ADMISSION & EXAMINATION RULES

for

Bachelor of Computer Applications-Master of Computer Applications (BCA)-MCA Integrated

1. OBJECTIVE

To act as a feeder program for higher studies and to provide strong conceptual and theoretical background leading to skilled manpower in industrial and service sectors to meet global demands.

2. THE PROGRAM

Highlights of the course are described in the following table:

a.	*Name of the Program*	Bachelor of Computer Applications (BCA)-MCA Integrated
b.	*Nature*	Regular and Full Time
c.	*Duration*	Six Years (12 Semesters)
d.	*Total number of credits*	260
e.	*Medium of Instruction and English Examinations*	English
f.	*Eligibility Criteria*	A candidate must have: Passed Senior Secondary (12th Standard/Intermediate) examination with Mathematics as one of the passed subjects from CBSE or any other Board recognized by Jamia Hamdard as equivalent thereto, securing at least 50% marks or equivalent CGPA in aggregate. ***(OR)*** Passed Senior Secondary (12th Standard/Intermediate) examination with Commerce background having one paper Accountancy or Business Mathematics, securing at least 50% marks or equivalent CGPA in aggregate. ***(OR)*** Passed Senior-Secondary (12th standard/intermediate) examination having one Theory paper Computer Science / Multimedia and Web Technology / Information Technology securing atleast 50% marks or equivalent CGPA in aggregate.
g.	*Selection procedure*	The admission to the BCA-MCA Integrated / B. Sc. (CS/IT) program will be on the basis of merit of the qualifying examination and/or interview to be conducted by Jamia Hamdard.
h.	*Period of Completion*	Not more than 08 years (16 Semesters)
i.	*Commencement of the Program*	July of the every academic session

. 3. PROGRAM STRUCTURE

Semester-wise course structure, guidelines for teaching, practical and associated assessment of BCA-MCA Integrated/ B. Sc. (IT) programme is described in the following tables:

Course Type	Abbreviation	Credits
Program Core Course	PCC	100
Program Elective	PE	24
Open Elective	OE	16
Foundation Course	FC	20
Ability Enhancement Course	AEC	08
Skill Enhancement Elective	SEE	16
Laboratory	LAB	38
Dissertation	DISS	38
Non-Credit Course	NCC	00
Total Credits		**260**

L – T – P stands for number of contact hours as Lecture-Tutorial-Practical in a week**.**

Semester – I

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCIA 101	Introduction to 'C' Programming	PCC	30	70	100	3-1-0	4
BCIA 102	Computer System Architecture	PCC	30	70	100	3-1-0	4
BCIA 103	Mathematical Foundation of Computer Science	FC	30	70	100	3-1-0	4
BCIA 104	English Language	AEC	30	70	100	2-0-0	2
BCIA 105	Media and Information Literacy Communication	AEC	30	70	100	2-0-0	2
BCIA 106	'C' Programming Lab	LAB	50	50	100	0-0-4	2
BCIA 107	Computer System Architecture Lab	LAB	50	50	100	0-0-4	2
				Total		**13-3-8**	**20**

Semester – II

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCIA 201	Introduction to Data Structures	PCC	30	70	100	3-1-0	4
BCIA 202	Data communication and Computer Networks Basics	PCC	30	70	100	3-1-0	4
BCIA 203	Fundamental Concepts of Operating Systems	PCC	30	70	100	3-1-0	4
BCIA 204	Elementary Physics	FC	30	70	100	3-1-0	4
BCIA 205	Data Structures Lab	LAB	50	50	100	0-0-4	2
BCIA 206	Unix/Linux Lab	LAB	50	50	100	0-0-4	2
*BCIA ES	Environmental Sciences	NCC	30	70	100	2-0-0	0
				Total		**14-4-8**	**20**

***This subject may be taught in both the semesters (Semester-I and Semester-II) at the discretion of the Department. However, Semester Examination will be conducted only at the end of Semester-II**

Semester – III

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCIA 301	Introduction to Object Oriented Programming	PCC	30	70	100	3-1-0	4
BCIA 302	Introduction to Database Management System	PCC	30	70	100	3-1-0	4
BCIA 303	Discrete Structures	PCC	30	70	100	3-1-0	4
	PE – 1	PE	30	70	100	3-1-0	4
BCIA 304	'C++' Programming Lab	LAB	50	50	100	0-0-4	2
BCIA 305	Database Management System Lab	LAB	50	50	100	0-0-4	2
				Total		**12-4-8**	**20**

Semester – IV

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCIA 401	Fundamentals of Probability and Statistics	FC	30	70	100	3-1-0	4
BCIA 402	Artificial Intelligence	PCC	30	70	100	3-1-0	4
	SEE – 1	SEE	30	70	100	3-1-0	4
	OE – 1	OE	30	70	100	3-1-0	4
BCIA 403	Artificial Intelligence Lab	LAB	50	50	100	0-0-4	2
BCIA 404	Lab based on SEE – 1	LAB	50	50	100	0-0-4	2
				Total		**12-4-8**	**20**

Semester – V

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCIA 501	Software Engineering	PCC	30	70	100	3-1-0	4
	PE – 2	PE	30	70	100	3-1-0	4
	SEE – 2	SEE	30	70	100	3-1-0	4
	OE – 2	OE	30	70	100	3-1-0	4
BCIA 502	Software Engineering Lab	LAB	50	50	100	0-0-4	2
BCIA 503	Lab based on SEE – 2	LAB	50	50	100	0-0-4	2
				Total		**12-4-8**	**20**

Semester – VI

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Viva voce	Total		
BCIA 601	Industrial Project and Dissertation	DISS	300	200	500	0-0-40	20

End Credit: 120

***An exit option is provided after successful completion of 6th semester if the student wants to exit he/she will be provided BCA/BSc IT Degree, otherwise the student goes directly into 7th semester of MCA.**

Semester – VII

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MCIA 701	Problem solving and Programming	PCC	30	70	100	3-1-0	4
MCIA 702	Computer Organization and Architecture	PCC	30	70	100	3-1-0	4
MCIA 703	Advanced Database Management Systems	PCC	30	70	100	3-1-0	4
MCIA 704	Software Engineering	PCC	30	70	100	3-1-0	4
MCIA 705	Data Communication and Computer Networks	PCC	30	70	100	3-1-0	4
MCIA 706	Communication Skills	AEC	30	70	100	2-0-0	2
MCIA 707	Problem solving and Programming Lab	LAB	50	50	100	0-0-4	2
MCIA 708	Database Management Systems Lab	LAB	50	50	100	0-0-4	2
					Total	**17-5-8**	**26**

Semester – VIII

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MCIA 801	Mathematical Foundations for Computer Applications	FC	30	70	100	3-1-0	4
MCIA 802	Advanced Data Structures	PCC	30	70	100	3-1-0	4
MCIA 803	Object-Oriented Programming Using C++	PCC	30	70	100	3-1-0	4
MCIA 804	Advanced Operating Systems	PCC	30	70	100	3-1-0	4
MCIA 805	Formal Languages and Automata Theory	PCC	30	70	100	3-1-0	4
MCIA 806	Data Structures Lab	LAB	50	50	100	0-0-4	2
MCIA 807	Object-Oriented Programming Using C++ Lab	LAB	50	50	100	0-0-4	2
					Total	**15-5-8**	**24**

Semester – IX

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MCIA 901	Design and Analysis of Algorithms	PCC	30	70	100	3-1-0	4
MCIA 902	Java Programming	PCC	30	70	100	3-1-0	4
MCIA 903	Compiler Design	PCC	30	70	100	3-1-0	4
	SEE – 3	SEE	30	70	100	3-1-0	4
	OE – 3	OE	30	70	100	3-1-0	4
MCIA 904	Java Programming Lab	LAB	50	50	100	0-0-4	2
MCIA 905	Lab based on SEE – 3	LAB	50	50	100	0-0-4	2
					Total	**15-5-8**	**24**

Semester – X

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MCIA 1001	Artificial Intelligence	PCC	30	70	100	3-1-0	4
MCIA 1002	Data Warehousing and Data Mining	PCC	30	70	100	3-1-0	4
MCIA 1003	Probability and Statistics	FC	30	70	100	3-1-0	4
	PE – 3	PE	30	70	100	3-1-0	4
	PE – 4	PE	30	70	100	3-1-0	4
MCIA 1004	Artificial Intelligence Lab	LAB	50	50	100	0-0-4	2
MCIA 1005	Data Warehousing and Data Mining Lab	LAB	50	50	100	0-0-4	2
					Total	**15-5-8**	**24**

Semester – XI

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
MCIA 1101	Cloud Computing and Virtualization	PCC	30	70	100	3-1-0	4
	PE – 5	PE	30	70	100	3-1-0	4
	PE – 6	PE	30	70	100	3-1-0	4
	SEE – 4	SEE	30	70	100	3-1-0	4
	OE – 4	OE	30	70	100	3-1-0	4
MCIA 1102	Technical Seminar and Report Writing	AEC	50	50	100	1-0-2	2
MCIA 1103	Lab based on SEE – 4	LAB	50	50	100	0-0-4	2
					Total	**16-5-6**	**24**

Semester – XII

Course Code	Course Title	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Viva Voce	Total		
MCIA 1201	Dissertation/Industrial Project	DISS	300	200	500	0-0-36	18

Grand Total of Credits = 260

PROGRAM ELECTIVES (PE)

PE – 1	
BCIA PE311	Introduction to Wireless Communication
BCIA PE312	Introduction to Mobile Computing
BCIA PE313	Web & E-Commerce Technologies
PE – 2	
BCIA PE521	Introduction to Data Mining
BCIA PE522	Introduction to Cloud Computing
BCIA PE523	Introduction to Data Science and Big data

Skill Enhancement Electives (SEE)

SEE – 1	
BCIA SEE411	Internet and Web Technology
BCIA SEE412	Programming in Visual Basic
BCIA SEE413	Fundamental Concepts of Microprocessor and Arduino Programming
SEE – 2	
BCIA SEE521	Introduction to Java Programming
BCIA SEE522	Fundamentals of .Net Programming
BCIA SEE523	PHP Programming

OPEN ELECTIVES (OE)

OE – 1	
BCIA OE411	Organization Behavior
BCIA OE412	Financial Accounting
BCIA OE413	Cyber Crimes & Cyber Laws
OE – 2	
BCIA OE511	Startup Entrepreneurship

BCIA OE512	Concepts of E-Governance and Smart City
BCIA OE513	Digital Marketing and E-Commerce

PE – 3	
MCIA PE1011	Software Quality Engineering
MCIA PE1012	Software Project Management
MCIA PE1013	Software Testing
PE – 4	
MCIA PE1021	Cryptography and Network Security
MCIA PE1022	E-commerce and Social Networking Applications
MCIA PE1023	Distributed Systems
PE – 5	
MCIA PE1131	Soft Computing
MCIA PE1132	Machine Learning
MCIA PE1133	Big Data Analytics
PE – 6	
MCIA PE1141	Mobile Computing
MCIA PE1142	Wireless Communication and Networks
MCIA PE1143	Object Oriented Analysis and Design

Skill Enhancement Electives (SEE)

SEE – 3	
MCIA SEE911	Internet and Web Programming
MCIA SEE912	Linux and Unix Programming
MCIA SEE913	PHP Programming
SEE – 4	
MCIA SEE521	Advanced Java Programming
MCIA SEE522	ASP .Net Programming
MCIA SEE523	Android Programming

OPEN ELECTIVES (OE)

OE – 3	
MCIA OE911	Accounting and Financial Management
MCIA OE912	Organizational Structure and Personal Management
MCIA OE913	Human Resource Management
OE – 4	

MCIA OE1121	E-Governance and Smart City
MCIA OE1122	Cyber Physical System and IOT
MCIA OE1123	Sustainable Development and Green Computing

Learning Outcomes

At the end of the program a student is expected to have:

1. An understanding of the theoretical foundations computing, Statistics, Mathematics and Management that helps them in pursuing higher degree.
2. Improved communication and awareness on ethics.
3. The ability and the mindset to continuously update and innovate.

4. MODE OF CURRICULUM DELIVERY

Mode of curriculum delivery includes classroom teaching, assignments, test, lab work, presentations, participation in relevant events and regularity.

5. ATTENDANCE

a. All students are supposed to attend every lecture and practical classes. However, the attendance requirement for appearing in the examination shall be a minimum of 75% of the classes held.
b. Each one-period teaching shall account for one attendance unit.
c. The concerned teacher will take a roll call in every scheduled class, maintains and consolidate the attendance record, which would be submitted to the Head of the Department at the conclusion of the semester.
d. Attendance on account of participation (with prior permission from the Head of the Department) in the co-curricular/extra-curricular activities can be granted by the Dean on receipt of certificates or recommendations of the respective activity issued by the Head of the Department.
e. Attendance records displayed on the Notice Board from time to time, in respect of short attendance, shall be deemed to be a proper notification and no individual notice shall be sent to the students/local guardian.
f. In case a student is found to be continuously absent from the classes without information for a period of 30 days, the concerned teacher shall report it to the Head of the Department.
g. Head of the Department may recommend for striking off the name of a student from rolls, after ensuring '**one month continuous absence'**, from all the concerned teachers.
h. A student, whose name has been struck off on account of long absence may apply to the Dean for readmission within 15 days of the notice of striking off the name. The readmission shall be effected on payments of prescribed readmission fees.
i. A student with less than 75% attendance in a subject shall not be allowed to appear in that subject in the semester examination. The Head of the Department shall recommend all such cases to the Dean of the School.

j. The Dean, on the recommendation of the Head of the Department, may consider the relaxation of attendance up to 10% on account of sickness and /or any other valid reason. No application for relaxation of attendance (duly certified by a Registered Medical Practitioner/Public hospital or a competent authority) will be entertained after 15 days from the recovery from illness etc.

6. INTERNAL ASSESSMENT

a. Internal assessment, to be made by concerned teachers, will be based on minor tests, quizzes, presentation, programming test, demonstrations and assignments.
b. Maximum of Three minor tests, with a total of 20 marks, for each theory paper shall be mandatory. Other modes of assessment shall account for remaining 10 marks.
c. A minor test each shall be scheduled after the completion of first and second term.
d. Dates for minor test will be announced at the beginning of the semester, by the examination coordinator.
e. The teacher concerned shall maintain a regular record of the marks obtained by students in minor tests and display the same in due course.
f. The concerned teachers shall submit the compiled internal assessment marks to the Head of the Department, on the conclusion of teaching of the current semester.
g. The Head shall display a copy of the compiled sheet, of internal assessment marks of all the papers, before forwarding it to the Controller of Examination, i.e. at the conclusion of the semester.
h. A promoted candidate, who has to reappear in the examination of a paper, will retain internal assessment marks.
i. In the case of re-admission, the candidates shall have to go through the internal assessment process afresh and shall retain nothing of the previous year.

7. SEMESTER EXAMINATIONS

Prescriptions for conducting semester examinations of theory and lab papers, those shall be conducted after the conclusion of each of the semesters, are presented in the following table:

a.	Mode	(Theory Papers)	Written only
		(Lab Papers)	Written, Demo, Programming and viva- voce.
b.	Duration	(Theory paper)	03 Hours
c.	Total Marks	(Theory Papers)	70 (Seventy only)
		(Lab Papers	50 (Fifty only)

8. DISSERTATION/INDUSTRIAL PROJECT

a. Each student of the final semester will have to go for a Dissertation/Industrial Project work either in the industry or in the Department under the guidance of one or two faculty members.
b. Period of completion of Dissertation/Industrial Project work shall be full one semester.
c. There shall normally be two supervisors-one internal and one *external (in the case of industry project form the place where the student is pursuing project-work)*.

d. All the students, who are pursuing the Dissertation/Industrial project work, shall be continuously in touch with the internal supervisor.
e. ***There shall be a mid-term evaluation of the progress*** and the internal supervisors will conduct it. However, an internal supervisor may ask the student to submit a confidential progress-report from the external supervisor *(in the case of industry project).*
f. All the candidates shall submit ***Three (03***) hard copies of the project reports that are duly approved and signed by internal as well as external *(if applicable)* supervisors.
g. An external examiner, appointed for the purpose, shall evaluate the project report.
h. The Head of the Department shall fix a date and time for viva-voce examinations, on receipt of the evaluation-report of the project reports from the external examiner.
i. Head of the Department shall forward the compiled total marks (awarded in internal assessment, project Report and Viva-voce Examination), in the project-semester of each of the candidate, to the Controller of Examination.

9. EXAMINATION

a. The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/ tutorials, quizzes/ viva voce and attendance. The end semester examination shall be comprised of written papers, practical and viva voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.
b. The marks obtained in a subject shall consist of marks allotted in end semester theory paper, practical examination and sessional work.
c. The minimum pass marks in each subject including sessional marks (Theory, Practical or Project etc.) shall be 40%.

10. PROMOTION SCHEME

a. A student will be promoted from 1st year to 2nd year/2nd year to 3rd year provided that he/she is **not having more than 06 (Six) backlog papers** (including Labs; excluding non-credit papers) in total. A student who fails to satisfy the criteria mentioned for the promotion shall **detained** in the same year.
b. A **detained** Student is not allowed to re-appear in the minor tests. His/her old internal assessment marks will remain same. However, he/she will be required to re-appear in the semester examination for those papers in which he/she had failed, when these papers are offered again (Examination for Odd semester paper will be held in Odd semester, and for Even semester papers will be held in Even semester).
c. **Supplementary Examination:** For the final year students, students can appear in supplementary examinations in their all backlog papers after the declaration of their Final semester results only.

11. THE GRADING SYSTEM

As per University Rule

12. CALCULATION OF SGPA AND CGPA OF A STUDENT IN A SEMESTER

As per University Rule

After having passed all the twelve semesters, the students shall be eligible for the award of **Master of Computer Applications MCA Integrated Degree of Jamia Hamdard.**

13. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The result of successful candidates, who fulfill the criteria for the award of **Master of Computer Applications (BCA)-MCA Integrated**, shall be classified at the end of last semester, on the basis of his/her final CGPA (to be calculated as per university rule).

