

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

B.Sc. DEGREE IN SOFTWARE 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
	THEORY							
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
	PRACTICAL							
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
Total					22			

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
	THEORY							
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
	PRACTICAL							
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
Total					19			

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SEMESTER – III

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
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
14BST31	Introduction to Software Engineering	3	0	0	3	40	60	100
	Elective – I (Open)	3	0	0	3	40	60	100
	PRACTICAL							
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
Total					21			

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SEMESTER – IV

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14BCT41	Java Programming	3	0	0	3	40	60	100
14BCT42	Computer Networks	3	1	0	4	40	60	100
14BST41	Object Oriented Analysis and Design	3	1	0	4	40	60	100
14BST42	Software Architecture	3	0	0	3	40	60	100
	Elective – II (Professional)	3	0	0	3	40	60	100
	PRACTICAL							
14BCL41	Java Programming Laboratory	0	0	2	1	100	0	100
14BCL42	Networks Laboratory	0	0	2	1	100	0	100
14BSL41	CASE Tools and UML Laboratory	0	0	2	1	100	0	100
Total					20			

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SEMESTER – V

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
14BCT51	Visual Programming	3	0	0	3	40	60	100
14BCT52	Web Technology	3	1	0	4	40	60	100
14BST51	Software Testing	3	1	0	4	40	60	100
14BST52	Software Quality Assurance	3	0	0	3	40	60	100
	Elective – III (Open)	3	0	0	3	40	60	100
	PRACTICAL							
14BCL52	Web Programming Laboratory	0	0	2	1	100	0	100
14BSL51	Visual Programming and Software Testing Laboratory	0	0	2	1	100	0	100
14BSP51	Mini Project	0	0	4	2	50	50	100
Total					21			

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CURRICULUM

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SEMESTER – VI

Course Code	Course Title	Hours / Week			Credit	Maximum Marks		
		L	T	P		CA	ESE	Total
	THEORY							
	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
	PRACTICAL							
14BSP61	Project Work	0	0	18	9	100	100	200
Total					18			

CA – Continuous Assessment, ESE – End Semester Examination

Total Credits: 121

LIST OF PROFESSIONAL ELECTIVES					
Course Code	Course Title	Hours/Week			Credit
		L	T	P	
SEMESTER IV					
14BCE01	Operations Research	3	0	0	3
14BCE02	Principles of Management	3	0	0	3
14BSE01	System Software	3	0	0	3
14BSE02	System Analysis and Design	3	0	0	3
14BSE03	Personal Software Process and Team Software Process	3	0	0	3
SEMESTER VI					
14BCE06	E-commerce	3	0	0	3
14BCE07	Cloud Computing	3	0	0	3
14BCE08	Software Project Management	3	0	0	3
14BSE04	Requirements Engineering	3	0	0	3
14BSE05	Software Reengineering	3	0	0	3
14BSE06	Software Reuse	3	0	0	3
14BSE07	Software Design	3	0	0	3
14BSE08	Software Patterns	3	0	0	3
14BSE09	Storage Management	3	0	0	3

LIST OF OPEN ELECTIVES					
Course Code	Course Title	Hours/Week			Credit
		L	T	P	
SEMESTER III					
14BSO01	User Interface Design	3	0	0	3
14BSO02	Human Resource Management	3	0	0	3
SEMESTER V					
14BSO03	Big Data Analytics	3	0	0	3
14BSO04	Enterprise Resource Planning	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, Second 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", 41st 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

14BCT13 DIGITAL PRINCIPLES

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

3 1 0 4

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, Fourth Edition, Pearson Education, Delhi, 2012.

REFERENCE BOOKS:

1. Floyd Thomas L., —Digital Fundamentals, 10th Edition, Pearson Education, Delhi, 2012
2. Yarbrough, John M. —Digital Logic: Applications and Design, Cengage Learning, Delhi, 9th Indian Reprint 2012.
3. Givone, Donald D., —Digital Principles and Design, Tata McGraw-Hill, Delhi, 22nd 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”, 4th 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++”, Sixth edition, Tata Mc Graw Hill Education Private Limited, New Delhi, 2013.

REFERENCE BOOKS:

1. Herbert Schildt, “C++ The Complete Reference”, Fourth 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”, Sixth 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 LearningIndia 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, First 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”, Second 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” Second Edition, Tata McGraw-Hill, New Delhi, 2008.
3. Balagurusamy, E., “Computer Programming and Data Structures”, Third 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”, 8th Edition, Wiley India Pvt. Ltd., New Delhi, 2012.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, Albert S. Woodhull, “Operating Systems, Design and Implementation”, 8th Edition, Pearson Prentice Hall, 2009.
2. Deitel H.M.,”Operating Systems”, 3rd Edition, Pearson Education, Reprint 2009.
3. Stallings William, “Operating Systems: Internals and Design Principles”, 7th 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”, 5th Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS:

1. Stallings William, “Computer Organization and Architecture Designing for Performance”, 8th 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”, 4th 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”, 6th Edition, McGraw Hill, New York, 2011.

REFERENCE BOOKS:

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

14BST31 INTRODUCTION TO SOFTWARE ENGINEERING

3 0 0 3

Pre-requisites: Computer Fundamentals and Basic Knowledge in Programming

UNIT – I 9

Introduction and Software Process: The Problem Domain – Software Engineering Challenges - Software Engineering Approach - Software Processes: Software Process - Desired Characteristics of Software Process – Software Development Process Models.

UNIT – II 9

Software Requirements Analysis and Specification: Software Requirements – Problem Analysis - Requirement Specification - Functional Specification with Use Cases – Validation - Metrics.

UNIT – III 9

Planning a Software Project: Process Planning – Effort Estimation – Project Scheduling and Staffing – Software Configuration Management Plan – Quality Plan – Risk Management – Project Monitoring Plan.

UNIT – IV 9

Function Oriented Design: Design Principles -Module Level Concepts - Design Notation and Specification - Structured Design Methodology - Verification - Metrics.

UNIT – V 9

Coding: Programming Principles and Guidelines – Common Coding Errors – Structured Programming - Information Hiding – Programming Practices – Coding Standards - Coding Process – Refactoring – Verification – Metrics.

TOTAL: 45

TEXT BOOK

1. Jalote Pankaj, “An Integrated Approach to Software Engineering”, 3rd Edition, Narosa Publishing House, New Delhi, 2014.

REFERENCE BOOKS:

1. Pressman, Roger S., “Software Engineering: A Practitioner’s Approach”, 7th Edition, McGraw Hill, New York, 2014.
2. Rajib Mall, “Fundamental of Software Engineering”, 2nd Edition, Prentice Hall of India, New Delhi, 2009.
3. Ghezzi, Carlo, Jazayeri Mehdi and Mandrioli Dino, “Fundamental of Software Engineering”, 2nd Edition, Prentice Hall of India, New Delhi, 2009.

