Edition, 7th Edition, 2010 (Unit –I).
2. Mike Cohn, "Succeeding with Agile: Software Development Using Scrum", Addison-Wesley, 2009 (Unit –II,III,IV,V).

Reference:

1. Ken Schwaber, "Agile Project Management with Scrum (Microsoft Professional)", Microsoft Press, 2004.

Web References:

1. http://highered.mcgraw-hill.com/sites/0073375977/information_center_view0/
2. http://www.succeedingwithagile.com/

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Course Code: 16ITE24	Course Title: SOFTWARE QUALITY AND TESTING	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Identify the suitable software process model.
2. Compare the different testing methods.
3. Examine the ways and means of managing, controlling and monitoring testing activity.
4. Apply the testing tools and techniques.
5. Assess the software testing techniques.

Unit I - PRINCIPLES OF TESTING AND QUALITY CONTROL 9

Context of Testing in Producing Software-Basic Principles of Testing with Examples-Software Development Life Cycle Models: Phases of Software Project- Quality Assurance and Quality Control-Testing-Verification and Validation- Process Model- Life Cycle Models.

Unit II - TESTING METHODS 9

White Box Testing: Static Testing- Structural Testing and Challenges in White Box Testing-Black Box Testing: Requirements Based Testing- Equivalence Partitioning-State Based Testing- Compatibility Testing- User Documentation Testing and Domain Testing. System Testing: Functional System Testing and Non Functional Testing.

Unit III - TEST MANAGEMENT, CONTROL AND MONITORING 9

Test Planning-Test Management-Test Process- Test Reporting-Test Process- Best Practices. Test Metrics and Measurements: Progress Metrics-Productivity Metrics-Release Metrics.

Unit IV - SYSTEM TESTING & TOOL 9

System Testing: Process- Commencement and Planning- Test Design- Execution and Reporting & Defect Tracking. Winrunner 8.0: Introduction to Winrunner - Checkpoints in Winrunner- Data Driven and Batch Testing- Improve Test Automation in Winrunner-GUI Mapping- Web Test Option in Winrunner.

Unit V - TEST AUTOMATION TOOLS 9

QTP 8.2: Introduction - Edit Test Scripts– Improving Test Automation in QTP-Data Driven and Batch Testing-Web Test Options in QTP. Loadrunner 8.0: Introduction to Performance Testing-Vuserscript Creation using Loadrunner- Vuserscript Execution and Results Analysis. Testdirector 8.0: Site Administrator-Understanding Testdirector.

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Course Outcomes

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

CO1: Identify the suitable software process model for specific scenario and quality control.
CO2: Compare the different testing methods for performing software testing.
CO3: Examine the ways and means of managing, controlling and monitoring testing activity involved in the software development.
CO4: Apply the testing tools and techniques for developing test cases and conduct investigations in system based testing.
CO5: Assess the software testing techniques using automation tools.

Text Books:

1. Srinivasan Desikan , Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Prentice Hall, 2007 (Unit I, II, III).
2. Nageshwar Rao Pusuluri, "Software Testing Concepts And Tools", Dream tech Press, 2014(Unit IV, V).

Reference Books:

1. Limaye M G, "Software Testing – Principles, Techniques and Tools", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009.
2. Mark Fewster, Dorothy Graham, "Software Test Automation: Effective Use of Test Execution Tools", Addison Wesley, New Delhi, 1999.
3. William E Perry, "Effective Methods of Software Testing", 3rd Edition, John Wiley &sons, Singapore 2009.
4. Ilene Burnstein, "Practical Software Testing: A Process-Oriented Approach", Springer International Edition, 2003.

Web References:

1. https://www.en.wikibooks.org/wiki/...to_Software.../Process/Life_Cycle
2. https://www.softwaretestingfundamentals.com
3. https://www.softwareqatest.com/qatweb1.html

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Course Code: 16ITE25	Course Title: E-COMMERCE	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT54 Computer Networks

Course Objectives

The course is intended to:

1. Outline the foundations and importance of E-commerce.
2. Summarize the specifications of electronic payment systems.
3. Identify the structure of transferring the business information
4. Determine the significance of Software Agents.
5. Recognize the uses of Mobile commerce and its capabilities.

Unit I – INTRODUCTION 9

Electronic Commerce – Overview of Electronic Commerce Framework – Electronic Commerce and Media Convergence– Applications; Network Infrastructure – Components of the I-Way- Network Access Equipment; Client Server Network Security-Client Server Security Threats-Firewalls and Network Security.

Unit II - WORLD WIDE WEB AND ELECTONIC PAYMENT SYSTEMS 9

E- Commerce and World Wide Web- Architecture- Technology Behind the Web-Security and Web; Consumer Oriented Applications – Mercantile Process Models; Electronic Payment Systems –Digital Token Based EPS – Smart Cards – Credit Cards – Risks – Designing EPS.

Unit III - ORGANIZATIONAL COMMERCE AND EDI 9

Electronic Data Interchange – EDI Applications in Business – Legal, Security and Privacy Issues- EDI and Electronic Commerce – EDI Standardization and Implementation – EDI Envelope for Message Transport-Value Added Networks-Internet Based EDI.

Unit IV - ADVERTISING, MARKETING AND SOFTWARE AGENTS 9

Advertising and Marketing on the Internet-Information Based Marketing-Advertising -on-Line Marketing Process; History of Software Agents –Characteristics and Properties of Agents-Technology-Telescript Agent Language-Safe-Tcl-Applets, Browsers and Software Agents-Software Agents in Action.

Unit V - MOBILE COMMERCE 9

Introduction – Wireless Device for Mobile Commerce-Location Based Services-Classification Framework-Wireless Personal and Local Area Network- Wireless Application Protocol-Mobile Business Services- Mobile Portals.

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Course Outcomes

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

CO1: Outline the foundations and importance of E-commerce in business application.

CO2: Summarize the specifications of electronic payment systems for Consumer Oriented Applications.

CO3: Identify the structure of transferring the business information using Electronic Data Interchange.

CO4: Determine the significance of Software Agents in Internet Security standards for Advertising and Marketing

CO5: Recognize the uses of Mobile commerce and its capabilities in intelligent agents and web-based Marketing.

Text Books:

1. Ravi Kalakota ,Andrew B Whinston, "Frontiers of Electronic Commerce" , Pearson Education Asia, 2013.(Unit-I,II,III,IV)
2. E.Brian Mennecke, J.Troy Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group Inc., IRM press, 2003. (Unit-V)

Reference Books:

1. Judy Strauss , Raymond Frost, " E Marketing ", PHI, 2002
2. Brenda Kienan , " Managing e Commerce Business" , PHI,2001
3. P. J. Louis, "MCommerce Crash Course", McGrawHill Companies February 2001.

Web References:

1. http://www.techtutorials.info/ecommerce.html
2. http://en.wikipedia.org/wiki/Electronic_data_interchange
3. http://cs.anu.edu.au/student/comp3410/lectures/security/symmetric-4up.pdf

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BoS Chairman

Course Code: 16ITE26	Course Title: USER INTERFACE DESIGN	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Summarize the different user interfaces.
2. Apply the knowledge to design user interface.
3. Create graphical interface controls.
4. Formulate multimedia interface concepts.
5. Combine different layout tests.

Unit I – INTRODUCTION 9

Introduction-Importance-Human-Computer Interface-Characteristics of Graphics Interface-Direct Manipulation Graphical System - Web User Interface-Popularity-Characteristic & Principles.

Unit II - HUMAN COMPUTER INTERACTION 9

User Interface Design Process- Obstacles-Usability-Human Characteristics in Design - Human Interaction Speed-Business Functions-Requirement Analysis-Direct-Indirect Methods-Basic Business Functions-Design Standards-System Timings - Human Consideration in Screen Design - Structures of Menus - Functions of Menus-Contents of Menu-Formatting -Phrasing the Menu - Selecting Menu Choice-Navigating Menus-Graphical Menus.

Unit III - WINDOWS 9

Characteristics-Components-Presentation Styles-Types-Managements-Organizations-Operations-Web Systems-Device-Based Controls: Characteristics-Screen -Based Controls: Operate Control - Text Boxes-Selection Control-Combination Control-Custom Control-Presentation Control.

Unit IV – MULTIMEDIA 9

Text for Web Pages - Effective Feedback-Guidance & Assistance-Internationalization-Accesssibility-Icons-Image-Multimedia -Coloring.

Unit V - WINDOWS LAYOUT 9

Prototypes - Kinds of Tests - Retest – Case Study: Information Search - Visualization - Hypermedia -WWW - Software Tools: Lumzy, Flat UI Pro, and Cacoo.

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Course Outcomes

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

CO1: Summarize the different user interfaces for graphics and web systems.
CO2: Apply the knowledge to design user interface using business functions and menus.
CO3: Create graphical interface controls for window based applications.
CO4: Formulate multimedia interface concepts with user interface design.
CO5: Combine different layout tests for window based applications.

Text Books:

1. Wilbent. O. Galitz ,"The Essential Guide to User Interface Design", 2nd Edition, John Wiley & Sons, New Delhi, 2009.

Reference Books:

1. Alan Cooper, "The Essential of User Interface Design", Wiley – Dream Tech Ltd., New Delhi, 2007.
2. Ben Sheiderman, "Design the User Interface", Pearson Education, New Delhi, 1998.
3. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, "Human – Computer Interaction", 3rd Edition, Pearson Education, New Delhi, 2004.
4. Theo Mandel, "Elements of User Interface Design", John Wiley & Sons, New Delhi,1997 .