BCIA 101 (INTRODUCTION TO 'C' PROGRAMMING)

Course Objectives:

1. To introduce the basic concepts of programming
2. To build the problem solving skills by converting real life problems into simple algorithms
3. To teach the skills required to code in C

Unit 1: Basic Concepts of Programming

Programming Fundamentals: Algorithms and Flowcharts, problem solving techniques, stepwise refinement; Programming in C: features of 'C', tokens, data type, operators, expression.

Unit 2: Branching and Looping

Branching Constructs: if-else, switch, conditional operator & goto statements; looping Constructs: white, do-while, for and Jumping statements.

Unit 3: Arrays and Functions

Arrays, string processing, Functions: categories of functions, recursion.

Unit 4: Pointers, Structures, and Unions

Pointers: operations on pointers, pointers & structures; Structures and Unions.

Unit 5: Debugging and File Handling

Development of efficient programs; Debugging, verification and testing of programs. File Management: Defining & opening a file, closing a file, input operations.

Text Books:

1. Yashwant Kanetkar, "Let us C" eighth edition, 2002.
2. Herbert Schildt, "C The Complete Reference" Fourth Edition, 2000.

Reference Books:

1. Kernighan and D. Ritchie, "The ANSI C Programming Language", 2000.
2. E. BalaGuruswamy, "Programming in ANSI C", 2008.
3. V Rajaraman, "Computer Basics and C Programming", PHI.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand the basics of computer programming
2. Write, compile, run, and debug C programs
3. Use different data types in a program
4. Design programs involving decision structures, loops and functions
5. Use different data structures and work with files

BCIA 102 (COMPUTER SYSTEM ARCHITECTURE)

Course Objectives:

1. To provide the basic familiarity of Logic Gates and Number Systems.
2. To cover the basic principles of Computer Organization, Operation, and Performance
3. To introduce Pipelining and Parallel Processing

Unit 1: Introduction

Logic gates, Boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

Unit 2: Data Representation and Basic Computer Arithmetic

Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, and multiplication and division algorithms for integers.

Unit 3: Basic Computer Organization and Design

Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

Unit 4: Central Processing Unit

Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

Unit 5: Memory and I/O Organization

Cache memory, Associative memory, mapping; Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Text Books:

1. M. Mano, Computer System Architecture, Pearson Education 1992.
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004.

Reference Books:

1. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India, 2009.
2. M.M. Mano, Digital Design, Pearson Education Asia, 2013.
3. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Comprehend the binary and hexadecimal number systems
2. Understand the principles and the implementation of computer arithmetic
3. Be familiar with the basics of computer organization and design
4. Understand the fundamentals of different instruction set architectures and their relationship to the CPU design
5. Understand the issues (like pipelining and caching) affecting modern processors

BCIA 103 (MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE)

Course Objectives:

1. To develop the essential tool of Matrix Algebra in a comprehensive manner
2. To introduce the idea of applying Differential Calculus to notions of Curvature
3. To familiarize the student with Conic Sections

Unit 1: Algebra of Matrices

Matrix Algebra including rank, inverse, linear system of equation, Eigen value & Caley Hamilton Theorem; Team working and management.

Unit 2: Introduction to Differential Calculus

Differentiation and partial differentiation, derivative of sum, dot product and cross product of two vectors, gradient, divergence and curl.

Unit 3: Successive and Partial Differentiations

Successive differentiation, libneitz theorem, partial differentiation.

Unit 4: Differential Calculus for curvatures

Curvature, asymptotes, singular points, concavity, points of inflexion and tracing of Cartesian curve, Differential equation of first order.

Unit 5: Coordinate Geometry

System of circles, standard equations and properties of parabola and Ellipse; General equation of second degree in two variables, tracing of conic sections, sphere.

Text Books:

1. Kresyzig, E., "Advanced Engineering Mathematics", John Wiley and Sons.
2. Babu Ram: Engineering Mathematics, vol 1 & vol 2.

Reference Books:

1. Jain, R. K. and Iyengar, S. R. K., "Advanced Engineering Mathematics", Narosa, 2003.
2. Ramana, "Higher Engineering mathematics", TMH.
3. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand the basics of Matrix Algebra
2. Do the sums on Normal and Partial Differentiation
3. Apply Differential Calculus on Curvatures
4. Write and interpret the equations of system of circles, parabola, and ellipse
5. Trace Conic Sections

BCIA 104 (COMMUNICATION SKILLS)

Course Objectives:

1. To give a brief summary of rules of Grammar
2. To impart effective reading, writing, and speaking skills
3. To teach drafting and presentation skills

Unit 1: Grammar, Dictionary, and Thesaurus

Review of English Grammar; Written and Spoken language; Common Errors in language; Punctuation (purpose, role, importance and use); Effective use of dictionary, thesaurus, encyclopedia, OED; Figures of speech.

Unit 2: Language, Phonetics, and Writing

Language Skills (listening, Speaking, Reading, Writing); Meaning what you mean; Listening: Effective and efficient listening in various situations (discussions, lectures, news, seminars, speech, telephone calls etc.); Speaking: Phonetics, intonation, accent, usage; strategies for a good rhetoric; Reading: Purpose; Comprehension; Tactics and strategies for good reading; Writing: Guidelines for good writing; various writing styles (General and technical writing styles).

Unit 3: Effectiveness and Efficiency in Communication

Communication (purpose, role importance, elements); Effective and efficient communication; role of content, context and language; Spoken and written communication Presentation and delivery; Role of speaker and audience.

Unit 4: Presentation Skills

Style and body language; Discussion and presentation skills of conferences meeting, seminars.

Unit 5: Drafting the Documents

General and Technical documents (correspondence applications, letter, resumes, CV), drafts, essays, memos; minutes, notes, proposals , précis, reports, summary, synopsis, references, table of contents, acknowledgements, prologue, epilogue, revision; Use of Audio-Visual Aids: OHP, Slides, Charts, Computers etc.

Text Books:

1. Maison, Margaret M., “Examine your English”.
2. R S Sharma, “Technical Writing”.

Reference Books:

1. R. Sudarshanam, “Understanding Technical English”.
2. Bansal, R.K. and J. B. Harrison, “Spoken English for India: A Manual of Speech and Phonetics”, Hyderabad: Orient Longman, 1983.
3. Lewis, Hedwig. Body Language, “A Guide for Professionals”, 2000.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand the basic rules of Grammar
2. Avoid committing common mistakes
3. Read, comprehend, and pronounce correctly
4. Give effective presentations
5. Know the pitfalls of General and Technical Writings

BCIA 105 (MEDIA AND INFORMATION LITERACY COMMUNICATION)

Course Objectives:

1. To introduce the fundamentals of media and information literacy
2. To help the students recognize the need and purpose of media and information literacy in today's world
3. To delineate the various role of media and information literacy in the society

Unit 1: Media Education and Literacy

Introduction to Media Education, History of Media Education; Perspectives on Media Education: The Inoculation Model, the Demystification Model, the Creative Participation Model.

Unit 2: Information Literacy

Introduction to Information Literacy, The politics of Information Literacy; The fellow Travelers to Information Literacy, Key moments in the History of Information Literacy.

Unit 3: Leveraging the Power of Computing

Introduction to the History of the Delivery of Computing Power; The Closeness of Computing technology, Mainframes, Micro and Personal Computers; Luggable Computers, Portable Computers, and the Laptop; Pocket Computers, Phones, and the Tablet; Wearable Computing and Augmented Reality Devices.

Unit 4: Digital Media Content

Introduction to Digital Media Content; the nature of Digital Media content; Participatory Culture; Trans media; Converged Content.

Unit 5: Digital Divides

Introduction to Digital Divides; First-Order Digital Devides – Access; Second-Order Digital Devides – Skills; Third-Order Digital Devides – Participation and Outcomes.

Text Books:

1. Marcus Leaning, "Media and Information Literacy – An Integrated Approach for the 21st Century" Chandos Publishing (An imprint of Elsevier) 2017.

Reference Books:

1. Michael C. Alewine and Mark Canada, "Introduction to Information Literacy for Students", Wiley Blackwell, 2017.
2. Forest Woody Horton Jr., "Overview of Information Literacy Resources Worldwide", UNESCO, 2013.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Develop familiarity with the history of Media and Information Literacy
2. Understand fundamental concepts and various perspectives
3. Appreciate the power of computing technology
4. Understand the nature of Digital Media content
5. See different orders of Digital Divide

BCIA 201 (INTRODUCTION TO DATA STRUCTURES)

Course Objectives:

1. To impart basic Data Structure Concepts
2. To introduce the basic concepts of Stacks, Queues, Lists, Trees, and Graphs
3. To give a brief account of Searching and Sorting Techniques

Unit 1: Data Representation

Representation of data, Data types, ADTs and Data Structures, linear and non – linear data structures.

Unit 2: Arrays, Structures, and Lists

Single and multidimensional arrays, Structures, Static and Dynamic implementation of arrays, Creation, insertion and deletion of linked list, doubly list, circular list etc.

Unit 3: Stack and its operations

Stacks and its application: Definition and examples, Implementing Push and Pop operations, Stack using dynamic memory allocation, Use of stack in problem solving, infix, prefix and postfix notations and conversions, Recursion using stack.

Unit 4: Queues

Queues: Definition and examples, Sequential and dynamic implementation, Implementation of Insert and remove operations.

Unit 5: Tree, Graph, Searching and Sorting

Introduction to tree and graph, Searching techniques: Linear Search, Binary Search, Sorting: Bubble Sort, Quick Sort, Merge Sort, Insertion Sort, Selection Sort.

Text Books:

1. Seymour Lipschutz, “Data Structures with C”, Schaum's Outline Series.
2. Langsam Yedidyah, Augenstein J Moshe, Tenenbaum M, “Data Structures using C and C++”, PHI.

Reference Books:

1. Horowitz, Sahni, Freed, “Fundamentals of Data Structures in C”, Silicon Press
2. Kruse R., “Data Structures and Program Design in C”, Pearson Education India.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++, Second edition, PHI, 2009.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Demonstrate familiarity with basic data structures.
2. Use Data Structures for Problem Solving.
3. Determine which data structure to use in different scenarios and be familiar with writing recursive methods.
4. Demonstrate understanding of the properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.
5. Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, and quick sort.

BCIA 202 (DATA COMMUNICATION AND COMPUTER NETWORKS BASICS)

Course Objectives:

1. To introduce the basics of Data Communication
2. To present the fundamentals of Computer Networks
3. To facilitate the familiarity with various functions and protocols of different layers

Unit 1: Introduction to Computer Networks

Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite;

Unit 2: Introduction to Data Communication

Analog and digital signal; data-ratelimits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

Unit 3: Arrays and Functions

Circuit switching; packetswitching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

Unit 4: Data Link Layer and Multiple Access Protocols

Error detection and error correction techniques;data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet; Routing: routing algorithms; network layer protocolof Internet- IP protocol, Internet control protocols.

Unit 5: Transport and Application Layer Functions and Protocols

Transport services- error and flow control,Connection establishment and release- three way handshake; Overview of DNS protocol; overview of WWW &HTTP protocol.

Text Books:

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM, 2007.

Reference Books:

1. Andrew S Tanenbaum: Computer Networks, 4th Edition, Pearson Education
2. William stallings: Data and computer communications, 7th Edition Pearson Education

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Define, use and implement Computer Networks and the basic components of a Network system.
2. Differentiate the various types of network configurations and applying them to meet the changing and challenging networking needs of organizations.
3. Understand the layers of OSI and TCP and get knowledge about congestion control and network security
4. Define the different protocols, software, and network architectures.
5. Analyze why networks need security and control, what errors might occur, and how to control network errors.

BCIA 203 (FUNDAMENTAL CONCEPTS OF OPERATING SYSTEMS)

Course Objectives:

4. To introduce the basic concepts of Operating Systems
5. To explain the mechanisms of OS to handle processes and their communication
6. To explain the mechanisms involved in memory and storage management in contemporary OS

UNIT WISE SYLLABUS

Unit 1: Introduction to Operating Systems

Overview of Operating System: Computer System Structure, Operating Systems Structure, Operating System functions; Computing Environments: Traditional Computing, Client-Server Computing, Peer-to-Peer Computing, Web based Computing, and Mobile Computing.

Unit 2: Process Management

Process Management: Process Concept, Process Scheduling, Inter Process Communication, Multithreading; Scheduling Algorithms: FCFS, SJF, RR, and Priority.

Unit 3: Deadlocks and Synchronization

Deadlocks: introduction, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock; Process Synchronization: The Critical-Section Problem, Semaphores, Classic Problems of Synchronization.

Unit 4: Memory Management

Memory management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation; Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.

Unit 5: Storage Management

Storage Management: File System, File Concept, Access Method, Directory and Disk Structure, File Sharing; Secondary-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling; I/0 Systems: Overview, I/O Hardware, Application I/O Interface.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne: Operating System Concepts. 8th Edition, John Wiley and Sons.

Reference Books:

1. William Stallings: Operating Systems Internals and Design Principles, 6th Edition, Prentice Hall.
2. Andrew S Tanenbaum: Modern Operating Systems, 3rd Edition, Prentice Hall.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand the creation of processes and threads
2. Comprehend the algorithms for process scheduling in terms of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time
3. optimally allocate memory to processes by increasing memory utilization and for improving the access time
4. Apply various Page Replacement Algorithms on a given input string
5. Understand different File Systems and Directory Structures

BCIA 204 (Elementary Physics)

Course Objectives:

1. To introduce the elementary concepts of Physics
2. To impart the basic knowledge of Mechanics, Electromagnetism, Optics, and Solid-state Physics
3. To inculcate the ability to solve qualitative and quantitative problems of Physics.

UNIT WISE SYLLABUS

Unit 1: Mechanics

Units and dimensions; Newton's laws; Conservation of linear momentum; Conservative and non-conservative force; Concept of potential energy; Work energy theorem; Periodic and oscillatory motion; Simple harmonic motion: Time period, Frequency, Phase and phase constant, Energy in simple harmonic motion.

Unit 2: Electromagnetism

Coulomb's law; Superposition principle; Concept of electric field and electric potential: Gauss's law, Simple applications of Gauss's law; Electric Current and current density: Ohm's law, Combination of resistors in series and parallel; Salient features of electromagnetic spectrum.

Unit 3: LASER

Conventional sources of light and LASER, Spontaneous emission, Stimulated Emission, Population inversion, Principle of LASER, Einstein's coefficients, Working of helium-neon and Ruby lasers.

Unit 4: Fiber Optics

Total internal reflection, Introduction of fiber optics, Numerical aperture, Step index and graded index fibers, Attenuation and dispersion mechanism, Application of optical fibers.

Unit 5: Elementary Ideas of Semiconductors

Classification of semiconductors: intrinsic and extrinsic semiconductors, Doping, P-type and N-type semiconductors; Band gap: Classification of materials on the basis of band gap, Formation of P-N junction, Depletion width, Forward biased and reverse biased P-N junction, I-V characteristics; Working of Light Emitting Diode (LED) and solar cell.

Text Books:

1. Halliday, Resnick and Walker: Fundamentals of Physics, Wiley India.
2. Subrahmanyam and Brijlal: A Text Book of Optics, S. Chand.

Reference Books:

1. David J. Griffiths: Introduction to Electrodynamics, PHI.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand the basics of Physics
2. Think critically and to use appropriate concepts to analyze situations involving the fundamental principles of physics
3. Use appropriate mathematical techniques and concepts to obtain solutions to problems in physics

BCIA 301 (INTRODUCTION TO OBJECT ORIENTED PROGRAMMING)

Course Objective:

1. To introduce standard tools and techniques for software development, using object oriented approach.
2. To describe the use of a version control system, an automated build process.
3. To develop an appropriate framework for automated unit and integration tests.

Unit – I: Principles of Object Oriented Programming (OOP)

Concepts of structured and object oriented programming; advantage of OOP methodologies.

Unit – II: Characteristics of OOP languages

Objects, classes, Data Abstraction, Encapsulation, inheritance, reusability, polymorphism and operator overloading, function overloading.

Unit – III: Introduction to C++

Keywords, Data types, Constants, Variables, Expressions and statements, Operators; Control Structures: if, if… else, switch; Repetitive Statements: for, while, do… while; Pointers, arrays and strings.

Unit – IV: Functions in C++

Parameter passing, Friend Functions, Inline Functions, Function Overloading, Operator overloading; Classes and Objects; Constructors and Destructors.

Unit – V: Inheritance

Single Inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical Inheritance, Hybrid Inheritance; Pointers, Virtual Functions and Polymorphism.

Text books:

1. E Balaguruswamy, “Object oriented programming with C++”, Fifth Edition, Tata McGraw Hill.

Reference books:

1. E Bjarne Stroustrup, “The C++ Programming Language”, Special Edition, Pearson Education.
2. Bruce Eckel, “Thinking in C++”, 2nd Edition, Pearson Education.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

BCIA 302 (INTRODUCTION TO DATABASE MANAGEMENT SYSTEM)

Course Objective:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models.
3. To understand and use data manipulation language to query, update, and manage a database.

Unit – I: Introduction & Database System Architecture

Overview of Database Management System, DBMS architecture, Characteristics of database approach, Various views of data, data models, Schemes, data independence, Advantages of DBMS over file processing systems, Responsibility of database administrator, Introduction to Database Languages & Environments.

Unit – II: E-R Modeling

Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.

Unit – III: Relational Data Model

Relational model concepts, relational constraints, relational algebra SQL: SQL queries, programming using SQL. EER and ER to relational mapping: Data base design using EER to relational language.

Unit – IV: Transaction Processing Concepts

Transaction system, testing of serializability, Serializability of schedules, Conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, Checkpoints, deadlock handling.

Unit – V: Data Normalization

Functional Dependencies, Normal form up to 3rd normal form. Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version Schemes, Recovery with concurrent transaction.