Course Outcomes:

On completion of the course the students will be able to

- understand software development life cycle phases
- impart knowledge on design methodologies, testing and estimation techniques
- identify, formulate and solve engineering problems
- know the common programming principles
- analysis the design and module level concepts

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”, Fifth Edition, McGraw Hill Education (India) Private Limited, New Delhi, 2015.

REFERENCE BOOKS:

1. Schildt Herbert, “Java: The Complete Reference”, 9th 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”, 4th 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”, 5th Edition, Morgan Kaufmann, 2012, Elsevier Inc.

REFERENCE BOOKS:

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

14BST41 OBJECT ORIENTED ANALYSIS AND DESIGN

3 1 0 4

Pre-requisites: Object Oriented Programming and Software Engineering

UNIT – I 9

Object Basics: Introduction - An Object-Oriented Philosophy – Objects - Objects are grouped in classes – Attributes - Object Behavior and Methods - Objects Respond to Messages - Encapsulation and Information Hiding - Class Hierarchy – Polymorphism - Object Relationships and Associations - Aggregations and Object Containment - Object- Oriented System Development Life Cycle.

UNIT – II 9

Object-Oriented Methodologies: Rumbaugh Object Modeling Technique - The Booch Methodology - The Jacobson Methodologies – Patterns – Frameworks - The Unified Approach.

UNIT – III 9

Object-Oriented Analysis: Business Object Analysis - Use-Case Driven Object-Oriented Analysis - Business Process Modeling - Use-Case Model- Object Analysis - Noun Phrase Approach - Common Class Pattern Approach - Use-Case Driven Approach - Classes Responsibilities and Collaborators.

UNIT – IV 9

Object-Oriented Design: Object-Oriented Design Process- Object-Oriented Design Axioms- Corollaries- Design Patterns- Designing Classes.

UNIT – V 9

Unified Modeling Language: Introduction- Static and Dynamic Models- Introduction to the Unified Modeling Language- UML Diagrams- UML Class Diagram- Use Case Diagram- UML Dynamic Modeling- Case study - Inventory and Banking.

Lecture:45, Tutorial:15, TOTAL: 60

TEXT BOOK:

1. Bahrami Ali, “Object Oriented Systems Development”, Tata McGraw Hill Publishing Company, New Delhi, 2008.

REFERENCE BOOKS:

1. Michael Blaha and James Rumbaugh, “Object Oriented Modeling and Design with UML”, Prentice Hall of India, 2012.
2. O’Docherty, Mike, “Object Oriented Analysis and Design”, Wiley, 2005.
3. Booch, Grady, “Object Oriented Analysis and Design”, Pearson Education, 2009.

Course Outcomes:

On completion of the course the students will be able to

- understand the object oriented concepts
- identify the relationships and hierarchies between objects
- design application using UML diagrams
- familiar with design process and design patterns
- draw various class diagrams

Pre-requisites: Software Engineering

UNIT – I **9**

Understanding Software Architecture: Envisioning Architecture – The Architecture Business Cycle – Origin of Architecture – Software Processes and the Architecture Business Cycle – Good Architecture – Software Architecture: Points of View - Patterns, Reference Models and Architectures – Importance – Structures and Views.

UNIT – II **9**

Creating an Architecture: Creating an Architecture – Understanding Quality Attributes – Functionality and Architecture – Architecture Quality Attributes – System Quality Attributes – Scenarios – Other System Quality Attributes – Business Qualities – Architecture Qualities - Achieving Qualities: Introducing Tactics – Availability – Modifiability – Performance – Security – Testability – Usability - Relationship of Tactics to Architectural Patterns – Architectural Patterns and Styles.

UNIT – III **9**

Designing and Documenting Architecture: Designing the Architecture – Life Cycle – Designing – Forming the Team Structure – Creating a Skeletal System – Documenting Software Architecture: Uses of Architectural Documentation – Views – Choosing the Relevant Views – Documenting a View – Documentation Across Views - Unified Modelling Language.

UNIT – IV **9**

Reconstructing Software Architectures and Software Product Lines: Introduction – Information Extraction – Database Construction – View Fusion – Reconstruction – Moving from One System to Many : Software Product Lines - Overview – Working – Scoping – Architectures for Product Lines - Difficulties.

UNIT – V **9**

Building Systems and Software Architecture in the Future: Building Systems from off the Shelf Components – Impacts of Components on Architecture – Architectural Mismatch – Component Based Design as Search – Software Architecture in the Future: Architecture Business Cycle Revisited – Creating an Architecture – Architecture within the Life Cycle – Impact of Commercial Components.

TOTAL: 45

TEXT BOOK:

1. Bass Len, Clements Paul and Kazman Rick, “Software Architecture in Practice”, 2nd Edition, Pearson Education, 2007.

REFERENCE BOOKS:

1. Mary Shaw and David Garlan, “Software Architectural Perspectives on an Emerging Discipline”, Prentice Hall, 2007.
2. Eric Braude, “Software Design: From Programming to Architecture”, Addison Wesley, 2004.
3. Rozanski Nick, “Software Systems Architecture”, Pearson Education India, 2005.

Course Outcomes:

On completion of the course the students will be able to

- understand the basic software architecture
- evaluate designs of existing software systems from an architectural perspective
- recognize the construction of systems using software architecture
- familiar with reconstructing software architecture
- explore the software architecture feature

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. Familiarization of features of any one of the standard UML case tool
2. Capturing key functional requirements for use cases and class diagram
3. Use work products – interaction diagrams, state chart diagrams, component diagrams and deployment diagrams
4. Implementation using any one of the object oriented languages
5. Testing – unit test case and integration test case

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

1. Rationale Rose, Microsoft Visio 2005
2. Load Runner, Test Director

Course Outcomes:

On completion of the course the students will be able to

- draw the various UML diagrams for their projects
- develop the projects based on the UML diagram
- perform various tests to validate the projects

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”, 3rd 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”, 4th Edition, Prentice Hall of India, 2008.
3. Brian A. Croft, Rick Darnell, Shelly Powers, “Dynamic Web Publishing”, 2nd 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: Software Engineering

UNIT – I 9

SDLC Models and Testing: Phases of Software Project – Quality Assurance and Control – Testing, Verification and Validation – Process model to different phases – Life cycle models – White Box Testing: Definition – Static Testing – Structural testing – Challenges.

UNIT – II 9

Black Box Testing: Definition – why and when to do black box testing – How to do black box testing – Integration Testing: Definition – Types – Phase of testing – Scenario Testing – Defect bash.

