

**KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE - 638 052**  
(Autonomous)

**B.Sc. DEGREE IN INFORMATION SYSTEMS (3 YEARS)**  
**CURRICULUM**

(For the candidates admitted from academic year 2014-15 onwards)

**SEMESTER – I**

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	<b>THEORY</b>							
14BCT11	Communicative English I	3	0	0	3	40	60	100
14BCT12	Applied Mathematics I	3	1	0	4	40	60	100
14BCT13	Digital Principles	3	1	0	4	40	60	100
14BCT14	Fundamentals of Computing	3	0	0	3	40	60	100
14BCC11	Problem Solving and Programming	3	0	3	4	40	60	100
14VEC11	Value Education	0	2	1	1	100	0	100
	<b>PRACTICAL</b>							
14BCL11	Digital Laboratory	0	0	3	1	100	0	100
14BCL12	Office Automation Laboratory	0	0	3	1	100	0	100
14BCL13	Communication Skills and Career Development Laboratory I	0	0	3	1	100	0	100
<b>Total</b>					<b>22</b>			

CA – Continuous Assessment, ESE – End Semester Examination

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**SEMESTER – II**

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	<b>THEORY</b>							
14BCT21	Communicative English II	3	0	0	3	40	60	100
14BCT22	Applied Mathematics II	3	1	0	4	40	60	100
14BCT23	Object Oriented Programming using C++	3	0	0	3	40	60	100
14BCT24	Basics of Electrical and Electronics Engineering	3	0	0	3	40	60	100
14BCT25	Data Structures	3	0	0	3	40	60	100
	<b>PRACTICAL</b>							
14BCL21	Object Oriented Programming Laboratory	0	0	3	1	100	0	100
14BCL22	Electrical and Electronics Engineering Laboratory	0	0	3	1	100	0	100
14BCL23	Data Structures Laboratory	0	0	3	1	100	0	100
<b>Total</b>					<b>19</b>			

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**SEMESTER – III**

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	<b>THEORY</b>							
14BCT31	Operating Systems	3	1	0	4	40	60	100
14BCT32	Computer Architecture	3	1	0	4	40	60	100
14BCT33	Database Management Systems	3	1	0	4	40	60	100
14BIT31	Introduction to Information Technology	3	0	0	3	40	60	100
	Elective – I (Open)	3	0	0	3	40	60	100
	<b>PRACTICAL</b>							
14BCL31	Operating Systems Laboratory	0	0	2	1	100	0	100
14BCL32	Database Management Systems Laboratory	0	0	2	1	100	0	100
14BCL33	Communication Skills and Career Development Laboratory II	0	0	2	1	100	0	100
<b>Total</b>					<b>21</b>			

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**SEMESTER – IV**

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	<b>THEORY</b>							
14BCT41	Java Programming	3	0	0	3	40	60	100
14BCT42	Computer Networks	3	1	0	4	40	60	100
14BCT43	Software Engineering	3	0	0	3	40	60	100
14BIT41	Open Source Programming	3	1	0	4	40	60	100
	Elective – II (Professional)	3	0	0	3	40	60	100
	<b>PRACTICAL</b>							
14BCL41	Java Programming Laboratory	0	0	2	1	100	0	100
14BCL42	Networks Laboratory	0	0	2	1	100	0	100
14BIL41	Open Source Programming Laboratory	0	0	2	1	100	0	100
<b>Total</b>					<b>20</b>			

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**SEMESTER – V**

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	<b>THEORY</b>							
14BCT51	Visual Programming	3	0	0	3	40	60	100
14BCT52	Web Technology	3	1	0	4	40	60	100
14BIT51	Internet of Things	3	0	0	3	40	60	100
14BIT52	Mobile Computing	3	1	0	4	40	60	100
	Elective – III (Open)	3	0	0	3	40	60	100
	<b>PRACTICAL</b>							
14BCL51	Visual Programming Laboratory	0	0	2	1	100	0	100
14BIL51	Web and Mobile Applications Laboratory	0	0	2	1	100	0	100
14BIP51	Mini-Project	0	0	4	2	50	50	100
<b>Total</b>					<b>21</b>			

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**SEMESTER – VI**

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	<b>THEORY</b>							
	Elective - IV (Professional)	3	0	0	3	40	60	100
	Elective - V (Professional)	3	0	0	3	40	60	100
	Elective - VI (Professional)	3	0	0	3	40	60	100
	<b>PRACTICAL</b>							
14BIP61	Project Work	0	0	18	9	100	100	200
<b>Total</b>					<b>18</b>			

CA – Continuous Assessment, ESE – End Semester Examination

**Total Credits: 121**

<b>LIST OF PROFESSIONAL ELECTIVES</b>					
<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester – IV</b>					
14BCE01	Operations Research	3	0	0	3
14BCE02	Principles of Management	3	0	0	3
14BIE01	Distributed Operating Systems	3	0	0	3
14BIE02	Business Intelligence	3	0	0	3
14BIE03	IT Infrastructure and Management	3	0	0	3
<b>Semester VI</b>					
14BCE06	E-commerce	3	0	0	3
14BCE07	Cloud Computing	3	0	0	3
14BCE08	Software Project Management	3	0	0	3
14BIE04	Service Oriented Architecture	3	0	0	3
14BIE05	Cyber Forensics	3	0	0	3
14BIE06	Software Metrics	3	0	0	3
14BIE07	Unix Internals	3	0	0	3
14BIE08	Principles of Data Communication	3	0	0	3
14BIE09	Artificial Intelligence	3	0	0	3

<b>LIST OF OPEN ELECTIVES</b>					
<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester – III</b>					
14BIO01	Management Information System	3	0	0	3
14BIO02	Multimedia Systems	3	0	0	3
<b>Semester V</b>					
14BIO03	Data Warehousing and Data Mining	3	0	0	3
14BIO04	XML and Web Services	3	0	0	3

## 14BCT11 COMMUNICATIVE ENGLISH I

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

### UNIT – I 9

**Grammar & Vocabulary:** Affixes and roots – Prefixes (de, dis, il, im, in, ir, mis, un) and Suffixes (-ful, -ness, -ly, -less, -able, -ing, -er, -est)- Synonyms & Antonyms, Homophones, Homonyms; **Writing:** Introduction to Technical Writing- using Abbreviations, Acronyms, and Single line Definition - Technical terms; Comprehension passage-I (Multiple choice). **Verbal Activities** (NOT FOR EXAMINATION): **Listening** : Types of listening; **Reading:** Skimming; **Speaking:** Storytelling.

### UNIT – II 9

**Grammar & Vocabulary:** Word formation and Derivation – Single-word Substitute – Noun, Verb, Adjective, Adverb; **Writing:** Letter writing – Informal letter writing; Comprehension passage-II (Question and Answer). **Verbal Activities** (NOT FOR EXAMINATION): **Listening** – Process of listening; **Reading:** Scanning; **Speaking:** Role Play.

### UNIT – III 9

**Grammar & Vocabulary:** Sentence formation - Tenses- Present - Indefinite/ Continuous / Perfect ; **Writing:** Letter Writing - Personal letter; Comprehension passage-III (Complete the sentence). **Verbal Activities** (NOT FOR EXAMINATION): **Listening:** Implications of effective listening; **Reading:** Identifying main idea; **Speaking:** Making oral Presentation – Different kinds of Presentation – Planning a presentation.

### UNIT – IV 9

**Grammar & Vocabulary:** Sentence formation - Tenses- Past - Indefinite/ Continuous / Perfect, Future - Indefinite/ Continuous / Perfect – Definitions; **Writing:** Writing & Sending Email Messages; Comprehension passage-IV (True or False, Match the Synonyms and Antonyms). **Verbal Activities** (NOT FOR EXAMINATION): **Listening:** Gap filling activity while listening; **Reading:** Summarizing; **Speaking** - Making oral Presentation – Adapting a speaker’s ideas to audience – planning the use of visual and other devices to involve audience.

### UNIT – V 9

**Grammar & Vocabulary:** Sentence Formation - Subject-verb agreement, Jumbled words, Error correction; **Writing:** Writing Instructions; Comprehension passage-V (Reasoning or Moral Questions). **Verbal Activities** (NOT FOR EXAMINATION): **Listening:** Listening to a discourse & filling up gaps in a worksheet; **Reading:** paraphrasing; **Speaking:** Group Discussion.

**TOTAL: 45**

#### TEXT BOOKS:

1. “Learn English – A Fun Book of Functional Language, Grammar and Vocabulary”, McGraw Hill Education [India] Pvt. Ltd, Santana Sinha Chaudhuri, 2013.

#### REFERENCE BOOKS:

1. Aruna Koneru, “Professional Communication”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2009.
2. Andrea J. Rutherford, “Basic Communication Skills for Technology”, 2<sup>nd</sup> Edition, Pearson Education, 2006.

#### Course Outcomes:

On completion of the course the students will be able to

- make students improve their grammar & vocabulary for use in different contexts
- get familiarized with different methods of listening skills
- speak effectively in English in various situations and acquire reading skills
- gain knowledge about writing skills



## 14BCT12 APPLIED MATHEMATICS I

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 1 0 4

### UNIT – I 9

**Matrices:** Characteristic Equation of a matrix – Eigen values and Eigen vectors of real matrix – Properties of eigen values and eigen vectors(statement only) – Cayley Hamilton theorem (statement only) – Similarity transformation(concept only) -Orthogonal matrices – orthogonal transformation of symmetric matrix to diagonal form – Quadratic forms - Reduction of Quadratic form to Canonical form by Orthogonal reduction.

### UNIT – II 9

**Ordinary Differential Equations:** Linear differential equations of second order with constant coefficients when the R.H.S is  $e^{ax}$ ,  $x^n$ ,  $n>0$ ,  $\sin(ax)$ ,  $\cos(ax)$ ,  $e^{ax} x^n$ ,  $e^{ax} \sin(bx)$ ,  $e^{ax} \cos(bx)$ . Differential equations with Variable coefficients (Euler's type only).

### UNIT – III 9

**Theory of Equations:** Relationships between roots and coefficient - Equations with real coefficients and imaginary roots- Symmetric function of the roots- Formation of equations whose roots are given—To diminish the roots of an equation by h – Multiple roots – Reciprocal equation- Simple problems only.

### UNIT – IV 9

**Vector Differential Calculus:** Scalar and vector point functions- vector operator, gradient, Directional derivative, Divergence and curl of vectors – Irrotational and solenoidal vectors. -Simple problems only.

### UNIT – V 9

**Vector Integral Calculus:** Line Integral(concept only) – Surface Integrals(concept only) and Volume Integrals (concept only) – Verification of Gauss Divergence theorem (without proof) – cubes and rectangular parallelepiped –Verification of Green's theorem (without proof) – circle and ellipse – Verification of Stoke's theorem (without proof) -Square, rectangle – Simple problems

**Lecture:45, Tutorial:15, TOTAL: 60**

#### TEXT BOOKS:

1. Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Engineering Mathematics For First Year B.E/B.Tech", Reprint Edition 2014, S.Chand and Co., New Delhi.
2. Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Numerical Methods", Reprint Edition 2014, S.Chand and Co., New Delhi.

#### REFERENCE BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 41<sup>st</sup> Edition, Khanna Publications, New Delhi, 2011.
2. Veerarajan. T., "Engineering Mathematics, (for first year), Reprint Edition 2013, Tata McGraw-Hill New Delhi.
3. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", Narosa Publishing House, New Delhi, Reprint 2014.
4. Dr.V.N.Vedamurthy, Dr. N. Ch.S.N. Iyengar,"Numerical Methods" Reprint 1999, Vikas Publishing House Pvt.Ltd.
5. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2011.

#### Course Outcomes:

On completion of the course the students will be able to

- find the eigen values and eigen vectors
- solve the linear differential equations of second order
- identify the roots of given equations
- have a clear idea about line , surface and volume integrals

**UNIT – I** 9

**Binary Systems and Logic Gates:** Digital systems- Binary Numbers- Number Base Conversions- Octal Numbers- Hexa Decimal Numbers- Complements-Signed Binary numbers- Binary codes- Binary storage and registers- Binary Logic-Digital Logic Gates

**UNIT – II** 9

**Minimization and Boolean Algebra:** Basic theorems and properties of Boolean Algebra- Boolean functions- Canonical and Standard Forms-Minimization: POS, SOP- K-Map Method: 2-variable, 3-variable, 4-variable- Don't care conditions- NAND and NOR Implementation.

**UNIT – III** 9

**Combinational Logic:** Combinational circuits- Analysis Procedure-Design Procedure - Binary Adder-Subtractor- Half Adder, Full Adder, Half Subtractor, Full Subtractor, -Decimal Adder- Binary multiplier- Magnitude comparator-Decoders- Encoders- Multiplexers-Demultiplexer.

**UNIT – IV** 9

**Synchronous Sequential Logic:** Sequential circuits- Latches- SR, D latches - Flip-Flops- D Flip-Flop, JK Flip-Flop, T Flip-Flop, characteristic table, characteristic equation -Analysis of clocked sequential circuits: Analysis of D flip-flops, Analysis of JK Flip-Flops, Analysis of T Flip-Flops.

**UNIT – V** 9

**Registers and Counters:** Registers- Shift Registers- Ripple counters-Binary Ripple counters, BCD Ripple counters- Synchronous counters- Binary, BCD counter- Ring counters-Johnson counter.

**Lecture:45, Tutorial:15, TOTAL: 60**

**TEXT BOOKS:**

1. Mano, M Morris and Ciletti D.Michael, "Digital Design", 4<sup>th</sup> Edition, Pearson Education, Delhi, 2012.

**REFERENCE BOOKS:**

1. Floyd Thomas L., "Digital Fundamentals", 10<sup>th</sup> Edition, Pearson Education, Delhi, 2012.
2. Yarbrough, John M., "Digital Logic: Applications and Design", Cengage Learning, Delhi, 9<sup>th</sup> Indian Reprint 2012.
3. Givone, Donald D., "Digital Principles and Design", Tata McGraw-Hill, Delhi, 22<sup>nd</sup> Reprint 2012.

**Course Outcomes:**

On completion of the course the students will be able to

- understand the basic concepts of logic gates to impart knowledge in designing various combinational circuits
- design and analyze circuits using flip flops
- gain knowledge on counters and registers by designing and analyzing various synchronous and asynchronous circuits

## 14BCT14 FUNDAMENTALS OF COMPUTING

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

### UNIT – I 9

**Basics of Computer:** Introduction – Digital and Analog Computers – Characteristics – History – Generations – Classification – Computer System – Applications – Computer System Hardware: Introduction – Central Processing Unit – Memory – Instruction – Microprocessor – Interconnection – Performance – Inside a Computer Cabinet.

### UNIT – II 9

**Memory and I/O Devices:** Computer Memory :Introduction - Representation – Hierarchy – CPU Registers – Cache Memory – Primary and Secondary Memory – Access types – Magnetic storage – Optical storage – Using memory – Input and Output Devices: Data Entry Devices – Output Devices – I/O Port – Working of I/O system.

### UNIT – III 9

**Types of Software :** User Computer Interface: Interaction – Types of Software – System Software – Application Software – Software Acquisition – Operating System: Introduction – Objectives – Types – Functions – Process Management – Memory Management – File Management – Device Management – Protection and Security – User Interface – Examples.

### UNIT – IV 9

**Computer Programming and Network Fundamentals:** Computer Programming Fundamentals: Introduction – Program Development Life Cycle – Programming Paradigms – Data Communication and Computer Network: Introduction – Importance – Data Transmission Media and Data Networking – Computer Network – Wireless Networking.

### UNIT – V 9

**Fundamentals of Internet Services and Security:** The Internet and Internet Services: Introduction – History – Internetworking – Architecture – Managing Internet Connections – Internet Address – Services – Uses – Information Systems – Computer Security: Threats and Attacks – Malicious Software – Hacking – Security Services and Mechanisms.

**TOTAL: 45**

#### TEXT BOOKS:

1. Anita Goel, “Computer Fundamentals”, Pearson Education India, 2010.

#### REFERENCE BOOKS:

1. Balagurusamy. E, “Fundamentals of Computers”, Tata McGraw-Hill Ltd., New Delhi, 2009.
2. Rajaraman, “Fundamentals of Computers”, 4<sup>th</sup> Edition, PHI Learning, 2008.
3. Leon Alexis, and Leon Mathews, “Introduction to Information Systems” Vijay Nicole Imprints Private Limited, First Edition, 2008.