Text books:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, “Database Systems Concepts”, 6th Edition, McGraw-Hill.
2. Date C J, “An Introduction to Database System”, Addison Wesley.

Reference books:

1. R. Elmasri, S. Navathe, “Fundamentals of Database Systems”, 5th Edition, Pearson Education.
2. Jim Melton, Alan Simon, “Understanding the new SQL: A complete Guide”, Morgan Kaufmann Publishers, 1993.
3. A.K.Majumdar, P. Bhattacharya, “Database Management Systems”, TMH, 1996.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Write relational algebra expressions for a given query query and optimize the developed expressions
2. Design the databases for a given specification of the requirement using ER method and normalization
3. Construct the SQL queries for a given specification for Open source and Commercial DBMS - MYSQL, ORACLE, and DB2
4. Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system
5. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

BCIA 303 (DISCRETE STRUCTURES)

Course Objective:

1. To apply logic reasoning to solve a variety of problems.
2. To construct correct direct and indirect proofs.
3. Students being able to use division into cases in a proof.

Unit – I: Introduction to prepositional calculus

Introduction to prepositional calculus: Statements, logical operations; truth tables of logical identities, Equivalence of logical identities, Tautologies and contradiction, Negation and De Morgan's law, Conditional and biconditional; Introduction to Boolean algebra: Basic definition and theorems, Boolean expressions, Sum-Of-Products form.

Unit – II: Sets and related operations

Cardinality, Union, Intersection, Complement, Difference, Symmetric Difference, Cartesian Product, subset, superset , power set , Venn diagram , Algebra of Sets, Duality; Properties of operators: commutative, associative, distributive; De Morgan's law, Standard sets.

Unit – III: Relations and their properties

Properties of relation: reflexive, irreflexive, symmetric, asymmetric, antisymmetric, transitive; Matrix of relations, relations represented as digraph, Equivalence relation, partition and equivalence class.

Unit – IV: Functions and its properties

Types of functions: One-to-one, onto, into, everywhere defined, Domain and range, Invertible functions, Composition of functions.

Unit – V: Introduction to recurrence relation

Homogeneous and non-homogeneous recurrence relations, Order and degree of a recurrence relation, Formulation of recurrence relations, Characteristic relation, Solution of recurrence relations.

Text books:

1. Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH, 1999.
2. C.L. Liu, "Elements of Discrete Mathematics", TMH, 2000.

Reference books:

1. Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI, 1996.
2. Narsingh Deo, "Graph Theory With Application to Engineering and Computer Science", PHI.
3. J. P. Trembly & P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill, 1997.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Express a given logic sentence in terms of predicates, quantifiers, and logical connectives.
2. Derive the solution for a given a problem using deductive logic and prove the solution based on logical inference.
3. Classify the algebraic structure for a given a mathematical problem.
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

5. Develop the given problem as graph networks and solve with techniques of graph theory.

BCIA 401 (Fundamentals of Probability and Statistics)

Course Objective:

1. To familiarize the students with statistical techniques.
2. To equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Unit – I: Overview of Probability

Introduction, Events & Different Types of Events, Addition & Multiplication Law, Conditional Probability, Bayes' Theorem.

***Unit – II:* Probability Distribution**

Random Variables, Expectation of Discrete Random Variables & Its Properties Continuous & Discrete Probability Function, Binomial, Poison & Normal Distribution.

Unit – III: Measures of Central Tendency

Definition, Function & Scope of Statistics, Arithmetic Mean, Weighted A.M., Median, Mode, Geometric & Harmonic Mean and Their Merits & Demerits.

Unit – IV: Measures of Variation

Measures of Variation: Range, The Interquartile Range or Quartile Deviation, Average (Mean), Deviation Standard Deviation, Coefficient of Variation, Skew ness, Moments & Kurtosis.

Unit – V: Correlation and Regression Analysis

Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient, Regression Analysis: Difference Between Correlation & Regression, Regression Lines, Regression Equations, Regressions Coefficient.

Text books:

1. S.P. Gupta & M.P. Gupta, "Business Statistics", Sultan Chand & Sons.
2. S.C. Gupta & V.K. Kapoor,"Fundamental of Mathematical Statistics", Sultan Chand & Sons.

Reference books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
4. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Learning Outcomes:

Upon successful completion of this course, students will be able to:

1. Learn the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
2. Learn the basic ideas of statistics including measures of central tendency, correlation and regression.
3. Understand the statistical methods of studying data samples.

BCIA 402 (INTRODUCTION TO ARTIFICIAL INTELLIGENCE)

Course Objective:

1. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, inference and logic.
2. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
3. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Unit – I: Overview of Artificial Intelligence

Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success; Scope of Artificial Intelligence, intelligent agents; Expert systems.

Unit – II: Problem Solving

Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem, Solving Problems by Searching, heuristic search techniques, constraint satisfaction problems, stochastic search methods.

Unit – III: Game Playing and Knowledge

Minimax, alpha-beta pruning; Knowledge: Definition and importance of knowledge, Knowledge representation, Various approaches used in knowledge representation, Issues in knowledge representation.

Unit – IV: Knowledge Representation and Reasoning

Building a Knowledge Base: Propositional logic, first order logic, situation calculus, theorem proving in First Order Logic; Planning, partial order planning; Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks.

Unit – V: Learning

Overview of different forms of learning, Learning Decision Trees, Neural Networks; Introduction to Natural Language Processing.

Text books:

1. E. Rich and K. Knight: Artificial intelligence, TMH, 2nd ed., 1999.

Reference books:

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1999
2. Nils J Nilsson ,"Artificial Intelligence -A new Synthesis" 2nd Edition (2000), Harcourt Asia Ltd.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Compare AI with human intelligence and traditional information processing, and discuss its strengths and limitations and its application to complex and human-centered problems.
2. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
3. Implement classical Artificial Intelligence techniques, such as search algorithms, minimax algorithm, neural networks, tracking, robot localization.
4. Apply Artificial Intelligence techniques for problem solving.
5. Review research articles from well-known AI journals and conference proceedings regarding the theories and applications of AI.

BCIA 501 (FUNDAMENTALS OF SOFTWARE ENGINEERING)

Course Objective:

1. To develop an understanding of software engineering, software crisis, SDLC. Understanding the concept of software project planning – feasibility analysis, requirement analysis, SRS documents.
2. Come to know the software designing strategies – structured analysis, structured design, DFD, structure chart.
3. Understand concept of Project Management along with software testing, maintenance, and back-up.

Unit – I: Software and Software Engineering

The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI)

Unit – II: Software Requirement Analysis

Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

Unit – III: Software Development Management

Estimation in Project Planning Process, Project Scheduling, Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan, Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.

Unit – IV: Design Engineering

Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design.

Unit – V: Software Testing Strategies & Tactics

Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing.

Text Books:

1. Pressman S.Roger, Software Engineering, Tata McGraw-Hill.
2. Yogesh Singh, Software Testing, Cambridge University Press.2011.

Reference Books:

1. Sommervillelan, Software Engineering, 5th ed., Addison Wesley-2000.
2. Fairley Richard, Software, Software Engineering Concepts, Tata McGraw-Hill.
3. Jalote Pankaj, An integrated approach to software engineering, Narosa Publishing House.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Evaluate and analyze the SDLC and basic architecture SRS documents.
2. Understand the concept project management.
3. Understand the software testing principles.

BCIA PE311 (INTRODUCTION TO WIRELESS COMMUNICATION)

Course Objective:

1. This course is intended to introduce to students into the basics of wireless systems – concepts, theory, limitation and costs of systems mainly for VHF and above.
2. To have an understanding of various multiple access techniques and the cellular concept as well as some 2G and 3G systems.
3. To identify the requirements of mobile communication as compared to static communication.

Unit – I: Introduction to Basic Principles

Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, Evolution of mobile communications, mobile radio systems-Examples, trends in cellular radio and personal communications.

Unit – II: Cellular Concept

Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems. Cellular telephony: frequency reuse principle, transmitting, receiving, roaming, GSM network architecture, GSM channel structure, GPRS.

Unit – III: Mobile radio propagation

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

Unit – IV: Second Generation and Third Generation Wireless Networks and Standards

WLL, Bluetooth. AMPS, GSM, IS-95 and DECT Satellite networks: orbits, footprint, categories of satellites. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

Unit – V: Introducing the Mobile Internet

Key Services for the mobile Internet, Business opportunities. WAP: the Mobile Internet Standard: Challenges and Pitfalls, Overview of the Wireless Application Protocol, Implementing WAP Services: The Wireless Markup Language, Enhanced WML: WML Script and WTAI,

Text books:

1. T.S.Rappaport, “Wireless Communications: Principles and Practice”, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.
2. R. Blake, “Wireless Communication Technology”, Thomson Delmar, 2003.

Reference books:

1. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications”, Second Edition, McGraw-Hill International, 1998.
2. Stephen G. Wilson, “Digital Modulation and Coding”, Pearson Education, 2003.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Summarize the principles and applications of wireless systems and standards.
2. Discuss the cellular system design and technical challenges.
3. Analyze the Mobile radio propagation, fading, diversity concepts and the channel modeling.
4. Analyze Multiuser Systems, CDMA, WCDMA network planning and OFDM Concepts.
5. Describe and differentiate four generations of wireless standard for cellular networks

BCIA PE312 (INTRODUCTION TO MOBILE COMPUTING)

Course Objective:

1. To learn about the concepts and principles of mobile computing.
2. To explore both theoretical and practical issues of mobile computing.
3. To discuss the features of IEEE 802.11 Wireless LAN's.

Unit – I: Mobile communication Introduction

Mobile computing devices mobile computing function, mobile computing architecture, evaluation of wireless technology (1G, 2G, 3G, 4G technology).

Unit – II: PCS and GSM

PCS Architecture**,** GSM architecture, Location tracking and call setup, Mobility management: Handover Security-GSM, SMS, International roaming for GSM.

Unit – III: GPRS and Packet Data Network

GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Spread Spectrum technology, Third Generation Networks, Applications on 3G.

Unit – IV: Wireless Networks

Wireless LAN: IEEE 802.11, Standards, Architecture, Services, Mobile Ad hoc Networks: WiFi and WiMAX, Wireless Local Loop, Bluetooth.

Unit – V: Emerging Mobile Communication Technology

Mobile IP, Cellular IP, VoIP, SIP, LTE, 4G goal and architecture.

Text books:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education.
2. William Stallings, "Wireless Communications and Networks", Pearson Education.

Reference books:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.
3. C.K. Toh, "Adhoc mobile wireless networks", PHI, 2002.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Assess the capabilities of next-generation networks and the role of wireless technologies in network design and operation.
2. Evaluate network protocols, routing algorithms, connectivity methods and characteristics.
3. Evaluate wireless network topologies, wireless connectivity and characteristics, and the impact of wireless networks on security and Internet communications.
4. Select appropriate wireless technologies in commercial and enterprise applications.

BCIA PE313 (WEB & E-COMMERCE TECHNOLOGIES)

Course Objective:

1. The aim of the course is to acquaint the students with the basics of internet technologies.
2. This course demonstrates an in-depth understanding of the tools and Web technologies necessary for business application design and development.
3. Provides an overview of business and technology topics, business models, virtual value chain, and innovation and marketing strategies.

Unit – I: An introduction to Electronic commerce

What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C).

Unit – II: The Internet and WWW

Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots.

Unit – III: Internet Security

Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime (Laws, Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus (How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorisation and Authentication, Firewall, Digital Signature (How it Works).

Unit – IV: Electronic Data Exchange

Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash.

Unit – V: Planning for Electronic Commerce and Internet Marketing

Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites; Internet Marketing: The PROS and CONS of online shopping, The cons of online shopping, Justify an Internet business, Internet marketing techniques, The E-cycle of Internet marketing, Personalization e-commerce.

Text books:

1. G.S.V.Murthy, “E-Commerce Concepts, Models, Strategies”, Himalaya Publishing House, 2011.
2. Kamlesh K Bajaj and Debjani Nag , “E- Commerce”, 2005.

Reference books:

1. Gray P. Schneider, “Electronic commerce”, International Student Edition, 2011.
2. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, “E-COMMERCE, FUNDAMENTALS AND APPLICATIONS”, Wiely Student Edition, 2011.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Have a good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.
2. Outline the history of the web, and technologies that makes the web pages and publishing them.
3. Analyze the impact of E-commerce on business models and strategy.
4. Recognize the fundamental principles of e-Business and e-Commerce.
5. Explain the added value, risks and barriers in the adoption of e-Business and e-Commerce

BCIA PE521 (INTRODUCTION TO DATA MINING)

Course Objective:

1. To identify the scope and necessity of Data Mining.
2. Describe the designing of Data Mining Techniques.
3. To develop ability to understand various algorithms based on data mining tools.

Unit – I: Data Mining Concepts

Data mining primitives, Basics of data mining, Data Mining Functionalities, Classification of Data Mining Systems, Architectures of data mining system.

Unit – II: Association Rules In Large Databases

Association Rule Mining, Mining Single Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint Based Association Mining.

Unit – III: Classification And Prediction

Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

Unit – IV: Cluster Analysis In Data Mining

Types of Data in Cluster Analysis. A Categorization of Major Clustering Methods, Partitioning Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis.

Unit – V: Data Warehousing and various Issues in Data Mining :

Introduction to Data Warehouse, Data warehousing and its characteristics, Online analytical processing (OLAP), characteristics of OLAP system, Scalability and data management issues in data mining algorithms, measures of interestingness

Text Books:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education.2005.
2. Richard Roiger, Michael Geatz, Data Mining: A Tutorial Based Primer, Pearson Education 2003.

Reference book:

1. G.K. Gupta, Introduction to Data Mining with Case Studies, PHI, 2006.
2. Soman K P, Diwakar Shyam, Ajay V Insight into Data Mining: Theory and Practice, PHI, 2006.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand Data Mining concept and various associative rule.
2. Understand the concept of Cluster Analysis In Data Mining
3. Understand the concepts of Data Ware Housing.

BCIA PE522 (INTRODUCTION TO CLOUD COMPUTING)

Course Objective:

1. To identify the scope and necessity of Data Mining.
2. Describe the designing of Data Mining Techniques.
3. To develop ability to understand various algorithms based on data mining tools.

Unit – I: Introduction to Cloud Computing

Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing.

Unit – II: Cloud Computing Architecture

Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment Models such as Public cloud, Private cloud, Hybrid cloud, Community cloud,

Unit – III: Case Studies

Case study of NIST architecture, Case study of Service model using Google App Engine, Microsoft Azure, Amazon EC2, Eucalyptus.

Unit – IV: Service Management in Cloud Computing

Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware such as Traditional vs. Cloud, Economics of scaling.

Unit – V: Cloud Security

Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing.

Text Books:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011.
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

Reference book:

1. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010
2. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand Data Mining concept and various associative rule.
2. Understand the concept of Cluster Analysis In Data Mining

3. Understand the concepts of Data Ware Housing.

BCIA PE523 (Introduction to Data Science and Big data)

Course Objective:

1. To identify the scope and necessity of Data Science and Big Data.
2. Describe the designing of NoSQL Data Management.
3. To develop ability to understand various algorithms based on Hadoop.

Unit – I: Understanding Big Data

What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing fraud and big data, risk and big data ,credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data mobile business intelligence, Crowd sourcing analytics ,inter and trans firewall analytics

Unit – II: NoSQL Data Management

Introduction to NoSQL , aggregate data models ,aggregates ,key-value and document data models, relationships, graph databases, schema less databases ,materialized views, distribution models, sharding , master-slave replication , peer-peer replication, sharding and replication, consistency , relaxing consistency , version stamps , mapreduce, partitioning and combining , composing map-reduce calculations

Unit – III: Basics Of Hadoop

Data format , analyzing data with Hadoop , scaling out , Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface , data flow, Hadoop I/O, data integrity, compression, serialization, Avro file-based data structures.

Unit – IV: Map Reduce Applications

Map Reduce workflows, unit tests with MRUnit , test data and local tests – anatomy of Map Reduce job run, classic Map-reduce , YARN , failures in classic Map-reduce and YARN, job scheduling , shuffle and sort , task execution, MapReduce types , input formats, output formats.

Unit – V: Hadoop Related Tools

Hbase, data model and implementations, Hbase clients, Hbase examples– praxis.Cassandra ,cassandra data model , cassandra examples , cassandra clients, Hadoop integration. Pig , Grunt , pig data model , Pig Latin , developing and testing Pig Latin scripts. Hive , data types and file formats , HiveQL data definition , HiveQL data manipulation – HiveQL queries

Text Books:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.

3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012. 5. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

Reference Books:

1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012. 7. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
2. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
3. Alan Gates, "Programming Pig", O'Reilley, 2011.

BCIA SEE411 (INTERNET AND WEB TECHNOLOGY)

Course Objectives:

1. To teach the basics of internet, its applications and the tools and technologies involved in publishing content on the World Wide Web
2. To introduce HTML, CSS, XML, the fundamentals of how the Internet and the Web function, and a general grounding introduction to more advanced topics such as programming and scripting using JavaScript
3. To expose students to the basics of e-commerce and the security issues associated with the web

Unit 1: Introduction to Internet and WWW

Introduction to Internet: History of World Wide Web; Protocols governing the web; Understanding the Internet: syntax of URLs, web page and browsers, search engine; Introduction to Cyber Laws in India.

Unit 2: Internet Applications

Internet applications: FTP, Telnet, Email, Chat; Internet addressing: identification of each computer using domain name and IP addresses, DNS.

Unit 3: Formatting Web Pages

Introduction to HTML, XML, DHTML and CSS; Formatting Web Pages with the help of different HTML tags, HTML table, HTML form; using CSS for formatting different objects; using DHTML for dynamic designing of web page.

Unit 4: JavaScript

Introduction to Javascript: Advantages of Javascript, Javascript Syntax, documents, forms, Datatype, Variable, Array, Operator and Expression, Looping Constructor, Event Handling, cookies.

Unit 5: E-Commerce and emerging trends

E-Commerce and security issues; Emerging trends: Internet telephony, virtual reality over the web, etc.; Intranet and extranet; firewall design issues.