UNIT – III 9

System and Acceptance Testing: Overview – Functional versus Non-functional testing – functional system testing – Non Functional Testing – Acceptance Testing – Summary of testing phases.

UNIT – IV 9

Performance Testing: Introduction – Factors Governing Performance testing – Methodology – Tools – Process – Challenges – Regression Testing: Definition – Types – When and How to do Regression testing.

UNIT – V 9

Planning, Execution and Reporting: Test Planning – Test Management – Test process – Test Reporting – Software Test Automation: Definition – Skills – Scope of Automation – Design and Architecture – Requirements – Process model.

Lecture:45, Tutorial:15 TOTAL : 60

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing: Principles and Practices”, Pearson Education, 2013.

REFERENCE BOOKS:

1. Renu Rajani and Pradeep Oak, “Software Testing Effective Methods, Tools and Techniques”, Tata McGraw Hill, 2006.
2. Perry William E., “Effective Methods of Software Engineering”, 3rd Edition, Wiley India, New Delhi, 2006.
3. Pressman, Roger S., “Software Engineering: A Practitioner’s Approach”, 8th Edition, McGraw Hill, New York, 2014.

Course Outcomes:

On completion of the course the students will be able to

- test various processes and continuous quality improvement
- identify errors and fault models
- understand the methods of test generation
- test adequacy assessment
- apply software testing techniques in commercial environments

Pre-requisites: Software Engineering

UNIT – I

9

Software Quality: Software Quality in Business Context: Meaning of Quality – Quality Challenge – Importance of Quality - Quality Control Vs Quality Assurance – QA at Each Phase of SDLC – QA in Software Support Projects – SQA Function – Managing Software Quality in an Organization: Quality Management System in an Organization – Expectations – Diagnostic Questions – Need for the SQA Group.

UNIT - II

9

Planning and Quality: Planning for Software Quality Assurance: Software Quality Assurance Plans – Organizational Level Initiatives – Quality Planning: Dilemmas and Observations – Product Quality and Process Quality: Introduction - Software Systems Evolution – Product Quality – Models for Software Product Quality – Process Quality.

UNIT – III

9

Software Measurement and Metrics: Introduction – Measurement during Software Life Cycle Context– Defect Metrics – Metrics for Software Maintenance – Classification of Software Metrics – Requirements Related Metrics – Measurements and Process Improvement – Measurement Principles – Identifying Measures and Metrics for Projects – Metrics Implementation in Projects – Benefits of Measurement and Metrics for Project Tracking and Control – Earned Value Analysis – Planning for Metrics Program – Issues in Software Measurements and Metrics Program Implementation – Object Oriented Metrics: An Overview.

UNIT - IV

9

ISO and CMM: ISO 9001: Overview – ISO 9000 Definition – Origins of ISO 9000 – Working of ISO – ISO Standards – ISO 9000 Family – ISO 9001:2000 – Organizations Need for ISO 9000 - ISO Certification – Assessment / Audit Preparation – Assessment Process – Surveillance Audits / Re-certification / Re-assessment Audits - ISO Consulting Services and Consultants –e-Business and ISO - Software CMM and Other Process Improvement Models.

UNIT – V

9

Quality: Careers in Quality: Overview – Introduction – P CMM and Careers – People Issues – Finding a Mentor – Roles of Quality Professionals – Quality Certifications – Quality Related Topics: Statistical Quality Control and Statistical Process Control – Software Maintenance Models – OO Maintainability – Maintenance in e-Business Era – Cyclomatic Complexity – Requirements – Principle of Coupling and Cohesion – Six Sigma.

TOTAL: 45

TEXT BOOKS:

1. Godbole Nina S., “Software Quality Assurance Principles and Practice”, Narosa Publishing House, New Delhi, 2004.

REFERENCE BOOKS:

1. Jeff Tian, “Software Quality Engineering Testing, Quality Assurance and Quantifiable Improvement”, Wiley India Pvt. Ltd., New Delhi, 2010.
2. Raju N.V.S., “Total Quality Management”, Cengage Learning, 2014.
3. Pressman Roger S., “Software Engineering A Practioner’s Approach”, 7th Edition, Tata McGraw Hill, New Delhi, 2010.
4. Alan C. Gillies, “Software Quality Theory and Management“, 2nd Edition, Cengage Learning, 2011.

Course Outcomes :

On completion of the course the students will be able to

- identify quality assurance and measurement problems
- evaluate different software development environments
- recognize standards, models to achieve quality in software development environments
- understand ISO certification, life cycle and its stages
- familiar with configuration management

14BCL52 WEB PROGRAMMING LABORATORY
(Common to Computer Systems & Design and Software Systems)

0 0 2 1

LIST OF EXPERIMENTS /EXERCISES:

1. Write names of several countries in a paragraph and store it as world.html. Each country name must be a hot text. When you click India Image (for example), it must open the file and it should provide a brief introduction about India.
2. Design a HTML document describing you. Assign a suitable background design and background color and a text color
3. Write a HTML document to print your class Time Table.
4. Develop a Complete Web Page using Frames and Framesets which gives the Information about a Hospital using HTML.
5. Develop a web page using image mapping and roll over effects.
6. Write a program using style sheet to create borders and to modify the font and text appearance.
7. Write a script to count the number of characters entered by user in a textbox and limit it to a particular number.
8. Create a form and validate it using java script.
9. Create a document using DHTML that changes the alignment of the heading to left, right and centered using the links given in the same document.
10. Create a XML document for displaying the book details.
11. Create an application in ASP to display a welcome message to the first time user along with the time.
12. Write a Cookie Program using ASP.NET that counts the number of access to a web page.

TOTAL : 30

REFERENCES / MANUALS / SOFTWARE:

1. Windows-Operating System
2. Java, C++

Course Outcomes:

On completion of the course the students will be able to

- create web pages using HTML and Cascading Styles sheets
- build dynamic web pages using JavaScript
- design interactive web applications using ASP and ASP.NET
- develop XML documents and XML DTD

LIST OF EXPERIMENTS /EXERCISES:**VB.NET**

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

TESTING

1. Integrated Testing
2. Validation Testing
3. Output Testing
4. System Testing
5. Stress Testing
6. Black Box Testing
7. User Acceptance Testing

Case Study:

Electricity Bill Generation-Area calculation -Air line Reservation System-Banking System-Library Management System-Stock Maintenance Application-Hospital Administrative Process-Railway Reservation Process-Inventory System.

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

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

Course Outcomes:

On completion of the course the students will be able to

- design applications using different controls
- implement object oriented programming concepts
- develop projects and perform testing

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", 9th Edition, 6th Reprint , Tata McGraw Hill Publishing Company, New Delhi, 2014.