#### Course Outcomes:

On completion of the course the students will be able to

- identify computer peripherals and familiar with software applications
- describe the chain of computer system events that occurs from when a user running a program
- have basic understanding of network connections and utilize the internet to research information

## 14BCC11 PROBLEM SOLVING AND PROGRAMMING

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 3 4

### UNIT – I 9

**Introduction to Computer and Problem Solving:** Overview of computers – Applications of computers-Characteristics of computer - Basic computer Organization – Number System - Problem solving: Planning the computer program – Algorithms - Flowcharts – Pseudo codes –Structuring the logic – Top-Down design.

### UNIT – II 9

**Case Study on Problem Solving:** Algorithm, Flowchart and Pseudo code for the problems: Exchanging the values of two variables – Finding the biggest number - Counting – Summation of numbers – Factorial computation – Generation of Fibonacci Sequence - Summation of series – Base Conversion - Reversing the digits of an Integer.

### UNIT – III 9

**Introduction to C and Control Statements:** Overview of C – Basic structure of a C Program – Executing a C Program – C Character set – Tokens – Keywords and Identifiers – Constants – Variables – Data types - Storage classes - Managing Input and output operations – Operators and Expressions - Decision making and branching - looping – break and continue statements.

### UNIT – IV 9

**Arrays, Strings and Functions :** Arrays – One dimensional and Two dimensional arrays - Handling of character Strings: Declaring and initializing string variables – String handling functions - Library functions – User defined functions :Elements of User defined Functions – nesting of functions – passing arrays to function – passing string to functions - recursion.

### UNIT – V 9

**Structures, Unions and Pointers:** Structure definition – Structure declaration – Accessing a structure member- Structure initialization – Array of Structures - Arrays within structures –Structures within Structures – Structures and Functions, Unions. Understanding pointers – Accessing address of a variable – declaring pointer variables – initialization of pointer variables – accessing a variable through its pointer – Pass by value vs. Pass by pointers

**Lecture:45, Practical:45, TOTAL: 90**

### REFERENCE BOOKS:

1. R.G.Dromey, “How to Solve it by Computer”, Pearson Education, 2009.
2. E.Balagurusamy, “Fundamentals of Computing and Programming”, Tata McGraw-Hill Education Pvt. Ltd., 2010.
3. Stephen G Kochan, “Programming in C”, Third Edition, Pearson Education, 2005.
4. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.

### Course Outcomes:

On completion of the course the students will be able to

- apply fundamental principles of problem solving techniques
- develop algorithm, flowchart and pseudo code to provide solutions to problems
- develop programs using basic programming principles of C language
- implement modular programming concepts using functions
- design simple applications using arrays, structures and pointers

**UNIT – I** **6**  
**Philosophy of Life Science:** Life – Purpose of life (four stages of life)–Philosophy of life (who am ‘I’) – Law of nature (cause of the life and body) – Content of the Life (five sheaths) – Goal of life. Five duties in life.

**Methodology:** Life and messages of spiritual and national leaders– The forgotten hero, etc.

**Project report:** Complementing with happiness - Every soul is potentially divine

**UNIT – II** **6**  
**Human Values-Moral foundation:** Truth, forgiveness, compassion, endurance, humility, non violence, moderate diet, non stealing, self purification, self discipline, self study, content, cleanliness, honesty, and totality in faith– Good habits – Attitude forming for Individual peace.

**Practical Methods:** Personal experience with above characters, Puranic Stories - Self resolve diary maintenance

**UNIT – III** **6**  
**Social Values:** Family – Family System - Greatness of women – World brotherhood (vasudeiva kudumbagam) – Glorious Bharath - Bharathian systems - Past –Present – Future - Team spirit - Goal setting – Economics – Education – Politics – Responsibilities of people – Preserving natural resources.

**Methodology:** Preparing an album on glorious Bharath Past, Present and Future Plans. Goal setting - Management Games. Team Spirit - Yogic Games.

**UNIT – IV** **6**  
**Development of Mental Prosperity:** Prosperity of mind – Functions of mind - Obstacles of mind - Practical method to perfect mind is yoga – Types – Uses – Precaution – Contradiction – Kriyas - Asanas – Pranayamas – Meditative techniques.

**Methodology:** Asana - Pranayama – Cyclic meditation – Nada anu sandhana – Meditation – Yogic games for memory. Album on asanas , pranayama and mantra.

**UNIT – V** **6**  
**Maintenance of Physical Health:** Human body – Structure - Ten Systems of the body as per modern science. Five elements - Harmonious relationship – Life force – Conserving vitality & health through natural life – Pranic food and its importance – Uses of herbs - Right way of cooking to preserve nutrients - Cause of the disease – Acute and chronic - Disease - Life and death.

**Methodology:** Natural food making, traditional millet dishes. Asanas, pranayamas, cleansing procedures. Quiz on healthy living, Uses of herbs or kitchen garden.

**TOTAL : 30**

**TEXT BOOK:**

1. “Value Education”, compiled by Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar, Pollachi, for Kongu Engineering College

**Course Outcomes:**

On completion of the course the students will be able to

- understand the purpose and value of life
- exhibit positive human values
- understand social values
- take steps to develop mental and physical Health

## 14BCL11 DIGITAL LABORATORY

(Common to Computer Systems & Design, Information Systems and Software Systems)

0 0 3 1

### LIST OF EXPERIMENTS:

1. Verification of AND, OR, NOT, NAND, NOR, XOR Logic Gates
2. Code Converters
3. Parity Generator
4. Half Adder / Full Adder
5. Half Subtractor / Full Subtractor
6. Encoder / Decoder
7. Multiplexer / Demultiplexers
8. Binary and BCD counter
9. Up / Down 4 bit Binary Counter
10. Shift Register
11. Ring counter

**TOTAL: 45**

### REFERENCES / MANUALS / SOFTWARE:

- Digital Trainer Kit
- Integrated Circuits

### Course Outcomes:

On completion of the course the students will be able to

- analyse logic gates
- understand the design of combinational and sequential logic circuits
- implement electronic circuits for Registers and Counters

## 14BCL12 OFFICE AUTOMATION LABORATORY

(Common to Computer Systems & Design, Information Systems and Software Systems)

0 0 3 1

### LIST OF EXPERIMENTS:

#### MS-WORD

1. Design student grade sheet & leave letter using following options in ms word. Page setup, font type, color, style, size, heading, bold, under line, text highlight color, line space, indents, alignment, tables.
2. Design a newspaper in ms word using following options. Insert- columns ,header, footer, Date, Time, Page break, borders, page numbers, water marks, pictures, charts, hyperlink, bookmark, textboxes, drop caps, cover page options.
3. Create a mail merge for sending a letter to different Recipients.
4. Design an invitation using macros and clip art.

#### MS-EXCEL

5. Create a consolidate attendance report for a class in ms excel using following options Math functions(Sum, average, count ,max ,min, count if, pivot), increase decimal, decrease decimal, merge cells, wrap text, borders, cell alignment, bold , font style, type colors, background colors, insert rows and columns, delete rows and columns , row height and column width.
6. Get external data from access and create chart for it
7. Solve mathematical problems using text functions, logical functions, mathematical and trigonometrical functions, date and time functions
8. Design an application using sorting and filtering data, freeze panes and view gridlines.

#### MS-POWER POINT

9. Create a presentation with different layouts and designs and use the following options. Page setup, slide orientation, background styles, colors, fonts, effects, Chart, text box, header, footer, word art, date, time, slide number, object, sound, clip art, pictures, custom animation and slide show.

**TOTAL: 45**

#### REFERENCES / MANUALS / SOFTWARE:

- Office Suite

#### Course Outcomes:

On completion of the course the students will be able to

- create and edit word documents
- build excel worksheets and carry out calculations
- prepare power point slide presentations for any application

**14BCL13 COMMUNICATION SKILLS AND CAREER DEVELOPMENT LABORATORY I**  
(Common to Computer Systems & Design, Information Systems and Software Systems)

**0 0 3 1**

**LIST OF EXPERIMENTS:**

1. Listening:
  - Listening to grammar exercises.
  - Listening to famous speeches.
2. Speaking:
  - Introduction on speech mechanism.
  - Speaking on general topics.
  - Presenting an abstract.
3. Reading:
  - Vocabulary drilling.
  - Reading newspaper.
4. Writing:
  - Dialogue writing
  - Letter writing.
  - Circular writing.
  - Paragraph writing.

**TOTAL: 45**

**REFERENCES / MANUALS / SOFTWARE:**

- Globarena

**Course Outcomes:**

On completion of the course the students will be able to

- enhance students communication skills
- enrich their vocabulary
- develop creative writing skills



## 14BCT21 COMMUNICATIVE ENGLISH II

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

### UNIT – I 9

**Grammar & Vocabulary:** Use of Pronouns/ Prepositions/ Conjunctions- Infinitives and Gerunds. Writing: Writing descriptions: places, people, buildings, events; Comprehension passage-I (Question and Answer & Multiple choice). **Verbal Activities** (NOT FOR EXAMINATION): Listening : Listening to Conversations; Speed Reading: Reading short stories; Speaking: Informal presentation.

### UNIT – II 9

**Grammar & Vocabulary:** Voice- Active/ Passive / Impersonal Passive; Writing: Report writing, Note making. **Verbal Activities** (NOT FOR EXAMINATION): Listening : Listening to Presentations; Speed Reading: Reading Passages (general); Speaking: Formal presentation.

### UNIT – III 9

**Grammar & Vocabulary:** Four Types of Sentences- Declarative- Interrogative- Imperative- Exclamatory; Writing: Essay writing; Comprehension passage-III (Complete the sentence). **Verbal Activities** (NOT FOR EXAMINATION): Listening : Listening to Announcements; Speed Reading: Reading News clips; Speaking: Participating in Interviews.

### UNIT – IV 9

**Grammar & Vocabulary:** Simple Sentences- Complex Sentences- Compound Sentences [If clause]; Writing: Transcoding: Transferring information from passages to charts and tables – converting information from charts and tables to passages; Comprehension passage-IV (True or False, Match the Synonyms and Antonyms). **Verbal Activities** (NOT FOR EXAMINATION): Listening : Listening to Instructions; Speed Reading: Reading technical passages; Speaking: Oral Presentation – General/Technical.

### UNIT – V 9

**Grammar & Vocabulary:** 1.Punctuation 2. Spotting errors; Writing: Formal letter writing – Job application letter; Comprehension passage-V (Reasoning or Moral Questions). **Verbal Activities** (NOT FOR EXAMINATION): Listening : Listening to TV News; Speed Reading: Reading Tongue twisters; Speaking: Group Discussion.

**TOTAL: 45**

#### TEXT BOOKS:

1. Learn English – A Fun Book Of Functional Language, Grammar And Vocabulary. McGraw Hill Education [India] Pvt. Ltd, Santana Sinha Chaudhuri 2013.

#### REFERENCE BOOKS:

1. Sangeeta Sharma and Mishra Binod,- Communication Skills for Engineers and Scientists, PHI Learning Pvt. Ltd., New Delhi. 2011.
2. Leena Sen,- Communication Skills, Prentice Hall of India Pvt. Ltd., 2009.

#### Course Outcomes:

On completion of the course the students will be able to

- improve their grammar and vocabulary for use in different contexts
- get familiarized with different methods of listening skills
- get familiarized with different methods of reading
- speak effectively in English in various situations
- acquire knowledge about various academic and technical writing skills

## 14BCT22 APPLIED MATHEMATICS-II

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 1 0 4

### UNIT – I 9

**Statistical Measures:** Summarizations of uni and multi dimensional data – frequency distribution - Measures of central tendency: mean, median, mode. Measures of dispersion: range, quartile deviation, mean deviation, standard deviation - simple problems.

### UNIT – II 9

**Curve Fitting:** Evaluation of constants by the method of group averages( To fit a straight line) – Equations involving three constants of the form  $y = a + bx + cx^2$ ,  $y = ax^b + c$ ,  $y = ab^x + c$  and  $y = ae^{bx} + c$  by the method of group averages – Fitting a straight line by the method of least squares- Fitting a parabola by the method of least squares – Fitting an exponential curve by the method of least squares. Method of moments(To fit a straight line and parabola).

### UNIT – III 9

**Correlation and Linear Regression:** Karl Pearson’s coefficient of correlation-Spearman’s rank correlation — regression coefficients – Estimation of two Regression lines -simple problems

### UNIT – IV 9

**Sampling:** Introduction to sampling distributions – Types of sampling- Standard Error –Test of Significance- - Test of significance for large samples-Test of significance for single proportion- Testing of significance for difference of proportions-Test of significance for single mean- Test of significance for difference of means of two large samples.

### UNIT – V 9

**Testing of Hypothesis:** t-test - t-test of significance for single mean - t-test for difference of means of small samples. F-test of significance-chi-square distribution- chi-square test of goodness of fit- Independence of attributes.

**Lecture:45, Tutorial:15, TOTAL: 60**

#### TEXT BOOKS:

1. S.P.Gupta., “Statistical Methods”, Sultan Chand & Sons, New Delhi, Forty First Edition, 2011.
2. Kandasamy P, Thilagavathy K and Gunavathy K., “Probability Statistics and Queueing Theory”, S.Chand, 2006.

#### REFERENCE BOOKS:

1. Gupta.S.P, “Practical Statistics”, S.Chand & Company Ltd, New Delhi, Reprint 2010.
2. Kandasamy. P, Thilagavathy. K and Gunavathy. K, “Numerical Methods”, Reprint Edition 2014, S.Chand and Co., New Delhi.
3. Babu Ram , “Engineering Mathematics”, Pearson, 2010.
4. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, 2011.

#### Course Outcomes:

On completion of the course the students will be able to

- find mean, median, mode and measures of dispersion
- obtain the curve fitting
- identify when correlation and regression analyses are appropriate
- know about the types of sampling and errors
- analyse the testing of hypothesis and formulate null and alternative hypotheses

## 14BCT23 OBJECT ORIENTED PROGRAMMING USING C++

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

### UNIT – I 9

**Introduction and C++ Functions:** Object Oriented Programming paradigm –Basic Concepts – Benefits of OOP – Beginning with C++ – Structure of C++ program –Tokens, Expressions and Control Structures. : Main Function –Function prototyping –Call by reference –Return by reference – Inline functions – Function overloading.

### UNIT – II 9

**Classes & Objects, Arrays:** Classes and objects -Specifying a class –Defining Member functions - Making an outside function inline –Nesting of member functions –Private member functions. Arrays within a class–Memory allocation for objects –Static data members and member functions –Arrays of objects –Friendly functions –Pointers to members.

### UNIT – III 9

**Constructors, Operator Overloading And Conversions:** Constructors and destructors: Constructors –parameterized constructors –Multiple Constructors –Copy constructor –Dynamic constructors –Destructors –Operator Overloading and type conversions : Rules for overloading operators - Overloading unary operators –Overloading binary Operators –Overloading binary operators using friends –Manipulation of strings using operators –Type conversions.

### UNIT – IV 9

**Inheritance and Polymorphism:** Inheritance: Single inheritance –Making a private member inheritable –Multilevel inheritance –Multiple inheritance –Hierarchical inheritance –Hybrid inheritance. Virtual base classes –Abstract classes –Constructors in derived class –Pointers-Pointers to objects –this pointer –Pointers to derived classes –Virtual functions –Pure virtual functions.

### UNIT – V 9

**Files and Exception Handling:** Working with files: Classes for file stream operations –Opening and closing a file –Detecting end-of-file –File modes –File pointers and their manipulations –Sequential input and output operations –Error handling during file operations –Command line arguments-Exception handling.

**TOTAL: 45**

#### TEXT BOOKS:

1. Balagurusamy, E., “Object Oriented Programming with C++”, 6<sup>th</sup> Edition, Tata Mc Graw Hill Education Private Limited, New Delhi, 2013.

#### REFERENCE BOOKS:

1. Herbert Schildt, “C++ The Complete Reference”, 4<sup>th</sup> Edition, Mc-Graw Hill Companies, United States of America, 2003.
2. Kamthane, A., “Object Oriented Programming with ANSI and Turbo C++”, Pearson Education, Delhi, 2006.
3. Deitel and Deitel, “C++ How to Program”, 6<sup>th</sup> Edition, PHI Press, 2009.