Text Books:

1. Raymond Greenlaw and Ellen Hepp, “Fundamentals of Internet and World Wide Web”, TMH.
2. Ivan Bayross, “Web Technologies Part II”, BPB Publications.

Reference Books:

1. Thomas A Powell, “HTML The Complete Reference”, Tata McGraw Hill Publications.
2. Burdman, “Collaborative Web Development”, Addison Wesley.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand fundamental tools and technologies and protocols governing the web.
2. Analyze a web page and identify its elements and attributes.
3. Create web pages using HTML and Cascading Style Sheets.

4. Build dynamic web pages using JavaScript (Client side programming).
5. Develop an understanding of electronic commerce and emerging internet trends.

BCIA SEE412 (Programming in Visual Basic)

Course Objectives:

1. To understand event-driven programming methods, including creating and manipulating objects, classes and using object-oriented tools such as the class debugger.
2. To make the students able to design, code, test and debug at a beginning level.

Unit – I: Introduction to VB

Visual & Non-Visual programming, Procedural, Object-Oriented, Object-Based and Event-Driven Programming Languages, VB as Even-Driven and Object-Based Language, VB Environment: Menu bar, Toolbar, Project explorer, Toolbox, Properties Window, Form Designer, Form Layout, Immediate window, Default Controls in Tool Box Visual Development and Event Driven programming.

Unit – II: Basics of Programming

Variables: Declaring Variables, Types of variables, Converting Variables Types, User Defined Data Types, Forcing Variable Declaration, Scope & Lifetime of Variables; Constants: Named & Intrinsic, Operators: Arithmetic, Relational & Logic.

Unit – III: Decision Statements in VB

If statement, if-then-else, select-case; Looping Statements in VB: do-loop, for-next, while-wend; Exit statement, Nested Control Structure; Arrays: Declaring and using Arrays, One-dimensional, Two-dimensional and Multi-dimensional Arrays, Static and Dynamic arrays, Array of Arrays.

Unit – IV: Procedures

General & Event Procedures, Subroutines, Functions, Calling Procedures, Arguments - Passing Mechanisms, Optional Arguments, Named Arguments, Functions Returning Custom Data Types Simple Program Development in VB such as Sum of Numbers, Greatest among Numbers, Checking Even/Odd Number, HCF of Two Numbers, Generate Prime Numbers, Generate Fibonacci Series, Factorial of a Number, Searching, Sorting, etc.

Unit – V: VB Objects and Monitoring Mouse Activity

Dialog Boxes, Common Controls, Menus, MDI Forms, Testing, Debugging and Optimization – Working with Graphics.

Monitoring Mouse Activity: File handling, File system controls, File system objects, DLL Servers.

Text Books:

1. Steven Holzner, “Visual Basic 6 Programming: Black Book”, Dreamtech Press.
2. Evangelos Petroutsos, “Mastering Visual Baisc 6”, BPB Publications.
3. Julia Case Bradley & Anita C. Millspaugh, “Programming in Visual Basic 6.0”, Tata McGraw- Hill Edition.

Reference books:

1. KMichael Halvorson, “Step by Step Microsoft Visual Basic 6.0 Professional”, PHI.
2. “Visual basic 6 Complete”, BPB Publications.

3. Scott Warner, “Teach Yourself Visual basic 6”, Tata McGraw-Hill Edition.
4. Brian Siler and Jeff Spotts, “Using Visual Basic 6”, Special Edition, PHI.

Learning Outcomes:

1. Students should be able to implement syntax rules in visual basic programs.
2. Students will have the understanding of variables and data types used in program development.
3. Students will be able to apply decision structures for determining different operations, apply loop structures to perform repetitive tasks.

BCIA SEE413 (Fundamental Concepts of Microprocessor and Arduino Programming)

Course Objectives:

1. Do assembly language programming.
2. Do interfacing design of peripherals like I/O, A/D, D/A, timer etc.
3. Develop systems using different microcontrollers.

Unit – I: Fundamentals of Microprocessor

Fundamentals of Architecture: 8 & 16 bit Microprocessor and Microcontroller and its comparison, Embedded System & its Characterization. 8051 Architecture Family: Block Diagrams, CPU, ALU, Family of Bus, Registers, Pointers. Timing Diagrams and Execution Cycles, Overview of Microprocessor Family, I/O Interfacing.

Unit – II: Instruction Set and programming

Addressing modes: Introduction, Instruction syntax, Data types, Subroutine, Types of Addressing. 8051 Instruction set, Instruction timings, Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs, C language programs, Assemblers and compilers.

Unit – III: Introduction to Arduino

Fundamentals of Arduino, Serial Monitoring, Digital and Analog Inputs, Understanding variables, If-Else Statement, comparison Operators and Conditions, While statement, Analog I/O and Serial Communications.

Unit – IV: Programming using Arduino

Arduino Environment, C Programming used for Arduino, ArduinoToolchain, Cross-Compilation, Arduino Sketches, Classes, Pins, Input and Outputs, Debugging, UART protocol, UART parity and Stop.

Unit – V: Applications

Microprocessor: LED, LCD and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, sensor interfacing.
Arduino: Traffic Light Count Down Timer, Parking Lot Counter, Weighing Machines, Emergency Light for railways, Security Systems.

Text books:

1. M. A. Mazidi, J. G. Mazidi and R. D. McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Pearson Education, 2007.
2. R. S. Gaonkar, “, Microprocessor Architecture: Programming and Applications with the 8085”, Pen ram International Publishing, 1996.
3. Byron Francis, “Arduino : The Complete Beginner's Guide - Step By Step Instructions”.

Reference books:

1. K. J. Ayala, “8051 Microcontroller”, Delmar Cengage Learning, 2004.
2. R. Kamal, “Embedded System”, McGraw Hill Education, 2009.

3. D. A. Patterson and J. H. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Morgan Kaufman Publishers, 2013.
4. D. V. Hall, "Microprocessors & Interfacing", McGraw Hill Higher Education, 1991.

Learning Outcomes:

1. Students will learn the general construction of Microprocessor and Microcontroller system and compare them.
2. Students will have the basic idea of introduction to programming.
3. Students will be able to implement small programs to solve well-defined problems on an embedded platform and develop familiarity with programming used to for various applications of Microprocessor and Arduino.

BCIA SEE521 (Introduction to Java Programming)

Course Objective:

1. To identify the scope and necessity of Java Programming.
2. Describe the designing of Java Programming Techniques.
3. To develop ability to understand various algorithms based on Java Programming.

Unit – I: Introduction to Java

Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

Unit – II: Arrays, Strings and I/O

Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

Unit – III: Object-Oriented Programming Overview

Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection. Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

Unit – IV: Exception Handling, Threading, Networking and Database Connectivity

Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

Unit – V: Applets and Event Handling

Java Applets:Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms,Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, textfields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets

Text Books:

1. Programming with Java, E Balagurusamy, Second edition, TMH.
2. Java -The Complete Reference, Patrick Naughton and Herbertz Schidt.
3. Core Java Volume-I and II 2nd edition-Sun MicroSystem.

Reference book:

1. The Java Programming Language, Ken Arnold, James Gosling, David Homes.
2. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9th Edition,Printice Hall.
3. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.

Learning Outcomes: Understand Java Programming concept and various rule.

BCIA SEE522 (Fundamentals of .Net Programming)

Course Objective:

1. To identify the scope and necessity of .Net Programming.
2. Describe the designing of C# Programming Techniques.
3. To develop ability to understand various Windows Forms and Managing States.

Unit – I: Introduction to .NET Framework and C#

.NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies The Common Language Implementation, Assemblies, Garbage Collection, The End to DLL Hell - Managed Execution, Name Spaces - Constructor and Destructors, Function Overloading & Inheritance, Operator Overloading, Modifiers - Property and Indexers , Attributes & Reflection API, When to use Console Applications - Generating Console Output, Processing Console Input.

Unit – II: C#.NET and ADO.NET:

Creating Language Features and Creating .NET Projects, Namespaces Classes and Inheritance -, Namespaces Classes and Inheritance -, C, Exploring the Base Class Library -, Debugging and Error Handling -, Data Types -, Exploring Assemblies and Namespaces, String Manipulation ,Files and I/O ,Collections, Benefits of ADO.NET, ADO.NET compared to classic ADO -, Datasets, Managed Providers -, Data Binding: Introducing Data Source Controls -, Reading and Write Data Using the Sql DataSource Control

Unit – III: Windows Forms and Controls in details

The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events, Windows Form Controls, Menus - Dialogs – ToolTips, Apply Inheritance techniques to Forms, Creating Base Forms, Programming Derived Forms, Printing - Handling Multiple Events, GDI+, Creating Windows Forms Controls

Unit – IV: Connectivity ASP.NET - Themes and Master Pages:

Introduction to ASP.NET, Working with Web and HTML Controls, Using Rich Server Controls, Login controls, Overview of ASP.NETValidation Controls, Using the Simple Validations, Using the Complex Validators Accessing Data using ADO.NET, Using the Complex Validators Accessing Data using ADO.NET, Configuration Overview, Creating a Consistent Web Site, ASP.NET 2.0 Themes - Master Pages, Displaying Data with the GridView Control Introducing the GridView Control, Filter Data in the GridView Control, Allow Users to Select from a DropDownList in the Grid, Add a Hyperlink to the Grid, Deleting a Row and Handling Errors.

Unit – V: Managing State:

Preserving State in Web Applications and Page-Level State, Using Cookies to Preserve State, ASP.NET Session State ,Storing Objects in Session State, Configuring Session State, Setting Up an Outof-Process State Server, Storing Session State in SQL Server, Using Cookieless Session IDs, Application State Using the DataList and Repeater

Controls, Overview of List-Bound Controls, Creating a Repeater Control and DataList Control

Text Books:

1. ASP.NET Complete Reference, Matthew Macdonald and Robert Standefer, TMH Professional
2. C# .Net, Christian Nagel, Wrox Publication
3. C# The Basics, Vijay Mukhi, BPB Publications

BCIA SEE523 (PHP Java Programming)

Course Objective:

1. To identify the scope and necessity of PHP Programming.
2. Describe the designing of HTML form with PHP.
3. To develop ability to understand various algorithms based PHP Programming.

Unit – I: Introduction to PHP

Java PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other, technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP , Expressions, scopes of a variable (local, global), PHP Operators : Arithmetic, Assignment, Relational , Logical operators, Bitwise , ternary and MOD operator. PHP operator Precedence and associativity

Unit – II: Handling HTML form with PHP

Capturing Form Data, GET and POST form methods Dealing with multi value fields, Redirecting a form after submission. PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For, and Do While Loop, Goto, Break, Continue and exit.

Unit – III: PHP Functions

Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local.

Unit – IV: Connectivity String Manipulation and Regular Expression

Creating and accessing String , Searching & Replacing String, Formatting, joining and splitting String , String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in regular expression.

Unit – V: Array

Anatomy of an Array ,Creating index based and Associative array, Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.

Text Books:

1. PHP : The Complete Reference, Steven Holzner, Mcgraw Higher Ed.
2. PHP Beginner's Practical Guide, Pratiyush Guleria, Bpb publications.
3. Web Programming With Php And Mysql: A Practical Guide, Max Bramer, Springer.

BCIA OE411 (Organization Behavior)

Course Objective:

1. To improve students understanding of human behavior in organization and the ability to lead people to achieve more effectively toward increased organizational performance.
2. To make the students understand group behavior in organizations, including communication, leadership, power and politics, conflict and negotiations.
3. To make the students understand organizational system, including organizational structures, culture, human resources and change.

Unit – I: Overview of Organization Behavior

Nature, Scope, Definition and Goals of organizational Behaviour, Fundamental Concepts of Organizational Behaviour, Models of Organizational Behaviour, essential attributes, Psychological dimensions and relevance in the emerging society.

Unit – II: Learning

Styles and principles, Skinner, Thorndike and Piaget theories, Conditions of learning; Memory: Short term and long term; Efficient and effective ways in respect of thinking, problem solving and decision making.

Unit – III: Effects of employee attitudes

Personal and Organizational Values, Job Satisfaction, Nature and Importance of Motivation, Achievement Motive, Theories of Work Motivation: Maslow's Need Hierarchy Theory, Mc Gregcrs's Theory 'X' and Theory 'Y.

Unit – IV: Personality and Stress

Models of personality, factors and desirable features of a healthy personality; Basic Needs and their hierarchy: Mallow model and self actualizing personalities; Work stress: Meaning and definition of Stress, Symptoms of Stress, Sources of Stress, Stress management.

Unit – V: Conflict in organization

Nature of Conflict, Process of Conflict, Levels of Conflict - Intrapersonal, Interpersonal, Sources of Conflict, Effect of Conflict, Conflict Resolution, Meaning and types of Grievances & Process of Grievances Handling.

Text books:

1. Stephen P. Robins, "Organisational Behavior", PHI Learning / Pearson Education, 11th edition.
2. Fred Luthans, "Organisational Behavior", McGraw Hill, 11th Edition, 2001.

Reference books:

1. Schermerhorn, Hunt and Osborn, "Organisational behavior", John Wiley, 9th Edition.
2. Udai Pareek, "Understanding Organisational Behaviour", 2nd Edition, Oxford Higher Education.

Learning Outcomes:

1. Students should be able to discuss the development of the field of organizational behavior.

2. Able to identify the processes used in developing communication and resolving conflicts.
3. Students should be able to identify the various leadership styles and the role of leaders in a decision making process.

BCIA OE412 (Financial Accounting)

Course Objective:

1. To understand the concept and role of accounting and financial reporting.
2. To have understanding of basic accounting concepts, accounting principles and techniques of posting basic business changes.
3. To understand structure and content of financial statements.

Unit – I: Overview of Financial Accounting

Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, Accounting standards in India.

Unit – II: Basics of accounting

Capital & Revenue items, Application of Computer in Accounting Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept.

Unit – III: Financial statement analysis

Ratio analysis, Funds flow analysis, concepts, uses, Preparation of funds flow statement, simple problem, Cash flow analysis, Concepts, uses, preparation of cash flow statement, simple problem, Break – even analysis.

Unit – IV: Definition nature and Objective of Financial Management

Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.

Unit – V: Concept & Components of working Capital

Factors Influencing the Composition of working Capital, Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts. Cash Management, Inventory Management and Receivables Management.

Text books:

1. Maheshwari & Maheshwari, “An Introduction to Accountancy”, 8th Edition, Vikas Publishing.
2. Gupta R.L., Gupta V.K., “Principles & Practice of Accountancy”, Sultan Chand & Sons, 1999.

Reference books:

1. Maheshwari S.N., “Principles of Management Accounting”, 11th Edition, Sultan Chand & Sons.

Learning Outcomes:

1. Students should be able to conceptually define accounting and bookkeeping.
2. Identify the accounting rules required for business enterprises.
3. Apply the accounting rules in determining financial results.

4. Connect knowledge and record business changes.
5. Compare the specificity of different accounts within the accounting policies.

BCIA OE413 (CYBER CRIMES & CYBER LAWS)

Course Objective:

1. To introduce the cyber world and cyber law in general.
2. To explain about the various facets of cyber-crimes.
3. To enhance the understanding of problems arising out of online transactions and provoke them to find solutions.

Unit – I: Introduction to IT laws & Cyber Crimes

Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy.

Unit – II: E-Mail Investigation

E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers.

Unit – III: Introduction to Cyber Crime Investigation

Cyber Forensics, Investigation Tools, e-Discovery, Digital Evidence Collection, Evidence Preservation, Forensics Tools and Softwares, Recovering deleted evidences, Password Cracking, Cyber Security.

Unit – IV: Intellectual property, Legal System of Information Technology

Social Engineering, Mail Bombs, Bug Exploits, Law of Intellectual Property: Copy Right Act, Trade and Merchandise Act, Patent Act, Domain Name Disputes, Cyber-Squatting.

Unit – V: International Perspective of Cyber Law

Electronic Data Interchange, EDI: Concept and legal Issues. Electronic Signature Law's of Major Countries, Cryptography Laws, Cyber Law's of Major Countries.

Text books:

3. Chris Reed and John Angel, "Computer Law", OUP, New York, 2007.
4. Justice Yatindra Singh, "Cyber laws", Uiversal Law publishing Co, New Delhi, 2012.

Reference books:

2. SK Verma and Raman Mittal, "Legal dimensions of cyber space", Indian Law Institute, New Delhi, 2004.
3. SR Bhansali, "Information Technology Act 2000", University book house pvt. ltd., Jaipur.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Describe laws governing cyberspace and analyze the role of Internet Governance in framing policies for Internet security.
2. Discuss different types of cybercrimes and analyze legal frameworks of different countries to deal with these cybercrimes.
3. Explain the importance of jurisdictional boundaries and identify the measures to overcome cross jurisdictional cyber-crimes.
4. Illustrate the importance of ethics in legal profession and determine the appropriate ethical and legal behavior according to legal frameworks.
5. Identify intellectual property right issues in the cyberspace and design strategies to protect ones intellectual property

BCIA OE511 (Startup Entrepreneurship)

Course Objective:

1. To Understand the importance of Entrepreneurship
2. To know various methods to gain finance for startup.
3. To develop ability to Launch and manage a new startup

Unit – I: Introduction to Entrepreneurship

Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship, Meaning of entrepreneur, the skills required to be an entrepreneur, the entrepreneurial decision process, and role models, mentors and support system.