REFERENCE BOOKS:

1. Tripathi P.C. and Reddy P.N., "Principles of Management", 2nd 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

Pre-requisites: Fundamentals of Computing

UNIT – I 9

Overview of Language Processors: Programming Languages and Language Processors -Language Processing Activities –Fundamentals of Language Processing –Symbol Tables.

UNIT – II 9

Assemblers: Elements of Assembly Language Programming –A Simple Assembly Scheme –Pass Structure of Assemblers –Design of a Two Pass Assembler–A Single Pass Assembler for INTEL x86 Family Processors.

UNIT – III 9

Macro and Macro Preprocessors: Introduction to Macros and Macro Processors –Macro Definition and Call – Macro Expansion –Nested Macro Calls –Advanced Macro Facilities –Design of a Macro Preprocessor.

UNIT – IV 9

Compilers and Interpreters: Causes of a Large Semantic Gap –Binding and Binding Times – Data Structures Used in Compilers –Scope Rules – Memory Allocation –Compilation of Expressions–Compilation of Control Structures–Code Optimization–Benefits of Interpretation–Overview of Interpretation–The Java Language Environment.

UNIT – V 9

Linkers and Loaders: Introduction–Relocation and Linking Concepts – Design of a Linker – Self-Relocating Programs – Loaders-Software Tools – Definition - Software Tools for Program Development – Editors – Debug Monitors – Programming Environments – User Interfaces.

TOTAL: 45

TEXT BOOKS:

1. Dhamdhare D.M., “Systems Programming”, Tata McGraw Hill Publishing Company, New Delhi, 2012.

REFERENCE BOOKS:

1. Chattopadyay, Santanu, “System Software”, Printice Hall of India, New Delhi, 2009.
2. Dhamdhare D.M., “Systems Programming and Operating Systems”, 2nd Revised Edition, Tata McGraw Hill Publishing Company, New Delhi, 2008.
3. Donovann John J., “Systems Programming”, Tata McGraw Hill Publishing Company, New Delhi, 2002.

Course Outcomes:

On completion of the course the students will be able to

- introduce the basic concepts and techniques of system software
- provide knowledge regarding the steps of translation process concepts
- impart the knowledge of how linking and loading process is actually takes place
- understand the structure of compiler and interpreter
- realize the linkers and loaders

Pre-requisites: Fundamentals of Computing

UNIT – I **9**

System Analysis and Design Methods and IS Building Blocks: A Framework for Systems Analysis and Design - The Players - Business Drivers for Today's Information Systems - Technology Drivers for Today's Information Systems - A Simple System Development Process – Information System Building Blocks: Introduction – The Product – A Framework- Network Technologies and the IS Building Blocks.

UNIT – II **9**

System Analysis: Introduction - System Analysis - Systems Analysis Approaches - The Scope Definition Phase - The Problem Analysis Phase - The Requirements Analysis Phase - The Logical Design Phase- The Decision Analysis Phase.

UNIT – III **9**

Requirement Discovery and Feasibility Analysis: Fact Finding Techniques For Requirements Discovery: Introduction – The Process of Requirements Discovery – Fact Finding Techniques -A Fact Finding Strategy- Feasibility Analysis and the System Proposal: Introduction - Feasibility Analysis and the System Proposal - Six Tests for Feasibility – Cost Benefit Analysis Techniques - Feasibility Analysis of Candidate Systems- The System Proposal.

UNIT – IV **9**

Systems and Database Design: Introduction - Systems Design - Approaches – In House Development - Integrating Commercial Software - Database Design: Introduction - Conventional Files versus the Database-Database Concepts for the Systems Analyst - Prerequisite for Database Design - Conventional File Design - Modern Database Design.

UNIT – V **9**

Input and Output Design: Input Design and Prototyping: Input Design Concepts and Guidelines - GUI Controls for Input Design - Design and Prototype Inputs -Output Design and Prototyping: Introduction- Output Design Concepts and Guidelines - Design and Prototype Outputs.

TOTAL: 45

TEXT BOOKS:

1. Jeffrey L. Whitten and Bentley D. Lonnie, “Systems Analysis and Design Methods”, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2014.

REFERENCE BOOKS:

1. Shelly Gary B., Cashman Thomsa J. and Rosenblatt Harry J., “Systems Analysis and Design Methods”, Cengage Learning India Pvt. Ltd., New Delhi, 2010.
2. Award Elias M., “System Analysis and Design”, Galgotia Publications Pvt. Ltd., New Delhi, 2010.
3. Kendall Kenneth E. and Kendall Julie E., “System Analysis and Design”, 9th Edition, Prentice Hall of India, 2013.

Course Outcomes:

On completion of the course the students will be able to

- understand the credentials of systems analysts to design better information systems
- perform system analysis
- familiarize with requirement discovery and feasibility
- analyze the database design
- recognize the input and output design

Pre-requisites: Software Engineering

UNIT – I **9**

The Software Engineering: Definition – Importance of Good Engineering – The Personal Software Process – The Discipline and Importance of High Quality Work – To Improve the Quality of Work – The Improvement Process – Time Management – Tracking Time – Period and Product Planning – Product Size.

UNIT – II **9**

Managing Time, Commitments and Schedules: Elements of Time Management – Categorizing Activities – Gather Data on Time Spent by Activity – Evaluating Time Distribution – Making a Time Budget – Finding More Time - Setting Ground Rules – Prioritizing Time – Managing Time Budget – Suggestions on Managing Variable Time –Time Management Objectives - Managing Commitments - Managing Schedules - Project Plan.

UNIT – III **9**

Defects and Code Review Checklist: Defects - Software Quality – Defects and Quality – What are Defects – Defect Versus Bugs – Defect Types – Understanding Defects – The Defect Recording Log – Counting Defects – Using the Defect Recording Log – The Updated PSP Process - Finding Defects - The Code Review Checklist.

UNIT – IV **9**

Designing with Teams and Testing: Designing with Teams - Design Principles - Designing in Teams – Design Standards – Designing for Reuse – Designing for Usability – Designing for Testability – Design Reviews and Inspections – The TSP Design Scripts – Integration and System Testing.

UNIT – V **9**

The Team Roles: The Team Leader Role – The Development Manager Role – The Planning Manger Role: The Planning Manger Goals - The Planning Manager Skills and Abilities - The Planning Manager Principle Activities - The Planning Manager Project Activities.

TOTAL: 45

TEXT BOOKS:

1. Humphery Watt S., “Introduction to Personal Software Process”, 1st Edition, Addison Wesley, New Delhi, 2000.
2. Humphery Watt S., “Introduction to Team Software Process”, 1st Edition, Addison Wesley, New Delhi, 2000.