#### Course Outcomes:

On completion of the course the students will be able to

- know the difference between object oriented programming and procedural programming
- develop the C++ program with control structures, arrays, classes and objects
- manipulate object oriented programming concepts using simple programs
- gain some practical experience of C++

**14BCT24 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING**  
(Common to Computer Systems & Design, Information Systems and Software Systems)

**3 0 0 3**

**UNIT – I** **9**

**Fundamentals of DC Circuits:** Basic concepts of electric field, Electric Current, Electric Potential, Potential Difference, Electric Work, Electric Power & Electric Energy. Basic Circuit Elements: R, L, C. Ohm's law, Kirchhoff's law: Kirchhoff's Current Law, Kirchhoff's Voltage Law. Resistance in Series, Resistance in parallel, Mesh Analysis for resistive network having independent source only– Simple Problems.

**UNIT – II** **9**

**Fundamentals of AC Circuits:** Generation of Sinusoidal alternating Voltage and Current: Equation, Waveform, Cycle, Time period and Frequency, RMS and Average value, Form factor, Peak factor – Simple Problems. Wiring Diagram for Fluorescent Lamp, Staircase wiring.

**UNIT – III** **9**

**Fundamentals of Electronics Circuits:** Basics concept of Conductors, Insulators, Semiconductors. Construction, Characteristics and Applications: PN Junction diode, Zener diode, Bipolar Junction Transistor, Silicon Control Rectifier.

**UNIT – IV** **9**

**Converters:** [Excluding problems]: Working principles of Half wave rectifier and Full wave rectifier –Centre tap and Bridge rectifier –Working Operation of SMPS,UPS(block diagram only)

**UNIT – V** **9**

**Electrical Machines:** [Excluding problems]: Faradays laws, Lenz's law, Self and Mutual Induction Principle, Construction, Types, Principle of Operation and Applications of: DC Generator, DC Motor, Single Phase Transformer.

**TOTAL: 45**

**TEXT BOOKS:**

1. P.V.Prasad, S.Sivanagaraju, R.Prasad, “Basic Electrical and Electronics Engineering”, Cengage Learning India Pvt. Ltd., 2013.

**REFERENCE BOOKS:**

1. Theraja B.L., “Fundamentals of Electrical Engineering and Electronics”, S.Chand & Co, New Delhi.
2. Metha, V.K., Rohit Metha, “Principles of Electrical Engineering”, S.Chand & Company Ltd., New Delhi.
3. Sedha R.S., “Applied Electronics”, 1<sup>st</sup> Edition, S.Chand & Company Ltd., New Delhi, 2001.

**Course Outcomes:**

On completion of the course the students will be able to

- acquire the basic concepts of Electrical and Electronics Engineering
- understand the basic connections for electrical equipments
- get exposed to the basic principles of electrical machines for controlling applications

## 14BCT25 DATA STRUCTURES

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

### UNIT – I 9

**Arrays and Stacks:** Linear Data Structures and their sequential storage representation: concepts and terminology – Storage structure for arrays – Structures and arrays of structures- Stacks – Application: Recursion, Conversion of Infix to Postfix

### UNIT – II 9

**Queues and Linked Lists:** Queues – Operations – Circular Queue – Priority Queue –Application : Simulation - Pointers and Linked Allocation – Linked Linear Lists : Operations , Doubly Linked Linear Lists – Application: Polynomial Manipulation.

### UNIT – III 9

**Trees:** Definitions and Concepts – Operation on Binary Trees- Binary tree Traversals - Storage Representation and Manipulation of Binary Trees: Linked Storage – Threaded Storage - Application of Binary Tree: Manipulation of Arithmetic Expression.

### UNIT – IV 9

**Graphs:** Graphs and their representation – Matrix representation of graph – Graph Traversal Techniques: Breadth first search – Depth first search – Spanning trees – Application: Program Evaluation and Review Technique (PERT).

### UNIT – V 9

**Sorting and Searching:** Sorting – Notation and Concepts – Selection Sort – Bubble Sort – Quick Sort – Heap Sort – Radix Sort – Searching Techniques: Sequential Search and Binary Search.

**TOTAL: 45**

#### TEXT BOOKS:

1. Tremblay, J.P. and Sorensen, P.G., “An Introduction to Data Structures with Applications”, 2<sup>nd</sup> Edition, Tata McGraw Hill, New Delhi, Reprint 2013.

#### REFERENCE BOOKS:

1. Brijendra Kumar Joshi, “Data Structures and Algorithms in C++”, Tata McGraw-Hill, New Delhi, 2010.
2. Vijayalakshmi Pai G.A., “Data Structures and Algorithms”, 2<sup>nd</sup> Edition, Tata McGraw-Hill, New Delhi, 2008.
3. Balagurusamy E., “Computer Programming and Data Structures”, 3<sup>rd</sup> Edition, Tata McGraw-Hill, New Delhi, 2012.

#### Course Outcomes:

On completion of the course the students will be able to

- apply and implement learned algorithm design techniques and data structures to solve problems
- use linear and non-linear data structures like Stack, Queue, Linked list, etc.
- handle operations like searching , insertion, etc on various data structures
- choose appropriate data structure as applied to specified problem definition

## 14BCL21 OBJECT ORIENTED PROGRAMMING LABORATORY

(Common to Computer Systems & Design, Information Systems and Software Systems)

0 0 3 1

### LIST OF EXPERIMENTS:

1. Simple Programs in C++
2. Implementation of Call by Value, Call by Address and Call by Reference
3. Create a Complex Number Class with all possible Operators
4. Implementation of Classes and Objects
5. Constructors and destructors
6. Operator Overloading and Function Overloading
7. Implementation of Inheritance
8. Implementation of Virtual Base Class
9. Implementation of Polymorphism
10. File Handling

**TOTAL: 45**

### Course Outcomes:

On completion of the course the students will be able to

- design programs using all of the syntactic features of C++
- develop programs that exploits the modularity of object-oriented programs
- solve real-time problems using the C++

**LIST OF EXPERIMENTS:**

1. Verification of Ohm's Law.
2. Verification of Kirchoff's Law.
3. Measurement of Current, Voltage and Power for simple DC circuits.
4. VI characteristics of PN junction diode.
5. VI characteristics of Zener diode.
6. Voltage Regulator using Zener diode.
7. Open circuit & Load Test on D.C. Shunt Generator
8. Single phase Power Measurement Using Voltmeter and Ammeter.
9. Load Test on Single Phase Transformer
10. Load Test on single Phase induction Motor
11. Load Test on three Phase induction Motor
12. Study of SMPS
13. Study of Half Wave and Full Wave Rectifiers

**TOTAL: 45**

**Course Outcomes:**

On completion of the course the students will be able to

- understand the basic connections for electrical equipments
- get exposed to the basic electrical machines connections for controlling applications

## 14BCL23 DATA STRUCTURES LABORATORY

(Common to Computer Systems & Design, Information Systems and Software Systems)

0 0 3 1

### LIST OF EXPERIMENTS:

1. Array Operations
2. Stack Operations using Arrays
3. Applications of Stack – Infix to postfix
4. Queue Operations using Arrays
5. Circular Queue using Arrays
6. Singly linked list Operations
7. Selection sort
8. Quick sort
9. Heap sort
10. Sequential search & Binary search
11. Selection sort
12. Binary Tree Traversal Techniques

**TOTAL: 45**

### Course Outcomes:

On completion of the course the students will be able to

- implement learned algorithm design techniques and data structures to solve problems
- apply linear and non-linear data structures like stack, Queue, Linked list, etc.
- handle operations like searching, insertion, etc on various data structures
- choose appropriate data structure for the specified problem definition



## 14BCT31 OPERATING SYSTEMS

(Common to Computer Systems and Design, Information Systems and Software Systems)

3 1 0 4

**Pre-requisites:** Fundamentals of Computing

### UNIT – I

9

**Overview of Operating System and Process Concept:** Role of Operating Systems –Computer System Organization—Computer System Architecture-Operating System Structure- Operating System Operations-Process Management-Memory Management-Storage Management - Protection and Security-Distributed System-Special Purpose Systems-Computing Environments- Process Concept – Process Scheduling –Operations on Processes –Interprocess Communication.

### UNIT – II

9

**Multithreading, Process Scheduling and Synchronization:** Overview –Multithreading Models – Threading Issues –Process Basic Concept-Scheduling Criteria –Scheduling Algorithms-Thread Scheduling –Multiprocessor Scheduling –Background –The Critical Section Problem –Peterson’s Solution-Synchronization Hardware –Semaphores –Classic Problems of Synchronization -Monitor.

### UNIT – III

9

**Deadlock and Memory Management:** System Model –Deadlock Characterization –Methods for Handling Deadlocks –Deadlock Prevention – Deadlock Avoidance – Deadlock Detection –Recovery from Deadlocks –Memory Management: Background –Swapping –Contiguous Memory Allocation – Paging –Structure of the Page Table-Segmentation.

### UNIT – IV

9

**Virtual Memory and File System:** Background –Demand Paging –Copy on Write–Page Replacement –Allocation of Frames –Thrashing – File Concept –Access Methods –Directory and Disk Structure.

### UNIT – V

9

**File System Implementation and Secondary Storage Structure:** File System Structure –File System Implementation –Directory Implementation –Allocation Methods –Free Space Management-Overview of Mass Storage Structure –Disk Structure –Disk Attachment-Disk Scheduling –Disk Management.

**Lecture: 45, Tutorial: 15, TOTAL: 60**

### TEXT BOOK:

1. Silberschatz Abraham., Galvin B Peter and Gagne Greg, “Operating System Concepts”, 8<sup>th</sup> Edition, Wiley India Pvt. Ltd., New Delhi, 2012.

### REFERENCE BOOKS:

1. Andrew S. Tanenbaum, Albert S. Woodhull, “Operating Systems, Design and Implementation”, 8<sup>th</sup> Edition, Pearson Prentice Hall, 2009.
2. Deitel H.M.,”Operating Systems”, 3<sup>rd</sup> Edition, Pearson Education, Reprint 2009.
3. Stallings William, “Operating Systems: Internals and Design Principles”, 7<sup>th</sup> Edition, Prentice Hall of India, 2012.

### Course Outcomes:

On completion of the course the students will be able to

- know the role of operating systems and their types
- apply the concept of a process, thread and scheduling algorithms in real time problems
- realize the concept of deadlock and different ways to handle it
- understand the various memory management techniques and file system

## 14BCT32 COMPUTER ARCHITECTURE

(Common to Computer Systems and Design, Information Systems and Software Systems)

3 1 0 4

**Pre-requisites:** Digital Principles

**UNIT – I** 9

**Basic Structure and Machine Instructions:** Computer Types- Functional Units- Operational Concepts- Bus Structures- Software- Performance- Multiprocessors and Multicomputers- Machine Instructions: Numbers, Arithmetic Operations and Characters- Memory Locations and Addresses- Memory Operations- Instructions and Instruction Sequencing- Addressing Modes.

**UNIT – II** 9

**Arithmetic:** Addition and Subtraction of Signed Numbers- Design of Fast Adders- Multiplication of Positive Numbers- Signed-Operand Multiplication- Fast Multiplication- Integer Division- Floating Point Numbers and Operations.

**UNIT – III** 9

**Processing Unit and Pipelining:** Fundamental Concepts- Execution of a Complete Instruction- Multiple Bus Organization- Hardwired Control- Microprogrammed Control - Pipelining: Basic Concepts- Data Hazards- Instruction Hazards.

**UNIT – IV** 9

**Memory System:** Basic Concepts- Semiconductor RAM Memories- Read-Only Memories- Speed, Size and Cost- Cache Memories- Performance Considerations- Virtual Memories- Memory Management Requirements- Secondary Storage.

**UNIT – V** 9

**Input/Output Organization:** Accessing I/O Devices- Interrupts- Direct Memory Access- Buses- Interface Circuits- Standard I/O Interfaces.

**Lecture: 45, Tutorial: 15, TOTAL: 60**

### TEXT BOOK:

1. Hamacher Carl, Vranesic Zvonko, Zaky Safwat, “Computer Organization”, 5<sup>th</sup> Edition, McGraw Hill Education, 2013.

### REFERENCE BOOKS:

1. Stallings William, “Computer Organization and Architecture Designing for Performance”, 8<sup>th</sup> Edition, Pearson Education.
2. Rajaraman V. and Radhakrishnan T., “Computer Organization and Architecture”, Prentice Hall of India.
3. Godse A. P. and Godse D. A., “Computer Organisation”, 4<sup>th</sup> Edition, Technical Publications, Pune.

### Course Outcomes:

On completion of the course the students will be able to

- understand the computer components like CPU, memory, I/O and storage
- acquire knowledge on machine instructions
- understand the multiprocessing system

## 14BCT33 DATABASE MANAGEMENT SYSTEMS

(Common to Computer Systems and Design, Information Systems and Software Systems)

3 1 0 4

**Pre-requisites:** Basic Knowledge in Programming Languages and Data Structures

### UNIT – I

9

**Introduction and Database Design Model:** Database System Applications – Purpose of Database Systems – View of Data – Database Languages – Relational Databases – Database Design – Data Storage and Querying – Transaction Management – Database Architecture – Data Mining and Information Retrieval – Specialty Databases – Database Users and Administrators – History of Database Systems – Database Design and the E-R Model.

### UNIT – II

9

**Structured Query Language:** Overview of SQL Query Language – SQL Data Definition - Basic Structure of SQL Queries – Additional Basic Operations - Set Operations - Null Values - Aggregate Functions - Nested Sub Queries - Modification of the Database – Intermediate SQL – Functions and Procedures – Triggers.

### UNIT – III

9

**Relational Database Design:** Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Functional Dependency Theory – Algorithms for Decomposition - Decomposition using Multivalued Dependencies – More Normal Forms – Database Design Process – Modeling Temporal Data.

### UNIT – IV

9

**Transactions:** Transaction Concept – A Simple Transaction Model – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability – Transaction Isolation and Atomicity – Transaction Isolation Levels – Implementation of Isolation Levels – Transactions as SQL Statements.

### UNIT – V

9

**Concurrency Control:** Lock Based Protocols – Deadlock Handling – Multiple Granularity – Timestamp Based Protocols – Validation Based Protocols – Multiversion Schemes – Snapshot Isolation – Insert Operations, Delete Operations and Predicate Reads – Weak Levels of Consistency in Practice – Concurrency in Index Structure.

**Lecture: 45, Tutorial: 15, TOTAL: 60**

### TEXT BOOK:

1. Silberschatz Abraham., Korth Henry F. and Sudarshan S., “Database System Concepts”, 6<sup>th</sup> Edition, McGraw Hill, New York, 2011.

### REFERENCE BOOKS:

1. Date C.J., Kannan A. and Swamynathan S., “An Introduction to Database Systems”, 8<sup>th</sup> Edition, Pearson Education, New Delhi, 2012.
2. Elmasri Remez, and Navathe Shamkant B., “Database Systems: Models, Languages, Design and Application Programming”, 6<sup>th</sup> Edition, Pearson Education, New Delhi, 2013.
3. Connolly Thomas and Begg Carolyn, “Database Systems : A Practical Approach to Design, Implementation and Management”, 4<sup>th</sup> Edition, Pearson Education, New Delhi, 2013.

### Course Outcomes:

On completion of the course the students will be able to

- understand data modeling concepts and their application in design and development process
- develop, design, and construct a typical enterprise database
- apply proper techniques in designing a database
- familiar with database management issues

## 14BIT31 INTRODUCTION TO INFORMATION TECHNOLOGY

3 0 0 3

**Pre-requisites:** Fundamentals of Computing

**UNIT – I** 9

**IT in the Business Environment:** Introduction – Business and Information Technology – Business in the Information Age - Need for Information Technology – Information Systems – Information Technology in the Modern Organization: Basics – Organizations Structure and IT Support – IT Support at Different Organizational Levels – Managing Information Technology in Organizations – IT Peoples and Careers.

**UNIT – II** 9

**Applying IT for Competitive Advantage:** Functional, Enterprise and Interorganizational Systems: Information Systems to Support Business Functions – Transaction Processing – Accounting and Finance Systems – Marketing and Sales Systems – Production and Operational Management – Human Resource Management – Integrated Information Systems and Enterprise Resource Planning(ERP) – Interorganizational Global Information Systems — Overview of Electronic Commerce.

**UNIT – III** 9

**Supply Chain, Data, Knowledge and Decision Support:** Supply Chains and Their Management - Problems and Solutions – IT Supply Chain Support and Systems Integration – ERP – Data, Knowledge and Decision Support: Management and Decision Making – Data Transformation and Management - Decision Support Systems – Enterprise Decision Support - Data and Information Analysis and Mining – Data Visualization Technologies – Knowledge Management and Organisational Knowledge Bases.