Unit – II: Business Opportunity Identification and Planning

Capturing Business ideas, methods of generating ideas, and opportunity recognition, Preparing a Business Plan: Meaning and significance of a business plan, components of a business plan, and feasibility study

Unit – III: Financing the New Venture

Importance of new venture financing, types of ownership securities, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks

Unit – IV: Launching and Managing the New Venture

Choosing the legal form of new venture, protection of intellectual property, and marketing the new venture, Characteristics of high growth new ventures, strategies for growth, and building the new venture capital

Unit – V: Harvesting Rewards

Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

Text Books:

1. Fundamentals of Entrepreneurship and Small Business Management, Vasant Desai, Himalaya Publishing House.

BCIA OE513 (Digital Marketing and E-Commerce)

Course Objective:

1. To Understand the importance of Digital Marketing
2. To know various methods of E-Commerce.
3. To understand Marketing startup process

Unit – I: History, Nature and Impact of E-Commerce

Internet and E-Commerce, The Nature of E-Commerce, Retailing on the Internet, Global E-Commerce, Doing Business on the Internet

Unit – III: E-Commerce Essentials

Distribution in E-Commerce, Customer Service and Web Site Personalization, Advertising for E-Commerce.

Unit – III: Marketing management

Marketing Information Management, Conducting Marketing Research, Creating a Web Site, Fundamentals of Internet Marketing.

Unit – IV: Business Structures and the Business Plan in E-Commerce

Business Structures and Economics in E-Commerce, Revenue Models and the Business Plan in E-Commerce

Unit – V: Marketing Entrepreneurship

Building a Career in E-Commerce, Ethical, Legal, and Social Responsibilities in E-Commerce Risk Management, Financing the Business.

Text Books:

1. Fundamentals of Digital Marketing by Pearson Paperback by Puneet Singh Bhatia, Pearson Publications.
2. Marketing 4.0: Moving from Traditional to Digital by Philip Kotler, Hermawan Kartajay and Iwan Setiawan, Published by Wiley

MCIA 701 (PROGRAMMING AND PROBLEM SOLVING USING 'C')

Course Objectives:

4. To introduce the basic concepts of programming
5. The course shall aim to acquaint the students about different features of the language
6. To build the problem solving skills by converting real life problems into simple algorithms
7. To teach the skills required to code in C

Unit – I

Introduction to Programming: Concept of algorithms, Flow Charts, Programming using C: Concept of variables, program statements and library functions, data types, int, char, float etc., expressions, arithmetic operation, relational and logic operations, assignment statements, extension of assignment of the operations. C primitive input output using getchar and putchar, scanf and printf functions

Unit – II

Conditional Statements and Iterations: conditional executing using if, else, switch and break statements, Concept of loops, for, while and do-while, continue. One dimensional arrays and 2-d arrays and Use in matrix computations.

Unit – III

Subprograms: Concept of Sub-programming, functions Example of functions. Argument passing.

Unit – IV

Pointers and Strings: Pointers, relationship between arrays and pointers, Argument passing using pointers, Array of pointers, Passing arrays as arguments. Strings and C string library.

Unit – V

Structures and File Handling: Structure and Unions. Defining C structures, Programming examples. File handling in C

TEXT BOOKS

- *Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.*
- *Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.*

REFERENCE BOOKS

- *Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.*
- *Kernighan & Ritchie, "C Programming Language", The (ANSI C Version), PHI, 2nd Edition.*

Learning Outcomes:

Upon successful completion of this course, students will be able to

6. Understand the basics of computer programming
7. Write, compile, run, and debug C programs

8. Use different data types in a program
9. Design programs involving decision structures, loops and functions
10. Study about Passing by value and pass by reference
11. Use different data structures and work with files

MCIA 702 (COMPUTER ORGANIZATION AND ARCHITECTURE)

Course Objectives:

1. The main objective of the syllabus is to make students understand the relevance Computer Organization in the software oriented course

2. It aims at introducing basic digital concepts and then use them to explain details of computer organization.

Unit – I

BASIC FUNCTIONAL BLOCKS OF A COMPUTER AND ITS REPRESENTATION: Functional units, Basic operational concepts, Bus structures, Performance and metrics, Instructions and instruction sequencing, Hardware–Software Interface, Instruction set architecture, Addressing modes, RISC, CISC, ALU design, Fixed point and floating point operations, Case study of a CPU (Intel Atom Board)

Unit – II

CPU CONTROL UNIT DESIGN: Execution of a complete instruction, Multiple bus organization, Hardwired control, Micro programmed control, Computer arithmetic, Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier etc.

Unit – III

PIPELINE: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Performance considerations, Exception handling. Case Study of Intel Atom Board.

Unit – IV

MEMORY SYSTEM DESIGN: Basic concepts, Semiconductor RAM – ROM, Speed, Size and cost, Cache memories, Improving cache performance, Virtual memory, Memory management requirements, Associative memories, Secondary storage devices. Case study of Intel Atom Board.

Unit – V

I/O ORGANIZATION: Accessing I/O devices, Programmed Input/Output, Interrupts, Direct Memory Access, Buses, Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

TEXTBOOKS

1. John P. Hayes, Computer Architecture and Organization, MGH, 1998.

2. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson Education, 2010.

3. M. Morris Mano, Computer System Architecture, 2nd Edition, PHI.

REFERENCE BOOKS

- *David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Elsevier, 2012.*
- *Carl Hamachar, Zvonco Vranesic and Safwat Zaky, Computer Organization, MGH, 1990.*
- *Vincent P. Heuring and Harry F. Jordan, Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 1996.*

Learning Outcomes:

Upon successful completion of this course, students will be able to:

4. Understand the operation of electronic logic elements
5. Understand the various parts of a system memory hierarchy
6. Understand the organization of a computer system in terms of its main components

MCIA -703 (DATABASE MANAGEMENT SYSTEMS)

Course Objectives:

1. Define the terminology, features, classifications, and characteristics embodied in database systems.
2. Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary.
3. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
4. Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.

Unit – I

Introduction to DBMS

Basics of File Processing Systems and Database Systems, Difference between traditional file system and DBMS, Responsibilities of Database Administrator, Three level Architecture of Database System, Physical and Logical data independence.

Unit – II

Introduction to various Database Models

Entity Relationship Model and its importance, Introduction to various Symbols used In ERD (Entity: Types of Entities, week Entity, Composite Entity, Strong Entity, Attribute: Types of

Attribute, Relationship: Type of relationship, Connectivity, Cardinality), Conversion of ER diagram to tables, Comparative study of Network, Hierarchical and Relational Models, Codd's 12 Rules, Comparison of Object Oriented Database and Object Relational Database.

Unit – III

Normalization in DBMS

Normalization and its various forms(1NF, 2NF, 3NF and BCNF), Functional Dependencies, Multi-valued Dependencies, Study of various Database Integrity like Domain, Entity, Referential Integrity Constraints.

Unit – IV

SQL

Categories of SQL Statements, The CREATE Statement, The DROP Command, The ALTER Command, Integrity Constraints, DML Statements: The SELECT Statement, The INSERT Statement, The DELETE Statement, The UPDATE Statement, SQL Operators: Simple Selects Comparison Operators, IN and NOT IN Operators, BETWEEN Operator, The LIKE Operator Logical Operators, IS NULL and IS NOT NULL, ANY, ALL, SQL FUNCTIONS, Joining Tables, SQL Subqueries, GROUP BY Clause, HAVING Clause

Unit – V

Transactions

Basic concepts, ACID Properties . Concurrency control techniques: Items, locks, Deadlocks, serializability, Locking two phase locking, Database recovery technique**:** Failure classification, recovery concepts, recovery techniques based on deferred and immediate update, Shadow paging.

TEXTBOOKS

- *R. Elmasri & S.B. Navathe, Fundamentals of Database Systems, Pearson Education, 6th edition, 2010.*

REFERENCE BOOKS

- *Silberschatz, H. Korth & S. Sudarshan, Database System Concepts, TMH, 5th Edition, 2010.*
- *R. Ramakrishnan & J. Gehrke, Database Management Systems, 3rd edition, TMH, 2007.*

Learning Outcomes:

On successful completion of the course, the students will be able to:

1. Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit.
2. Demonstrate an understanding of the relational data model.
3. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.
4. Formulate, using relational algebra, solutions to a broad range of query problems.

5. Formulate, using SQL, solutions to a broad range of query and data update problems.

MCIA 704 (SOFTWARE ENGINEERING)

Course Objectives:

1. Knowledge of basic SW engineering methods and practices, and their appropriate application.
2. Describe software engineering layered technology and Process frame work.
3. A general understanding of software process models such as the waterfall and evolutionary models.
4. Understanding of software requirements and the SRS documents.

Unit – I

Introduction, Software Model and Process: Software Crisis, Need and Definition of Software Engineering, Software Myths, Process Model: Waterfall Model, V-Model, Incremental Model, Evolutionary Model,

Unit – II

Requirement Engineering: Inception, Elicitation, Elaboration, Negotiation, Specification, Validation, Requirements, Analysis & Model: Domain Analysis, Data Flow Modeling, Class-based Modeling, CRC Modeling.

Unit – III

Software Design Concepts: Abstraction, Modularity, Cohesion, Coupling, Software Design: Architectural Design, Data Design: Entity Relationship Design, User Interface Design, Object Oriented Design, Web Application Design: Aesthetic Design, Content Design, Navigation Design

Unit – IV

Testing and Quality: Software Testing, Verification and Validation, Test Strategy: Unit Testing, Integration Testing, System Testing, User Acceptance Testing: Alpha & Beta Testing, Internal and External View of Testing: White Box Testing, Black Box Testing, Quality Concepts, Garvin's Quality Dimension, McCall's Quality Factors, ISO 9126 Quality Factors

Unit – V

Maintenance and Software Metrics: Maintenance: Corrective, Perfective, Adaptive, Metrics: Size Oriented Metrics, Function Point Metrics, CK Metrics suite, Introduction to Risk Management

TEXT BOOKS

- *R. S. Pressman, "Software Engineering – A practitioner's approach", 7th Edition, McGraw Hill Int. Ed., 1992.*
- *K. K. Agarwal and Yogesh Singh, Software Engineering, New Age*

REFERENCE BOOKS

- *P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.*
- *Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.*
- *James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons*

Learning Outcomes:

1. Basic knowledge and understanding of the analysis and design of complex systems.
2. Ability to apply software engineering principles and techniques.
3. Ability to develop, maintain and evaluate large-scale software systems.
4. To produce efficient, reliable, robust and cost-effective software solutions.

MCIA - 705 (DATA COMMUNICATION AND COMPUTER NETWORKS)

Course Objectives:

1. The main emphasis of this course is on the organization and management of local area networks (LANs).
2. The course objectives include learning about computer network organization and implementation.
3. It aims at obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.

Unit – I

Transmission Media: Twisted pair, Coaxial Cable, Fiber Optics, Wireless transmission, Bluetooth, Radio, Microwave, Infrared.

Network Classifications: Study of various Types of Networks (LAN, MAN, WAN, WLAN, PAN, etc.) , Comparison of various enterprise network infrastructures (Internet, Intranet, and Extranet), Introduction to IEEE 802 family.

Unit – II

Introductory Concepts - Network hardware - Network software - Physical layer – Guided transmission media, OSI reference model

Data Link Layer –Error Detection and Correction, Data link control and protocol, Design issues - Channel allocation problem - Multiple access protocols -Ethernet - Wireless LAN - 802.11 architecture.

Unit – III

Network Layer – Addressing, Design issues, Routing algorithms, Congestion control algorithms Quality of Service , Internetworking.

Unit – IV

Transport Layer - Transport service - Elements of transport protocols - User Datagram Protocol - Transmission Control Protocol.

Unit – V

Application Layer - DNS - Electronic mail - World Wide Web - Multimedia – Network security.

TEXT BOOKS

- *A.S.TANENBAUM, "Computer Networks", Pearson Education, IV Edition, 2003*
- *W.STALLINGS, "Data and Computer Communication", Pearson Education, 2001*
- *B.A Forouzan "Data Communication and Networking"TMH*

REFERENCE BOOKS

- *Shanmavgaon, K.S. "Digital and Analog Communication System", John Wiley and Sons.*
- *Roden, M.S. "Analog and Digital Communication System", P.H.I.*
- *Scheber, W.L. "Data Communication", MGH.*

Learning Outcomes:

1. The course introduces computer communication network design and its operations.
2. On completion of the course, the student should be able in part to design, implement and maintain a typical computer network (LAN).

MCIA 802 (DATA STRUCTURE)

Course Objectives:

4. To impart basic Data Structure Concepts
5. To introduce the basic concepts of Stacks, Queues, Lists, Trees, and Graphs
6. To give a brief account of Searching and Sorting Techniques

Unit – I

Arrays and Linked Lists: Storage structures for arrays, matrix, row-major, column-major, Sparse matrices. Linked list, Doubly linked lists, Circularly linked lists – Operations on polynomials, Dynamic storage management - Garbage collection and compaction.

Unit – II

Stack and Queue

Stacks and queues: insertion, deletion, Stack and queue using linked list, Circular queue, Prefix, postfix, infix notation and conversions.

Unit – III

Trees

Binary tree insertion, deletion, traversal (inorder, preorder and postorder), Binary Search Tree, Threaded binary tree, AVL tree, B-tree, B+-tree.

Unit – IV

Sorting and Searching

Selection sort, Insertion sort, Bubble sort, Merge Sort, Heap sort, and Quick sort, sorting in linear time, Hash Tables.

Unit – V

Graph

Representation of Graphs, Breadth First Search, Depth First Search, Topological Sort, Strongly Connected Components, Algorithm for Kruskal's and Prim's for Finding Minimum cost Spanning Trees, Dijkstra's Algorithm for finding Single source shortest paths.

TEXT BOOKS

- *Seymour Lipschutz, "Data Structures with C", Schaum's Outline Series*
- *LangsamYedidyah, Augenstein J Moshe, Tenenbaum M, "Data Structures using C and C++", PHI*

REFERENCE BOOKS

- *Horowitz, Sahni, Freed, "Fundamentals of Data Structures in C", Silicon Press*
- *Kruse R., "Data Structures and Program Design in C", Pearson Education India*

Learning Outcomes:

Upon successful completion of this course, students will be able to

6. Demonstrate familiarity with basic data structures.
7. Use Data Structures for Problem Solving.
8. Determine which data structure to use in different scenarios and be familiar with writing recursive methods.
9. Demonstrate understanding of the properties of various data structures such as stacks, queues, lists, trees and graphs and Use various data structures effectively in application programs.
10. Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, and quick sort.

MCIA 803 (OBJECT- ORIENTED PROGRAMMING USING C++)

Course Objective:

4. The course will introduce standard tools and techniques for software development, using object oriented approach.
5. Describe the use of a version control system, an automated build process.
6. To develop an appropriate framework for automated unit and integration tests.

Unit – I

Introduction: Introducing Object-Oriented Approach Comparisons with Procedural Approach, Characteristics of Object-Oriented Languages. Basic terms and ideas: Abstraction, Encapsulation, Information hiding, Inheritance, Polymorphism, Review of C, Difference between C and C++, cin, cout, new, delete operators.

Unit – II

Classes and Objects: Abstract data types, Object & classes, attributes, methods, Reference variable, C++ class declaration, State identity and behavior of an object, Constructors and destructors, copy Constructor, Static Class Data, inline function, default arguments, const arguments Friend Functions.

Unit – III

Inheritance: Inheritance, Types of Inheritance, Class hierarchy, derivation – public, private & protected, Hybrid Inheritance and virtual base class Aggregation, composition vs classification hierarchies, function overriding and constructor calls in different types of Inheritance

Unit – IV

Polymorphism: Type of Polymorphism – Compile time and runtime, Method polymorphism, Polymorphism by parameter, This Pointer ,Operator overloading and Type Conversions, Parametric polymorphism, Virtual Functions, Virtual Destructors, Generic Programming – template function and Template Classes

Unit – V

Files and Exception Handling: Console I/O :Stream, stream classes, unformatted I/O operations, formatted I/O operations, manipulators.File I/O Basics of data files, creating/ opening & closing a file, reading data from file, writing data into file, error-handing functions, random access of data files. Namespaces and Exception handling

TEXT BOOKS

Balagurusamy, "Object Oriented Programming with C++", TMH

REFERENCE BOOKS

- *Stephen Prata "C++ Primer Plus" Pearson Education*
- *Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.*
- *D .Parasons, "Object Oriented Programming with C++", BPB Publication*
- *AR.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997.*

Learning Outcomes:

Upon successful completion of this course, students will be able to

5. Specify simple abstract data types and design implementations, using abstraction functions to document them.
6. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
7. Name and apply some common object-oriented design patterns and give examples of their use .Design applications with an event-driven graphical user interface

MCIA 804 (OPERATING SYSTEMS)

Course Objective:

4. To learn the fundamentals of Operating Systems.
5. To learn the mechanisms of OS to handle processes and threads and their communication
6. To learn the mechanisms involved in memory management in contemporary OS.

Unit – I

Introduction

Services Provided, Evolution: Serial, Batch, Multiprogramming, Real & Distributed Operating System, Layered Approach, System Calls, Nucleolus of Operating System,

Unit – II

Process

Concept, Process Control Block, States, State Transitions Diagram, Operations on Process, Interrupt Processing Swapping , Context Switching, Co-operating Processes, Deadlock Introduction, Examples Indefinite Postponement, Necessary Conditions, Prevention. Avoidance, Detection &Recovdery, Bankers Algorithm, Case Study: UNIX.

Unit – III

Scheduling

Introduction, Levels of Scheduling, Objectives, Pre-emptive & Non-pre-emptive Scheduling, CPU Scheduling Algorithms: FCFS, RR, SJF, SRT, HRRN, Multi-Level Feedback Queues, Illustrative Examples, Fair share scheduling, Scheduling In Distributed Systems.

Unit – IV

Process Synchronization

Introduction, Critical Section, Race Conditions, Mutual Exclusion Primitives, Dekker Algorithm, Peterson Algorithm, Bakery Algorithm, Hardware Solution, Semaphores, Classical Problems: Producer Consumer Problem, Sleeping barber Problem, Dinning Philosopher Problem.

Unit – V

Memory Management

Introduction, Contiguous & Non-Contiguous, Paging, Segmentation, Paging with Segmentation, Virtual Memory Management: Introduction, Demand Paging, Page Replacement, Locality, Working set, Page Fault Frequency. Auxiliary Memory Management: File Systems: Introduction, File system Structure, Directory Structure, File system Implementation, Directory Implementation, Allocation Methods, Free space Management.