REFERENCE BOOKS:

1. Jalote Pankaj, “ CMM in Practice : Processes for Executing Software Projects”, Pearson Education, New Delhi, 2006
2. Humphery Watt S., “A Discipline for Software Engineering”, 1st Edition, Pearson Education, New Delhi, 2007.
3. Ince Darrel, “ ISO 9001 and Software Quality Assurance “, 1st Edition, Tata McGraw Hill Publishing Company, New Delhi, 1994.

Course Outcomes:

On completion of the course the students will be able to

- describe the fundamentals of group dynamics and how they affect a software process
- understand the time management, schedules and commitments
- comment on software development life cycle processes and customize it to specific development environments
- employ mechanisms for the measurement and assessment of process effectiveness, improve and optimize processes
- identify the importance of team work in project development

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”, 5th 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”, 3rd 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”, 3rd 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”, 5th Edition, 11th Reprint 2014, Tata McGraw-Hill, New Delhi.

REFERENCE BOOKS:

1. Roger S. Pressman, “Software Engineering- A practitioners Approach”, 7th Edition, McGraw Hill, New York, 2014.
2. Gray Clifford F. and Larson Erik W., “Project Management, The Managerial Process”, 3rd 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

Prerequisite : Software Engineering

UNIT – I

9

Software Requirement, Customer’s Perspective and Practices: Essential Software Requirement: Software Requirements Defined – Requirements Development and Management – Every Project has Requirements – Bad Requirements–Benefits-Requirements from the Customer’s Perspective: Expectation Gap – Who is the Customer – Customer Development Partnership –Creating a Culture that Respects Requirements – Identifying Decision Makers – Reaching Agreement on Requirements-Good Practices for Requirements Engineering.

UNIT – II

9

Business Requirements and Requirements Elicitation: Establishing the Business Requirements: Defining Business Requirements – Vision and Scope Document – Scope Representation Techniques – Scope in Focus – Vision and Scope on Agile Projects – Using Business Objectives to Determine Completion. Finding the Voice of the User: – User Classes –User Personas – Connecting with User Representatives - Product Champion – User Representation on Agile Projects – Resolving Conflicting Requirements - Requirements Elicitation.

UNIT – III

9

Understanding, Playing and Documenting User Requirements: Understanding User Requirements: Use Cases and User Stories – Use Case Approach – Benefits of Usage Centric Requirements- Playing by the Rules: Business Rules Taxonomy –Documenting and Discovering Business Rules – Business Rules and Requirements – Documenting the Requirements: Software Requirements Specification – Software Requirements Specification Template- Requirements Specification on Agile Projects.

UNIT – IV

9

Writing and Specifying Data Requirements: Writing Excellent Requirements: Characteristics – Guidelines – Sample Requirements - A Picture is Worth 1024 Words: Modeling the Requirements – Voice of the Customer to Analysis Models – Selecting the Right Representations – Data Flow Diagram – Swimlane Diagram – State Transition Diagram and State Table – Dialog Map – Decision Tables and Decision Trees – Event Response Tables – Few Words about UML Diagrams – Modelling on Agile Projects. Specifying Data Requirements: Modeling Data Relationships – Data Dictionary – Data Analysis – Specifying Reports – Dashboard Reporting.

UNIT – V

9

Functionality and Risk Reduction: Beyond Functionality: Software Quality Attributes – Exploring Quality Attributes – Defining Quality Requirements – Specifying Quality Requirements with Planguage – Quality Attribute Trade-Offs – Implementing Quality Attribute Requirements – Constraints – Handling Quality Attributes on Agile Projects. Risk Reduction through Prototyping: Prototyping – Mock Ups and Proofs of Concept – Throwaway and Evolutionary Prototypes – Paper and Electronic Prototypes – Working with Prototypes – Prototype Evaluation - Risks and Success Factors of Prototyping.

TOTAL : 45

TEXT BOOKS:

1. Wiegers Karl and Beatty Joy, “Software Requirements”, Microsoft Dreamtech Press, 2013.

REFERENCE BOOKS:

1. Sommerville Ian and Sawyer Pete, “Requirements Engineering”, Wiley, 2014.
2. Leffingwell Dean and Widrig Don, “Managing Software Requirements A Use Case Approach”, Pearson Education, 2007.

Course Outcomes:

On completion of the course the students will be able to

- understand the principles of requirements engineering
- familiarize with document procedure, functionality and risks
- identify and document the user requirements
- specify and write the data requirements
- explore the functionality and risks

Pre-requisites: Software Engineering

UNIT – I

9

Software Evolution Process: Introduction – Models and Theories – Studies – Software Evolution Process – Program Types – E and S Types Classification – Laws – Practical Implications of the Laws – Evolutionary Patterns in Open Source Software – Types of Entities – Patterns in Open Software Evolution Studies – Software Models – Requirement Driven Software Evolution.

Unit – II

9

Software Design and Maintenance: Taxonomy of Software Evolution – Dimensions – Models of Software Evolution – Software Design and Software Evaluation Techniques – Challenges – Classification of Challenges – Enumeration of Challenges – Software Maintenance Process – Software Redocumentation - Software Renovation – Technology and Architectures – Benefits.

Unit – III

9

Program Comprehension: Concepts – Theories – Opportunistic and Systematic Strategies – Impact of Program Characteristics – Influence of Individual Programmer Differences – Effects of Task Variability in Program Comprehension – Implications for Tool Research – Current Theories and Tools Support – Cognitive Models – Tool Requirements – Tools Research – Methods – Program Trends – Programmer Characteristics – Agile Developers – Higher Levels of Abstraction – Dynamically Configured Systems – Aspect Oriented Programming – Future Methods, Theories and Tools – Legacy Systems – Life Cycle – Assessment.

Unit – IV

9

Reverse and Reengineering: Reverse Engineering – Procedure – Clean Room – Dirty Room – Strictly Clean Reverse Engineering – Patterns – Forward Engineering – Reengineering Approaches – Organizational Patterns for Moving Forward – Software Reengineering – Objectives – Concepts – Models – Software Reliability Methods – Dealing – Reengineering Phases and Tasks – Implementation.

Unit – V

9

Code Slicing and Refactoring: Code Slicing – Static and Dynamic Slicing – Conditioned Slicing – Forward and Backward Slicing – Amorphous Slicing – Applications – Slicing Sequential Programs – Code Refactoring – Definition – Dependencies – Eliminating Analysis – Dynamic Refactoring – Static and Dynamic Analysis – Feasibility – Tools – Practical Criteria – Implications of Software Reuse – Technology Transfer.