**UNIT – IV** 9

**Achieving Information and Organizational Goals:** Artificial Intelligence and Intelligent Systems - Expert Systems – Strategic Information Systems and Reorganization: Strategic Advantage and IT – Porter’s Competitive Forces Model and IT – Strategic Information Systems Examples – Ineffective Organizations in the Information Age – Business Process Reengineering – Virtual Corporations and IT.

**UNIT – V** 9

**Information Systems Developing and Implementing IT:** Information Systems Planning – SDLC – Alternative Methods for System Development – System Development Outside the IS Department – Building Internet and Intranet Applications – Implementing IT: Ethical issues – Impacts of IT – Security – Protecting Information Systems.

**TOTAL: 45**

### TEXT BOOKS:

1. Turban Efraim, Rainer Kelly R. and Potter Richard E., “Introduction to Information Technology”, 2<sup>nd</sup> Edition, Wiley India, 2014.

### REFERENCE BOOKS:

1. James A. O’Brien, “Introduction to Information Systems”, 12<sup>th</sup> Edition, Tata McGraw Hill, 2008.
2. Ralph Stair and George Reynolds, “Fundamentals of Information Systems”, 7<sup>th</sup> Edition, Course Technology, 2014.
3. Rainer and Cegielski, “Introduction to Information Systems: Enabling and Transforming Business”, 3<sup>rd</sup> Edition, John Wiley, 2009.

### Course Outcomes:

On completion of the course the students will be able to

- understand the need for information technology
- apply information technology to facilitate business processes
- identify the need for system transformation
- apply knowledge in achieving the organizational goals
- provide solutions for business problems

## 14BCL31 OPERATING SYSTEMS LABORATORY

(Common to Computer Systems and Design, Information Systems and Software Systems)

0 0 2 1

### LIST OF EXPERIMENTS / EXERCISES:

1. Basic UNIX Commands
2. Shell Programming using control and conditional statements
3. Implementation of FCFS scheduling algorithms
4. Implementation of SJF scheduling algorithms
5. Implementation of FIFO page replacement algorithms
6. Implementation of LRU page replacement algorithms
7. Implementation of file operations
8. Implement inter process communication using pipes and message queues
9. Implement inter process communication using semaphores
10. Implement the process management system calls
11. Implement producer-consumer problem

**TOTAL : 30**

### REFERENCES / MANUALS / SOFTWARE:

1. Linux Operating System
2. Borland C

### Course Outcomes:

On completion of the course the students will be able to

- work with basic commands of Unix
- compare and contrast various CPU scheduling algorithms
- write programs based on multiple cooperating processes and synchronization algorithms

**14BCL32 DATABASE MANAGEMENT SYSTEMS LABORATORY**  
(Common to Computer Systems and Design, Information Systems and Software Systems)

**0      0      2      1**

**LIST OF EXPERIMENTS / EXERCISES:**

1. Simple DDL and DML
2. Check / Key Constraints
3. Views
4. Sequences
5. Nested queries
6. Group by functions / having clause
7. PL/SQL functions
8. PL/SQL procedures
9. Triggers
10. Cursors
11. PL/SQL packages

**CASE STUDY**

Banking System, Inventory System, Student Information System, Library Management System.

**TOTAL : 30**

**REFERENCES / MANUALS / SOFTWARE:**

1. SQL
2. Oracle

**Course Outcomes:**

On completion of the course the students will be able to

- design and implement a database schema for a given problem-domain
- populate and query a database using SQL DML/DDL commands
- declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- programming PL/SQL including stored procedures, stored functions, cursors, packages

**14BCL33 COMMUNICATION SKILLS AND CAREER DEVELOPMENT LABORATORY II**  
(Common to Computer Systems and Design, Information Systems and Software Systems)

**0 0 2 1**

**LIST OF EXPERIMENTS / EXERCISES:**

1. Listening to software packages
  - (i) Concord
  - (ii) Verbal aptitude
2. Speaking
  - (i) Introducing oneself and answering FAQ's.
  - (ii) Making a presentation
  - (iii) Participating in group discussion
  - (iv) Introduction on soft skills
3. Reading
  - (i) Reading comprehension
  - (ii) Reading reviews on advanced technology
4. Writing
  - (i) Writing a job application letter with resume
  - (ii) Explaining a project
  - (iii) Answering tricky interview questions

**TOTAL : 30**

**REFERENCES / MANUALS / SOFTWARE:**

1. Young India Software
  - (a) Tense Buster Intermediate
  - (b) Tense Buster Advanced
  - (c) Issues in English
2. Video Files
  - (a) Videos for group discussion
  - (b) Videos for speaking

**Course Outcomes:**

On completion of the course the students will be able to

- make students familiar with the pronunciation styles of the native speakers of English
- participate in communicative activities in formal contexts effectively
- write effective reports and improve accuracy in the use of language

## 14BCT41 JAVA PROGRAMMING

(Common to Computer Systems and Design, Information Systems and Software Systems)

3 0 0 3

**Pre-requisites:** Object Oriented Programming

### UNIT – I

9

**Introduction:** Java Evolution: Java History - Features – Comparison of Java with C and C++ - Java and Internet –Java and WWW-Web Browsers-Hardware and Software Requirements – Java Support Systems- Java Environment - Overview of Java Language: Simple Java Program - More of Java - Application with Two Classes - Java Program structure – Java Tokens –Java Statements- Installing and Configuring Java - Implementing a Java Program – Java Virtual Machine- Command Line arguments – Constants, Variables and Data Types - Operators and Expressions.

### UNIT – II

9

**Decision Making Statements, Classes, Objects and Methods:** Decision Making and Branching - Decision Making and Looping - Classes, Objects and Methods: Introduction to Class - Defining a Class –Fields Declaration – Methods Declaration - Creating Objects –Accessing Class Members - Constructors – Method Overloading – Static Members – Nesting of Methods - Inheritance - Overriding methods - Final Variables and Methods - Final Classes – Finalizer Methods - Abstract Methods and Classes – Methods with Varargs - Visibility Control.

### UNIT – III

9

**Arrays, Strings and Vectors, Interfaces and Packages:** One-dimensional Arrays-Creating an Array –Two Dimensional Arrays- Strings –Vectors – Wrapper Classes- Enumerated Types – Interfaces: Defining Interfaces – Extending Interfaces – Implementing Interfaces – Accessing Interface variables – Packages: Java API Packages – Using System Packages- Naming Conventions - Creating Packages – Accessing and Using a Package – Adding a Class to a Package – Hiding Classes.

### UNIT – IV

9

**Multithreaded Programming, Managing Errors and Exceptions:** Creating Threads-Extending the Thread Class –Stopping and Blocking a Thread- Life Cycle of a Thread – Using Thread Methods - Thread Exceptions – Thread Priority – Synchronization – Runnable Interface –Inter-thread communication – Managing Errors and Exceptions: Types of Errors - Exceptions – Syntax of Exception Handling Code - Multiple Catch Statements –Using Finally Statement - Throwing own Exceptions.

### UNIT – V

9

**Applet Programming and Graphics Programming:** Introduction - Applets Vs Applications - Writing Applets - Building Applet Code - Applet Life Cycle – Creating an Executable Applet – Designing a Web Page –Applet Tag - Adding Applet to HTML File –Running the Applet – More About Applet Tag - Passing Parameters to Applets – Graphics Programming: The Graphics Class – Lines and Rectangles – Circles and Ellipses - Drawing Arcs – Drawing Polygons.

**TOTAL: 45**

### TEXT BOOK:

1. Balagurusamy E., “Programming with Java A Primer”, 5<sup>th</sup> Edition, McGraw Hill Education (India) Private Limited, New Delhi, 2015.

### REFERENCE BOOKS:

1. Schildt Herbert, “Java: The Complete Reference”, 9<sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2014.
2. Poornachandra Sarang, ”Java Programming “, McGraw Hill Professional, 2012.
3. Savitch J. Walter and Mock Kenrick, ”Absolute Java”, 4<sup>th</sup> Edition, Pearson Education International, 2010.

### Course Outcomes:

On completion of the course the students will be able to

- write java programs using inheritance, polymorphism and encapsulation
- understand the concept of interfaces and packages
- write simple applet and graphics programs



## 14BCT42 COMPUTER NETWORKS

(Common to Computer Systems and Design, Information Systems and Software Systems)

3 1 0 4

**Pre-requisites:** Fundamentals of Computing

### UNIT – I

9

**Foundation:** Introduction to Computer Networks –Applications-Requirements-Network Architecture -Implementing Network Software–Performance.

### UNIT – II

9

**Direct Link and Wireless Networks:** Perspectives on connecting-Encoding (NRZ,NRZI, Manchester, 4B/5B)-Framing-Error Detection-Reliable Transmission-Ethernet and Multiple Access Networks (802.3) –Wireless Networks(802.11/Wi-Fi,802.15.1,Cell Phone Technologies).

### UNIT – III

9

**Routing:** Basics of Internetworking (IP)-Service Model-Global Addresses – Datagram Forwarding in IP-Subnetting and Classless Addressing-Address Translation(ARP)-Host Configuration (DHCP)-Error Reporting (ICMP)-Virtual Networks and Tunnels-Routing: Network as a Graph-Distance Vector (RIP)-Link State (OSPF)-Metrics.

### UNIT – IV

9

**UDP and TCP:** Simple Demultiplexer (UDP)-Reliable Byte Stream (TCP): End-to-End Issues-Segment Format-Connection Establishment and Termination-Sliding Window Revisited-Triggering Transmission-Adaptive Retransmission-Record Boundaries-TCP Extensions-Performance-Alternative Design Choices-Remote Procedure Call: RPC Fundamentals-RPC Implementations.

### UNIT – V

9

**Applications:** Traditional Applications: Electronic Mail (SMTP,MIME,IMAP) -World Wide Web (HTTP)-Web Services-Multimedia Applications: Session Control and Call Control-Resource Allocation for Multimedia Applications-Infrastructure Services: Name Service (DNS)-Network Management (SNMP).

**Lecture:45, Tutorial:15, TOTAL: 60**

### TEXT BOOK:

1. Davie Bruce S. and Peterson Larry L., “Computer Networks - A System Approach”, 5<sup>th</sup> Edition, Morgan Kaufmann, 2012, Elsevier Inc.

### REFERENCE BOOKS:

1. Forouzan Behrouz A., “Data Communications and Networking”, 5<sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2012.
2. Tanenbaum Andrew S., “Computer Networks”, 5<sup>th</sup> Edition, Pearson Education, 2014.
3. Godbole, Achyut S and Kahate Atul., “Data Communication and Networks”, 2<sup>nd</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2011.

### Course Outcomes:

On completion of the course the students will be able to

- understand the components required to build different types of networks
- identify the functionality of each layer for an application
- trace the flow of information from one node to another

## 14BCT43 SOFTWARE ENGINEERING

(Common to Computer Systems and Design and Information Systems)

3 0 0 3

**Pre-requisites:** Fundamentals of Computing

### UNIT – I

9

**Process Models and Understanding Requirements:** A Generic Process Model- Process Assessment and Improvement – Prescriptive Process Models –Agility- Agility and Cost of Change – Agile Process – Extreme Programming -Understanding Requirements: Requirements Engineering- Establishing the Groundwork – Eliciting Requirements – Developing Use Cases – Building the Requirements Model- Negotiating Requirements – Validating Requirements.

### UNIT – II

9

**Estimation and Project Scheduling:** Observations on Estimation- The Project Planning Process- Software Scope and Feasibility – Resources – Software Project Estimation – Decomposition Techniques – Empirical Estimation Models – Estimation for Object Oriented Projects – Specialised Estimation Techniques – The Make/Buy Decision – Project Scheduling.

### UNIT – III

9

**Requirements Modelling and Design Concepts:** Requirements Analysis – Scenario Based Modelling – UML Models that Supplement the Use Case – Data Modelling Concepts – Class Based Modelling – Design Concepts: Design within the Context of Software Engineering – The Design Process – Design Concepts – The Design Model.

### UNIT – IV

9

**Software Testing Strategies:** A Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Convention Software – Test Strategies for Object Oriented Software – Test Strategies for WebApps - Validation Testing – System Testing – The Art of Debugging – Testing Conventional Applications: Software Testing Fundamentals – Internal and External Views of Testing – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing - Model Based Testing – Testing for Specialized Environments, Architectures and Applications – Patterns for Software Testing.

### UNIT – V

9

**Risk Management and SCM:** Reactive versus Proactive Risk Strategies – Software Risks – Risk Identification –Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management – The RMMM Plan – Software Configuration Management: SCM- The SCM Repository- The SCM Process – Configuration Management for WebApps.

**TOTAL: 45**

### TEXT BOOK:

1. Pressman S. Roger, “Software Engineering: A Practioner's Approach”, 7<sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2014.

### REFERENCE BOOKS:

1. Sommerville Ian, "Software Engineering", 8<sup>th</sup> Edition, Pearson Education Asia, Singapore, 2009.
2. Jalote Pankaj, "An Integrated Approach to Software Engineering", 3<sup>rd</sup> Edition, Narosa Publishing House, New Delhi, 2005.
3. Ghezzi, et al, "Fundamentals of Software Engineering", 2<sup>nd</sup> Edition, Prentice Hall of India, New Delhi, 2009.

### Course Outcomes:

On completion of the course the students will be able to

- understand the methods for collecting the requirements and designing projects
- estimate and schedule projects
- identify the testing and monitoring strategies

**Pre-requisites:** Basic Knowledge in Computer Programming

**UNIT – I** **9**

**Introduction to PHP and Programming:** Basic Syntax-Sending Data to the Web Browser-Writing Comments-Variables-Strings-Concatenating Strings-Numbers-Constants-Single Vs Double Quotation Marks-Debugging Steps-Programming with PHP: Creating and Handling an HTML Form-Conditionals and Operators-Validating Form Data-Arrays-For and While Loops.

**UNIT – II** **9**

**MySQL and SQL:** Introduction to MYSQL- Naming Database Elements-Column Types and Properties-Accessing MYSQL-Introduction to SQL: Creating Databases and Tables-Inserting Records-Selecting Data-Using Conditionals-Using LIKE and NOT LIKE-Sorting Query Results-Limiting Query Results-Updating Data-Deleting Data-Using Functions.

**UNIT – III** **9**

**Database Design and PHP with MYSQL:** Normalization-Creating Indexes-Using Different Table Types-Languages and MYSQL-Time Zones and MYSQL-Foreign Key Constraints-Using PHP with MYSQL: Modifying the Template-Connecting to MYSQL-Executing Simple Queries-Retrieving Query Results-Ensuring Secure SQL-Counting Returned Records-Updating Records with PHP.

**UNIT – IV** **9**

**Common Programming Techniques and Error Handling:** Sending Values to a Script-Using Hidden Form Inputs-Editing Existing Records-Paginating Query Results-Making Sortable Displays-Error Handling and Debugging: Error Types and Basic Debugging-Displaying PHP Errors-Adjusting Error Reporting in PHP-Creating Custom Error Handlers –PHP Debugging Techniques-SQL and MYSQL Debugging Techniques.

**UNIT – V** **9**

**Web Application Development with Cookies and Sessions:** Sending Email-Handling File Uploads-PHP and JavaScript-Understanding HTTP Headers-Date and Time Functions–Cookies and Sessions: Making a Login Page and Login Functions-Using Cookies and Sessions-Improving Session Security

**Lecture:45, Tutorial:15, TOTAL: 60**

**TEXT BOOK:**

1. Ullman Larry, “PHP and MySQL for Dynamic Web Sites”, 4<sup>th</sup> Edition, Pearson Education, 2015.

**REFERENCE BOOKS:**

1. Gilmore W. Jason and Nardone Massimo, “Beginning PHP and MYSQL”, 5<sup>th</sup> Edition, Apress, 2014.
2. Michele E. Davis and Jon A. Phillips, “Learning PHP and MYSQL”, 2<sup>nd</sup> Edition, Shroff, 2007.
3. Quigley Ellie and Gargenta Marko, “PHP and MYSQL by Example”, Pearson Education, 2007.