TEXT BOOKS

- *Silberschatz, Galvin, Gagne, Operating System Concept,John Willey*
- *Milan Milenkovic, Operating Systems: Concepts & Design*

REFERENCE BOOKS

- *H.M. Deitel, Operating System, Pearson Education*
- *Operating System by William Stallings, Pearson Education*

- *Andrew S. Tanenbaum, Modern Operation Systems, Pearson Education*
- *Maurice J. Bach, The Design of UNIX Operating System ,Pearson Education*

REFERENCE BOOKS

- *P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.*
- *Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.*
- *James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons*

Learning Outcomes:

Upon successful completion of this course, students will be able to

4. Analyze the structure of OS and basic architectural components involved in OS design
5. Analyze and design the applications to run in parallel either using process or thread models of different OS
6. Analyze the various device and resource management techniques for timesharing and distributed systems
7. Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
8. Interpret the mechanisms adopted for file sharing in distributed Applications
9. Conceptualize the components involved in designing a contemporary OS.

MCIA 805 (FORMAL LANGUAGES AND AUTOMATA THEORY)

Course Objective:

1. To learn how to construct finite state machines and the equivalent regular expressions.
2. To learn proving the equivalence of languages described by finite state machines and regular expressions.
3. To be able to construct pushdown automata and the equivalent context free grammars.

Unit – I

INTRODUCTION: Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other.

Unit – II

REGULAR EXPRESSION (RE) AND REGULAR LANGUAGES: Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages,

Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

Unit – III

CONTEXT FREE GRAMMAR (CFG) AND CONTEXT FREE LANGUAGES (CFL): Definition, Examples, Derivation , Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.

Unit – IV

PUSH DOWN AUTOMATA (PDA): Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.

Unit – V

COMPUTABILITY: Turing Machines: Turing machine as a model of Computation, Universal Turing machine, Language Acceptability, Decidability, Halting Problem.

TEXTBOOKS

- *P. Linz, An Introduction to Formal Languages and Automata, 5th Edition, Jones Barlett, 2011.*
- *John E. Hopcroft, Rajeev Motwani& Jeffery D. Ullman, Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Education, 2007.*

REFERENCE BOOKS

- *John C. Martin, Introduction to Languages and the Theory of Computation, 4th edition, TMH, 2011.*
- *Daniel I. A.Cohen, Introduction to Computer Theory**, 2**nd edition, John Wiley, 1997.*
- *Harry R. Lewis, Christos H. Papadimitriou, Elements of the Theory of Computation, 2nd edition, Pearson Education, 1998.*

Learning Outcomes:

1. Upon successful completion of this course, students will be able to
2. Master regular languages and finite automata.
3. Master context - free languages, push - down automata, and Turing recognizable languages.
4. Be exposed to a broad overview of the theoretical foundations of computer science.
5. Be familiar with thinking analytically and intuitively for problem - solving situations in related areas of theory in computer science.

MCIA – 901 (DESIGN AND ANALYSIS OF ALGORITHMS)

Unit – I

Algorithm Analysis

Time Space Tradeoff – Asymptotic Notations – Conditional asymptotic notation – Removing condition from the conditional asymptotic notation, Properties of big-Oh notation – Recurrence equations – Solving recurrence equations – Analysis of linear search.

Unit – II

Divide and Conquer

General Method – Binary Search – Finding Maximum and Minimum – Merge Sort – Greedy Algorithms: General Method – Container Loading – Knapsack Problem.

Unit – III

Dynamic Programming

General Method – Multistage Graphs – All-Pair shortest paths – Optimal binary search trees – 0/1 Knapsack – Travelling salesperson problem .

Unit – IV

Backtracking

General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.

Unit – V

Graph Traversals

Graph Traversals - Connected Components – Spanning Trees – Biconnected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem – Introduction to NP-Hard and NP-Completeness.

TEXTBOOKS

- *E. Horowitz, S. Sahni, & S. Rajsekaran, Fundamentals of Computer Algorithms, Galgotia Publication.*
- *T. H. Cormen, C. E. Leiserson, R. L. Rivest & C. Stein, Introduction to Algorithms, 3rd Edition, PHI, 2010.*
- *Sara Baase, Computer Algorithms: Introduction to design and analysis, 3rd Edition, Pearson, 2002.*

REFERENCE BOOKS

- *J. Kleinberg & E. Tardos, Algorithm Design, 1st Edition, Pearson, 2012.*
- *S. Dasgupta, C. Papadimitriou & U. Vazirani, Algorithms, 1st Edition, TMH, 2013.*

MCIA - 902 (JAVA PROGRAMMING)

Course Objective:

1. To learn programming using Java.
2. To provide knowledge of object-oriented paradigm in the Java programming language,
3. To learn the use of Java in a variety of technologies and on different platforms.

Unit – I

Java Basics

Java and Internet, Difference between C++ and Java, Byte code and platform independence, Features of Java, Java Standard Edition (Java SE), Java Runtime Environment (JRE), Java Just In Time (JIT) Compiler, Installing JDK, Compiling and executing Java Application, Java Program Structure, Java Keywords, Data types, Variables, Arrays, Expressions, Operators, Control Statements, for each statement, Command Line Arguments.

Unit – II

Object-Oriented Programming – I

Class and Encapsulation, Objects, Methods, Default and parameterized Constructors, Inheritance, super and this Keywords, Static Methods, Polymorphism, Overloading, Overriding, Dynamic Method Dispatch.

Unit – III

Object-Oriented Programming – II

Abstract class, final Keyword, Interface and Multiple Inheritance, Package, Creating Package, Using Imports, static import, Access Controls, public, private, protected and default Control, Using Scanner Class for Formatted Input, Universal Superclass Object, toString() Method, Variable Argument List.

Unit – IV

String, Exception handling and Multithreading

String, Methods of String, StringBuffer and StringBuilder, Exception, try and catch Statement, Multiple catch Statements, Nested try Statement, throw, throws and finally Statements, Creating Exception Subclasses, Thread, Advantages of Thread, Creating Threads by Extending Thread Class and Implementing Runnable Interface, Creating Multiple Threads, Life Cycle of a Thread, Thread Priorities, Thread Synchronization.

Unit – V

GUI Programming

Applet and AWT Basics, Applet Vs. Application, Applet Life Cycle, Passing Parameters to Applets, Drawing Line, Rectangle, Ellipse and Arc, Font and Color Class, Frame, FlowLayout, BorderLayout and GridLayout Manager, Delegation Event Model, Listeners, Action and Item Events, Handling Mouse and Keyboard Events, Using Components, Text Field, Label, Button, Choice, List.

TEXT BOOKS

- *Herbert Schildt, Java: The Complete Reference, Seventh Edition, DEC-06, ISBN: 9780072263855*
- *Joel Murach and Andrea Steelman, Murach's Java SE 6, ISBN-10: 1-890774-42-1; ISBN-13: 978-1-890774-42-4*

REFERENCE BOOKS

- *Katherine Sierra, Kathy Sierra, Bert Bates, SCJP Sun Certified Programmer for Java 6 Study Guide: Exam (310-065), McGraw-Hill Companies, June 2008, ISBN-13: 9780071591065*
- *Jeff Friesen, Beginning Java SE 6 Platform: From Novice to Professional, Apress*
- *Deital and Deital, Java How to Program, 8/e, Prentice Hall, 03/17/2009, ISBN: 0136123716*
- *Khalid Mughal, Rolf Rasmussen, A Programmer's Guide to Java SCJP Certification: A Comprehensive Primer, 3/e, ISBN: 0321556054*

Learning Outcomes:

Upon successful completion of this course, students will be able to –

1. *Understand the structure and model of the Java programming language,*
2. *use the Java programming language for various programming technologies*
3. *develop software in the Java programming language,*
4. *evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements*
5. *propose the use of certain technologies by implementing them in the Java programming language to solve the given problem choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems*

MCIA - 903 (COMPILER DESIGN)

Course Objective:

1. To learn the basic techniques that underlie the practice of Compiler Construction.
2. To learn run-time environment into which the high-level code is translated

Unit – I

INTRODUCTION: Introduction to Translators (interpreter, compiler & cross-compiler), Phases of compilation and overview, Introduction to GCC.

LEXICAL ANALYSIS (SCANNER): Regular language, finite automata, regular expression and their applications to lexical analysis, from regular expression to finite automata, Implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, ambiguity, YACC.

Unit – II

SYNTAX ANALYSIS (PARSER): Context-free language and grammar
BASIC PARSING TECHNIQUES: Parsers, Top down parsing, Shift reduce parsing, operator grammar, operator precedence parsing, predictive parsers. LL(1) grammar, LR(0), SLR(1), LR(1), LALR(1) grammars and Bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc,bison).

Unit – III
SYNTAX-DIRECTED TRANSLATION: Syntax-directed Translation schemes, Implementation of Syntax directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser.

Unit – IV
SEMANTIC ANALYSIS: Attribute grammar, syntax directed definition, evaluation and flow of attribute in a syntax tree.
SYMBOL TABLE: Data structure for symbols tables, representing scope information, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

Unit – V
INTERMEDIATE CODE GENERATION: Translation of different language features, different types of intermediate codes.
CODE IMPROVEMENT (OPTIMIZATION): Analysis: control-flow, data-flow dependence etc., Code improvement local optimization, global optimization, loop optimization, peep-hole optimization

TEXTBOOKS

- *Alfred V. Aho, Monica S. Lam, Ravi Sethi& Jeffrey D. Ullman, Compilers: Principles, Techniques, and Tools, 2nd edition, Prentice Hall, 2006.*

REFERENCE BOOKS

- *Allen I. Holub, Compiler Design in C , PHI, 2003.*
- *C. N. Fischer and R. J. LeBlanc, Crafting a compiler with C, Benjamin Cummings, 2003.*
- *J.P. Bennet, Introduction to Compiler Techniques, 2nd Edition, TMH, 2003.*

  HenkAlblas and Albert Nymeyer, Practice and Principles of Compiler Building with C, PHI, 2001.

Learning Outcomes:
Upon successful completion of this course, students will be able to

1. understand both the theory and practice of compiler design.
2. implement a complete compiler for a small programming language.

MCIA SEE911(Internet and Web Programming)

Course Objective:

3. To learn front-end development technologies including HTML, CSS, JavaScript, and JQuery.

4. To learn Using the C# web development framework to build web applications that employ design patterns like MVC.

Unit I: Introduction:

Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internetservices, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.Introduction to web, protocols governing the web, web development strategies, Web applications, web project, web team**,** services of web server, Common gateway interface (CGI), Uniform Resource Locator (URL), format of the URL, Hyper Text Transfer Protocol (HTTP)

Unit II: Web Page Designing:

Principles and planning of Web Design: HTML: list, table, images, frames, forms, CSS; XML: DTD, XML schemes, presenting and using XML

Unit III: Scripting:

Java script: Introduction, documents, forms, statements, functions, objects; event and event handling; introduction to AJAX, VB Script

Unit IV: Server Site Programming:

Introduction to active server pages (ASP),ASP.NET, java server pages (JSP), JSP application design, tomcat server, JSP objects,declaring variables, and methods, debugging, sharing data between JSP pages, Session, Application: data base action , development of java beans in JSP, introduction to COM/DCOM.

Unit V: PHP (Hypertext Preprocessor):

Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form ,mail, file upload, session, error, exception, filter, PHP-ODBC**.**

Text Books:

5. Deitel, “Java for programmers”, Pearson Education

References

1.Xavier, C, “ Web Technology and Design” , New Age International.
2.IvanBayross,” HTML, DHTML, Java Script, Perl & CGI”, BPB Publication.
3.RameshBangia, “Internet and Web Design” , New Age International
4.Bhave, “Programming with Java”, Pearson Education
5.Ullman, “PHP for the Web: Visual QuickStart Guide”, Pearson Education

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Understand user experience design methodologies like separation of concerns, Ajax, and responsive web design.

2. Explore the anatomy and use of web requests and responses, including the types and formats of data that comprises them.
3. Know how a web server works and the facilities it utilizes to service client requests.

MCIA SEE912 Linux and Unix Programming

Course Objective:

1. To learn how to use UNIX/Linux resources to find additional information about UNIX/Linux commands.
2. To learn organizing and managing files within the UNIX/Linux file system;
3. To learn organizing and managing their processes within UNIX/Linux;

Unit I: Introduction:

Short HistoryWhy is Linux So Successful?UNIX Flavors BSD, SysV, Linux StandardsSystem ArchitectureThe KernelThe ShellUtilities Tools and ApplicationsLinux Programming SecurityUsers and GroupsPUID & PGIDReal and Effective IDsAuthenticating Users File System Permissions.

Unit II: Programming under Linux:

Privileged Execution ModeKernel Mode Vs. User Mode, SystemcallsFilesUsing FilesUsing Links Working With DirectoriesObtaining File InformationFile PermissionsSpecial PermissionsSignalsThe Way the Kernel Handles Signal Types of Signals Results of a ProcessReceiving a Signal, Handling Signals, Signals List, Sending Signals Handling SignalsResponse to SignalsActivation of pause, signalSystem Call for Signal HandlingError Handler

Unit III: Process

Programs and ProcessesThe Process IDsThe Process TableThe Process State PS Report Process StatusContext SwitchThe Process Environment Process Group Job and ProcessesProcess TerminationCreating a New ProcessThe wait Function FamilyExecuting a ProgramThe system C Library FunctionRedirection of Input and OutputThe vfork System Call.

Unit IV: Threads:

Thread CreationThread CancellationThreadSpecific Data Synchronization and Critical SectionsGNU/Linux Thread ImplementationProcesses Vs. ThreadsInterProcess communication (IPC)Pipes Named PipesShared MemoryMessage Queuecsh Level commands Synchronization MechanismsFile locking Semaphoreto COM/DCOM.

Unit V: Sockets:

What Is A Socket?A Brief History Of Sockets Communication Protocolscommunication CapabilitiesEndpoint AddressesThe Internet Protocol (IP) Internet AddressesAddress ClassesConnection Oriented Communications And TCP Connectionless communications And UDP Stream Sockets The Basic Model Sending Data(send) Receiving Data(recv.)Shutting Down A Socket Related files The select( ) System Call Broadcast and Datagram Sockets.

TEXT BOOKS:

1.Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.

2.Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education, 2003.

References:

1.Unix Network Programming ,W.R.Stevens,PHI.

2.Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. comfortably use basic UNIX/Linux commands from the command line (from a terminal window);
2. usefully combine UNIX/Linux tools using features such as filters, pipes, redirection, and regular expressions;
3. Customize their UNIX/Linux working environment;
4. be knowledgeable enough about basic UNIX/Linux shell scripting to be able to successfully read and write bash shell scripts

MCIA SEE913PHP Programming

Course Objective:

1. Write PHP scripts to handle HTML forms.
2. Write regular expressions including modifiers, operators, and metacharacters.

Unit 1: PHP Basics-Syntax, Operators, Variables, Constants, Control Structures, Language Constructs and Functions**.**

Unit 2: Functions- Syntax, Arguments, Variables, References, Returns, Variable Scope Arrays- Enumerated Arrays, Associative Arrays, Array Iteration, Multi-Dimensional Arrays, Array Functions, SPL**.**

Unit 3; Object Oriented Programming- Instantiation, Modifiers/Inheritance, Interfaces, Exceptions, Static Methods & Properties, Autoload, Reflection, Type Hinting, Class Constants.
Strings and Patterns- Quoting, Matching, Extracting, Searching, Replacing, Formatting

Unit 4: Web Features- Sessions, Forms, GET and POST data, Cookies, HTTP Headers

Unit 5: Databases and SQL - SQL, Joins, Analyzing Queries, Prepared Statements, Transactions. Streams and Network Programming- Files, Reading, Writing, File System Functions, Streams, Sample web applications using PHP

Text Books:

AJAX and PHP: Building Responsive Web Applications, by Cristian Darie, Bogdan Brinzarea, Filip CherecheTosa, Mihai Bucica.

References:

• Professional PHP 6 EdcLecky -Thompson, Steven D. Nowicki,Thomas Myer
Wrox Publishers
• PHP6 and MySQL Bible - Steve Suehring,TimConverse,and Joyce Park
Wiley India Pvt.Ltd.

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
2. Analyze and solve various database tasks using the PHP language.
3. Analyze and solve common Web application tasks by writing PHP programs.

MCIA SEE1121 (ADVANCED JAVA PROGRAMMING)

Course Objectives:

1. Covers techniques for better class construction
2. Understand Exceptions. How and when they should be handled
3. An overview of database access and details for managing information using the JDBC API
4. Examines the use of Object Serialization
5. Addresses how to use Remote Method Invocation
6. A general overview of Reflection and its uses
7. Will be introduced to Java security
8. Learn how to use Servlet and JSP and XML with JSP
9. Be able to create and use custom JSP tags
10. A presentation of Enterprise JavaBeans and how to use it

Unit – I

Java Database connectivity (JDBC): Introduction to JDBC, Two Tier and Three Tier Database Design, JDBC API, Different types of JDBC drivers, Statement, PreparedStatement, Batch update, Scrollable and Updatable ResultSet, Transaction, Overview of JDBC 2.0 API.

Unit – II

Java Servlets: HTML forms and controls, Static Vs Dynamic web pages, Difference between Post and Get, Introduction to Servlet and Java Web Server, Servlet API, Basic Servlet structure, Servlet life cycle, Handling the Client request and FORM data, HttpRequest and HttpResponse, Handling cookies, Session Tracking, Using servlet to access database with JDBC.

Unit – III

Java Server Page (JSP) and Java Beans: Introduction to JSP, Components of JSP page, JSP Comments, Scripting elements, Declaration, Directives, implicit objects, Introduction to Java bean, Bean naming conventions, Getter and Setter methods, Advantages of Java Bean, Integrating Java Beans with JSP for reading information from forms, Integrating Servlet, JSP and Bean, Accessing database using JSP.