TOTAL : 45

TEXT BOOKS:

1. Afshar Alam and Tendai Padenga, “Application Software Reengineering”, Pearson Education, New Delhi, 2010.

REFERENCE BOOKS:

1. Sal Valenti, “Successful Software Reengineering”, IRM Press, London, 2002.
2. Perry William E., “Effective Methods of Software Engineering”, 3rd Edition, Wiley India, New Delhi, 2006.
3. Pressman Roger S., “Software Engineering: A Practitioner’s Approach”, 7th Edition, McGraw Hill, New Delhi, 2014.

Course Outcomes:

On completion of the course the students will be able to

- understand software aging phenomenon
- explore the evolution of software taxonomy and techniques
- apply the methods to assess the situation for reengineering strategy
- familiar with reverse engineering phenomena
- describe the code slicing

Prerequisite : Software Engineering

UNIT – I **9**

Introduction to Software Reuse: Introducing Software Reuse -Definition and Basic Essentials- Further Introductory Essential-Systematic Re-Use -Reusable Software Assets: Software Asset - Characteristics of Reusable Assets - Managing Software Asset -Assets vs Objects.

UNIT – II **9**

Reuse Repository: Needs of Repository -Requirements for Reuse Repository -Repositories on the Internet -Tool Categories on the Market - Reuse Process: Need for a Process - Starting a Corporate Reuse Programme

UNIT – III **9**

The Management Issues: To Reuse or not to Reuse - Reuse for all and all for Reuse-Adapting the Work Structure - General Aspects of a Metrics programme -A Typical Reuse Metrics Programme

UNIT – IV **9**

Reuse Techniques and Technologies: Rationale - Reuse Enabling Architecture - Object Oriented Techniques - Design Patterns – Object Oriented Frameworks.

UNIT – V **9**

Component Based Development: Agent Based System- Comparison Techniques – Experience Review and Success stories - Case Study: Sodalialia & Thomson.

TOTAL: 45

TEXT BOOKS:

1. Michel Ezran, Maurizio Morisio and Colin Tully, “Practical Software Reuse”, Springer Press, London, 2002.

REFERENCE BOOKS:

1. Ivar Jacobson, Martin Griss and Patrick Johnson, “Software Reuse: Architecture, Process and Organization for business success”, Addison Wesley, New York, 1997.
2. Stephen H. Kan, “Metrics and models in Software Quality Engineering”, 2nd Edition, Addison Wesley, New York, 2003.
3. Hafedh Mili, Ali Mili, Sherif Yacoub and Edward Addy, “Reuse Based Software Engineering”, John Wiley & Sons Ltd., New York, 2002.

Course Outcomes:

On completion of the course the students will be able to

- understand the importance and need of reusability in software development
- analyse the reuse techniques and to decide to reuse or not
- explore the reuse repository and its functions
- identify component based development and other methodologies
- familiar with component based development in real time applications

Pre-requisites: Software Engineering

UNIT – I

9

Software Design Role: Nature of Design Process – Definition – Role of Design Activity – Design as a Problem Solving Process – Design as a Wicked Problem – Software Design Process: Definition – Building Models – Transferring Design Knowledge – Constraints Upon Design Process – Recording Design Decision – Designing with Others.

UNIT – II

9

Design Process and Qualities: Context for Design – Linear Development Processes – Incremental Development Process – Economic Factors – Longer Term – Design Qualities: Quality Concept – Assessing Design Quality – Quality Attributes – Assessing Design Process.

UNIT – III

9

Transferring Design Knowledge: Describing Design Solution – Representing Abstract Ideas – Design Viewpoints for Software – Forms of Notation – Transferring Design Knowledge: Need to Share Knowledge – Architecture Concept – Design Methods – Design Patterns – Unified Interpretation.

UNIT – IV

9

Design Representations: Problem of Selection – Black Box Notations – White Box Notations – Developing Diagram – Rationale for Method: Software Design Method – Support Design Methods – Methods Work Miracles – Problem Domains.

UNIT – V

9

Design Process, Strategies and Patterns: Role of Strategy Methods – Describe Design Process – D-Matrix – Design Top-Down Decomposition – Design by Composition – Organizational Influences – Design Patterns: Design by Template and Design Reuse – Design Patterns – Designing with Patterns – Patterns in the Context.

TOTAL : 45

TEXT BOOKS:

1. David Budgen, “Software Design”, 2nd Edition, Pearson Education, 2008.

REFERENCE BOOKS:

1. Eric Braude, “Software Design: From Programming to Architecture”, John Wiley & Sons, 2004.
2. Francoise Detienne, “Software Design – Cognitive Aspect”, Springer Publications, 2012.
3. Lingfeng Wang, Kay Chen Tan, “Modern Industrial Automation Software Design”, John Wiley & Sons Publication, 2006.

Course Outcomes:

On completion of the course the students will be able to

- convert real-world problems into programming algorithms
- identify standard programming algorithms to meets user requirements
- communicate algorithmic solutions to other programmers
- test the solution
- understand that design patterns are standard solutions

Pre-requisites: Object Oriented Analysis and Design

UNIT – I **9**

Introduction: Design Pattern - Design Patterns in Smalltalk MVC - Describing Design Patterns - Catalog of Design Patterns - Organizing the Catalogs - How Design Patterns Solve Design Problems - How to select a Design Pattern - How to Use Design Pattern.

UNIT – II **9**

Creational Patterns: Abstract Factory: Intent -Motivation - Applicability -Structure- Participants - Collaborations-Consequences - Implementation - Builder - Factory Method - Prototype – Singleton.

UNIT – III **9**

Structural Patterns: Adapter: Intent -Motivation - Applicability -Structure- Participants - Collaborations-Consequences - Implementation- Sample Code - Bridge - Composite - Decorator – Proxy.

UNIT – IV **9**

Behavioral Patterns: Chain of Responsibility - Command - Interpreter - Iterator - Mediator - Memento - Observer - State -Strategy - Template .

UNIT – V **9**

Case Study: Designing a Document Editor: Design Problems - Document Structure - Formatting - Embellishing the User Interface - Supporting Multiple Look and Feel Standards - Supporting Multiple Window Systems - User Operations -Spelling Checking and Hyphenation.

TOTAL : 45

TEXT BOOKS:

1. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, “Design Patterns Elements of reusable object-oriented software”, 8th Edition, Pearson Education, 2012.