Web References:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-831-user-interface-design-and-implementation-spring-2011/lecture-notes/
2. http://nptel.ac.in/courses/106105087/pdf/m09L20.pdf
3. https://www.tutorialspoint.com/software_engineering/software_user_interface_design.htm

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Course Code: 16ITE27	Course Title: ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Apply the concepts of Engineering economics.
2. Evaluate various Interest formulae's.
3. Apply the concepts of financial management.
4. Estimate the valuation measures.
5. Analyze capital budgeting process.

Unit I – INTRODUCTION TO ECONOMICS 9

Introduction to Economics-Concept of Engineering Economics-Elements of Costs-Other Costs and Revenues- Break-Even Analysis- Profit Volume Ratio-Elementary Economic Analysis: Examples for Simple Economic Analysis.

Unit II – VALUE ENGINEERING 9

Introduction- Value engineering – Function, Aims, Value Engineering Procedure-Interest Formulas and their Applications-Examples in all the Methods.

Unit III – FINANCIAL MANAGEMENT :AN OVERVIEW 9

Introduction: Evolution of Financial Management, Goals, Agency Problem, Key Activities, Risk-return Tradeoff-Organizational, Regulatory and Tax Framework-Indian Financial System.

Unit IV – VALUATION CONCEPTS 9

Time Value of Money-Risk and Return-Valuation of Securities: Basic Valuation Model, Bond Validation, Equity Validation.

Unit V – CAPITAL BUDGETING 9

Basics of Capital Budgeting Process-Costs and Benefits-The Cost of Capital-Risk of Analysis in Capital Budgeting.

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Course Outcomes

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

CO1: Apply the theories, cost concepts and policies related to economics.
CO2:Evaluate various Interest formulae and their applications for different investment situations.
CO3: Apply the concepts of financial management and concepts of globalization.
CO4: Estimate the measures of valuation for various applications in accounting.
CO5:Analyze capital budgeting process and financial statements using risk analysis.

Text Book:

1. Panneer Selvam.R, "Engineering Economics", Prentice Hall of India Ltd, New Delhi, 2nd Edition, 2012(Unit –I,II).
2. Prasanna Chandra, "Financial Management - Theory & Practice", 4th Edition, Tata Mcgraw Hill Publications, New Delhi, 2001(Unit – III,IV,V).

Reference Books:

1. James C.VanHorne, John M.Wachowicz, "Fundamentals of Financial Management", FT Prentice Hall, Harlow, 11th Edition, 2001.
2. Samuelson Paul A,Nordhaus W.D., "Economics", Tata Mcgraw Hill Publishing Company Ltd, New Delhi, 2004.
3. Mote V L, Samuel Paul,Gupta G S, "Managerial Economics: Concepts and Cases", Tata Mcgraw Hill Publishing Company Ltd, 2004.

Web References:

1. https://onlineengineering.wordpress.com/category/it/engineering-economics-financial-accounting-it/
2. http://nptel.ac.in/downloads/105103023/
3. http://nptel.ac.in/courses/105103023/41

BoS Chairman

Course Code: 16ITE28	Course Title: PRINCIPLES OF MANAGEMENT	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ITT33 Software Engineering

Course Objectives

The course is intended to:

1. Explain social responsibilities as engineers & managers.
2. Create Planning process and decision making.
3. Compile the ways and means of managing the organization process.
4. Analyze various organizations and motivation strategies.
5. Combine various controlling techniques and tools.

Unit I - OVERVIEW OF MANAGEMENT 9

Organization - Management - Role of Managers - Evolution of Management Thought – Organization and the Environmental Factors - Managing Globally - Strategies for International Business. Case Study: Flight Plans, Out of Control.

Unit II - PLANNING 9

Nature and Purpose of Planning - Planning Process - Types of Plans – Objectives - Management by Objective (MBO) Strategies - Types of Strategies - Policies - Decision Making - Types of Decision– Decision Making Process - Rational Decision Making Process - Decision Making Under Different Conditions. Case Study: Underwater Chaos, Icelandic Volcano, Global Commerce.

Unit III - ORGANIZING 9

Nature and Purpose of Organizing - Organization Structure - Formal and Informal Groups Organization - Line and Staff Authority - Departmentation - Span of Control - Centralization and Decentralization - Delegation of Authority - Staffing - Selection and Recruitment - Orientation – Career Development - Career Stages – Training - Performance Appraisal. Case Study: The Virus Hunters.

Unit IV - DIRECTING 9

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories Leadership - Leadership Theories- Communication - Hurdles to Effective Communication -Organization Culture - Elements and Types of Culture - Managing Cultural Diversity. Case Study: Delivery Disaster, Master and Commander.

Unit V - CONTROLLING 9

The Control Process – Controlling for Organizational Performance – Budgetary and Non-Budgetary Control Techniques - Tools for Measuring Organizational

BoS Chairman

Performance – Contemporary Issues in Control. Case Study: Deep Water in Deep Trouble, Smooth Ride.

Course Outcomes

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

CO1: Explain Social responsibilities as engineers & managers for future managers.
CO2: Create Planning process and decision making for an organization.
CO3: Compile the ways and means of managing the organization process for staffing.
CO4: Analyze various organizations and motivation strategies to develop self-motivation among the engineers.
CO5: Combine various controlling techniques and tools for measuring organizational performance.

Text Book:

1. Stephen P. Robbins, Mary Coulter, "Management", 11th Edition, Prentice Hall of India, 2012.

Reference Books:

1. Charles W L Hill, Steven L McShane, "Principles of Management", Mcgraw Hill Education, Special Indian Edition, 2007.
2. Hellriegel, Slocum,Jackson, "Management - A Competency Based Approach", ThomsonSouth Western, 10th Edition, 2007.
3. Harold Koontz, Heinz Weihrich,Mark V Cannice, "Management - A Global & Entrepreneurial Perspective", Tata Mcgraw Hill, 12th Edition, 2007.

Web References:

1. www.docs-engine.com/.../stephen-p-robbins-management-powerpoint.html
2. nptel.ac.in/courses/110102016/
3. nptel.ac.in/courses/122108038/
4. www.nptelvideos.in/.../concept-evolution-of-management-thought.html
5. www.slideshare.net/.../principles-of-management-presentation-731212

BoS Chairman

Course Code: 16ITE29	Course Title: ARDUINO PROGRAMMING	
Elective	L : T : P : C	2: 0: 2: 3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT42 Microprocessor and Microcontroller

Course Objectives

The course is intended to:

1. Categorize arduino shields.
2. Configure the arduino IDE to communicate.
3. Creation the arduino program.
4. Interface LCD and motor devices in Arduino.
5. Interface sensors and Ethernet shield in Arduino.

Unit I - THE ARDUINO PROGRAMMING ENVIRONMENT 6

Introduction to the Arduino – Atmel AVR –Arduino Project-Atmega Series- Different Ardunio– Arduino Sheilds

Unit II - PROGRAMMING IN ARDUINO 6

Introduction to IDE- Designing First Arduino Sketch-Basics of Programming: Variable and Data Types-Control Structure– Functions - Libraries

Unit III - ARDUINO LANGUAGE 6

I/O Function-Time Functions –Mathematical Functions –Trigonometry-Interrupts Serial Communication: Uart Communication-Starting Serial Data –Writing Data –Reading Data

Unit IV - INTERFACING ARDUINO WITH MOTORS 6

Introduction to Servo Motor - Controlling Servo Motor - Introduction to Stepper Motor - Controlling Stepper Motor - Liquid Crystal - Example Application.

Unit V - INTERFACING ARDUNIO WITH SENSORS 6

Detecting Movement- Detecting Light-Detecting Motion-Measuring Distance- Measuring Distance Accurately-Detecting Vibration-Detecting Sound-Measuring Temperature-Working with the Ethernet

BoS Chairman

LAB COMPONENT **30**

1. Experiment with arduino using basics of Programming
2. Implement Digital and Analog Interface using LED
3. Interface the arduino Kit with LCD
4. Interface the arduino Kit with sensors
   - Ultrasonic Sensor
   - IR sensor
   - Touch sensor
5. Interface the arduino Kit with Motors
   - Servo motor
   - Stepper motor
6. Experiment with arduino kit by connecting to Wi-Fi shield

Course Outcomes

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

CO1: Categorize arduino shields for various technologies.
CO2: Configure the arduino IDE to communicate with the arduino hardware.
CO3: Create the arduino program using function libraries.
CO4: Interface arduino with devices such as motors and LCD.
CO5: Interface arduino with devices such as sensors and Ethernet shield.

Text Books:

1. James A. Langbridge "Arduino Sketches: Tools and Techniques for Programming Wizardry", 1st Edition, Wiley publication,2015 (Unit I,II,III,IV).
2. Michael, Margolis. "Arduino Cookbook",2nd Edition, O'Reilly Media, 2012.(Unit V).

Reference Books:

1. Tero Karvinen, Kimmo Karvine, Ville Valtokari "Make: Sensors: A Hands-On Primer for Monitoring the Real World with Arduino and Raspberry Pi" ,1st Edition,2014.
2. Bahga, Arshdeep, and Vijay Madisetti, "Internet of Things: A Hands-on Approach" VPT Publisher, 2014.
3. McEwen, Adrian, and Hakim Cassimally, "Designing the Internet of Tshings", John Wiley & Sons, 2013.