Unit – IV

Introduction to RMI& EJB: Overview of RMI, Architecture of RMI, Advantages of RMI, Difference between RPC and RMI, Stub and Skeleton, Writing a sample RMI program to add two numbers, Introduction to EJB, EJB architecture, Overview of entity, session and message beans.

Unit – V

Introduction to Java Frameworks: Introduction to Spring and Spring MVC framework, Advantages and disadvantages of Spring framework, Introduction to Struts 2 framework, Advantages and disadvantages of Struts 2framework Introduction to JavaServer Faces (JSF) framework, Advantages and disadvantages of JSFframework, Introduction to Hibernate framework, Advantages and disadvantages of Hibernate framework, Introduction to Google Web Toolkit (GWT) framework, Advantages and disadvantages of GWTframework.

TEXT BOOKS

- *By Marty Hall, Larry Brown, Core Servlets and JavaServer Pages Volume 1: Core Technologies, Pearsons*
- *Bert Bates, Kathy Sierra, Bryan Basham, Head First Servlets and JSP, O'Reilly*

REFERENCE BOOKS

- *Budi Kurniawan, Java for the Web with Servlets, JSP, and EJB: A Developer's Guide to J2EE Solutions, New Riders Publishing*
- *Monica Pawlan, Writing Enterprise Applications with Java 2 SDK, Enterprise Edition, Sun Microsystems, Inc.*
- *Advanced Java 2 Platform HOW TO PROGRAM, Deitel & Deitel, PHI.*

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Develop Swing-based GUI
2. Develop client/server applications and TCP/IP socket programming
3. Update and retrieve the data from the databases using SQL

4. Develop distributed applications using RMI
5. Develop component-based Java software using JavaBeans
6. Develop server side programs in the form of servlets

MCIA SEE1122 (ASP.NET PROGRAMMING)

Course Objectives:

1. To get the practical knowledge of ASP.NET
2. To develop website using visual studio web development environment.
3. To know the framework architecture of .NET
4. To work with disconnected architecture of ADO.NET and can store and retrieve data easily from
5. Database.

Unit – I

Introduction: The .Net Platform and the Web, The Pathway to Web Application , The Web Client/Server Model , Components of ASP.NET and the .NET framework o Overview of IIS o Overview of ASP.NET o Language Independence in the .NET framework

Unit – II

Working with ASP.NET , The Features of ASP.NET , The Anatomy of ASP.NET Pages , Introducing Web Forms , Visual Studio IDE Basics , Code-Behind feature • Application Configuration , Over view of Global.asax file and Web.config flie

Unit –III

Web controls for Displaying and Formatting Data Following properties should be consider in each control of ASP.NET Properties, Access Key, BackColor, Border Width, BorderStyle, CSS Class, Enabled, Font.Bold, Font. Italic, Font.Name Font.Overline , Font.Size, Font. Strikeout, Font. Underline , ForeColor , Height , TabIndex , ToolTip, Width , Id , Runat , Text • Label , Setting Properties , BorderStyle , BorderWidth • Panel , Setting Properties BackImageUrl , Horizontal Align , Wrap , Add runtime control/s in panel , Table , Setting Properties , Back Image Url , Cell Spacing , Cell Padding , Gridlines, Horizontal Align

Unit –IV

Validation Controls Base Validator, Required Field Validator, Compare Validator, Range Validator, Regular Expression Validator, Custom Validator, Causes Validation Property Grouping - Validation Group Property, Page.Validators and Page.IsValid,,Authentication & Authorization What is Authentication and Authorization, Types of Authentication, Forms Authentication, Role based Authentication, Windows and Basic Authentication, What is ASP.NET Impersonation, Using location section in web. Configuration

Unit –V

Application Service Providers ASP.NET Providers Introduction, Membership Providers, Role Providers, Writing Custom Providers, Profile Providers, Web Parts Personalization Providers, Data Bound Controls Databinding traditional way, SqlDataSource, GridView, DetailsView, FormView, DataList, Repeater, ListView, DataPag

Web Caching Why Caching, Types of Caching- Output Caching -Fragment Caching -Substitution Caching -Data Caching, SQL Cache Invalidation, Globalization and Localization Definitions, Creating Resource files for different cultures, Designing the WebForm, & linking controls to keys in Resource files Alternatives to intialize

Unit –VI

AJAX.NET :What is AJAX, What is AJAX.NET, Script Manager• Update Panel, Update Progress, Timer, AJAX Control Toolk,

Routing What is Routing?, Mapping Route to Phyiscal file, Reading Route Parameters, Route Expression, Generate URL using Markup, Understanding & Publishing Web Application **Introduction to ASP.NET Web Application**, Advantages of IIS Applications, Creating web application in IIS, Converting File System application to IIS Application, Using Virtual Directory, Publishing ASP.NET Website, Culture specific formatting

TEXTBOOKS

- *William Penberthy,Beginning ASP.NET for Visual Studio 2015*
- *Matthew MacDonald, MacDonald, Matthew.2002, English, Book, Illustrated edition: ASP.NET : the complete reference*

REFERENCE BOOKS

- *William Penberthy,Beginning ASP.NET for Visual Studio 2015*
- *Matthew MacDonald, MacDonald, Matthew.2002, English, Book, Illustrated edition: ASP.NET : the complete reference*

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Create a Web form with server controls.
2. Separate page code from content by using code-behind pages, page controls, and components.
3. Display dynamic data from a data source by using Microsoft ADO.NET and data binding.

Debug ASP.NET pages by using trace.

MCIA SEE1123 (ANDROID PROGRAMMING)

Course Objectives:

1. Deliver robust mobile business applications and integrate them with enterprise systems
2. Create intuitive, reliable software using activities, services, and intents
3. Design UIs that work seamlessly with a range of phones and tablets
4. Integrate applications with enterprise web and location-based services.

Unit – I

Introduction to Android Introduction to Android Brief history of Android What is Android? Why is Android important? What benefits does Android have? What is OHA? Why to choose Android? Software architecture of Android Advantages of Android Android features Android market Comparing Android with other platform Terms and acronyms

Unit – II

Installation and Configuration of Android Details about the software requirement Download and installation process of eclipse Download and installation process of JDK Installation of ADT plugin for eclipse Download and installation process of Android SDK Configuration of ADT plug-in for eclipse How to select Android version? Step to create new project? Running your application Creation of new AVD

Unit –III

Getting Started How to select Android version? Step to create new project Running Your Application Creation of New AVD Creating run configuration creating your first Android activity List of basic sample programs

Introductions to Application Components. Activities Services Broadcast receivers Content providers Intents Notifications Activating and shutting down components Brief idea about manifest file Brief idea about activities and Task

Unit –IV

Android Component Life Cycle Activity Life Cycle with sample program Service Life Cycle with sample program 6. Android Layouts What are views, Layouts and there classification? How Android Draws views and Layout? Classification Table Layout ln detail with Example Tab Layout ln detail with Example Frame Layout ln detail with Example Absolute Layout ln detail with Example Linear Layout in detail with Example

Unit –V

Android Views Grid View In detail With Example Map View In detail with Example Cont. Sub Topical Views Web View In detail with Example Spinner In detail with Example Gallery In detail with Example Google Map View In detail with Example Introduction to creating activity user with views Different ways of creating views Using xml , Working with data storage, Shared preferences Preferences activity, Files access, SQLite database, View animation Drawable animation, Service lifecycle Foreground service, Preparing for publishing Signing and preparing the graphics• Publishing to the Android Market

TEXTBOOKS

- *Java: A beginner's guide. Herb Schildt*
- *Reto Meier,Professional Android 2 Application Development*

REFERENCE BOOKS

- *Java: A beginner's guide. Herb Schildt*
- *Reto Meier,Professional Android 2 Application Development*

Learning Outcomes:

Upon successful completion of this course, students will be able to

1. Install and configure Android application development tools.
2. Design and develop user Interfaces for the Android platform.
3. Save state information across important operating system events.
4. Apply Java programming concepts to Android application development

PROGRAM ELECTIVES (PE)

MCIA PE1011 Software Quality Engineering

Course objectives

1. Explore software project management activities from product concept through development based upon case studies and best practices.

UNIT-I:

Introduction Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics

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UNIT-II: Software Quality Metrics Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

UNIT-III: Software Quality Management and Models Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models,

Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

UNIT-IV: Software Quality Assurance Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

UNIT-V: Software Verification, Validation & Testing: Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

Books:

1. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345-7.

2. Metrics and Models in Software Quality Engineering, Stephen H. Kan, AddisonWesley (2002), ISBN: 0201729156

Course Learning Outcome

1. An Ability To Apply Knowledge Of Mathematics, Science, And Engineering.
2. An Ability To Design And Conduct Experiments, As Well As To Analyze And Interpret Data.
3. An Ability To Design A System, Component, Or Process To Meet Desired Needs Within Realistic Constraints Such As Economic, Environmental, Social, Political, Ethical, Health And Safety, Manufacturability, And Sustainability.
4. An Ability To Function On Multi-Disciplinary Teams.
5. An Ability To Identify, Formulate, And Solve Engineering Problems.
6. An Understanding Of Professional And Ethical Responsibility.
7. An Ability To Communicate Effectively.
8. A Knowledge Of Contemporary Issues.
9. An Ability To Use The Techniques, Skills, And Modern Engineering Tools Necessary For Engineering Practice.

MCIA PE1012 Software Project Management

Course objectives

1. Explore software project management activities from product concept through development based upon case studies and best practices.

UNIT I-

PROJECT CONCEPTS AND ITS MANAGEMENT (12 hours)

Project life cycle models-ISO 9001 model-Capability Maturity Model-Project Planning-Project tracking-Project closure. Evolution of Software Economics – Software Management Process Framework: Phases, Artifacts, Workflows, Checkpoints – Software Management Disciplines: Planning / Project Organization and Responsibilities / Automation / Project Control – Modern Project Profiles

UNIT II-COST ESTIMATION (12 hours)

Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model) – Estimating Web Application Development – Concepts of Finance, Activity Based Costing and Economic Value Added (EVA) – Balanced Score Card

UNIT III-SOFTWARE QUALITY MANAGEMENT (12 hours)

Software Quality Factors – Software Quality Components – Software Quality Plan – Software Quality Metrics – Software Quality Costs – Software Quality Assurance Standard – Certification – Assessment.

UNIT IV-SOFTWARE MANAGEMENT AND METRICS (12 hours)

Software Configuration Management – Risk Management: Risk Assessment: Identification / Analysis / Prioritization – Risk Control: Planning / Resolution / Monitoring – Failure Mode and Effects Analysis (FMEA) – Defect Management – Cost Management. Software Metrics – Classification of Software Metrics: Product Metrics: Size Metrics, Complexity Metrics, Halstead's Product Metrics, Quality Metrics, and Process metrics.

UNIT V-PROJECT EVALUATION AND EMERGING TRENDS (12 hours)

Strategic Assessment–Technical Assessment–Cost Benefit Analysis–Cash Flow Forecasting– Cost Benefit Evaluation Technique–Risk Evaluation–Software Effort Estimation. Emerging Trends: Import of the internet on project Management –people Focused Process Models.

Course Learning Outcome

As a result of successfully completing this course, the student will understand the unique considerations of the software development life cycle that impact project management. More specifically, the student will learn about best practices in the field. As a result of this study, the student will be able to leverage templates and skills to become one of the top project managers in the latest methodologies available in software project management with core knowlwdge on the following

1. To understand Software Project Models and Software Management Concepts.
2. To understand the various methods of Cost Estimation.

3. To Study about Software Quality Management
4. To Study about Software Metrics.
5. To understand Project Evaluation.

MCIA PE1131 (SOFT COMPUTING)

Course Objectives:

Introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world problems.

Unit – I

NEURAL NETWORKS: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptron, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit – II

FUZZY LOGIC: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.
OPERATIONS ON FUZZY SETS: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.
FUZZY ARITHMETIC: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Unit – III

FUZZY LOGIC: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges Uncertainty based Information: Information & Uncertainty,
INFERENCING: Mamadani and T-S models
APPLICATION OF FUZZY LOGIC: Medicine, Economics etc.

Unit – IV

Neuro-Fuzzy Systems: Introduction to Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks.

Unit – V

EVOLUTIONARY OPTIMIZATION TECHNIQUES: Genetic Algorithm: An Overview, GA in problem solving, Implementation of GA, Particle Swarm Optimization.

TEXTBOOKS

- *J. A. Anderson, An Introduction to Neural Networks, PHI, 1999.*

- *Hertz J. Krogh, R.G. Palmer, Introduction to the Theory of Neural Computation, Addison-Wesley, California, 1991.*
- *G.J. Klir & B. Yuan, Fuzzy Sets & Fuzzy Logic, PHI, 1995.*

REFERENCE BOOKS

- *J. A. Freeman, D.M. Skapura, Neural Networks: Algorithms, Applications and Programming Techniques, Addison Wesley, 1992.*
- *Melanie Mitchell, An Introduction to Genetic Algorithm, PHI, 1998.*

Learning Outcomes

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. Recognize the feasibility of applying a soft computing methodology for a particular problem
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
4. Apply genetic algorithms to combinatorial optimization problems
5. Apply neural networks to pattern classification and regression problems
6. Effectively use existing software tools to solve real problems using a soft computing approach
7. Evaluate and compare solutions by various soft computing approaches for a given problem.

MCIA PE1132 Machine learning

Course Objectives:

1. To provide a broad survey of approaches and techniques in machine learning;
2. To develop a deeper understanding of several major topics in machine learning;
3. To develop the design and programming skills that will help you to build intelligent, adaptive artifacts;
4. To develop the basic skills necessary to pursue research in machine learning.

1. **Introduction**

   Chapter 1. Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation.

2. **Inductive Classification**

   Chapter 2. The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific

hypotheses. Version spaces and the candidate elimination algorithm. Learning conjunctive concepts. The importance of inductive bias.

3. **Decision Tree Learning**

   Chapter 3. Representing concepts as decision trees. Recursive induction of decision trees. Picking the best splitting attribute: entropy and information gain. Searching for simple trees and computational complexity. Occam's razor. Overfitting, noisy data, and pruning.

4. **Ensemble Learning** . Bagging, boosting, and DECORATE. Active learning with ensembles.

5. **Experimental Evaluation of Learning Algorithms**

   Chapter 5. Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.

6. **Computational Learning Theory**

   Chapter 7. Models of learnability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training. Sample complexity for finite hypothesis spaces. PAC results for learning conjunctions, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension.

7. **Rule Learning: Propositional and First-Order**

   Chapter 10. Translating decision trees into rules. Heuristic rule induction using separate and conquer and information gain. First-order Horn-clause induction (Inductive Logic Programming) and Foil. Learning recursive rules. Inverse resolution, Golem, and Progol.

8. **Artificial Neural Networks**

   Chapter 4. Neurons and biological motivation. Linear threshold units. Perceptrons: representational limitation and gradient descent training. Multilayer networks and backpropagation. Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.

9. **Support Vector Machines**

   (Paper handouts) Maximum margin linear separators. Quadractic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.

10. **Bayesian Learning**

    Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logisitic regression. Bayes nets and Markov nets for representing dependencies.

11. **Instance-Based Learning**

    Chapter 8. Constructing explicit generalizations versus comparing to past specific examples. k-Nearest-neighbor algorithm. Case-based learning.

12. **Text Classification**

    Bag of words representation. Vector space model and cosine similarity. Relevance feedback and Rocchio algorithm. Versions of nearest neighbor and Naive Bayes for text.

13. **Clustering and Unsupervised Learning**

Learning from unclassified data. Clustering. Hierarchical Aglomerative Clustering. k-means partitional clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabled data.

14. **Language Learning**

(paper handouts) Classification problems in language: word-sense disambiguation, sequence labeling. Hidden Markov models (HMM's). Veterbi algorithm for determining most-probable state sequences. Forward-backward EM algorithm for training the parameters of HMM's. Use of HMM's for speech recognition, part-of-speech tagging, and information extraction. Conditional random fields (CRF's). Probabilistic context-free grammars (PCFG). Parsing and learning with PCFGs. Lexicalized PCFGs.

Learning Outcomes

1. Develop an appreciation for what is involved in learning from data.
2. Understand a wide variety of learning algorithms.
3. Understand how to apply a variety of learning algorithms to data.
4. Understand how to perform evaluation of learning algorithms and model selection.

MCIA PE1013 (SOFTWARE TESTING)

Course Objectives:

1. To ensure that it fulfills all the requirements of the customer, which means firstly understanding the customer requirements and then ensuring it behaves in the similar manner
2. To find out the defects or issues occurring in the application before it is encountered by the end user.
3. To evaluate the overall performance of application.
4. Providing a high quality product to the end user.
5. To evaluate security related issues for the application under test.
6. Creating a strong test scenario which in turn ensures that not a single scenario is missed.
7. Re-factoring the legacy test scenarios according to changed/updated functionality of the application as per the changing requirements of the end user.

Unit – I

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

Unit – II

White Box and Black Box Testing: White box testing, static testing, static analysis tools, Structural testing: Unit/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

Unit – III

Integration, System, and Acceptance Testing: Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution

Unit – IV

Test Selection & Minimization for Regression Testing: Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic

Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

Unit – V

Test Management and Automation: Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented Systems.

TEXT BOOK

- *S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.*
- *Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.*

REFERENCES BOOKS

- *Naik and Tripathy, "Software Testing and Quality Assurance", Wiley*
- *K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.*

Learning Outcomes

1. Various test processes and continuous quality improvement
2. Types of errors and fault models
3. Methods of test generation from requirements
4. Behavior modeling using UML: Finite state machines (FSM)
5. Test generation from FSM models
6. Input space modeling using combinatorial designs
7. Combinatorial test generation
8. Test adequacy assessment using: control flow, data flow, and program mutations
9. The use of various test tools
10. Application of software testing techniques in commercial environments

MCIA PE1021 (CRYPTOGRAPHY AND NETWORK SECURITY)

Course Objectives:

1. To understand the fundamentals of Cryptography
2. To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
3. To understand the various key distribution and management schemes.
4. To understand how to deploy encryption techniques to secure data in transit across data networks
5. To design security applications in the field of Information technology

Unit – I

INTRODUCTION: Introduction to security attacks, services and mechanism, introduction to cryptography.