**Course Outcomes:**

On completion of the course the students will be able to

- familiarize with open source programming concepts
- develop applications using PHP and MYSQL
- identify error handling techniques
- gain knowledge on cookies and session handling
- develop web applications

## 14BCL41 JAVA PROGRAMMING LABORATORY

(Common to Computer Systems and Design, Information Systems and Software Systems)

0 0 2 1

### LIST OF EXPERIMENTS / EXERCISES:

1. Classes and objects
2. Command line arguments
3. Constructors
4. Method overloading
5. Method overriding
6. Inheritance
7. Interfaces
8. Packages
9. Multithreading
10. Exception handling
11. Applets
12. Graphics programming

### CASE STUDY

Determine Odd and Even Numbers - Sorting and Searching - Complex Number Manipulation - Area Calculation for Geometrical Shapes - Payroll Preparation - Mark List Preparation - Voters Eligibility - Banner Creation – Simple Arithmetic Calculations using Applets – Draw Circles and Arcs.

**TOTAL : 30**

### REFERENCES / MANUALS / SOFTWARE:

1. Java

### Course Outcomes:

On completion of the course the students will be able to

- design and implement object oriented programming concepts
- develop simple applets
- write graphical applications

## 14BCL42 NETWORKS LABORATORY

(Common to Computer Systems and Design, Information Systems and Software Systems)

0 0 2 1

### LIST OF EXPERIMENTS / EXERCISES:

1. Write a java program to implement URL
2. Write a java program to implement echo
3. Write a java program to implement remote command execution
4. Write a java program to implement TCP/IP client sockets
5. Develop an application for transferring files over the port
6. Develop a client–server application for chat
7. Write a java program to implement remote method invocation
8. Write a java program to implement remote procedure call under client / server environment
9. Write a java program to illustrate java native interface
10. Write a java program to implement ARP/RARP
11. Write a java program using ping command to check the connectivity

**TOTAL : 30**

### REFERENCES / MANUALS / SOFTWARE:

1. Windows-Operating System
2. Java

### Course Outcomes:

On completion of the course the students will be able to

- design and implement socket programming
- choose appropriate network classes to implement client server programming in Java
- check the connectivity between systems in a given network

**LIST OF EXPERIMENTS / EXERCISES:**

1. Write a PHP code for sending data to the web browser
2. Write a PHP program for String Concatenation
3. Write a PHP code using constants and variables
4. Write a PHP program for validating conditionals
5. Write a PHP program using arrays
6. Write a PHP code to retrieve the record of a student from student database
7. Create a registration form with PHP and MYSQL and validate it
8. Write a PHP code with MYSQL for changing the password
9. Write a PHP script with MYSQL database for editing user records
10. Write a PHP script with MYSQL database for creating clickable links out of the table column and headings
11. Display a contact form that upon submission will send an email with the form data to an email address
12. Write a PHP script with MYSQL database that allows the user to upload an image file from their computer to the server

**TOTAL : 30****REFERENCES / MANUALS / SOFTWARE:**

1. Laboratory Manual (PHP & MYSQL Programming)

**Course Outcomes:**

On completion of the course the students will be able to

- write scripts using PHP constructs
- develop web applications with PHP and MYSQL
- validate forms using PHP

## 14BCT51 VISUAL PROGRAMMING

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

### Pre-requisites: Object Oriented Programming

#### UNIT – I

9

**Introduction:** Essential Visual Basic .Net: Visual Basic Integrated Development Environment – Visual Basic Language Operators: Visual Basic Statements - Declaring Constants - Declaring Variables - Data Types – Converting between Data Types - Declaring Arrays and Dynamic Arrays - Using Visual Basic Operators.

#### UNIT – II

9

**Conditionals, Loops and Procedures:** Visual Basic Language Conditionals and Loops: If...Else Statements - Select Case - Switch and Choose - Do Loop - For Loop - For Each...Next Loop - While Loop - With Statement – Handling Higher Math - Date and Time - Financial Data – Visual Basic Language Procedures: Creating Sub Procedures - Creating Functions - Passing a Variable Number of Arguments - Creating Properties – Windows Forms: Using the MsgBox Function – InputBox Function.

#### UNIT – III

9

**Exception Handling, Menus and Dialog Boxes:** Visual Basic Language Exception Handling: Using Unstructured Exception Handling - Using Structured Exception Handling - Using Multiple Catch Statements – Using Finally - Throwing an Exception – Windows Forms Menus Dialog Boxes: Menu Items – Context menus-Open File Dialogs – Save File Dialogs - Font Dialogs - Color Dialogs - Print Dialogs - Print Preview Dialogs - Page Setup Dialogs-Immediate Solutions.

#### UNIT – IV

9

**Files and Data Access with ADO.NET:** Graphics and File Handling: Using the FileStream Class – FileMode Enumeration - FileAccess Enumeration - FileShare Enumeration – StreamReader Class - StreamWriter Class – BinaryReader Class – BinaryWriter Class - File Class – Directory Class –Data Access: Databases Definition - Accessing Data with the Server Explorer - Data Adaptors and Datasets - Working with ADO .Net - Overview of ADO .Net Objects-Immediate Solutions.

#### UNIT – V

9

**Handling Database:** OleDbConnection Class - SqlConnection Class – OracleConnection Class-OleDbCommand Class - SqlCommand Class – OracleCommand Class-OleDbDataAdapter Class - SqlDataAdapter Class – DataSet Class-OleDbDataReader Class - SqlDataReader Class-DataTable Class-DataRow Class-DataColumn Class-DataRelation Class-Immediate Solutions

**TOTAL: 45**

#### TEXT BOOKS:

1. Holzner Steven, “Visual Basic .NET Programming Black Book”, Dreamtech Press, New Delhi, 2014.

#### REFERENCE BOOKS:

1. Chavan Shirish, “Visual Basic .Net”, Pearson Education, 2009.
2. Vick Paul, “The Visual Basic .NET Programming Language”, Pearson Education, 2004.
3. Bill Sheldon, Billy Hollis, Rob Windsor, David McCarter, Gaston Hillar C. and Todd Herman, “Professional Visual Basic 2012 and .NET 4.5 Programming”, John Wiley & Sons, 2012.

#### Course Outcomes:

On completion of the course the students will be able to

- explore the .Net framework
- create and apply procedures, sub-procedures and functions for effective code
- implement object oriented programming concepts in visual basic programs
- use different file functions in visual basic .Net
- develop projects using ADO .Net

## 14BCT52 WEB TECHNOLOGY

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 1 0 4

**Pre-requisites:** Computer Networks and Java Programming

**UNIT – I** 9

**HTML, HTTP and TELNET:** Introduction - History of WWW - The Basics of WWW and Browsing – HTML - Creating links – Frames – Tables – Lists – Forms – Images - Style Sheets - Common Gateway Interface - Remote Login.

**UNIT – II** 9

**DHTML:** Introduction – Cascading Style Sheets – DHTML Document Object Model and Collections – Event Handling – Data Binding.

**UNIT – III** 9

**XML:** Communication Incompatibilities - XML versus HTML - Electronic Data Exchange - XML Terminology - Introduction to DTD - Document Type Declaration - Element Type Declaration - Attribute Declaration - Limitations of DTDs - Introduction to Schema - Complex Types - Extensible Stylesheet Language Transformation.

**UNIT – IV** 9

**ASP:** Introduction - Advantages of Using ASP - First ASP Script - Processing of ASP Scripts with Forms – Variables and Constructs – Subroutines – Include/Virtual – ASP Cookies – ASP Objects – Connecting to Data with ASP.

**UNIT – V** 9

**ASP .NET:** Introduction - Popular Web Technologies - ASP.NET Concept - Overview of .NET Framework - ASP.NET Details - Server Controls and Web Controls - Validation Controls.

**Lecture:45, Tutorial:15, TOTAL : 60**

### TEXT BOOKS:

1. Godbole Achyut and Kahate Atul, “Web Technologies: TCP/IP, Web/Java Programming and Cloud Computing”, 3<sup>rd</sup> Edition, Tata McGraw Hill, New Delhi, 2014.
2. Gopalan N.P. and Akilandeswari J., “Web Technology A Developer’s Perspective”, Prentice-Hall of India Pvt. Ltd., New Delhi, 2008.

### REFERENCE BOOKS:

1. Xavier C., “World Wide Web Design with HTML”, Tata McGraw Hill, New Delhi, 2008.
2. Deitel P.J. and Deitel H.M., “Internet and World Wide Web: How to Program”, 4<sup>th</sup> Edition, Prentice Hall of India, 2008.
3. Brian A. Croft, Rick Darnell, Shelly Powers, “Dynamic Web Publishing”, 2<sup>nd</sup> Edition, TechMedia, New Delhi, 2006.

### Course Outcomes:

On completion of the course the students will be able to

- explore web technology concepts
- understand the server side programming technologies
- learn the concepts of scripting languages
- familiar with web programming
- understand the XML and its applications in web



**Pre-requisites:** Computer Networks

**UNIT – I** 9

**Internet of Things:** Third ICT Wave – Rise of the Machines –IoT Kaleidoscope - Defining Internet of Things- IoT A Web 3.0 View- Ubiquitous IoT Applications: Panoramic View of IoT Applications – Vertical IoT Applications.

**UNIT – II** 9

**Four Pillars of IoT:** Horizontal, Verticals and Four Pillars – M2M Internet of Devices – RFID Internet of Objects – WSN Internet of Transducers– SCADA Internet of Controllers.

**UNIT – III** 9

**DNA and Middleware:** DNA of IoT: DCM – Device – Connect – Manage – Middleware and IoT: Overview of Middleware– Communication Middleware for IoT – LBS and Surveillance Middleware.

**UNIT – IV** 9

**Protocol Standardization for IoT:** Web of Things versus Internet of Things- IoT Protocol Standardization Efforts- Unified Data Standards.

**UNIT – V** 9

**Architecture Standardization for WoT:** Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence – Challenges of IoT Information Security.

**TOTAL: 45**

**TEXT BOOKS:**

1. Zhou Honbo, “The Internet of Things in the Cloud A Middleware Perspective”, CRC Press, 2013.

**REFERENCE BOOKS:**

1. McEwen Adrian and Cassimally Hakim, “Designing the Internet of Things”, John Wiley & Sons Ltd., 2014.
2. Pfister Cuno, “Getting Started with the Internet of Things”, O’Reilly Media Inc., 2011.
3. Erl Thomas, Puttini Ricardo and Mahmood Zaigham, “Cloud Computing Concepts, Technology & Architecture”, Prentice Hall, 2014.

**Course Outcomes:**

On completion of the course the students will be able to

- gain knowledge in rise of machines in day to day life
- understand the pillars of internet connecting devices
- identify the need for middleware in connecting the devices
- explore various protocol standardization
- know the architecture for WoT and security

**Pre-requisites:** Computer Networks

**UNIT – I** 9

**Introduction:** Applications - A simplified reference model – Wireless Transmission: Frequencies for radio transmission – Signals – Antennas - Signal Propagation – Multiplexing - Spread Spectrum - Medium Access Control: Motivation for a Specialized MAC – SDMA – FDMA – TDMA – CDMA - Comparison of S/T/F/CDMA.

**UNIT – II** 9

**Telecommunications Systems:** GSM - Mobile Services - System Architecture - Radio Interface – Protocols - Localization and Calling – Handover – Security - New Data Services - Satellite Systems: History – Applications – Basics – Routing – Localization - Handover.

**UNIT – III** 9

**Wireless LAN:** Infrared vs Radio Transmission - Infrastructure and Ad-hoc Network - IEEE 802.11 - System Architecture - Protocol Architecture - Physical Layer-Medium Access Control Layer - MAC Management - 802.11b - 802.11a – Bluetooth: User Scenarios-Architecture - Radio Layer - Baseband layer - Link Manager Protocol - L2CAP – Security - SDP - Profiles – IEEE802.15.

**UNIT – IV** 9

**Mobile Network Layer:** Mobile IP: Goals Assumptions and Requirements - Entities and Terminology - IP Packet Delivery - Agent Discovery - Registration – Tunneling and Encapsulation – Optimizations -Reverse Tunnelling – IPV6 – IP Micro-Mobility Support - Mobile Ad-hoc Networks: Routing – Destination Sequence Distance Vector - Dynamic Source Routing - Alternative Metrics - Overview Ad-Hoc Routing Protocols.

**UNIT – V** 9

**Wireless Application Protocol:** Architecture - Wireless Datagram Protocol - Wireless Transport Layer Security - Wireless Transaction Protocol - Wireless Session Protocol - Wireless Application Environment - Wireless Markup Language – WMLScript - Wireless Telephony Application – Push Architecture - Push/Pull Services.

**Lecture:45, Tutorial:15, TOTAL : 60**

**TEXT BOOKS:**

1. Jochen Schiller, “Mobile Communications”, 2<sup>nd</sup> Edition, Pearson Education, Delhi, 2013.

**REFERENCE BOOKS:**

1. Lee, William C.Y., “Mobile Cellular Telecommunications”, 2<sup>nd</sup> Edition, McGraw-Hill, New York, 2006.
2. Pahlavan Kaveh and Krishnamoorthy Prasanth, “ Principles of Wireless Networks”, Pearson Education, New Delhi, 2003.
3. Stallings William, “Wireless Communications and Networks”, Pearson Education, 2002.

**Course Outcomes:**

On completion of the course the students will be able to

- understand the mechanisms that are used to control the medium access
- gain knowledge on mobile telecommunication systems
- explore the wireless local area network technologies
- familiarize the protocols and mechanisms developed for the network layer to support mobility
- recognize the architecture of WAP and its protocol communications

**14BCL51 VISUAL PROGRAMMING LABORATORY**  
(Common to Computer Systems & Design and Information Systems)

**0    0    2    1**

**LIST OF EXPERIMENTS / EXERCISES:**

1. Working with Basic Common Controls, Branching and Looping
2. Implementation Constructor and Destructor
3. String Functions
4. Implementation of Polymorphism
5. Inheritance and Interface
6. Working with Menus and Dialog Controls
7. Implementation of Database

**Case Study:**

Electricity Bill Generation-Area calculation-Payroll Processing-Student Mark list Preparation-Billing System-Air line Reservation System-Banking Process-Library Management System-Stock Maintenance Application-Hospital Administrative Process-Railway Reservation Process.

**TOTAL: 30**

**REFERENCES / MANUALS / SOFTWARE:**

1. Windows Operating System
2. .Net Framework, VB.Net
3. SQL-Server

**Course Outcome:**

On completion of the course the students will be able to

- design applications using visual basic .Net controls
- implement object oriented programming concepts
- develop projects using ADO .Net

**LIST OF EXPERIMENTS /EXERCISES:****GSM Kit with Computer(Modem)**

1. SMS Management
  - i. Sending “Hello World” through SMS
  - ii. Reading the Received SMS
  - iii. Reading the SMS Stored in the Inbox (Sent and Unsent, Read and Unread)
  - iv. Deleting a SMS Stored in the Inbox.
  - v. Writing a SMS Inside the Inbox.
2. Call Management
  - i. Dialing a Voice Call to a Particular Number.
  - ii. Answering an Incoming Call (Auto Answering and Attending)
  - iii. Disconnecting a Call.
3. Managing Phone Book.
  - i. Displaying Phone Book Memory Storage
  - ii. Reading Phone Book Contacts
  - iii. Finding A Particular Phonebook Contact
  - iv. Writing A Contact Inside The Phone Book
4. Displaying IMEI Number, Model, Manufacturer and Software Version of the GSM Modem.
5. Showing the Signal Quality of the Network, Service Centre Address and the Mobile Operator Name.
6. Displaying the GPRS IP Address.

**GSM kit with Controller**

7. Finding the voltage of the battery and showing it on the LCD.
8. Switching ON and OFF of the LEDs as per the concern message received.

**Web Programming**

9. Develop a HTML document for student’s resume using the following tags (Heading, Anchor, Paragraph, Background images and background color, text color)
10. Develop a web page for the time table using lists(Ordered and Unordered) and table tags
11. Design a Web page for giving the information about the hospital using Frame and Frameset
12. Write a program using style sheet to create borders and to modify the font and text appearance.
13. Write a script to count the number of characters entered by user in a textbox and limit it to a particular number.
14. Create a form and validate it using Java Script.

**TOTAL : 30****REFERENCES / MANUALS / SOFTWARE:**

1. MP Lab, ICProg, Turbo C
2. Notepad, Internet Explorer, Mozilla Firefox

**Course Outcomes:**

On completion of the course the students will be able to

- understand the commands used for mobile related operations
- perform 16f877a controller related operations
- design and validate the web pages

## 14BCE01 OPERATIONS RESEARCH

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

**Pre-requisites:** Basic Knowledge in Mathematics

**UNIT – I** 9

**Linear Programming:** Mathematical formulation of Linear Programming Problem –Graphical solution –Simplex method –Artificial variable techniques-Big M Method –Simple problems only.