Web References:

1. https://www.arduino.cc/en/Tutorial/HomePage
2. http://www.control.aau.dk/~jdn/edu/doc/arduino/litt/ArduinoTutorials.pdf
3. http://forefront.io/a/beginners-guide-to-arduino/

BoS Chairman

Course Code: 16ITE30	Course Title: .NET PROGRAMMING	
Elective	L : T : P : C	2 : 0 : 2 : 3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT35 Object oriented programming using Java

Course Objectives

The course is intended to:

1. Utilize the simple console application.
2. Create a console application.
3. Apply the concept of generics.
4. Develop windows application.
5. Create a mini project.

Unit I - INTRODUCTION TO C# AND WINDOWS APPLICATION 6

C# and the .NET Architecture – CLR - Assemblies – Classes – Namespaces -C# Basics – Variables - Statements – Arrays – Multi Dimensional Arrays –Jagged Arrays –Array Classes.

Unit II - CLASSES AND OBJECTS 6

Classes – Objects and Classes Types-Methods – Method Overloading –Constructors – Read Only Fields-Inheritance: Types of Inheritance –Modifier – Interfaces- Operators and Types – Operator Overloading.

Unit III - ADVANCE C# CONCEPTS 5

Delegates –Delegate Interfaces - Anonymous Methods – Multicast Delegates - Generics Overview – Classes – Features – Interfaces – Methods – Framework Types – Collection.

Unit IV - DATA ACCESS WITH .NET 6

ADO.NET Introduction – Namespaces – Shared Classes –Connections – Transactions – Commands – Data Readers – Dataset – Data Tables – Working with ADO.NET – SQL Server – Connection Strings – Data Provider – SQL Comments – Data Access with ADO.NET – Viewing Data.

Unit V - WINDOWS & WEB APPLICATION DEVELOPMENT 7

Windows Forms: Creating a Windows Form Application – Control Class – Standard Control and Components - ASP.NET: Introduction – Web Forms – Data Binding - Development – Web Services with ASP.NET.

BoS Chairman

LAB COMPONENT 30

1. Develop console application using basic of C#.
2. Create a console application using oops concepts in c#.
3. Create a windows application to demonstrate all standard controls and components.
4. Create a dynamic web application using ASP components.
5. Create a web application to access the data in ASP.NET with ADO.NET and LINQ.
6. Implement web service using ASP.NET and host in IIS.

Course Outcomes

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

CO1: Utilize the simple console application using statements and arrays.
CO2: Create a console application using OOP concepts.
CO3: Apply the concept of generics to work with any data type.
CO4: Develop a windows application with database connectivity.
CO5: Create a mini project using windows form and web forms with database connectivity.

Text Book:

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, "Professional C# 5.0 and .NET 4.5.1", Wiley India, 2014.

Reference Books:

1. John Sharp, "Microsoft Visual C# Step by Step", 8th Edition Developer Reference, 2015.
2. Jon Skeet, "C# in Depth", 3rd Edition, Manning Publication, 2014.
3. Kogent Learning Solutions Inc. "C# 2012 Programming Black Book Covers .NET 4.5", Dream Tech Press,2012.
4. Ian Griffiths "Programming C# 5.0",Oreilly Publication, 2012.

Web References:

1. http://csharp.net-informations.com/gui/cs_forms.htm
2. http://asp.net-tutorials.com/
3. http://www.w3schools.com/xml/xml_services.asp
4. https://msdn.microsoft.com/en-IN/library/dd492132.aspx

BoS Chairman

Course Code: 16ITE31	Course Title: LINUX SYSTEM ADMINISTRATION AND PROGRAMMING	
Elective	L : T : P : C	2 : 0 : 2 : 3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16GET26 C Programming
- 16ITT44 Operating systems

Course Objectives

The course is intended to:

1. Implement the basic Linux system functionalities.
2. Describe the fundamental Linux system tools and utilities.
3. Write the shell scripts program.
4. Implement the basic services and advanced tasks.
5. Configure the various software packages.

Unit I - INTRODUCTION to LINUX 6

Introduction to Linux And Basics: Linux Distributions – File System Introduction - File System Hierarchies- File System Security with Reference to Selinux -Types of Partitions and Mount Options - RAID Overview-Logical Volume Management.

Unit II - INSTALLATION AND CONFIGURATION 7

Installation and Configurations: Types of Installation Media and Examples -Installation of GNU/Linux - Start Up and Shut Down Sequences - Run Levels-Basic System Navigation- Window Manager, Desktop Environments – KDE, GNOME - Editors (Vim, Nano, Emacs and GUI Editors).

Unit III - SHELL PROGRAMMING 5

Using GNU/Linux (Shell Commands): Overview of Shells – BASH and Other Important Shells - Process Management - User Administration - Networking Overview and Commands -Introduction to IO Redirection - Software Repositories.

Unit IV - SERVICES IN LINUX 5

Apache Web Server and PHP-Firewall Services Using IP-Tables- Openssh - CUPS Printing System – Databases (Mysql) and Basic Administration.

Unit V - INSTALLATION OF SOFTWARE USING SOURCE PACKAGES 7

Installation of Software Using Source Packages, Gcc Compilation – Securing the System – Backups and File Sharing with Reference to Rsync and LVM Snapshots –

BoS Chairman

GRUB and Rescue Mode Operations – Log Processing with Reference to Tools like Awstat- BASH Programming- SVN and Basic Operations.

LAB COMPONENT **30**

1. Study of Unix/Linux general purpose utility command list and execution of various system administrative commands.
2. Write Bash shell, Bourne shell and C shell basic programs in Linux operating system.
3. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
4. Installation of LAMP stack , Tomcat , CUPS , Firewal (openssh).
5. Installation of VirtualBox on a PC having other operating system.
6. Installation of Unix/Linux packages.

Course Outcomes

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

CO1: Implement basic system functionalities of Linux operating system.
CO2: Describe the fundamental Linux system tools and utilities for different installation media.
CO3: Write shell scripts to automate different tasks.
CO4: Implement the basic services and advanced tasks in Linux.
CO5: Configure the various software packages in Linux

Text Book:

1. N. B. Venkateshwarlu, "Introduction to Linux Installation and Programming", B S Publishers, Hyderabad, 2009.

Reference Books:

1. Siny Kumari, "Linux Shell Scripting Essentials", 1st Edition, Packt Publishing,2015.
2. Robert Love , "Linux System Programming",2nd Edition, O'Reilly Publishers,2014.
3. Mark G. Sobell, "Practical Guide to Linux Commands, Editors, and Shell Programming", 3rd Edition,2012.
4. William E. Shotts Jr. "The Linux Command Line: A Complete Introduction", 1st Edition,2012.

Web References:

1. http://dsl.org/cookbook/cookbook_toc.html
2. http://www.tldp.org/guides.html
3. http://www.linux.org/threads/programming-in-linux.4187
4. http://www.freeos.com/guides/lsst/

BoS Chairman

Course Code: 16ITE32	Course Title: ADVANCED JAVA PROGRAMMING	
Elective	L : T : P : C	2:0:2:3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT35 Object oriented programming using Java

Course Objectives

The course is intended to:

1. Develop a native and multi- threaded application.
2. Develop client/server applications.
3. Implement the distributed objects.
4. Develop web based application.
5. Illustrate the multi-tier architecture of web-based enterprise applications.

Unit I - JAVA THREADS 6

Reflection-Fields – Methods; Threads- Running Threads - Returning Information from a Thread – Synchronization – Thread Scheduling - Java Native Interfaces.

Unit II - NETWORK PROGRAMMING IN JAVA 6

Sockets for Clients-Using Sockets - Constructing and Connecting Sockets - Getting Information about a Socket; Sockets for Servers- Using Server Sockets - Constructing Server Sockets; UDP- UDP Clients - UDP Servers – Datagram Packet Class – Datagram Socket Class.

Unit III - APPLICATIONS IN DISTRIBUTED ENVIRONMENT 6

Remote Method Invocation-Remote Objects - Activation – Object Serialization; CORBA-IDL Technology – Naming Services – CORBA Programming Models.

Unit IV - MULTI-TIER APPLICATION DEVELOPMENT 6

Server Side Programming- Servlets – Java Server Pages – Applet to Servlet Communication - Connecting to Databases – JDBC Principles – Database access – Interacting – Database Search –Database Support in Web Applications.

Unit V - BEANS AND ENTERPRISE APPLICATIONS 6

JAR File Creation - Enterprise JavaBeans- EJB Architecture – Types of Enterprise Beans – Steps in Developing an EJB.

BoS Chairman

LAB COMPONENT 30

1. Program using Multithreading.
2. Program using Java Native Interfaces.
3. Program using Socket Programming.
4. Implement remote object using CORBA.
5. Create a dynamic web application using JSP with JDBC Connectivity.
6. Develop enterprise application using EJB.

Course Outcomes

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

CO1: Develop a native and multi- threaded application using java threads.
CO2: Develop client/server applications for transmitting data.
CO3: Implement the distributed objects using RMI and CORBA.
CO4: Develop web based application involving JDBC Connectivity.
CO5: Illustrate the multi-tier architecture of web-based enterprise applications using Enterprise Java Beans.

Text Books:

1. Elliotte Rusty Harold, "Java Network Programming", 4th Edition, O'Reilly publishers, 2013 (Unit-I,II,IV).
2. Sudha Sadasivam G, "Distributed Component Architecture", Wiley, New Delhi, 2008 (Unit -III,V).