REFERENCE BOOKS:

1. Eric Freeman, Elisabeth Freeman, “Head First Design Patterns”, 1st Edition, Shroff Publishers and Distributors Pvt. Ltd., Reprint 2011.
2. Prof.Meda Sreenivasa Roa, Narasimha Karumanchi, “Peeling Design Patterns for Beginners and Interviews”, Career Monk Publications, 2012.
3. Frank Bachmann, Regine Meunier, Hans Rohnert, “Pattern Oriented Software Architecture”, Volume 1, Reprint 2001.

Course Outcomes:

On completion of the course the students will be able to

- design and implement codes
- implement codes with lower complexity
- assess the quality of design
- impart the design pattern in real time applications
- understand the behavioral patterns in software

Pre-requisites: Database Management Systems

UNIT – I

9

Storage Systems: Introduction to Information Storage – Data Center Environment: Application – DBMS – Host – Connectivity – Storage – Data Protection: RAID – Implementation Methods – Array Components – Techniques – Levels – Intelligent Storage Systems: Components – Storage Provisioning – Types.

UNIT – II

9

Storage Networking Technologies: Fibre Channel Storage Area Networks: Overview- SAN and its Evolution – Components – FC connectivity – IP SAN and FCoE: iSCSI – FCIP – FCoE – Network Attached Storage : General Purpose vs. NAS Devices – Benefits – File Systems and Network File Sharing – Components – I/O Operation – Implementation – Object Based Storage Devices – Content Addressed Storage.

UNIT – III

9

Backup, Archive and Replication: Introduction to Business Continuity: Information Availability – BC Terminology – Planning Life Cycle – Failure Analysis – Business Impact Analysis – Technology Solutions – Backup and Archive: Backup Purpose – Considerations – Granularity – Considerations – Methods – Architecture – Restore Operations – Topologies – Local Replication: Replication Terminology – Users of Local Replicas - Consistency – Local Replication Technologies- Remote Replication: Modes of Remote Replication – Technologies.

UNIT – IV

9

Cloud Computing: Cloud Enabling Technologies – Characteristics – Benefits – Cloud Service Models – Cloud Deployment Models – Cloud Computing Infrastructure – Cloud Challenges – Cloud Adoption Considerations.

UNIT – V

9

Securing and Managing Storage Infrastructure: Securing the Storage Infrastructure: Information Security Framework – Risk Triad – Storage Security Domains – Security Implementations in Storage Networking – Securing Storage Infrastructure in Virtualized and Cloud Environments – Managing the Storage Infrastructure: Monitoring - Management Activities – Management Challenges.

TOTAL : 45

TEXT BOOKS:

1. Somasundaram Gnanasundaram and Alok Shrinivastava, “Information Storage and Management”, 2nd Edition, EMC Education Services, Wiley India, 2014.

REFERENCE BOOKS:

1. Volker Herminghaus and Albrecht Scriba, “Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation”, Springer Science and Business Media, 2009.
2. Ivanka Menken, “Storage Management - The Complete Cornerstone Guide to Storage Management Best Practices Concepts, Terms, and Techniques for Successfully Planning, Implementing and Managing Storage Management Solutions”, 2nd Edition, Emereo Publishing, 2012.
3. Nitin Vengurlekar, Murali Vallath and Rich Long, “Oracle Automatic Storage Management: Under the Hood and Practical Deployment Guide”, McGraw Hill Professional, 2007.

Course Outcomes:

On completion of the course the students will be able to

- evaluate storage architectures and data center elements
- identify physical and logical components of a storage infrastructure
- analyze storage networking technologies
- recognize business continuity solutions
- familiar on storage security and management

14BSO01 USER INTERFACE DESIGN

3 0 0 3

Pre-requisites: Fundamentals of Computing

UNIT – I 9

Graphical and Web User Interfaces: Graphical User Interface- Web User Interface- Merging of Graphical Business Systems and the Web- Principles of User Interface Design- The User Interface Design Process: Know Your User or Client.

UNIT – II 9

Text, Messages and Assistance: Words- Sentences- Messages and Text- Text for Web Pages- Effective Feedback- Guidance and Assistance: Providing the Proper Feedback- Guidance and Assistance.

UNIT – III 9

Internationalization, Accessibility and Creating Graphics, Icons and Images: International Considerations- Accessibility- Create Meaningful Graphics- Icons and Images: Icons- Multimedia.

UNIT – IV 9

Colors: Color- Color Uses- Problems with Color- Color and Human Vision- Choosing Colors- Colors for Textual Graphic Screens and Statistical Graphics Screens- Colors for Web Pages.

UNIT – V 9

Organize, Test and Retest: Organizing and Laying Out Screens- Screen Examples- Test and Retest: Purpose and Importance of Usability Testing- Scope of Testing- Prototypes- Kinds of Tests- Developing and Conducting the Test- Analyse- Modify and Retest- Evaluate the Working System.

TOTAL: 45

TEXT BOOKS:

1. Galitz, O Wilbert, “The Essential Guide to User Interface Design”, 2nd Edition, Wiley, New Delhi, 2015.

REFERENCE BOOKS:

1. Cooper Alan, “The Essentials of User Interface Design”, Wiley Dream Tech Ltd., New Delhi, 2004.
2. Shneiderman Ben, Plaisant Catherine, Cohen Maxine and Jacobs Steven, “Designing the User Interface”, Pearson Education, New Delhi, 2014.
3. Lauesen Soren, “User Interface Design: A Software Engineering Perspective”, Addison Wesley, 2004.

Course Outcomes:

On completion of the course the students will be able to

- understand the concepts of graphical user interface, web user interface
- use the colors properly in GUI development and web development
- develop skills in designing an user interface
- design elements like text, graphics, icons, images and colors
- organize and test the user interface

UNIT – I**9**

Introduction: Understanding the Nature and Scope of HRM – Nature – Scope – Functions and Objectives – Organisation of HR Department – HR model – Evolution – Human Capital Management – Jobs and Careers - Human Resource Planning: Nature – Importance – Factors affecting HRP – Planning Process – Requisites for Successful HRP – Barriers to HRP.

UNIT – II**9**

Analysing Work and Designing Jobs: Nature – Job Analysis and Competitive Advantage – Process – Methods of Collecting Job Data – Potential Problems – Job Design – Factors affecting Job Design – Approaches – Issues - Recruiting Human Resources: Nature – Purpose and Importance – Factors – Recruitment Process – Searching – Screening – Evaluation and Control – Alternatives to Recruitment.

UNIT – III**9**

Selecting Human Resources: Nature – Selection as a Source of Competitive Advantage – Organisation for Selection – Selection Process – Barriers for Effective Selection - Training, Development and Career Management: Nature – Inputs – Gaps – Training and Development as Source of Competitive Advantage – Training Process - Appraising and Managing Performance: Performance Appraisal – Appraisal Process – Challenges – Job Evaluation – Process – Methods- Incentives and Performance based Payments: Nature – Scope – Types – Group Incentive Plans – Incentives for Indirect Workers.