**UNIT – II** 9

**Applications of Linear Programming:** Transportation Model –Initial basic feasible solution – Northwest corner rule –Least cost method –Vogel’s approximation method –Balanced and unbalanced problems –Assignment model –Balanced problems –Unbalanced problems -Simple problems.

**UNIT – III** 9

**Inventory Models:** Deterministic inventory models –Static and dynamic EOQ Models –with or without shortage –Probabilistic inventory model –Discrete and continuous type -Simple problems.

**UNIT – IV** 9

**Network Scheduling by PERT/CPM:** Introduction –Network and basic components –Rules of Network construction –Time calculation in Networks –CPM.PERT –PERT calculations (without crashing).

**UNIT – V** 9

**Game Theory:** Two person zero-Sum Games-Maximin-Minimax Principle-Saddle Point and Value of the Game-Games without saddle points, Mixed strategies-Matrix oddment method for  $n \times n$  games-Dominance property-Graphical method for  $2 \times n$  or  $m \times 2$  games-Simple problems.

**TOTAL: 45**

### TEXT BOOKS:

1. Sundaresan V., Ganapathy Subramanian K.S. and Ganesan K., “Resource Management Techniques”, A.R. Publications, Arpakkam, 2013.

### REFERENCE BOOKS:

1. Prem Kumar Gupta and Hira D.S., “Operations Research”, S. Chand & Co., Ram Nagar, New Delhi, 1997.
2. Sharma J.K., “Operations Research Theory and Application”, Macmillan, London, 2009.
3. Kantiswarup, Gupta P. K. and Man Mohan, “Operations Research”, Sultan Chand & Sons, New Delhi, 1999.

### Course Outcomes:

On completion of the course the students will be able to

- identify and develop operational research models from the verbal description of the real system
- develop a complete procedure for solving different kinds of programming problems
- solve inventory and shortest route problems
- analyze network scheduling using CPM and PERT
- solve problems in game theory

## 14BCE02 PRINCIPLES OF MANAGEMENT

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

### UNIT – I

**Management Science and Society:** Definition of Management – Managing Science or Art - The Evolution of Management Thought – Patterns of Management Analysis – The System Approach to Management Process- Functions of a Manager – Management and Society the External Environment, Social Responsibility and Ethics.

9

### UNIT – II

**Planning :** Types of Plan – Steps in Planning – Objectives – Evolving Concepts in Management by Objectives – Strategies, Policies and Planning Premises: Nature and Purpose of Strategies and Policies – Strategic Planning Process – The TOWS Matrix – Blue Ocean Strategy- Portfolio Matrix - Major Kinds of Strategies and Policies – Hierarchy of Company Strategies – Porter's Industry Analysis and Generic Competitive Strategies – Premising and Forecasting – Decision Making.

9

### UNIT – III

**Organizing and Staffing:** Formal and Informal Organization – Organizational Division – Organization Levels and the Span of Management – An Organizational Environment for Entrepreneurship and Intrapreneurship – Reengineering the Organization – The Structure and Process of Organizing – Basic Question for Effective Organizing – Organization Structure Departmentation - Line / Staff Authority, Empowerment and Decentralization – Human Resource Management and Selection.

9

### UNIT – IV

**Leading:** Human Factors in Managing – Motivation - Motivation – An Early Behavioral Model – Maslow's Hierarchy of Needs Theory – Alderfer's ERG Theory – Herzberg's Motivation Hygiene Theory – The Expectancy Theory of Motivation – Equity Theory – Goal Setting Theory of Motivation – Skinner's Reinforcement Theory – McClelland's Needs Theory of Motivation – Special Motivational Techniques – Job Enrichment – A Systems and Contingency Approach to Motivation – Leadership - Communication: Purpose of Communication – Communication Process – Communication in the Organization – Barriers and Breakdowns in Communication – Toward Effective Communication – Electronic Media in Communication.

9

### UNIT – V

**Controlling :** The Basic Control Process – Critical Control Points, Standards and Benchmarking – Control as a Feedback System – Real Time Information and Control – Feed Forward or Preventive Control – Control of Overall Performance – Profit and Loss Control – Control Through Return on Investment – Management Audits and Accounting Firms – The Balanced Scorecard- Bureaucratic and Clan Control – Requirements for Effective Control – Control Techniques and Information Technology.

9

**TOTAL: 45**

### TEXT BOOKS:

1. Koontz Harold and Weihrich Heinz, "Essentials of Management", 9<sup>th</sup> Edition, 6<sup>th</sup> Reprint , Tata McGraw Hill Publishing Company, New Delhi, 2014.

### REFERENCE BOOKS:

1. Tripathi P.C. and Reddy P.N., "Principles of Management", 2<sup>nd</sup> Edition, McGraw Hill, New York, 1991.
2. Chandra Bose, "Principles of Management and Administration", Prentice Hall of India, New Delhi, 2001.
3. Mason Carpenter, Talya Bauer and Berrin Erdogan, "Principles of Management", XanEdu Publishing Inc, New Delhi, 2009.

### Course Outcomes:

On completion of the course the students will be able to

- understand the nature and purpose of management
- gain knowledge in planning, organizing and staffing strategies
- incorporate managerial procedures
- familiarize with controlling mechanisms
- develop leadership qualities

## 14BIE01 DISTRIBUTED OPERATING SYSTEMS

3 0 0 3

**Pre-requisites:** Operating Systems

**UNIT – I** 9

**Fundamentals and Process Communication:** Distributed Computing System - Evolution – System Models – Distributed Systems Popularity - Distributed Operating System – Issues in Designing – Distributed Computing Environment - Introduction to Message Passing – Features – Issues in IPC by Message Passing – Synchronization – Buffering – Multi datagram Messages.

**UNIT – II** 9

**Procedure Call Model and Memory:** Introduction – RPC Model – Transparency – Implementing RPC Mechanism – Stub Generation – Messages – Marshaling – Server Management – Parameter Passing Semantics - Call Semantics - Introduction to Distributed Shared Memory – General Architecture – Design and Implementation Issues of DSM – Granularity - Structure of Shared Memory Space – Consistency Models – Replacement Strategy – Thrashing.

**UNIT – III** 9

**Synchronization:** Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms.

**UNIT – IV** 9

**Resource Management and Process:** Introduction – Desirable Features of a Good Global Scheduling Algorithm – Task Assignment Approach – Load Balancing Approach – Load Sharing Approach - Introduction to Process Management – Process Migration.

**UNIT – V** 9

**Distributed File Systems:** Introduction – Desirable Features – File Models – File Accessing Models - File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles.

**TOTAL: 45**

### TEXT BOOKS:

1. Sinha Pradeep K., “Distributed Operating Systems: Concepts and Design”, Prentice Hall of India, 2008.

### REFERENCE BOOKS:

1. Coulouris George, Dollimore Jean and Kindberg Tim, “Distributed Systems Concepts and Design”, 4<sup>th</sup> Edition, Pearson Education, 2008.
2. Ajay D. Kshemkalyani and Mukesh Singhal, “Distributed Computing: Principles, Algorithms and Systems”, Cambridge University Press, 2008.
3. Tanenbaum Andrew S., “Distributed Operating Systems”, Pearson Education, 2002.

### Course Outcomes:

On completion of the course the students will be able to

- understand the concepts of process communication
- gain knowledge on remote procedural call
- familiarize with synchronization techniques
- acquire skills on resource and process management
- gain knowledge on distributed file systems

**UNIT – I****9**

**Introduction:** Framework of BI – Intelligence creation and BI governance – Transaction process Vs Analytic Processing – Successful BI implementation – Tools and Techniques. Data warehousing: Definition and Concepts – Process overview – Architectures – Data integration and extraction, transformation and Load process – Data warehouse development – Implementation issues.

**UNIT – II****9**

**Business Performance Management:** Overview – Strategy – Plan – Monitor – Act and adjust – Performance measurement – Methodology – Technologies and applications – Performance dashboards and scorecards.

**UNIT – III****9**

**Data Mining for BI:** Concepts and definitions – Applications – Process – Methods – Artificial Neural Networks for Data mining – Software Tools – Myths and blunders.

**UNIT – IV****9**

**Text and Web Mining:** Concepts and Definitions – Natural language Processing – Text Mining Applications – Text Mining Process – Tools – Web mining overview – Web Content Mining and Web Structure Mining – Web usage Mining.

**UNIT – V****9**

**Business Intelligence Implementation:** Implementation – BI and Integration Implementation – Connecting BI systems – On-Demand BI – Issues – Emerging Topics – Online Social Networking – Virtual Worlds – Social Networks and BI – Reality Mining.

**TOTAL: 45****TEXT BOOKS:**

1. Efraim Turban, Ramesh Sharda, Dursun Delen and David King, “Business Intelligence – A Managerial Approach”, 2<sup>nd</sup> Edition, Perason Publication, 2015.

**REFERENCE BOOKS:**

1. David Loshin, “Business Intelligence - The Savy Manager’s Guide”, 2<sup>nd</sup> Edition, Elsevier, 2013.
2. Rajiv S. Abherwal, Irma Becerra and Fernandez, “Business Intelligence – Practices, Technologies and Management”, Wiley Publications, 2010.

**Course Outcomes:**

On completion of the course the students will be able to

- understand the business performance and management
- apply the data mining techniques for business intelligence
- determine the operation procedures of business intelligence
- know the applications of text and web mining in business intelligence
- select appropriate data mining tools and methods to manipulate and achieve data



**Pre-requisites:** Basic Knowledge in Information Technology

**UNIT – I** 9

**IT Infrastructure:** Introduction - Evolution of Computer – Computer Basics – Network and Internet – Computing Resources – Information Technology – IT Infrastructure Management – IT Infrastructure: Introduction - Challenges – Design issues – Determining Customer’s Requirements - IT Systems Management Process – IT Service Management Process – Information System Design Process – Patterns – IT Infrastructure Library - Case Study: Survey the Current IT Infrastructure Status of Wipro.

**UNIT – II** 9

**Service Delivery Process:** Service Level Management- Financial Management – IT Service Continuity Management – Capacity Management – Availability Management - Case Study: TCS Implementation and Operation of Digital Passport to India Project.

**UNIT – III** 9

**Service Support Process and Storage Management:** Configuration Management – Incident Management – Problem Management - Change Management – Release Management – Storage Management: Introduction – Backup and Storage – Archive and Retrieve – Disaster Recovery – Space Management – Database and Application Protection – Bare Machine Recovery – Data Retention-Case Study: TCS enables West Bengal’s E-District Initiative to Deliver Effective Citizen Services.

**UNIT – IV** 9

**Security Management:** Introduction – Computer Security – Internet Security – Physical Security – Identity Management – Access Control System – Intrusion Detection- Case Study: Hexaware’s Enterprise Security Solutions Protect an Enterprise’s Information Assets through Holistic Management of Security Components.

**UNIT – V** 9

**IT Ethics and Emerging Trends in IT:** Introduction – Intellectual Property – Privacy and Law – Computer Forensics – Ethics and Internet – Cyber Crimes – Emerging Trends in IT: Introduction – E-commerce – Electronic Data Interchange – Global system for Mobile Communication – Bluetooth – Infrared Technology- Case Study: Services offered by Asset Network Incorporation.

**TOTAL: 45**

**TEXT BOOK:**

1. Phalguni Gupta, Surya Prakash and Umarani Jayaraman, “IT Infrastructure and its Management”, Tata McGraw Hill Ltd., 2011.

**REFERENCE BOOKS:**

1. Anita Sengar, “IT Infrastructure Management”, 2<sup>nd</sup> Edition, S.K. Kataria & Sons, 2009.
2. Manoj Kumar Choube, and Saurabh Singhal, “IT Infrastructure and Management”, Pearson Education, 2012.
3. Bruce Robertson and Valentin Sribar, “The Adaptive Enterprise: IT Infrastructure Strategies to Manage Change and Enable Growth”, Intel Press, 2004.

**Course Outcomes:**

On completion of the course the students will be able to

- familiarize with information technology services and management processes
- understand the information technology infrastructure facilities
- know about service support and storage management
- identify the need for security management
- analyze the code of ethics in information technology

## 14BCE06 E-COMMERCE

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

**Pre-requisites:** Fundamentals of Computing

**UNIT – I** 9

**Business Models for E-commerce:** Business Model - E-Business Models Based on the Relationship of Transaction Parties - E-Business Models Based on the Relationship of Transaction Types.

**UNIT – II** 9

**E-Marketing:** Traditional Marketing - Identifying Web Presence Goals - Browsing Behaviour Model - Online Marketing - E-Advertising - Internet Marketing Trends - Target Markets - E-Branding - Marketing Strategies.

**UNIT – III** 9

**E-Payment Systems:** E-Banking at ICICI Bank - Concerns in Internet Banking - Digital Payment Requirements - Digital Token-based E-Payment Systems - Classification of New Payment Systems - Electronic Cash - Risk and E-Payment Systems - Designing E-Payment Systems - Digital Signature - Online Financial Services in India - Online Stock Trading.

**UNIT – IV** 9

**E-Supply Chain and Value Chain Management:** E-Supply Chain Management: Supply Chain-Supply Chain Management at Marico Industries - Mahindra & Mahindra - Amul Dairy - CISCO-Virtual Value Chain - Seven Dimensions of E-Commerce Strategy - Value Chain and E-Strategy-Planning the E - Commerce Project.

**UNIT – V** 9

**E-Security, Legal and Ethical Issues:** E-Security: Information System Security - Security on the Internet - E-Business Risk Management Issues - Information Security Environment in India - Legal and Ethical Issues.

**TOTAL : 45**

### TEXT BOOKS:

1. Joseph P.T. and S.J., “E-Commerce An Indian Perspective”, 5<sup>th</sup> Edition, PHI Learning Pvt. Ltd., New Delhi, 2015.

### REFERENCE BOOKS:

1. Kalakota Ravi and Whinston Andrew B., “Frontiers of Electronic Commerce”, Pearson Education, 2004.
2. Whitely David, “E-Commerce Strategy, Technologies and Applications”, McGraw-Hill, Singapore, 2008.
3. Awad Elias M., “Electronic Commerce from Vision to Fulfillment”, 3<sup>rd</sup> Edition, Prentice-Hall of India, New Delhi, 2007.

### Course Outcomes:

On completion of the course the students will be able to

- gain knowledge on business models for electronic commerce
- expose strategies for marketing and secured payment
- acquire skills in legal and ethical issues
- analyze various value chains
- understand the need of security in e-commerce

## 14BCE07 CLOUD COMPUTING

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

**Pre-requisites:** Computer Networks

**UNIT – I** 9

**Introduction to Cloud, Parallel and Distributed Computing:** Overview of Cloud Computing - Historical Developments - Building Cloud Computing Environments - Computing Platforms and Technologies - Principles of Parallel and Distributed Computing: Computing Eras-Parallel vs Distributed Computing - Elements of Parallel Computing - Elements of Distributed Computing - Technologies for Distributed Computing.

**UNIT – II** 9

**Virtualization:** Introduction to Virtualization - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques - Virtualization and Cloud Computing - Pros and Cons of Virtualization - Technology Examples.

**UNIT – III** 9

**Cloud Computing Architecture:** Introduction - Cloud Reference Model - Types of Clouds - Economics of the Cloud - Open Challenges.

**UNIT – IV** 9

**Data Intensive Computing:** Introduction to Data Intensive Computing - Characterizing Data Intensive Computations – Challenges - Historical Perspective - Technologies for Data Intensive Computing Storage Systems - Programming Platforms - Aneka Map Reduce Programming - Introducing the Map Reduce Programming Model.

**UNIT – V** 9

**Cloud Platforms and Applications:** Amazon Web Services - Compute Services - Storage Services - Communication Services - Additional Services - Google AppEngine - Architecture and Core Concepts - Application Life Cycle - Cost Model - Microsoft Azure - Azure Core Concepts - SQL Azure - Windows Azure Platform Appliance - Cloud Applications: Scientific Applications – Healthcare – Biology – Geoscience - Business and Consumer Applications - CRM and ERP – Productivity - Social Networking - Media Applications - Multiplayer Online Gaming.

**TOTAL : 45**

### TEXT BOOKS:

1. Buyya Rajkumar, Vecchiola Christian and Thamarai Selvi S., “Mastering Cloud Computing”, McGraw Hill Education Pvt. Ltd., New Delhi, 2013.