Reference Books:

1. Budi Kurniawan, "Java: A Beginner's Tutorial",4th Edition, Brainy Software, 2015.
2. Santosh Kumar K, Kogent Solutions, "JDBC Servelts and JSP Includes JSF and Design Patterns Black Book", Dream Tech Press, 2008.
3. Sheng Liang," The Java Native Interface: Programmer's Guide and Specification", Addison-Wesley, 1999.
4. Patrick Niemeyer and Jonathan Knudsen, "Learning Java", 3rd Edition, O'Reilly, 2005.

Web References:

1. http://www.javatpoint.com/
2. http://docs.oracle.com/en/java/
3. http://www.tutorialspoint.com/

BoS Chairman

Course Code: 16ITE33	Course Title: GRAPHICS AND MULTIMEDIA	
Elective	L : T : P : C	2:0:2:3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16GET26 C Programming

Course Objectives

The course is intended to:

1. Implement line, circle and ellipse drawing algorithms.
2. Implement two dimensional line clipping algorithms.
3. Identify the suitable geometrical transformations solutions.
4. Recognize the multimedia technologies.
5. Design interactive multimedia applications.

Unit I - OUTPUT PRIMITIVES 6

Points and Lines – Line Drawing Algorithms – Circle Generating Algorithms – Ellipse Generating Algorithms – Filled Area Primitives.

Unit II -2D TRANSFORMATIONS 6

Basic Transformations – Matrix Representations and Homogeneous Coordinates – Composite Transformations – Other Transformations – Transformation between Coordinate Systems.

Unit III - 2D VIEWING AND 3D TRANSFORMATIONS 6

2D Viewing: Clipping Operations – Point Clipping – Cohen Sutherland Line Clipping – Polygon Clipping – Curve Clipping – Text Clipping – Exterior Clipping. 3D Geometric and Modeling Transformations: Translation – Rotation – Scaling – Other Transformations.

Unit IV - INTRODUCTION TO MULTIMEDIA 6

Multimedia Elements – Multimedia Applications – Multimedia System Architecture – Evolving Technologies for Multimedia – Defining Objects for Multimedia – The Need for Data Compression – Multimedia Databases.

Unit V - MULTIMEDIA SYSTEM DESIGN 6

Data and File Format Standards: Rich Text Format – TIFF File Format – RIFF – MIDI – JPEG DIB – AVI – MPEG – TWAIN. Multimedia Application Design: Multimedia Application Classes – Types of Multimedia Systems – Virtual Reality Design – Components of Multimedia Systems.

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LAB COMPONENT 30

Tools & Languages:

C, OpenGL, GIMP/Photoshop, Inkscape / Illustrator, Vectorian Giotto/Flash.

1. Implementation of basic output primitives using C program.
2. Implementation of simple graphics applications using C program.
3. Implementation of DDA and Bresenham's line drawing algorithms.
4. Perform two dimensional geometric transformations such as translation, rotation, scaling.
5. Perform operations on image using image editing software.
6. Create interactive animation using animation software.

Course Outcomes

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

CO1. Implement line, circle and ellipse drawing algorithms to develop applications.
CO2: Implement algorithms for two dimensional line clipping.
CO3: Identify the suitable solutions for 2D and 3D geometrical transformations.
CO4. Recognize the multimedia technologies used in the society.
CO5. Design interactive multimedia applications using designing tools.

Text Books:

1. Hearn, Baker, "Computer Graphics with OpenGL", Fourth Edition, Pearson Education, 2014 (Unit - I,II,III).
2. Andleigh, P. K and Kiran Thakrar, "Multimedia Systems and Design", First Edition, Pearson Education, 2015 (Unit - IV,V).

Reference Books:

1. Hearn, Baker, "Computer Graphics with OpenGL", Fourth Edition, Pearson Education, 2014.
2. John Vince, "Mathematics for Computer Graphics", 2nd Edition, Springer SPI publisher services, 2010.
3. F.S. Hill, "Computer Graphics using OPENGL", Second edition, Pearson Education, 2007.

Web References:

1. http://www.opengl-tutorial.org/beginners-tutorials/
2. https://helpx.adobe.com/photoshop/topics.html
3. https://helpx.adobe.com/illustrator.html
4. https://helpx.adobe.com/animate.html
5. https://helpx.adobe.com/audition/topics.html
6. https://helpx.adobe.com/premiere-pro.html
7. http://www.sketchup.com/learn

BoS Chairman

Course Code: 16ITE34	Course Title: DATA ANALYTICS USING R	
Elective	L : T : P : C	2:0:2:3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT45 Database Management Systems

Course Objectives

The course is intended to:

1. Select the dataset for further processing.
2. Apply data management operations using sort, merge, subset and aggregate operations.
3. Apply various statistics methods for better understanding of data.
4. Predict the future by using regression method for the upcoming new data.
5. Create the advanced graphics operations for enhanced visualization.

Unit I – R Fundamentals 6

Introduction to R: Usage of R – Working with R – Packages. Creating a dataset: Understanding datasets – Data structures – Data input – Annotating datasets.

Unit II – Data Management 7

Basic data management: Variables – Missing values – Date values – Type conversions – Sorting data – Merging datasets – Sub setting datasets. Advanced data management: Numerical and character functions – Control flow – Aggregation and reshaping.

Unit III – Graphs and Statistics 6

Basic Graphs: Bar plots – Pie charts – Histograms – Box plots. Basic statistics: Descriptive statistics – Frequency and contingency tables – Correlations.

Unit IV – Linear Regression 5

Regression: Many faces – OLS regression – Regression diagnostics – Unusual observations – Corrective measures – Selecting the best model.

Unit V – Advanced Graphics 6

Advanced graphics with ggplot2: Four graphics systems – Introduction to ggplot2 – Plot type – Grouping – Faceting – adding smoothed lines – Modifying the appearance of graphs – Saving the graphs.

BoS Chairman

LAB COMPONENT **30**

1. Construct new data set by incorporating various data structures for importing the data set.
2. Implement the data management operations like sort, merge, subset and aggregate.
3. Create bar chart, pie charts, histogram and box plot.
4. Visualize the statistics results using descriptive statistics method.
5. Predict the result of new data using the regression methods.
6. Experiment the different functions in ggplot2 to visualize the results.

Course Outcomes

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

CO1: Select the dataset for further processing using data structures and various data importing options.

CO2: Apply data management operations using sort, merge, subset and aggregate operations for managing the data.

CO3: Apply various statistics methods for better understanding of data using functions in statistics packages.

CO4: Predict the future by using regression method for the upcoming new data using various regressions.

CO5:Create the advanced graphics operations for enhanced visualization using ggplot2.

Text Book:

1. Robert I.Kabacoff, "R in Action: Data analysis and graphics with R", Dreamtech Press, Second Edition, 2015.

Reference Books:

1. DT Editorial Services, "Big Data – Black Book", Dreamtech Press, 2015 .
2. EMC Education Services, "Data Science and Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data", Wiley, 2015.
3. Roger D. Peng, "R Programming for Data Science", Lean Publishing, 2015.

Web References:

1. https://cran.r-project.org/manuals.html
2. http://www.cyclismo.org/tutorial/R/
3. http://www.r-tutor.com/r-introduction
4. https://www.programiz.com/r-programming
5. https://www.w3schools.in/r/
6. https://vincentarelbundock.github.io/Rdatasets/datasets.html
7. https://www.r-bloggers.com/datasets-to-practice-your-data-mining/

S. Ramkrecccc

BoS Chairman

Course Code: 16ITE35	Course Title: XML and WEB SERVICES	
Elective	L : T : P : C	2: 0: 2: 3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT55 Web Technology

Course Objectives

The course is intended to:

1. Construct an XML application.
2. Apply XML technologies.
3. Formulate the manipulation and dynamic access.
4. Determine web services and ensure security.
5. Create WSDL and UDDI web services.

Unit I - INTRODUCTION 6

Introduction - Rules of XML Structure – Well-Formed and Valid Documents- Namespaces- DTD - XML Schema (XSD).

Unit II - XML TECHNOLOGY 6

Applying Style to XML – XSLT - XPATH - XQUERY – XLINK.

Unit III - XML PARSING 6

XML Parsers- XML DOM Architecture- Classes of DOM Family- Combining XML DOM and XSL-XML AJAX.

Unit IV - WEB SERVICES: SOAP 6

SOAP: Elements- Message Structure - RPC Representation -Namespaces–Encoding- Binding – SOAP & HTTP- Voicexml.

Unit V - WEB SERVICES: UDDI, WSDL & RDF 6

UDDI: Overview - Architecture - WSDL: Representing Data Types – RDF: Statements- Elements- Containers.

LAB COMPONENT 30

Implement below listed XML and Web services concepts for anyone specific application

1. Create a XML document to store information and create the DTD.
2. Implement a XML schema for the XML document.
3. Present the XML document using CSS and XSLT.
4. Create an XML application using XML DOM & AJAX.
5. Construct a program to implement SOAP and WSDL Service.
6. Create a web service for currency conversion with appropriate client program.

BoS Chairman

Course Outcomes

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

CO1: Construct an XML application using structure and presentation technologies.
CO2: Apply XML technologies such as XSLT, XPath, XLink and XQuery for an application.
CO3: Formulate the manipulation and dynamic access using DOM and AJAX.
CO4: Determine web services and ensure security using SOAP.
CO5: Create web service using WSDL and UDDI for analyzing the needs for semantic web.

Text Book:

1. Ron Schmelzer ,Travis Vandersypen, Jason Bloomberg , "XML and Web Services unleashed", Pearson Education, 11th Impression , 2014.