UNIT – IV**9**

Motivation: Definition - Importance – Challenges – Theories of Motivation – Rewards – Job Design – Empowerment – Participative Management – Problem Employees – Quality of Work Life – Motivational Techniques- Empowering Employees: Scope – Pre-requisites for Successful Participation – Importance – Limitations – Evolution - Communication: Nature – Significance – Interpersonal Communication – Types – Barriers of Effective Communication – Organisational Communication – Networks – Roles – Policies and Communication Audit – Informal Communication.

UNIT – V**9**

Welfare: Nature – Merits and Demerits – Types of Welfare Activities – Approaches to Labour Welfare – Administration of Welfare Facilities - Safe and Healthy Environment: Safety – Types of Accidents – Need for Safety – Safety Programme – Health- Industrial Relations: Nature – Importance – Approaches – Parties to IR – Strategy – Role of HRM - Trade Unions: Nature – Strategic Choices - Union Tactics – Trends in Trade Union Movement - E-HR: Nature – Activities – e-Recruitment – e-Selection – e-Performance Management – e-Learning – e-Compensation.

TOTAL: 45**TEXT BOOKS:**

1. Aswathappa K., “Human Resource Management: Text and Cases”, 7th Edition, Tata McGraw Hill, 2013.

REFERENCE BOOKS:

1. Gary Dessler, “A Framework for Human Resource Management”, 7th Edition, Pearson Education, 2014.
2. Sharon Pande, Swapnalekha Basak,” Human Resource Management- Text and Cases”, Pearson Education, 2012.
3. Rao V.S.P., “Human Resource Management: Text and Cases”, 2nd Edition, Excel Books, 2008.

Course Outcomes:

On completion of the course the students will be able to

- synthesize the procedure for staffing
- design a training program using a useful framework for evaluating training needs
- appraise the training results
- implement performance based payment system
- identify the safety needs of employees

Pre-requisites : Database Management Systems and Data mining

UNIT – I **9**

Digital Data and Big Data: Types of Digital Data – Classification of Digital Data - Introduction to Big Data : Characteristics of Data – Evolution – Definition – Challenges –What is Big Data – Other Characteristics of Big Data – Why – Information Consumer or We Produce Information – Traditional BI vs Big Data – Typical Data Warehouse Environment – Hadoop Environment – New Today’s – Changing in Realms of Big Data.

UNIT – II **9**

Big Data Analytics and Technology Landscape: Big Data Analytics - Where do we Begin – What – Why this Sudden Hype – Classifications of Analytics – Greatest Challenges – Top Challenges Facing Big Data – Why Big Data Analytics Important – Kind of Technologies – Data Science – Data Scientist – Terminologies Used in Big Data Environment- Base – Top Analytical Tool – Big Data Technology Landscape - No SQL – Hadoop.

UNIT – III **9**

Hadoop and Map Reduce: Hadoop - Introduction – Need for Hadoop – Why not RDBMS – RDBMS vs Hadoop – Distributed Computing Challenges – History – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – Hadoop Distributed File System – Processing Data with Hadoop – Managing Resources and Applications with Hadoop Yarn – Interacting with Hadoop Eco System - Map Reduce Programming - Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.

UNIT – IV **9**

Cassandra : Apache Cassandra – Features of Cassandra – CQL Data Types – CQLSH – Keyspaces – Crud – Collections – Using a Counter – Time to Live -Alter Commands – Import and Export – Querying System Tables – Practice Examples

UNIT – V **9**

Hive And JasperReport : Hive - What is Hive – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language – Rcf file Implementation – Serde – User Defined Function – JasperReport - Introduction to Jasper Report – Connecting to MongoDB NOSQL Database – Connecting to Cassandra NOSQL Database.

TOTAL : 45

TEXT BOOKS:

1. Seema Acharya , Subhashini Chellapan, “ Big Data And Analytics”, Wiley, 2015.

REFERENCE BOOKS:

1. Bill Franks, “Taming the Big Data Tidal Wave”, Wiley Reprint, 2014.
2. DJ Editorial Services, “Big Data Black Book”, Dreamtech Press, 2015.
3. Barat Baesens , “Analytics in a Big Data World”, Wiley, 2014.

Course Outcomes:

On completion of the course the students will be able to

- understanding the basic concepts of big data
- recognize various sources of big data and analytic process
- explore the evolution of analytics using casandra
- familiarize the tools and techniques for analytical process
- identity between analysis and reporting

14BSO04 ENTERPRISE RESOURCE PLANNING

3 0 0 3

Pre-requisites: Fundamentals of Computing

UNIT – I 9

Introduction: Enterprise -An Overview – Business Processes – Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments – Risks of ERP – Benefits of ERP.

UNIT – II 9

ERP and Technology: ERP and Related Technologies - Business Intelligence and Business Analytics- Business Process Reengineering(BPR) - Data Warehousing and Data Mining - Online Analytical Processing(OLAP) - Supply Chain Management(SCM) - Geographic Information System – Advanced Technology and ERP Security

UNIT – III 9

ERP Implementation: To Be or Not To Be – Implementation Challenges – ERP Implementation Strategies – ERP Implementation Life Cycle – Pre Implementation Tasks – ERP Deployment Methods.

UNIT – IV 9

ERP Implementation: ERP Project Teams - Process Definition - Vendors and Consultants – Employees and Employee Resistance - Contracts with Vendors, Consultants and Employees – Training and Education – Data Migration– Project Management and Monitoring – Post Implementation Activities – Success and Failure Factors.

UNIT – V 9

The Business Modules: Business Modules of an ERP Package – Financials - Manufacturing-Human Resources Management - Plant Maintenance - Materials Management-Quality Management – Marketing – Sales, Distribution and Service.

TOTAL : 45

TEXT BOOKS:

1. Leon Alexis, “ERP Demystified”, McGraw Hill Education, 2014.

REFERENCE BOOKS:

1. Bansal Veena, “Enterprise Resource Planning A Managerial Perspective”, Pearson Education, 2013.
2. Monk F. Ellen and Wagner J. Bret, “Concepts in Enterprise Resource Planning”, 4th Edition, Cengage Learning, 2013.
3. Vinod Garg Kumar and Venkitakrishnan N.K., “Enterprise Resource Planning: Concepts and Practice”, Prentice Hall of India, New Delhi, 2003.

Course Outcomes:

On completion of the course the students will be able to

- understand the ERP system and its components
- familiar with ERP technologies and components used
- explore the ERP life cycle and challenges in implementation
- identify the need of different modules in ERP system
- recognize the various business modules in ERP