### REFERENCE BOOKS:

1. Rittinghouse John.W and Ransome James F, “Cloud Computing Implementation, Management and Security” , CRC Press, 2012.
2. Miller Michael, “Cloud Computing Web-Based Applications that Change the Way You Work and Collaborate Online”, Pearson Education, 2013.
3. Saurabh Kumar, “Cloud Computing Unleashing Next Gen Infrastructure to Application”, 3<sup>rd</sup> Edition, Wiley India Pvt. Ltd., New Delhi, 2014.

### Course Outcomes:

On completion of the course the students will be able to

- outline the applications of cloud services in real time scenarios
- categorize the architecture, infrastructure and delivery models of cloud computing
- analyze the core issues and standards of cloud computing
- know the advancements in cloud computing
- identify the different cloud platforms

## 14BCE08 SOFTWARE PROJECT MANAGEMENT

(Common to Computer Systems & Design, Information Systems and Software Systems)

3 0 0 3

**Pre-requisites:** Fundamentals of Computing

**UNIT – I** 9

**Introduction:** Introduction to Software Project Management – Project Evaluation and Programme Management: Introduction – A Business Case – Project Portfolio Management - Evaluation of Individual Projects - Cost benefit Evaluation Techniques - Risk Evaluation - Programme Management - Managing the Allocation of Resources - Strategic Programme Management - Creating a Programme - Aids to Programme Management - Some Reservation about Programme Management - Benefits Management.

**UNIT – II** 9

**Project and Activity Planning:** An Overview of Project Planning - Activity Planning: Introduction – The Objectives of Activity Planning – When to Plan - Project Schedules - Projects and Activities – Sequencing and Scheduling Activities - Network Planning Models – Formulating a Network Model – Adding the Time Dimensions – The Forward and Backward Pass – Identifying Critical Path – Activity Float – Shortening the Project Duration - Identifying Critical Activities – Activity on Arrow Networks.

**UNIT – III** 9

**Resource Allocation and Progress Monitoring:** Resource Allocation: Introduction – Nature of Resources – Resource Requirements – Scheduling Resources – Creating Critical Paths – Counting the Cost – Publishing the Resource Schedule – Cost Schedules – Scheduling Sequence - Monitoring and Control: Introduction - Creating the Framework - Collecting the Data - Review-Project Termination Review – Visualizing Progress - Cost Monitoring - Earned Value Analysis - Prioritizing Monitoring - Getting the Project Back to Target - Change Control

**UNIT – IV** 9

**Managing Contracts and People in Software Environment:** Managing Contracts: Introduction - Types of Contract - Stages in Contract Placement - Typical Terms of a Contract - Contract Management – Acceptance – Managing People in Software Environments: Introduction - Understanding Behaviour – Organizational Behaviour - Selecting Right Person – Instruction – Motivation – Oldham Hackman Model – Stress – Healthy and Safety - Ethical and Professional Concerns.

**UNIT – V** 9

**Working in Teams:** Introduction – Becoming a Team - Decision Making – Organization and Team Structures - Coordination Dependencies – Dispersed and Virtual Teams – Communication Genres – Communication Plans – Leadership.

**TOTAL : 45**

### TEXT BOOKS:

1. Hughes Bob, Cotterell Mike and Mall Rajib, “Software Project Management”, 5<sup>th</sup> Edition, 11<sup>th</sup> Reprint 2014, Tata McGraw-Hill, New Delhi.

### REFERENCE BOOKS:

1. Roger S. Pressman, “Software Engineering- A practitioners Approach”, 7<sup>th</sup> Edition, McGraw Hill, New York, 2014.
2. Gray Clifford F. and Larson Erik W., “Project Management, The Managerial Process”, 3<sup>rd</sup> Edition, McGraw-Hill, New Delhi, 2008.
3. Jalote Pankaj, “Software Project Management in Practice”, Pearson Education, New Delhi, 2005.

### Course Outcomes:

On completion of the course the students will be able to

- learn project managerial aspects in software development
- identify the basic steps in project management
- know the issues in project monitoring and control
- acquire knowledge on project and activity planning
- understand different roles in team work

## 14BIE04 SERVICE ORIENTED ARCHITECTURE

3 0 0 3

**Pre-requisites:** Object Oriented Programming

**UNIT – I** 9

**Introduction to SOA with Web Services:** Service Oriented Enterprise - Service Oriented Development - Service Oriented Architecture - SOA and Web Services – Rapid Integration – Multi Channel Access – Business Process Management – Extended Web Services Specifications.

**UNIT – II** 9

**Overview of Service Oriented Architecture:** Service Oriented Business and Government – Service Oriented Architecture Concepts – Service Governance, Processes, Guidelines, Principles, Methods and Tools – Key Service Characteristics – Technical Benefits - Business Benefits.

**UNIT – III** 9

**SOA and Web Services:** Web Services Platform – Service Contracts –Service Level Data Model – Service Discovery – Service Level Security – Service Level Interaction Patterns – Atomic Services and Composite Services – Generating Proxies and Skeletons from Service Contracts – Service Level Communication and Alternative Transports – Retrospective on Service Oriented Architectures.

**UNIT – IV** 9

**SOA Web Services for Integration and SOA Multi Channel Access:** Overview of Integration – Integration and Interoperability using XML and Web Services – Two Approaches for using XML and Web services for Integration and Interoperability – Applying SOA and Web Services for Integration – Service Enabling Legacy Systems – Enterprise Service Bus Pattern - SOA and Multi Channel Access: Business Benefits of SOA and Multi Channel Access – Service Oriented Architecture for Multi Channel Access –Client/Presentation Tier – Channel Access Tier- Communication Infrastructure – Business Service Access Tier – Business Service Tier – Examples.

**UNIT – V** 9

**SOA and Business Process Management:** Basic Business Process Management Concepts - Example Business Process – Combining BPM, SOA and Web Services – Orchestration and Choreography Specifications – Example of Web Services Composition.

**TOTAL: 45**

### TEXT BOOKS:

1. Newcomer Eric and Lomow Greg, “Understanding SOA with Web Services”, Pearson Education Inc., 2007.

### REFERENCE BOOKS:

1. Erl Thomas, “Service Oriented Architecture Concepts, Technology and Design”, Prentice Hall, 2009.
2. Pulier Eric and Taylor Hugh, “Understanding Enterprise SOA”, 1<sup>st</sup> Edition, Manning Publications, 2005.
3. Frank Buschmann, Regine Meunier, Peter Sommerlad and Michael Stal, “Pattern Oriented Software Architecture A system of Patterns”, Wiley, 2015.

### Course Outcomes:

On completion of the course the students will be able to

- gain knowledge on basic principles of service oriented architecture components and techniques
- understand the architecture of web services
- explore concepts of service design and business process management
- apply service oriented architecture concepts in business process management
- acquire knowledge on the benefits of service oriented architecture in multi-channel and client server

**Pre-requisites:** Fundamentals of Computing

**UNIT – I** 9

**Understanding Computer Investigations:** Preparing a Computer Investigation – Taking a Systematic Approach – Procedures for Corporate Hightech Investigations – Understanding Data recovery Workstation and Software – Conducting an Investigation - Completing the Case – Investigator’s Office and Laboratory: Understanding Forensic Lab Certification Requirements – Determining the Physical Requirements for a Computer Forensics Lab – Selecting a Basic Forensic Workstation – Building a Business Case for Developing a Forensics Lab.

**UNIT – II** 9

**Data Acquisition:** Understanding Storage Formats for Digital Evidence – Determining the Best Acquisition Method – Contingency Planning for Image Acquisitions - Using Acquisition Tools- Validating Data Acquisitions – Performing RAID Data Acquisitions- Using Remote Network Acquisitions Tools – Using other Forensics Acquisitions Tools.

**UNIT – III** 9

**Processing Crime and Incident Scenes:** Identifying Digital Evidence e-Collecting Evidence in Private Sector Incident Scenes – Processing Law Enforcement Crime Scenes - Preparing for a Search – Securing a Computer Incident or Crime Scene – Seizing Digital Evidence at the Scene – Storing Digital Evidence – Obtaining a Digital Hash – Reviewing a Case .

**UNIT – IV** 9

**Computer Forensic Tools, Analysis and Validation:** Evaluating Computer Forensics Tool Needs - Computer Forensics Software Tools - Computer Forensics Hardware Tools – Validating and Testing Forensic Software - Computer Forensic Analysis and Validation: Determining Data Collection and Analysis – Validating Forensic Data – Addressing Data Hiding Techniques – Performing Remote Acquisitions.

**UNIT – V** 9

**Investigations:** Virtual Machines, Networks Forensics and Live Acquisitions : Virtual Machine Overview – Network Forensic Overview – Performing Live Acquisitions – Developing a Standard Procedures for Network Forensics – Using Network Tools - Email Investigations: Exploring the role of Email in Investigations – Exploring the Role of Client and Server in Email – Investigating E-mail Crimes and Violations – Understanding Email Servers – Using Specialized Email Forensic Tools - Cell Phone and Mobile Device Forensics: Understanding Mobile Device Forensics – Understanding Acquisition Procedures for Cell Phones and Mobile Devices.

**TOTAL : 45**

**TEXT BOOKS:**

1. Nelson Bill, Phillips Amelia and Steuart Christopher, “Guide to Computer Forensics and Investigations”, 4<sup>th</sup> Edition, Cengage Learning, 2013.

**REFERENCE BOOKS:**

1. Godbole Nina and Belapure Sunit, “Cyber Security Understanding Cyber Crimes, Computer Forensics & Legal Perspectives”, Wiley, 2011.
2. Cheswick R William, Bellovin M Steven and Rubin D Aviel, “Firewalls and Internet Security”, 2<sup>nd</sup> Edition, Pearson Education, 2003.
3. Kruse II G Warren and Heiser G Jay, “Computer Forensics: Incident Response Essentials”, Pearson Education, 2010.

**Course Outcomes:**

On completion of the course the students will be able to

- comprehend computer forensics investigations and testimony on evidences
- understand the role of computer forensics in cyber world
- identify current techniques and tools for forensic examinations
- familiarize with data acquisition in investigation
- perform simple investigations

**Pre-requisites:** Software Engineering

### UNIT – I

9

**Software Measurement and Software Metrics:** A New Order – Measurement in Quality Thinking – Precision in Expression – Representation of Reality – Knowledge Creation – Measurement Technology – Measuring with the Mind- Words – Numbers – Three Phase Coexist – Measurement Scales – Levels of Measurement – Intrinsic Nature of Measurement – Software Measuring Instruments – Measurement Continuum – Corner Stone – Software Metrics - Metrics Mapping – Simple Metrics – Complex Metrics – Metrics are Organisation Specific – Importance of Estimation And Planning in the Context of Metrics – Metrics Vocabulary – Guidelines from Quality Standards – Applying Software Metrics – Benefits.

### UNIT – II

9

**Design of Metrics System and Visualization:** Metrics System – Information Based Architecture – Goals – Decision Centres – Models – Metrics – Measurement – Data Collection – Implementing the Metrics System Architecture – Metrics Planning Approaches – Metrics Planning Document Checklist – Metrics Data Visualization Data Analysis – Graphical Analysis - Visualizing Data – Graphical Techniques – Distribution Analysis - Mapping- Life Cycle Profiles – Effort Profile – Process Compliance Profile – Responsibility Matrix – Resource Balancing – Contours – Radar Charts- Dynamic Views – Clustering – Data Exploration and Visualization Tools – Emerging Technology.

### UNIT – III

9

**Process and Estimation Model:** Analysis to System Thinking – Model Building – Analytical Model – Regression Model – Higher-Level Empirical Models – Descriptive Statistics on Multiple Metrics – Single Metrics – Three Analytical Dimensions – Process Diagnostic Panel – Analytical Summary of Single Metrics – Global Summary – Process Correlations – Multiple Scatter Plots –s DOE -Estimation Models -Estimation Process – Software Estimation Risks – Estimation Methodologies – Thumb Rules – Delphi Estimate – Golden Rule – Prediction Capability – Equations – Estimation Algorithms – Estimation Science – Advent of Parametric Models – Calibration – COCOMO – Lookup Table – Equations – COCOMO II.200 Applications – Tailoring COCOMO – Estimation System – Software Life Cycle Management – Slim Estimate – Software Sizing Tools – Estimation Tools.

### UNIT – IV

9

**Metrics for Defect Management:** Defect Measurement- Defect Classification - Defect Database -Analysis of Defect Data - Defect Correlation Defect Driver Matrix - Looking for Consistency - Defect Filter Matrix Defect Detection Probability - Rayleigh Defect Discovery Model - Three Phases of Reliability Measurement - Reliability Enhancement - Home Grown Model - Quantitative Defect Management - The Challenge -Metrics Intelligence – Metrics Synchronization-Milestone Diary- Earned Value Model -Extended Milestone Diary - Responding to Metrics - Discovering "The Factory Within The Factory" - Few Data: Sharp Focus- Choice of Online Metrics - Benefits of Online Metrics - Two Systems - The Humble Beginning - Advent of Software Management Tools Birth of Process Databases - Enterprise Integration - Process Intelligence - A Symbiotic Dependence - An Economic Alternative: Metrics Based DSS.

### UNIT – V

9

**Project Management Metrics:** Metrics in Project Management -Tailoring Metrics for the Project -Setting Quantitative Goals: Goal Metrics Correlation - GMC Analysis -Quality Function Deployment - Risk Estimation - Simulating Schedule Risk - Mapping Risk Using Risk Exposure Number - Analysis of REN -Six Sigma Renaissance Consummate - Towards Truth -No Universal Method - Effective Use of Metrics - Looking at Metrics Data -Applying Metrics - Creating Decision Centers - Equip People With Knowledge at Less Cost -The Marvelous Spreadsheet - Things to Remember during Implementation - Lead with Numbers - Integrated Management - Mirror, Microscope and Telescope -Unlimited Scope.

**TOTAL: 45**

### TEXT BOOKS:

1. Ravindranath Pandian C., “Software Metrics A guide to Planning, Analysis and Application”, AUERBACH Publications, 2011.

### REFERENCE BOOKS:

1. Fenton Norman E., “Software Metrics A Rigorous Approach”, Chapman & Hall, London, 1991.
2. Kan Stephen H., “Metrics and Models in Software Quality Engineering”, 2<sup>nd</sup> Edition, Addison Wesley, New York, 2002.
3. Lingfeng Wang and Kay CHen Tan, “Modern Industrial Automation Software Design”, John Willey & Sons Publication, 2006.

### Course Outcomes :

On completion of the course the students will be able to

- understand the objectives and general principles of measurement
- assess the quality standards of different software
- identify different metrics plan and process prediction
- determine the data collection and defect identification methods
- interpret and communicate metric results

**Pre-requisites:** Fundamentals of Computing

**UNIT – I** **9**

**Kernel and Files:** Introduction to the Kernel: Architecture of the Unix Operating System - Introduction to System Concepts - Kernel Data Structures - System Administration - Internal Representation of Files: Inodes - Structure of a Regular File - Directories- Conversion of a Path Name to an Inode – Super Block – Inode Assignment to a New File – Allocation of Disk Blocks – Other File Types.

**UNIT – II** **9**

**System Calls for the File System:** Open – Read – Write - File and Record Locking – Lseek – Close - File Creation - Creation of Special Files - Change Directory and Root - Change Owner and Mode - STAT & FSTAT – Pipes – Dup - Mounting and Unmounting File Systems – Link – Unlink - File System Abstractions and Maintenance.

**UNIT – III** **9**

**Structure of Processes:** Process States and Transitions - Layout of System Memory – Context of a Process - Saving the Context of a Process - Manipulation of the Process Address Space – Sleep.

**UNIT – IV** **9**

**Process Control:** Process Creation – Signals - Process Termination – Awaiting Process Termination - Invoking Other Programs - User ID of a Process - Changing the Size of a Process- Shell - System Boot and the INIT Process.

**UNIT - V** **9**

**Memory Management and Interprocess Communication:** Memory Management Policies: Swapping - Demand Paging – Hybrid System with Swapping and Demand Paging - Interprocess Communication: Process Tracing – System V IPC – Network Communications – Sockets.

**TOTAL: 45**

**TEXT BOOKS:**

1. Bach J. Maurice, “The Design of the UNIX Operating System”, PHI Learning Pvt. Ltd., New Delhi, 2012.

**REFERENCE BOOKS:**

1. Rosen Kenneth, Host Douglas, Farber James and Rosinski Richard, “UNIX The Complete Reference”, 2<sup>nd</sup> Edition, Tata McGraw Hill, 2007.
2. Vahalia Uresh, “UNIX Internals The New Frontiers”, Pearson Education, 2010.
3. Stevens Richard W and Rago Stephen A., “Advanced Programming in the UNIX Environment” 3<sup>rd</sup> Edition, Pearson Education, 2013.