Reference Books:

1. Joe Fawcett, Danny Ayers, Liam R.E.Quin, "Beginning XML", Wrox, 5th Edition, 2012.
2. James L. Mohler, Jon M. Duff, "Designing Interactive Web Sites", Cengage Learning, Second Indian Reprint 2009.
3. Erik T. Ray, "Learning XML", O'Reilly, 2nd Edition, 2009.

Web References:

1. www.w3schools.com
2. www.tutorialpoint.com

BoS Chairman

Course Code: 16ITE36	Course Title: DISTRIBUTED DATABASES	
Elective	L : T : P : C	2 : 0 : 2 : 3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT45 Database Management Systems

Course Objectives

The course is intended to:

1. Design the distributed database.
2. Determine the data in distributed database.
3. Choose the appropriate querying techniques.
4. Create an index to distributed database.
5. Combine the data using aggregation function.

Unit I - INTRODUCTION 6

A Rich Data Model – Documents – Collections – Databases - Getting and Starting MongoDB - MongoDB Shell - Data Types.

Unit II - CREATING, UPDATING AND DELETING DOCUMENTS 6

Inserting and Saving Documents - Removing Documents - Updating Documents - The Fastest Write This Side of Mississippi - Requests and Connections.

Unit III - QUERYING 6

Introduction to find - Query Criteria – Type Specific Queries - $where Queries – Cursors - Cursor Internals.

Unit IV - INDEXING 6

Introduction to Indexing - Unique Indexes - Index Administration - Geospatial Indexing – Administration(Backup and Repair).

Unit V - AGGREGATION AND ADVANCED COMMANDS 6

Aggregation – MapReduce - Database Commands - Capped Collections - GridFS: Storing Files.

BoS Chairman

LAB COMPONENT 30

1. Configure the mongodb environment.
2. Create a database to perform document insertion, projection, deletion and drop.
3. Implement the indexing concept in mongodb.
4. Implement the aggregation function on documents.
5. Develop an application using Java and mongodb.

Course Outcomes

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

CO1: Design the distributed database for real world application.
CO2: Determine the data in distributed database for the given problem.
CO3: Choose the appropriate querying techniques to extract the information from database.
CO4: Create an index to distributed database for fast retrieving of data.
CO5: Combine the data using aggregation function for customized projection of information.

Text Book:

1. Kristina Chodorow and Michael Dirolf, "MongoDB: The Definitive Guide", First Edition, O'Reilly books, 2015.

Reference Books:

1. Rick Copeland, "MongoDB Applied Design Patterns", 1st Edition, O'Reilly books, 2013.
2. M.Tamer Ozsu, Patrick Valduriez, "Principles of Distributed Database Systems", 3rd Edition, Pearson Education, 2011.
3. Stefano Ceri, Giuseppe Pelagatti, "Distributed Databases: Principles and Systems", 1st Edition, McGraw-Hill, 2014.

Web References:

1. https://www.mongodb.com
2. http://www.gocit.vn/files/MongoDB-www.gocit.vn.pdf
3. https://www.tutorialspoint.com/mongodb/index.htm

BoS Chairman

Course Code: 16ITE37	Course Title: EMBEDDED SYSTEM PROGRAMMING	
Elective	L : T : P : C	2:0:2: 3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16GET26 C Programming
- 16ITT42 Microprocessor and Microcontrollers

Course Objectives

The course is intended to:

1. Construct a program using basic C concepts.
2. Develop C programs using PIC microcontroller.
3. Apply preprocessor Directives.
4. Use CCS-PICC environment.
5. Develop a project to commercial or personal purpose.

Unit I - EMBEDDED C **5**

Variables and constants- I/O Operations-Operators and Expressions-Control Statements-Functions-Pointers and Arrays-Memory Types.

Unit II - PIC MICROCONTROLLER HARDWARE **6**

Introduction- Memory Organization-Interrupts and Reset-I/O Ports – Timers-Analog to Digital I/O- Assembly Language.

Unit III - STANDARD I/O AND PREPROCESSOR DIRECTIVES **7**

Standard Input and Output Functions-Preprocessor Directives-Function Qualifying Directives- Device Specification Directives- Preprocessor Directives (Built-in Library - Memory Control – Compiler Control).

Unit IV - CCS- PICC C COMPILER AND IDE **5**

IDE-Projects-PIC Wizard Code Generator-Source Files- Editor Operation- View Menu-Tool Menu- MicroChip MPLAB.

Unit V - PROJECT DEVELOPMENT PROCESS **7**

Project Development Process Steps- An Electronic Scooter: Definition Phase- Motor Selection- Design (Hardware & Software) - Phases (Test Definition - System Integration and Software Development-System test).

BoS Chairman

LAB COMPONENT 30

1. Program for I/O and Looping Operations.
2. Program for Function Creation.
3. Program for Arrays and Pointers.
4. Program for Interrupts.
5. Program for Timers.
6. Program for UART.

Course Outcomes

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

CO1: Construct a program using basic C concepts for a given application.
CO2: Develop C programs using PIC microcontroller for a given task.
CO3: Apply the suitable preprocessor directives to simplify the program code.
CO4: Apply CCS-PICC environment to program a target device.
CO5: Develop an electronic project that involve microcontrollers for either commercial or personal purposes.

Text Book:

1. Richard Barnett, Larry O'cull, Sarah Cox, " Embedded C Programming and the Microchip PIC", Thomson Delimer Learnings, 1st Edition,2014.

Reference Books:

1. Raj Kamal, "Embedded systems: architecture, programming and design", Tata McGraw Hill, 2009.
2. Michel Barr, Anthony Massa, "Programming Embedded Systems With C and GNU Development Tools", 2nd Edition ,O'Reilly, 2009.

Web Reference:

1. www.tutorialspoint.com

BoS Chairman

Course Code: 16ITE38	Course Title: GAME PROGRAMMING	
Elective	L : T : P : C	2:0:2: 3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented Programming using Java

Course Objectives

The course is intended to:

1. Identify the fundamental characteristics.
2. Explain the principles and processes.
3. Discuss the concepts of animation and its characteristics.
4. Use Game programming platforms, frame works and engines.
5. Create applications using game engine

Unit I - 3D GRAPHICS FOR GAME PROGRAMMING 6

Coordinate Systems, Vertex Transformation, Rasterization and Fragment Operations, Vector Properties, Lighting and Shading.

Unit II - GAME DESIGN PRINCIPLES 6

Genres of Games, Game Concepts, Character Development, Story Telling, Core mechanics ,Game Balancing, Principles of Level Design.

Unit III - GAMING ENGINE DESIGN 6

Renderers, Software Rendering, Hardware Rendering, Controller Based animation, collision detection.

Unit IV - GAMING PLATFORMS AND FRAMEWORKS 6

Flash, DirectX, OpenGL, XNA with Visual Studio, Mobile Gaming for the Android, Unity.

Unit V - GAME DEVELOPMENT 6

Developing 2D and 3D interactive games using Unity, DirectX, Isometric and Tile Based Games, Puzzle games, Single Player games, Multi-Player games.

LAB COMPONENT 30

1. Designing Simple Objects for Games.
2. Animating Objects.
3. Use of dynamic text.
4. Using keyboard controls for games.
5. Collision detection.
6. Creating simple games.

BoS Chairman

Course Outcomes

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

CO1: Identify the fundamental characteristics for 3D graphics.
CO2: Explain the principles and processes in Game design.
CO3: Discuss the concepts of animation and its characteristics for game development.
CO4: Use Game programming platforms, frame works and engines for developing 2D and 3D games.
CO5: Create applications using game engine.

Text Books:

1. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", 3rd Edition, Course Technology PTR, 2011(Unit –I).
2. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 2nd Edition, Prentice Hall / New Riders, 2009 (Unit –II).
3. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" 2nd Edition, Morgan Kaufmann, 2006 (Unit-III,IV,V).

Reference Books:

1. Mike Mc Shaffrfy,David Graham, "Game Coding Complete", 4th Edition, Cengage Learning, PTR, 2012
2. Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3rd Edition, 2009.

Web Reference:

1. unity3d.com/learn/tutorials

BoS Chairman

Course Code: 16ITE45	Course Title: DISTRIBUTED PROCESSING	
Elective	L : T : P : C	2: 0: 2 :3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT35 Object Oriented Programming using Java

Course Objectives

The course is intended to:

1. Analyze dataset in distributed environment
2. Examine the architecture of Hadoop file system
3. Create map reduce program in hadoop environment.
4. Inspect the different map reduce types and formats used in hadoop
5. Create map reduce program in multimode cluster

Unit I – INTRODUCTION TO HADOOP 6

Data-Data Storage and Analysis-Comparison with Other Systems-A Brief History of Hadoop-Apache Hadoop and the Hadoop Ecosystem. Map Reduce: A Weather Dataset-Analysing the Data with Unix Tools-Analysing the Data with Hadoop-Scaling Out-Hadoop Streaming-Hadoop Pipes.

Unit II – HADOOP DISTRIBUTED FILESYSTEM 6

The Design of HDFS-HDFS Concepts-The Command-Line Interface-Hadoop File systems-The Java Interface-Data Flow-Parallel Copying with distcp- Hadoop Archives

Unit III - HADOOP INPUT AND OUTPUT 6

Data Integrity-Compression-Serialization-File-Based Data Structures-Developing a Map Reduce Application: The Configuration API-Configuring the Development Environment-Writing a Unit Test-Running Locally on Test Data-Running on a Cluster-Tuning a Job-MapReduce Workflows

Unit IV – WORKING OF MAPREDUCE 6

Anatomy of a Map Reduce Job Run-Failures-Job Scheduling-Shuffle and Sort-Task Execution. MapReduce Types and Formats: MapReduce Types-Input Formats-Output Formats.

Unit V – SETTING UP A HADOOP CLUSTER 6

Cluster Specification-Cluster Setup and Installation-SSH Configuration-Hadoop

BoS Chairman

Configuration-YARN Configuration-Security-Benchmarking a Hadoop Cluster-Hadoop in the Cloud

LAB COMPONENT **30**

1. Installation of hadoop Single node cluster
2. Execution of basic hadoop Commands
3. Installation of hive in Single node cluster
4. Implementation of Map reduce program in hadoop using java
5. Implementation of Map reduce program in hive

Course Outcomes

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

CO1: Analyze datasets using different tools in distributed environment
CO2: Implement the Hadoop distributed file system.
CO3: Create a map reduce program using single node cluster in hadoop environment
CO4: Inspect the different map reduce types and formats used in hadoop
CO5: Develop map reduce program in multimode cluster involving various components

Text Book:

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'reilly O'Reilly Media, Inc 2014.

Reference Books:

1. Boris Iublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
3. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.

Web References:

1. https://hadoop.apache.org/
2. https://www.feedspot.com
3. https://stackoverflow.com/

BoS Chairman

Course Code: 16ITE46	Course Title: BLOCK CHAIN TECHNOLOGIES	
Elective	L : T : P : C	2: 0: 2 :3
Type: Theory	Total Contact Hours:	60 Hours

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

- 16ITT34 Data Structures
- 16ITT62 Cryptography & Network Security

Course Objectives

The course is intended to:

1. Analyze the significance of Blockchain architecture and its applications
2. Examine the Bitcoin transactions and its verification using Blockchain
3. Analyze smart contracts to attain consensus in Permissioned Block chain
4. Create a Business network using Hyperledger composer
5. Inspect usage of Block chain in various Governmental and Non-Governmental organizations

Unit I – INTRODUCTION, ARCHITECTURE OF BLOCK CHAIN 6

Introduction – Block Structure – Architecture – Block Header – Genesis Block – Merkle Trees – Hashing - Signature & Encryption Schemes – Business Applications

Unit II – PERMISSIONLESS MODEL, CONSENSUS ALGORITHMS 6

Bitcoin Basics – Wallet - Decentralized Consensus – Aggregate transactions - Proof of Work – Miners – Consensus Algorithms – Double Spending - Verifying Transactions – Fork – Reward

Unit III - PERMISSIONED MODEL, CONSENSUS ALGORITHMS 6

Permissioned Block Chain – Smart Contracts - Consensus – Raft – Byzantine – Paxos – Degree of Decentralization – Asset Transfer - Enterprise Application

Unit IV – HYPER LEDGER APPLICATION DEVELOPMENT 6

Fabric Architecture – Transaction Flow – Channel – Ordering Service –Membership & Identity Management – Network Setup – Hyperledger Composer – Roles – Network Administration

Unit V – BLOCKCHAIN USE CASES & SECURITY 6

Financial Services – Supply Chain – Government – Digital Identities – Land Record Registry – Security Overview – Membership & Access Control – Privacy

BoS Chairman

LAB COMPONENT 30

1. Installation of Hyperledger Fabric in a Linux Environment and setup first network
2. Study of various components of Hyperledger Fabric and its purpose
3. Implementation of Marbles asset transfer and instantiation of new chain code in Hyperledger Fabric
4. Installation of Hyperledger Composer for Blockchain Application Development
5. Implementation of Business Network in Hyperledger Composer
6. Installation of Hyperledger Indy Pool and run sample identity transactions

Course Outcomes

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

CO1: Analyze various block components in a block chain generated using various cryptographic schemes

CO2: Examine all the transactions in Bitcoin network and attain consensus using algorithms for verified transactions to be updated in the block

CO3: Analyze transactions of authorized users using smart contracts to attain consensus in an enterprise application model

CO4: Create a Business network for given application logic using Hyperledger composer

CO5: Inspect the significance of blockchain adaptation in various Non-Governmental and Governmental organization

Text Book:

1. Andreas M. Antonopoulos, "Mastering Bitcoin", 2nd Edition, O'Reilly Media, 2017
2. Melanie Swan, "Blockchain: Blueprint for a New Economy", 1st Edition, O'Reilly Media, 2017

Reference Books:

1. Nitin Gaur, Luc Desrosiers, Et al, "Hands-On Blockchain with Hyperledger", Packt Publisher, June 2018
2. Imran Bashir, "Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks", Packt Publisher, March 2017

Web References:

1. https://nptel.ac.in/courses/106105184/
2. https://www.hyperledger.org/projects/fabric
3. https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

BoS Chairman

Course Code: 16ITE39	Course Title: PROFESSIONAL ETHICS	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16ENT11 Communication Skills – I
- 16ENT21 Communication Skills – II

Course Objectives

The course is intended to:

1. Articulate the importance of ethical and moral responsibilities.
2. Explain the fundamentals aspects of ethics and moral Issues.
3. Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
4. To educates the code of ethics and how they can be used for ensuring safety and reducing the risk.
5. Explain the importance of professional practices.

Unit I - INTRODUCTION TO ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Three types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism.

Unit II - MORAL REASONING AND ETHICAL THEORIES 9

Professional Ideas and virtues – Utilitarianism –Duty Ethics – Rights Ethics – Testing Ethical Theories – Self Interest , Customs, and Religion – Uses of Ethical Theories.

Unit III - ENGINEERING AS SOCIAL EXPERIMENTATION 9

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

Unit IV - THE ENGINEER'S RESPONSIBILITIES FOR SAFETY 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk–Three mile Island, Chernobyl, and Safe Exits.

Unit V – RESPONSILBITIES TO EMPLOYER'S 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining –Confidentiality – Conflicts of Interest.

BoS Chairman

Course Outcomes

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

CO1: Articulate the importance of ethical and moral responsibilities.
CO2: Explain the fundamentals aspects of ethical practices.
CO3: Contribute to shape a better world by taking responsible and ethical actions to improve the environment and the lives of world community.
CO4: Be an example of faith, character and high professional ethics, and cherish the workplace responsibilities, rights of others, public's welfare, health and safety.
CO5: Explain the importance of professional practices as a future employee.

Text Book:

1. Mike W Martin,Roland Schinzinger, "Ethics in Engineering", 3rd Edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi, 2014.

Reference Books:

1. Charles E Harris, Michael S Protchard,Michael J Rabins, "Engineering Ethics – Concepts and Cases", 5th Edition, Wadsworth Thompson Learning, United States, 2014.
2. Charles Fleddermann B , "Engineering Ethics", 4th Edition, Pearson Education, 2014.

Web References:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

BoS Chairman

Course Code: 16ITE40	Course Title: DISASTER MANAGEMENT	
Elective	L : T : P : C	3: 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16CET73 Environmental Studies

Course Objectives

The course is intended to:

1. Describe basic concepts of disaster and hazards in India.
2. Study the various natural and manmade disasters.
3. Study the engineering and environmental aspects of disasters.
4. Explain the various approaches to disaster management principles.
5. Study the modern techniques used in disaster mitigation and management.

Unit I – INTRODUCTION 9

Definition – Types of Disasters – Relationship between disasters and human development – Disaster management cycle – A case study of a successful reconstruction after flood and community based disaster preparedness program.

Unit II – CAUSES AND TYPES OF DISASTERS 9

Water and climate related disasters – Geoscience related disasters – Industrial, nuclear and chemical disasters – Accident related disasters – Biological disasters – Disaster caused due to social, ethnic and religious conflicts.

Unit III – ENGINEERING AND ENVIRONMENTAL ASPECTS OF DISASTERS 9

Disaster due to Engineering and Technical Failure – Earth quake and coastal Engineering – Technology and Disaster management – Pollution control and monitoring – A case study on arsenic contaminant in West Bengal.

Unit IV – APPROACHES IN DISASTER MANAGEMENT 9

Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief – Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect –Case Study –Chennai Floods - IT Disaster Recovery.

Unit V - DISASTER MITIGATION 9

Temporary shelter – Food and nutrition – Safe drinking water – Rehabilitation after cyclone – Response to drought and earthquake – Response after Tsunami – IT Disaster Recovery.

BoS Chairman

Course Outcomes

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

CO 1: Gain an exposure to disasters, their significance and types.
CO 2: Ensure that students begin to understand the relationship between various disasters.
CO 3: Gain a preliminary understanding of Various aspects of Disasters.
CO 4: Enhance the awareness of various approaches to disaster management.
CO 5: Develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Text Book:

1. Tushar Bhattacharya, "Disaster Science and Management", Tata McGraw Hill, 2012.

Reference Books:

1. Sharma.S.R, "Disaster management", A P H Publishers, 2011.
2. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
3. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.
4. Muthusamy Seenirajan, Muthusamy Natarajan, Ramasamy Thangaraj, Murugesan Bagyaraj, Study and Analysis of Chennai Flood 2015 Using GIS and Multicriteria Technique, Scientific Research Publishing,2017.

Web References:

1. http://nidm.gov.in
2. http://cwc.gov.in
3. http://ekdrm.net
4. https://education.alberta.ca/media/3272747/2-it-disaster-recovery-planning-guide.pdf
5. https://cdn.ttgtmedia.com/rms/pdf/Disaster%20RecoveryTemplate%20Download%20Final.pdf

BoS Chairman

Course Code: 16MAE01	Course Title: NUMERICAL METHODS	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16MAT15 Engineering Mathematics - I
- 16MAT25 Engineering Mathematics -II

Course Objectives

The course is intended to:

1. Solve the system of linear equations
2. Solve the non-linear equations
3. Predict the unknown values from the given set of data's
4. Solve first order ordinary differential equation
5. Solve first order ordinary differential equation.