**Course Outcomes:**

On completion of the course the students will be able to

- recognize the structure of files and directories
- identify system information using Unix system structure and system calls
- understand the process concepts
- familiarize with inter process communication
- know about the memory management policies



**Pre-requisites:** Fundamentals of Computing

**UNIT – I**

**9**

**Data Communications, Networking and Analog Digital Transmission Methods:** Data Communications and Networking: Introduction - Fundamental Concepts - Data Communications – Protocols – Standards - Standards Organizations - Signal Propagation - Analog and Digital Signals - Bandwidth of a Signal and a Medium - Fourier Analysis and Concept of Bandwidth of a Signal - Data Transmission Rate and Bandwidth - Analog and Digital Transmission Methods: Introduction - Analog Signal, Analog Transmission - Digital Signal, Digital Transmission - Digital Signal, Analog Transmission - Baud Rate and Bits Per Second - Analog Signal, Digital Transmission - Nyquist Theorem.

**UNIT – II**

**9**

**Modes of Data Transmission, Multiplexing and Transmission Errors:** Modes of Data Transmission and Multiplexing : Introduction - Parallel and Serial Communication - Asynchronous, Synchronous and Isochronous Communication - Simplex, Half-duplex and Full-duplex Communication - Multiplexing and Demultiplexing - Types of Multiplexing - FDM versus TDM - Transmission Errors Detection and Correction: Introduction - Error Classification - Types of Errors - Error Detection.

**UNIT – III**

**9**

**Transmission Media, Medium Access Sublayer and ISDN:** Transmission Media: Introduction - Guided Media - Unguided Media - Shannon Capacity - Medium Access Sublayer and ISDN: Introduction - Static and Dynamic Channel Allocation - Medium Access Control Sublayer - MAC in LAN and WAN - Classification and Study of MAC Sublayer Protocols/Collisions - ISDN and Its Background - ISDN Architecture - ISDN Interfaces - Functional Grouping -Reference Points - ISDN Protocol Architecture – Narrowband - ISDN and Broadband ISDN.

**UNIT – IV**

**9**

**X.25 Protocol and Accessing the Internet:** Understanding How X.25 works - Characteristics of X.25 - Packet Format – X.25 Operation – CCITT X.21 - Accessing the Internet: Introduction - Dial-up Access for an Individual User - Leased Lines - Digital Subscriber Line - Cable Modems – DTE-DCE Interface - EIA RS-232 and EIA RS-449 Interface – SONET/SDH-Synchronous Transport Signals - SONET Layers - Applications.

**UNIT – V**

**9**

**TCP/IP, IP, ARP, RARP and ICMP:** Introduction - TCP/IP Basics - IP Addresses – Logical Addresses - TCP/IP-An Example -The Concept of IP Address and IP Datagram/Package - Address Resolution Protocol - Reverse Address Resolution Protocol – Internet Control Message Protocol - Datagram Fragmentation and Reassembly-Comparison of OSI and TCP/IP Protocol Suites.

**TOTAL: 45**

**TEXT BOOKS:**

1. Achyut Godbole S. and Atul Kahate, “Data Communications and Networks”, 2<sup>nd</sup> Edition, McGraw Hill Education Pvt. Ltd., 2014.

**REFERENCE BOOKS:**

1. William Stallings, “Data and Computer Communications”, 9<sup>th</sup> Edition, Tata McGraw Hill, New Delhi, 2014.
2. Aub Herbert, Schilling Donald L. and Saha Goutam, “Principles of Communication Systems”, 3<sup>rd</sup> Edition, Tata McGraw Hill, New Delhi, 2008.
3. Forouzan Behrouz A., “Data Communications and Networking”, 5<sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2012.

**Course Outcomes:**

On completion of the course the students will be able to

- understand the data transmission and encoding techniques
- gain knowledge on analog and digital data communication
- familiarize with error correction and detection mechanisms
- recognize X.25 protocol and Internet accessing mechanisms
- identify the functionalities of various protocols

**Pre-requisites:** Fundamentals of Computing

**UNIT – I** **9**

**Artificial Intelligence, Problems and Search:** Artificial Intelligence: AI Problems - Underlying Assumption- AI Technique- Level of the Model- Criteria for Success- Problems, Problem Spaces and Search: Defining the Problem as a State Space Search- Production Systems - Problem Characteristics - Production System Characteristics - Issues in the Design of Search Programs - Problems.

**UNIT – II** **9**

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

**UNIT – III** **9**

**Knowledge Representation and Predicate Logic:** Knowledge Representation Issues: Representations and Mappings - Approaches to Knowledge Representation - Issues in Knowledge Representation - Frame Problem - Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and ISA Relationships - Computable Functions and Predicates – Resolution - Natural Deduction.

**UNIT – IV** **9**

**Representing Knowledge and Symbolic Reasoning:** Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge - Logic Programming - Forward Versus Backward Reasoning – Matching - Control Knowledge - Symbolic Reasoning: Introduction to Nonmonotonic Reasoning – Logics for Nonmonotonic Reasoning – Implementation Issues – Augmenting a Problem-solver – Implementation of Depth First Search – Implementation of Breadth First Search .

**UNIT – V** **9**

**Statistical Reasoning, Weak Slot and Filler Structures:** Statistical Reasoning: Probability and Bayes' Theorem - Certainty Factors and Rule based Systems - Bayesian Networks – Dempster Shafer Theory - Fuzzy Logic - Weak Slot and Filler Structures: Semantic Nets – Frames.

**TOTAL : 45**

**TEXT BOOKS:**

1. Rich Elaine, Knight Kevin and Nair B Shivashankar, “Artificial Intelligence”, 3<sup>rd</sup> Edition, Tata McGraw Hill Education Pvt. Ltd., 2013.

**REFERENCE BOOKS:**

1. Khemani Deepak, “Artificial Intelligence”, 1<sup>st</sup> Edition, Tata McGraw-Hill Publication, 2013.
2. Patterson W. Dan, “Introduction to Artificial Intelligence and Expert Systems”, Pearson Education, 2015.
3. Russell Stuart Jonathan and Norvig Peter, “Artificial Intelligence A Modern Approach”, 3<sup>rd</sup> Edition, Pearson Education, 2014.

**Course Outcomes:**

On completion of the course the students will be able to

- acquire knowledge on artificial intelligence techniques
- familiarize with heuristic search techniques
- expose various statistical theorems
- understand the knowledge representation and reasoning
- analyze various predicate logics and filler structures

**Pre-requisites:** Fundamentals of Computing

**UNIT – I** 9

**Management Information System in a Digital Firm and E-Business Enterprise :** MIS Concept – Definition – Role of the MIS – Impact of the MIS – MIS and the User – Management as a Control System – MIS: A Support to the Management – Management Effectiveness and MIS – Organization as a System – MIS Organization Effectiveness – MIS for a Digital Firm - E-Business Enterprise A Digital Firm.

**UNIT – II** 9

**Strategic Management of Business Performance and Information Security:** Essentiality of Strategic Planning – Tools of Planning – Balance Score Card, Score Card and Dash Board- Strategic Management of Business Performance-Strategy-Three Approaches to Development Strategy – Class and Types of Strategy- EFQM Model - Information Security Threads and Management.

**UNIT – III** 9

**Decision Making and Information, Knowledge, Business Intelligence:** Decision Making Concepts – Decision Making Process – Decision Analysis by Analytical Modeling – Behavioral Concepts in Decision-Making – Organizational Decision Making – MIS and Decision Making – Information, Knowledge, Business Intelligence.

**UNIT – IV** 9

**Applications in Manufacturing and Service Sector:** Introduction – Personnel Management – Financial Management – Production Management – Raw Materials Management – Marketing Management – Corporate Overview – Applications in Service Sector: Introduction to Service Sector- Creating a distinctive Service - Service Concept - Service Process Cycle and Analysis - Customer Service Design - Service Management System - MIS Application in Service Industry - MIS Service Industry.

**UNIT – V** 9

**Technology of Information Systems and Data Warehouse:** Introduction – Data Processing – Transaction Processing – Application Processing – Information System Processing – OLAP for Analytical Information – TQM for Information System – Human Factors and User Interface - Real Time Systems and Good Design - Case Tools and I-Case - Strategic Nature of IT Decision -Evaluation and Feasibility of IT Solutions – MIS Choice of the Information Technology – Data Warehouse Architecture to Implementation.

**TOTAL: 45**

**TEXT BOOKS:**

1. Waman S. Jawadekar, “Management Information Systems Text and Cases”, 5<sup>th</sup> Edition, 3<sup>rd</sup> Reprint, Tata McGraw Hill Publishing Company, New Delhi, 2014.

**REFERENCE BOOKS:**

1. Laudon Kenneth C. and Laudon Jane P., “Management Information Systems Managing the Digital Firm”, 9<sup>th</sup> Edition, Prentice Hall of India, New Delhi, 2008.
2. O’ Brien, James A. and Marakas George M., ”Management Information Systems”, 7<sup>th</sup> Edition, McGraw Hill, New York, 2007.
3. Schultheis Robert and Sumner Mary, “Management Information System The Manager’s View”, 4<sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2007.

**Course Outcomes:**

On completion of the course the students will be able to

- integrate business sectors with information systems
- gain knowledge on strategic management
- make right decisions at right time for improving business processes
- develop managerial skills in manufacturing and service sectors
- familiarize with data warehousing and information system processing

**Pre-requisites:** Computer Fundamentals

**UNIT – I** **9**

**Multimedia and Text:** Multimedia Definitions - Use of Multimedia - Delivering Multimedia - Text: Power of Meaning-Fonts and Faces-Using Text in Multimedia-Computers and Text-Font Editing and Design Tools-Hypermedia and Hypertext.

**UNIT – II** **9**

**Images and Sound:** Before Starting-Making Still Images- Color-Image File Formats-Sound: Power of Sound-Digital Audio-MIDI Audio- MIDI vs. Digital Audio-Multimedia System Sounds- Audio File Formats-Vaughan’s Law-Adding Sound to Multimedia Project.

**UNIT – III** **9**

**Animation and Video:** Power of Motion-Principles of Animation-Animation by Computer- Making Animations that Work-Video: Using Video-Working of Video-Digital Video Containers- Obtaining Video Clips-Shooting and Editing Video.

**UNIT – IV** **9**

**Making Multimedia and Skills:** Stages of a Multimedia Project-The Intangibles-Hardware-Software-Authoring Systems-Multimedia Skills.

**UNIT – V** **9**

**Internet and Multimedia on the Web:** Internet History-Internetworking-Multimedia on the Web-Designing for the WWW: Developing-Text-Images-Sound-Animation-Video.

**TOTAL: 45**

**TEXT BOOKS:**

1. Vaughan Tay, “Multimedia: Making It Work”, 8<sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2011.

**REFERENCE BOOKS:**

1. Koegel Buford John F., “Multimedia Systems”, Addison Wesley, New York, 2003.
2. Jeffloate Judith, “Multimedia in Practice: Technology and Applications”, Prentice Hall of India, New Delhi, 2004.
3. Andleigh Prabat K. and Thakrar Kiran, “Multimedia Systems and Design”, Prentice Hall of India, New Delhi, 2003.

**Course Outcomes:**

On completion of the course the students will be able to

- gain knowledge on multimedia elements
- integrate different medias to develop meaningful scenes
- understand the supporting file formats
- explore multimedia hardware, software and authoring tools
- develop multimedia projects for web

## 14BIO03 DATA WAREHOUSING AND DATA MINING

3 0 0 3

**Pre-requisites:** Database Management Systems

**UNIT – I** 9

**Data Warehousing and Online Analytical Processing:** Data Warehouse Basic Concepts – Data Warehouse Modeling- Data Warehouse Design and Usage – Data Warehouse Implementation- Data Generalization by Attribute Oriented Induction.

**UNIT – II** 9

**Data Cube Technology:** Data Cube Computation - Data Cube Computation Methods - Processing Advanced Kinds of Queries by Exploring Cube Technology - Multidimensional Data Analysis in Cube Space.

**UNIT – III** 9

**Introduction:** Data Mining: Uses of Data Mining - Data Mining Definition - Kinds of Data – Kinds of Patterns - Technologies Used - Kinds of Applications Targeted - Major Issues in Data Mining

**UNIT – IV** 9

**Data Preprocessing and Association:** Data Preprocessing: Overview - Data Cleaning - Data Integration - Data Reduction - Data Transformation and Data Discretization – Mining Frequent Patterns, Associations and Correlations: Basic Concepts - Frequent Itemset Mining Methods - Pattern Evaluation Methods.

**UNIT – V** 9

**Classification and Cluster Analysis:** Basic Concepts - Decision Tree Induction – Bayes Classification Methods - Clusters Analysis: Cluster Analysis - Partitioning Methods –Hierarchical Methods.

**TOTAL : 45**

### **TEXT BOOKS:**

1. Han Jiawei, Kamber Micheline and Pei Jian, “Data Mining Concepts and Techniques”, 3<sup>rd</sup> Edition, Morgan Kaufmann Publishers, 2014.

### **REFERENCE BOOKS:**

1. Witten H. Ian and Frank Eibe, “Data Mining Practical Machine Learning Tools and Techniques”, Elsevier Inc., 2005.
2. Berson Alex and Smith J. Stephen, “Data Warehousing, Data Mining & OLAP”, Tata McGraw Hill Edition, 10<sup>th</sup> Reprint, 2007.
3. Dunham H. Margaret, “Data Mining Introductory and Advanced Topics”, Pearson Education, 2006.

### **Course Outcomes:**

On completion of the course the students will be able to

- familiarize the concepts of data warehouse architecture and data cube technology
- know the basics of data mining and different data mining tasks
- understand data preprocessing and related concepts
- acquire knowledge on association rule mining algorithms and its applications
- solve problems using classification and clustering algorithms

**Pre-requisites:** Web Technology

**UNIT – I** **9**

**XML:** Extending the Enterprise: Role of XML – Advantages of XML – XML and the Web – SOAP – Web Services – .NET and J2EE – Revolutions of XML – The Data Revolution – The Architectural Revolution – The Software Revolution – Combination and Collaboration.

**UNIT – II** **9**

**XML Technology Family:** XML Technologies – Leveraging the XML Technology Family – XML 1.0 – XML Namespaces – Structuring with Schemas – DTD – XML Schema – XML processing – DOM – SAX – Presentation Technologies – CSS – XSL – XFORMS – XHTML – VoiceXML – Transformation – XSLT – XLINK – XPATH – Xquery – XML Infrastructure Technologies – RDF.

**UNIT – III** **9**

**SOAP:** The Road to SOAP – HTTP – XML – RPC – SOAP – Background – Protocol – Overview – SOAP Message Structure – Message Path – SOAP Intermediaries – SOAP and Actors – SOAP Design Patterns – SOAP Faults – SOAP with Attachments.

**UNIT – IV** **9**

**Web Services, NET, J2EE and Beyond:** Web Services – Web Services Technologies – UDDI – WSDL – ebXML – ebXML Technologies – NET, J2EE and Beyond: SOAP, Web Services and E-Commerce – .NET and J2EE – IBM – BEA – HP – Oracle.

**UNIT – V** **9**

**XML Security:** Security Overview – Canonicalization – XML Security Framework –XML Encryption – XML Digital Signature – XKMS Structure – Guidelines for Signing XML Documents

**TOTAL : 45**

**TEXT BOOKS:**

1. Frank Coyle P., “XML, Web Services and the Data Revolution”, Pearson Education, New Delhi, 2007.

**REFERENCE BOOKS:**

1. Schmelzer, Vandersypen, Bloomberg et al, “XML and Web Services: Unleashed”, Pearson Education, New Delhi, 2012.
2. Nagappan Ramesh, Skoczylas Robert and Sriganesh Patel, “Developing Java Web Services”, Wiley Publishing Inc., New York, 2004.
3. Bersani C., Boulmakoul A. and Garbolinol E., “Java Web Services Architecture”, Morgan Kaufmann Publishers, 2005.

**Course Outcomes:**

On completion of the course the students will be able to

- understand the concepts of XML
- familiarize with XML technology and its applications
- know about web services and SOAP
- work on various web service technologies
- comprehend the role of XML security