Unit I - SOLUTION OF SYSTEM OF LINEAR EQUATIONS 9

Solution of System of Linear Equations-Direct Method: Gaussian Elimination Method, Choleski Method, Iterative Methods: Gauss-Seidel - Sufficient Conditions for Convergence. Power Method to Find the Dominant Eigen Value and the Corresponding Eigen Vector.

Unit II - SOLUTION OF NON-LINEAR EQUATION & CURVE FITTING 9

Solution of Non-Linear Equation: Method of False Position - Newton- Raphson Method - Order of Convergence of These Methods. Curve Fitting - Method of Least Squares.

Unit III - INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Newton's Forward, Backward Interpolation – Lagrange's Interpolation. Numerical Differentiation and Integration – Trapezoidal Rule – Simpson's 1/3 Rule – Gaussian Two Point and Three Point Quadrature Formula –Double Integration Using Trapezoidal Rule.

Unit IV - SOLUTION OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS 9

Numerical Solution of First Order Ordinary Differential Equation-Single Step Method: Taylor's Series-Euler's Method - Runge-Kutta Method of Fourth Order – Multi Step Method: Adams' Method.

Unit V - SOLUTION OF PARTIAL DIFFERENTIAL EQUATION 9

Numerical Solution of Laplace Equation and Poisson Equation by Liebmann's Method - Solution of One Dimensional Heat Flow Equation - Bender - Schmidt Recurrence Relation - Crank - Nicolson Method.

BoS Chairman

Course Outcomes

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

CO1: Solve the system of linear equations and calculate the dominant Eigen value.
CO2: Solve the non-linear equations and apply the principle of least squares to fit a curve for the given data.
CO3: Predict the unknown values from the given set of data's by applying the numerical techniques to find derivatives and to evaluate integrals.
CO4: Solve first order ordinary differential equation using numerical techniques.
CO5: Solve first order ordinary differential equation using numerical techniques.

Text Books:

1. Srimanta Pal , Subodh C. Bhunia, "Engineering Mathematics", 1st Edition, Oxford University Press, New Delhi, 2015.
2. Grewal, B.S. , Grewal, J. S., "Numerical Methods in Engineering and Science",10th Edition, Khanna Publishers, New Delhi, 2010.

Reference Books:

1. Gerald, C. F. ,Wheatley, P. O., "Applied Numerical Analysis", 7th Edition, Pearson Education Asia, New Delhi, 2007.
2. Jain M. K., Iyengar, S. R. , Jain, R. K, "Numerical Methods for Scientific and Engineering Computation", 5th Edition, Wiley Eastern Company,2007.

Web References:

1. http://nptel.ac.in/courses/122102009/
2. tutorial.math.lamar.edu/Classes/DE/IntroFirstOrder.aspx

BoS Chairman

Course Code: 16MAE02	Course Title: RESOURCE MANAGEMENT TECHNIQUES	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16MAT15 Engineering Mathematics - I
- 16MAT25 Engineering Mathematics -II

Course Objectives

The course is intended to:

1. Apply linear programming techniques.
2. Optimize transportation problem and assignment problem.
3. Apply integer programming techniques.
4. Apply non-linear programming technique.
5. Optimize project management.

Unit I - LINEAR PROGRAMMING 9

Principal Components of Decision Problem – Modeling Phases – LP Formulation and Graphic Solution – Resource Allocation Problems – Simplex Method – Big-M Method.

Unit II - DUALITY AND NETWORKS 9

Definition of Dual Problem – Primal – Dual Relationships – Dual Simplex Methods – Post Optimality Analysis – Transportation and Assignment Model – Shortest Route Problem.

Unit III - INTEGER ROGRAMMING 9

Cutting Plan Algorithm – Branch and Bound Methods, Multistage (Dynamic) Programming.

Unit IV - CLASSICAL OPTIMISATION THEORY 9

Unconstrained External Problems, Newton – Raphson Method – Equality Constraints – Jacobian Methods – Lagrangian Method – Kuhn – Tucker Conditions – Simple Problems.

Unit V - OBJECT SCHEDULING 9

Network Diagram Representation – Critical Path Method – Time Charts and Resource Leveling – PERT.

BoS Chairman

Course Outcomes

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

CO1: Apply linear programming techniques to optimize linear objective function.
CO2: Optimize transportation problem and assignment problem by applying suitable algorithms.
CO3: Apply integer programming techniques to optimize linear objective function.
CO4: Apply Non-Linear programming technique to optimize non-linear objective function.
CO5: Optimize project management using PERT and CPM.

Text Books:

1. Wayne L. Winston,"Operations Research" , 4th Edition, Thomson Learning, 2003.

Reference Books:

1. Hamdy H. Taha, "Operations Research-An Introduction" ,9th Edition, Pearson Education,2010.
2. J. K. Sharma, "Operations Research Theory and Applications",3rd Edition, Macmillan Publishing Company, 2006.
3. Frederick S. Hiller, Gerald J. Lieberman, "Introduction to Operations Research",8th Edition, Tata McGraw Hill (P) Ltd, New Delhi, 2010.
4. R. Panneer Selvam, "Operations Research" PHI Learning, 2008.
5. V.K.Khanna, "Total Quality Management" New Age International, 2008.

Web References:

1. http://www.nptelvideos.in/2012/12/advanced-operations-research.html
2. http://freevideolectures.com/Course/2365/Fundamentals-of-Operations-Research
3. http://nptel.ac.in/courses/111105039/

BoS Chairman

Course Code: 16MAE03	Course Title: GRAPH THEORY	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16MAT15 Engineering Mathematics - I
- 16MAT25 Engineering Mathematics -II

Course Objectives

The course is intended to:

1. Apply concepts of Cut sets and Cut vertices.
2. Transform the given graph.
3. Apply the inclusion and exclusion concepts.
4. Apply the generating and recurrence relation concepts.
5. Apply graph in coding theory.

Unit I - CUT-SETS AND CUT-VERTICES 9

Cut-Sets- Properties of Cut-Sets- Fundamental Circuits and Cut-Sets- Connectivity and Separability- Network Flows- 1-Isomorphism- 2-Isomorphism.

Unit II - PLANAR GRAPHS AND MATRIX REPRESENTATION OF GRAPH 9

Planar graph- Kuratowski's Two graphs- Incidence Matrix- Sub matrices of A(G)- Circuit Matrix- Cut set Matrix- Path Matrix- Adjacency Matrix.

Unit III - PERMUTATIONS AND COMBINATIONS 9

Fundamental principles of counting – Permutations and combinations – Binomial theorem –combinations with repetition – Combinatorial numbers – Principle of inclusion and exclusion –Derangements – Arrangements with forbidden positions.

Unit IV - GENERATING FUNCTIONS 9

Generating Functions – Partitions of Integers – Exponential generating function – Summation Operator – Recurrence Relations – First Order and Second Order – Non-Homogeneous Recurrence Relations – Method of Generating Functions.

Unit V - GRAPHS IN SWITCHING AND CODING THEORY 9

Contact Networks- Analysis of Contact Networks-Synthesis of Contact Networks-Sequential Switching Networks-Unit Cube and its Graph- Graphs in Coding Theory.

BoS Chairman

Course Outcomes

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

CO1: Apply concepts of Cut sets and Cut vertices in netwcrk flows.
CO2: Transform the given graph into incidence and Adjacency matrix.
CO3: Apply the concepts of Principle of inclusion and exclusion.
CO4: Apply the concepts of generating and recurrence relation.
CO5: Apply graph in coding theory.

Text Book:

1. NarsinghDeo, "Graph Theory: With Application to Engineering and Computer Science", 5th Edition, Prentice Hall of India, 2016.

Reference Books:

1. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction",5th Edition Addison Wesley, 2007.
2. R.J. Wilson, "Introduction to Graph Theory", 4th Edition,Prentice Hall,1998.
3. Bondy, J.A.,Murthy, U.S.R., Graph Theory with Applications, Macmillan, Springer,2008.
4. R. Balakrishnan, K. Ranganathan, "Text Book of Graph Theory ",Springer science and Business Media, 2000.

Web References:

1. http://www.nptelvideos.in/2012/11/graph-theory.html
2. http://freevideolectures.com/Course/3019/Graph-Theory
3. http://freevideolectures.com/Course/2350/Networks-Signals-and-Systems/19

BoS Chairman

Course Code: 16MAE04	Course Title: ALGEBRA AND NUMBER THEORY	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

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

- 16MAT15 Engineering Mathematics - I
- 16MAT25 Engineering Mathematics -II

Course Objectives

The course is intended to:

1. Apply the Galois theory
2. Apply the Sylow's theorems.
3. Apply algebraic properties to group codes.
4. Apply the elementary number theory concepts.
5. Develop an algorithm.

Unit I - FIELD THEORY 9

Fields - Characteristics of a Field - Algebraic Extensions - Roots of Polynomials - Splitting Fields – Simple Extensions – Elements of Galois Theory- Finite Fields.

Unit II - SYLOW'S P-SUBGROUPS 9

Class Equations for Finite Groups – Sylow P-Subgroup – Zorn's Lemma -Sylow's Theorems (First Proof Only) – Direct Products – Finite Abelian Groups.

Unit III - CODING THEORY 9

Encoders and Decoders – Group Code – Hamming Codes – Basic Notions of Error Correction Using Matrices – Error Correction in Group Codes – Decoding Group Codes.

Unit IV - NUMBER THEORY 9

Functions of Number Theory – Multiplicative Functions – Definition and Basic Examples – Mobius Function and Mobius Inversion Formula – The Euler Phi Function – Carmichael Conjecture.

Unit V - DIOPHANTINE EQUATIONS 9

Linear Diophantine Equations – Continued Fractions - Pythagorean Triples – Fermat's Last Theorem – Sums of Squares – Waring's Problem.

BoS Chairman

Course Outcomes

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

CO1: Apply the Galois theory in field extension concepts
CO2: Apply the Sylow's theorems in Finite Abelian groups.
CO3: Apply algebraic properties to group codes.
CO4: Apply the elementary number theory concepts to generate Mobius functions.
CO5: Develop an algorithm to solve system of diophantine equations.

Text Books:

1. I.N. Herstein , "Topics in Algebra", 2nd Edition, Wiley Eastern Limited, New Delhi, 2006.
2. David M. Burton," Elementary Number Theory", 7th Edition, McGraw-Hill,2011.

Reference Books:

1. D.S.Malik, J.N. Mordeson,M.K.Sen,"Fundamental of Abstract Algebra", International Edition, McGraw Hill, 1996.
2. G. H. Hardy, "An introduction to the theory of numbers", 6th Edition, Oxford University Press, 2008.

Web References:

1. http://www.nptel.ac.in/courses/111101001/
2. http://www.nptel.ac.in/courses/111103020/

BoS Chairman

OPEN ELECTIVES

Course Code: 16OET22	Course Title: OPEN SOURCE TECHNOLOGIES	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

1. Explain the fundamental concepts of open source software.
2. Execute a real time application.
3. Implement the open source software packages.
4. Develop a shell script for an application.
5. Create a database to store real time data.

Unit I - INTRODUCTION TO OPEN SOURCE 6

GNU Operating System-Brief history of GNU -GNU Manifesto-Licenses -overview and usage of various Linux Distributions.

Unit II- LINUX COMMAND LINE 10

Starting with Linux Shells: Linux-Linux Distribution, Getting to the Shell: Reaching the Command Line- Accessing CLI via a Linux Console Terminal- Accessing CLI via Graphical Terminal Emulation- Using the GNOME Terminal Emulator- Using the Konsole Terminal Emulator- Using the xterm Terminal Emulator-Basic bash shell Command.

Unit III - SHELL SCRIPTING I 10

Basic Script Building: Using Multiple Commands-Creating a Script File-Displaying Messages-Using Variables-Redirecting Input and Output-Pipes-Performing Math-Exiting the Script. Using Structured Commands: Condition Statement-looping Statements.

Unit IV - SHELL SCRIPTING II 10

Handling user input- Creating Functions: Basic Script Functions- Returning a Value-Using Variables in Functions- Array Variables and Functions- Function Recursion-Creating a Library- Using Functions on the Command Line.

Unit V – PRODUCING SCRIPTS 9

Using a MySQL Database: Using MySQL- Using the database in scripts. Using the Web: Installing Lynx- The lynx command line- The Lynx configuration file- Capturing data from Lynx; Using E-Mail; Creating Little Shell Scripts.

BoS Chairman

Course Outcomes

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

CO1: Explain the fundamental concepts of open source software for a real world problem.
CO2: Execute a real time application using Linux commands.
CO3: Implement the open source software packages for real time problems.
CO4: Develop a shell script for an application using functions.
CO5: Create a database to store real time data using MySQL.

Text Book:

1. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley 2015.

Reference Books:

1. Kailash Vadera , Bhavyesh Gandhi, "Open Source Technology",University Science press, 2009.
2. Andrew M. St. Laurent, "Understanding Open Source & Free Software Licensing: Guide to Navigating Licensing Issues in Existing & New Software", O'Reilly Publication, 2016.
3. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a nutshell", 6th Edition, OReilly media, September 2009.

Web References:

1. http://www.gnu.org/philosophy/
2. http://distrowatch.com/dwres.php?resource=major
3. http://tldp.org/guides.html

BoS Chairman

Course Code: 16OET23	Course Title: ENTERPRISE RESOURCE PLANNING	
Elective	L : T : P : C	3:0:0:3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

1. Identify the basic of ERP along with its benefits and risks.
2. Identify the ERP related technologies for business process.
3. Propose the Enterprise resource management technology.
4. Predict the implementation strategies & methodologies of ERP.
5. Create the various ERP related business modules.

Unit I – INTRODUCTION 9

Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments: Quantifiable benefits, Intangible Benefits, Risks of ERP: People Issues, Process Risk, Technological Risks, Implementation Issues, Operation & Maintenance Issues, Managing Risks on ERP Projects.

Unit II - ERP AND TECHNOLOGY – I 9

ERP and Related Technologies: Business Intelligence, E- Commerce and E-Business, Business Process Reengineering (BPR), Data Warehousing & Data Mining.

Unit III - ERP AND TECHNOLOGY – II 9

On-line Analytical Processing(OLAP), Product Life Cycle Management(PLCM), Supply Chain Management(SCM), Customer Relationship Management(CRM), Advanced Technology and ERP Security.

Unit IV – ERP IMPLEMENTATION 9

Implementation Challenges – Implementation Strategies - Implementation life cycle – Implementation Methodologies - Project team.

Unit V – BUSINESS MODULES 9

Finance – Manufacturing – Human Resources – Plant Maintenance – Material Management – Quality Management – Marketing – Sales, Distribution and Services.

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Course Outcomes

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

CO1: Identify the basic of ERP along with its benefits and risks for different projects.
CO2: Identify the ERP related technologies for business process from heterogeneous database.
CO3: Propose the Enterprise resource management technology for handling the ERP related security issues.
CO4: Predict the implementation strategies & methodologies of ERP for the different project team.
CO5: Create the various ERP related business modules for ERP Maintenance and management.

Text Book:

1. Alexis Leon, "ERP Demystified", 3rd Edition, Tata McGraw-Hill, 2014.

Reference Books:

2. Alexis Leon, "Enterprise Resource Planning", 3rd Edition, Tata McGraw-Hill, 2014.
3. Vinod Kumar Grag, N.K. Venkitakrishnan, "ERP- Concepts and Practice", 2nd Edition Prentice Hall of India, 2011.
4. Sinha P. Magal , Jeffery Word, "Essentials of Business Process and Information System", Wiley India, 2012.

Web References:

1. https://www.infosys.com/industries/high-technology/case-studies/Pages/oracle-implementation-global.aspx
2. https://www.odoo.com/
3. https://www.top10erp.org/Case-Study-Library.aspx

BoS Chairman

Course Code: 16OET24	Course Title: MULTIMEDIA SYSTEMS AND APPLICATIONS	
Elective	L : T : P : C	3 : 0 : 0 : 3
Type: Theory	Total Contact Hours:	45 Hours

Course Objectives

The course is intended to:

1. Identify the suitable multimedia elements.
2. Examine the process involved in adding sound and animation.
3. Predict the video usage, hardware and software requirements.
4. Create the skills and process involved in making of multimedia project.
5. Formulate the web based multimedia application.

Unit I – INTRODUCTION TO MULTIMEDIA 9

Multimedia-Introduction, Multimedia Applications, Delivering Multimedia. Text-Fonts and Faces, Hypermedia and Hypertext. Images-Making Still Images, Color, Image file formats.

Unit II – SOUND AND ANIMATION 9

Sound-The power of Sound, Digital Audio, MIDI Audio, MIDI vs Digital Audio, Multimedia system sounds, Audio file formats, Adding Sound to Multimedia Project. Animation-The power of Motion, Principles of Animation, Animation by Computer, Animation Techniques.

Unit III - VIDEO AND MAKING MULTIMEDIA 9

Video-Using Video, Working of Video, Digital Video Containers. Making Multimedia-Stages of Multimedia Project, Intangibles, Hardware, Software, Authoring Systems.

Unit IV – PROCESS OF MAKING MULTIMEDIA 9

Multimedia Skills, Planning and Costing-The process of Making Multimedia, Scheduling, Estimating. Designing and Producing.

Unit V – INTERNET AND MULTIMEDIA 9

Internet and Multimedia-Internetworking, Multimedia on the Web, Designing for the World Wide Web-Developing for the Web, Delivering-Testing.

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Course Outcomes

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

CO1: Identify the suitable multimedia elements for the multimedia applications.
CO2: Examine the process involved in adding sound and animation to multimedia project.
CO3: Predict the video usage, hardware and software requirements for making multimedia.
CO4: Create the skills and process involved in making of multimedia project using Gantt chart tool.
CO5: Formulate the multimedia concept for designing the web based application.

Text Book:

1. Tay Vaughan, "Multimedia : Making it work", 9th Edition, McGraw Hill, 2016.

Reference Books:

1. Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Fifth Impression, Pearson Education, Asia, 2011.
2. .K.R.Rao, Zoran.S.Bojkovic, Dragorad A. Milovanovic, "Multimedia Communication systems Techniques, Standards and networks", Eastern Economy Edition, 2002.

Web References:

1. www.cse.wustl.edu/~jain/refs/mul_refs.htm
2. http://guides.lib.umich.edu/c.php?g=282762&p=1884093
3. www.eduproindia.in/ multimedia-communications.html

BoS Chairman