CONVENTIONAL ENCRYPTION: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers.

MODERN BLOCK CIPHERS: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryption and decryption, strength of IDEA, confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Unit – II

MATHEMATICAL FOUNDATION: ring and field, prime and relative prime numbers, modular arithmetic, Fermat's and Euler's theorem, Euclid's Algorithm, Chinese Remainder theorem, discrete logarithms.

Principals of public key crypto systems, RSA algorithm, security of RSA, key management, Diffie–Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, ElGamal encryption.

Unit – III

MESSAGE AUTHENTICATION AND HASH FUNCTION: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA).

DIGITAL SIGNATURES: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

Unit – IV

AUTHENTICATION APPLICATIONS: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME.

Unit – V

IP SECURITY: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET). System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems.

TEXTBOOKS

- *William Stallings, Cryptography and Network Security: Principals and Practice", Prentice Hall, New Jersy.*
- *Johannes A. Buchmann, Introduction to Cryptography, Springer-Verlag.*

REFERENCE BOOKS

- *Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security: Private Communication in Public World, 2nd Edition, Pearson Education.*
- *Atul Kahate, Cryptography and Network Security, TMH, 2003.*

Learning Outcomes:

1. To know about various encryption techniques.
2. To understand the concept of Public key cryptography.
3. To study about message authentication and hash functions
4. To impart knowledge on Network security

MCIA PE1022 E-commerce and Social Networking Applications

Course Objectives:

Unit 1: Introduction to E-Commerce: Defining Commerce; Main Activities of Electronic Commerce; Benefits of E-Commerce; Broad Goals of Electronic Commerce; Main Components of E-Commerce; Functions of Electronic Commerce – Communication, Process Management, Service Management, Transaction Capabilities; Process of E-Commerce; Types of E-Commerce; Role of Internet and Web in E-Commerce; Technologies Used; E-Commerce Systems; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models.

Unit 2: E-Commerce Activities: Various Activities of E-Commerce; Various Modes of Operation Associated with E-Commerce; Matrix of E-Commerce Types; Elements and Resources Impacting E-Commerce and Changes; Types of E-Commerce Providers and Vendors; Man Power Associated with E-Commerce Activities; Opportunity Development for E-Commerce Stages; Development of E-Commerce Business Case; Components and Factors for the Development of the Business Case; Steps to Design and Develop an E-Commerce Website.

Unit 3: Internet – The Backbone for E-Commerce: Early Ages of Internet; Networking Categories; Characteristics of Internet; Components of Internet – Internet Services, Elements of Internet, Uniform Resource Locators, Internet Protocol; Shopping Cart, Cookies and E-Commerce; Web Site Communication; Strategic Capabilities of Internet.

Unit 4: ISP, WWW and Portals: Internet Service Provider (ISP); World Wide Web (WWW); Portals – Steps to build homepage, Metadata; Advantages of Portal; Enterprise Information Portal (EIP).

Unit 5: Reference Models: Open Systems Interconnection (OSI) Model – Physical layer, Data link layer, Network layer, Transport layer, Session layer, Presentation layer, Application layer; Transmission Control Protocol (TCP) / Internet Protocol (IP) Model; Protocol – Internet Protocol (IP), User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Dynamic Host Configuration Protocol (DHCP), Hyper Text Transfer Protocol (HTTP), File Transfer Protocol (FTP), Telnet, Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP).

Unit 6: Electronic Payment Systems

Unit 7: E-Marketing: Traditional Marketing; E-Marketing; Identifying Web Presence Goals – Achieving web presence goals, Uniqueness of the web, Meeting the needs of website visitors, Site Adhesion: Content, format and access; Maintaining a Website; Metrics Defining Internet Units of Measurement; Online Marketing; Advantages of Online Marketing.

Unit 8: E-Security: Security on the Internet; Network and Website Security Risks – Denial-of-Service attacks, Viruses, Unauthorized access to a computer network; Vulnerability of Internet Sites; Network and Website Security – Transaction security and data protection, Security audits and penetration testing; E-Business Risk Management Issues; Firewall – Network policy, Advanced authentication mechanism, Packet filtering, Application gateways; Defining Enterprise Wide Security Framework.

U**nit 9: E-Payment Systems: Electronic Funds Transfer; Digital Token B**ased E-Payment Systems; Modern Payment Systems; Steps for Electronic Payment; Payment Security; Net Banking.

Unit 10: E-Customer Relationship Management: Customer Relationship Management (CRM) – Marketing automation, Enterprise customer management; Customer Relationship Management Areas; CRM Processes; Architectural Components of a CRM Solution – Customer's information repository, Campaign management, Event triggers, business logic and rules repository, Decision support tools, Higher level statistical analysis, Forecasting and planning tools, True channel management, Workflow management, Collateral management; Electronic Customer Relationship Management; Need, Architecture and Applications of Electronic CRM.

Unit 11: Supply Chain Management: Supply Chain Management (SCM); Goals of SCM; Functions of SCM; Strategies of SCM; Electronic SCM and its benefits; Components of Electronic SCM; Electronic Logistics and its Implementation.

Unit 12: Wireless Application Protocol: Wireless Application Protocol (WAP); Architecture of WAP; Working of WAP; Wireless Technologies; Generations in Wireless Communications; Security Issues related to Wireless Communications; Mobile Computing in Four Dimensions; Wireless Millennium.

Unit 13: Knowledge Management: Knowledge Management and its Goals; Collaborative Computing and Knowledge Management; Knowledge Management Tools; Features of Knowledge Management Tools; Knowledge Creating Process; Knowledge Management Strategies for Different Organizations; Knowledge Management in Research and Development Organizations.

Unit 14: Implementation of E-Commerce: WWW.EBAY.COM - B2C Website – Registration, Time factor, Bidding process, Growth of eBay; PayPal – New Trend in Making Payments Online; National Electronic Funds Transfer.

Learning Outcomes:

1. Find and assess e-commerce web sites for quality, reliability and effectiveness;
2. Evaluate e-commerce markets and transactions, including supply chains;
3. Assess the effect of changing technology on traditional business models and strategy;
4. Assess the impact e-commerce is having on how firms are organized and behave;
5. Consider ethical and legal issues related to e-commerce technologies such as manipulation of graphic and sound information, privacy and control of electronic media;

MCIA PE1141 (MOBILE COMPUTING)

Course Objectives:

6. To provide guidelines, design principles and experience in developing applications for small, mobile devices, including an appreciation of context and location aware services
7. To develop an appreciation of interaction modalities with small, mobile devices (including interface design for non-standard display surfaces) through the implementation of simple applications and use cases.
8. To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.
9. To understand the use of transaction and e-commerce principles over such devices to support mobile business concepts
10. To appreciate the social and ethical issues of mobile computing, including privacy.

Unit – I

Introduction to Mobile Communications and Computing : Mobile Computing (MC) : Introduction to MC, novel applications, limitations, and architecture. GSM : Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

Unit – II

Wireless Medium Access Control : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

Unit – III

Mobile Network Layer : Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Unit – IV

Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Unit – V

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, pushbased mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

TEXTBOOKS

- *Jochen Schiller, "Mobile Communications," Addison-Wesley, 2009.*
- *Frank Adelstein & Sandeep Ks Gupta, Fundamentals of Mobile & Pervasive Computing, TMH.*

REFERENCE BOOKS

- *R. Dayem, Mobile Data & Wireless Lan Technologies, Prentice-Hall, 2005.*
- *Charles Perkins, Ad hoc Networks, Addison Wesley*

Learning Outcomes:

1. At the end of the module, the student will be able to demonstrate:
2. A working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities
3. The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
4. A comprehension and appreciation of the design and development of context-aware solutions for mobile devices.
5. An awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behaviour.

MCIA PE1142 (WIRELESS COMMUNICATION AND NETWORKS)

Course Objective:

4. This course is intended to introduce to students into the basics of wireless systems – concepts, theory, limitation and costs of systems mainly for VHF and above.
5. To have an understanding of various multiple access techniques and the cellular concept as well as some 2G and 3G systems.
6. To identify the requirements of mobile communication as compared to static communication.

Unit – I: Introduction to Basic Principles

Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications.

Unit – II: Cellular Concept

Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems. Cellular telephony: frequency reuse principle, transmitting, receiving, roaming, GSM network architecture, GSM channel structure, GPRS.

Unit – III: Mobile radio propagation

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

Unit – IV: Second Generation and Third Generation Wireless Networks and Standards

WLL, Bluetooth. AMPS, GSM, IS-95 and DECT Satellite networks: orbits, footprint, categories of satellites. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

Unit – V: Introducing the Mobile Internet

Key Services for the mobile Internet, Business opportunities. WAP: the Mobile Internet Standard: Challenges and Pitfalls, Overview of the Wireless Application Protocol, Implementing WAP Services: The Wireless Markup Language, Enhanced WML: WML Script and WTAI,

Text books:

3. T.S.Rappaport, “Wireless Communications: Principles and Practice”, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.
4. R. Blake, “Wireless Communication Technology”, Thomson Delmar, 2003.

Reference books:

3. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications”, Second Edition, McGraw-Hill International, 1998.
4. Stephen G. Wilson, “Digital Modulation and Coding”, Pearson Education, 2003.

Learning Outcomes:

Upon successful completion of this course, students will be able to

6. Summarize the principles and applications of wireless systems and standards.
7. Discuss the cellular system design and technical challenges.
8. Analyze the Mobile radio propagation, fading, diversity concepts and the channel modeling.
9. Analyze Multiuser Systems, CDMA, WCDMA network planning and OFDM Concepts.
10. Describe and differentiate four generations of wireless standard for cellular networks

MCIA PE1143 OBJECT ORIENTED ANALYSIS AND DESIGN

Unit-1: Overview of Object Oriented Systems Development: Two Orthogonal Views of the Software, Concept of Object Oriented Software, Importance of Object Oriented Software, Object Oriented Future, Object Oriented Systems Development Methodology, Overview of Unified Approach.

Unit-2: Object Basics*:* An Object Oriented Philosophy, Objects, Object Behavior, Object Oriented Properties, Association and Aggregation.

Unit-3: Object Oriented Systems Development Life Cycle: The Process of Software Development, Developing Good Quality Software, Use Case Driven Approach for Object Oriented Systems Development, Reusability.

Unit-4: Object Oriented Methodologies: Introduction, Types of Object Oriented, Methodologies, Patterns, Unified Approach.

Unit-5:Unified Modeling Languages (UML): Overview of Unified Modeling Language (UML), Static and Dynamic Models, UML Diagrams, UML Class Diagrams, Use-Case Diagrams, UML Dynamic Modeling, Implementation diagrams, Model Management: Package and Model Organization, UML Extensibility, UML Meta-Model.

Unit-6: Object Oriented Analysis – Identifying Use-Cases: Complexity in Object Oriented Analysis, Business Process Modeling and Business Object Analysis, Use-Case Driven Object Oriented Analysis, Use-Case Model, Developing Efficient Documentation.

Unit-7: Object Analysis: Classification: Object Analysis, Classification Theory, Approaches for Identifying Classes, Class Responsibility Collaboration.

Unit-8: Object Oriented Analysis – Identifying Relationships, Attributes, and Methods: Introduction, Associations, Inheritance Relationships, A Part of Relationship-Aggregation, Class Responsibility: Identifying Attributes and Methods, Class Responsibility: Defining Attributes, Object Responsibility: Methods and Messages.

Unit-9: Object Oriented Design Process and Design Axioms: Design Process, Design Axioms, Corollaries, Design Patterns.

Unit-10: Designing Classes: The Object Oriented Design Principles, UML Object Constraint Language (OCL), Strategies for Designing Classes, Class Visibility: Designing Public Private and Protected Protocols, Designing Classes: Refining Attributes, Designing Methods and Protocols, Packages and Managing Classes.

Unit-11: Access Layer: Object Store and Persistence, Database Management Systems, Logical and Physical Database Organization and Access Control, Object Oriented Database Management Systems (OODBMS), Object Relational Systems, Designing Access Layer Classes.

Unit-12: View Layer: User Interface Design as a Creative Process, Designing View Layer Classes, Purpose of a View Layer Interface, Prototyping the User Interface.

Unit-13: Software Quality Assurance: Quality Assurance Tests, Software Testing Techniques, Testing Strategies, Impact of Object Orientation on Testing, Test Cases, Test Plan, Myer's Debugging Principles.

Unit-14: System Usability and Measuring User Satisfaction: Usability Testing, User Satisfaction Test, Analyzing User Satisfaction by Satisfaction Test Template, Developing Usability Test Plans and Test Cases.

MCIA PE1023 (DISTRIBUTED SYSTEMS)

1. Present the principles underlying the function of distributed systems and their extension to grid and cloud computing and virtualization techniques
2. Create an awareness of the fundamental technical challenges in advanced distributed systems design and implementation;
3. Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles and paradigms, including grid and cloud computing;
4. Enhance students' understanding of key issues related to multi-level interoperability across a distributed infrastructure and across multiple heterogeneous and distributed resources in a dynamically changing computing environment;
5. Expose students to past and current research issues in the field of distributed systems and new challenges in cloud computing; and
6. Provide experience in analyzing a distributed computing model and implementing typical algorithms used in distributed systems and distributed applications in cloud infrastructure.

Unit – I

CHARACTERIZATION OF DISTRIBUTED SYSTEMS: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges.
SYSTEM MODELS: Architectural models, Fundamental Models,
THEORETICAL FOUNDATION FOR DISTRIBUTED SYSTEM: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.
DISTRIBUTED MUTUAL EXCLUSION: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Unit – II

DISTRIBUTED DEADLOCK DETECTION: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.
AGREEMENT PROTOCOLS: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Unit – III

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.
Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.
Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Unit – IV

TRANSACTIONS AND CONCURRENCY CONTROL: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.
DISTRIBUTED TRANSACTIONS: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.
Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Unit – V

DISTRIBUTED ALGORITHMS: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. CORBA Case Study: CORBA RMI, CORBA services.

TEXTBOOKS

- *Singhal & Shivaratri, Advanced Concept in Operating Systems, McGraw Hill.*
- *Coulouris, Dollimore, & Kindberg, Distributed System: Concepts and Design, Pearson.*

REFERENCE BOOKS

- *Gerald Tel, Distributed Algorithms, Cambridge University Press.*

MCIA PE1133 (BIG DATA ANALYTICS)

Course Objectives:

1. Understand the Big Data Platform and its Use cases
2. Provide an overview of Apache Hadoop
3. Provide HDFS Concepts and Interfacing with HDFS
4. Understand Map Reduce Jobs
5. Provide hands on Hodoop Eco System
6. Apply analytics on Structured, Unstructured Data.
7. Exposure to Data Analytics with R.

Unit – I

INTRODUCTION: Introduction to BigData Platform , Challenges of Conventional Systems, Intelligent data analysis , Nature of Data, Analytic Processes and Tools, Analysis vs Reporting, Modern Data Analytic Tools.

STATISTICAL CONCEPTS: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error.

Unit – II

MINING DATA STREAMS: Introduction To Streams Concepts , Stream Data Model and Architecture , Stream Computing , Sampling Data in a Stream , Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments , Counting Oneness in a Window, Decaying Window, Real time Analytics Platform(RTAP) Applications , Stock Market Predictions.

Unit – III

HADOOP: History of Hadoop, The Hadoop Distributed File System, Components of Hadoop, Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFSBasics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features.

Unit – IV

HADOOP ENVIRONMENT: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration-Security in Hadoop, Administering Hadoop, HDFS – Monitoring Maintenance-Hadoop benchmarks, Hadoop in the cloud

Unit – V

FRAMEWORKS: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper, IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.

TEXTBOOKS

- *Michael Minelli , Michele Chambers , Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013.*
- *Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, TMH, 2011.*

REFERENCE BOOKS

- *Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.*
- *Tom White, Hadoop: The Definitive Guide, 3rd Edition, O'reilly Media, 2012.*

Learning out comes:

1. Identify Big Data and its Business Implications.
2. List the components of Hadoop and Hadoop Eco-System
3. Access and Process Data on Distributed File System
4. Manage Job Execution in Hadoop Environment
5. Develop Big Data Solutions using Hadoop Eco System
6. Analyze Infosphere BigInsights Big Data Recommendations.
7. Apply Machine Learning Techniques using R.

OPEN ELECTIVES (OE)

MCIA OE911 (ACCOUNTING AND FINANCIAL MANAGEMENT)

Unit – I

Introduction: Basics of accounting, Accounting equation, Conventions underlying preparation of Financial Statements-balance sheet, profit and loss statement; accounting processes; basic accounts, trail balance and financial statements; issues such as provisions for bad debts tax, dividends, losses such as bad debts, missing information, classification effect, cost of assets, rentals etc.;

Unit – II

Income measurement (revenue; recognition and matching cost and revenues; inventory valuation); Depreciation Accounting; Intangible assets Accounting; Understanding published annual accounts including funds flow statement.

Unit – III

Basic Cost Concept: Cost classification; allocation, appointment, and absorption; Cost analysis for Managerial Decisions (direct costing, break-even analysis; relevant costs; pricing; pricing-joint costs; make or buy; relevant fixed costs and sunk costs), Cost Analysis for control (standard costing; variances; material, labor, overhead, sales and profit); Standard Cost Accounting (budgeting and control; elements of budgeting; control of manufacturing and manufacturing expenses; performance appraisal, evaluation of cost control systems).

Unit – IV

Financial Management: Introduction to Management Control systems; Goals, Strategies, and Key variables; Finance function (concepts, scope and its relationship with other functions), Tools of financial analysis (funds and cash flow analysis, ration-analysis);

Unit – V

Financial forecasting (cash flow forecasting under uncertainty, financial planning), Estimation and management of working capital (operation cycle concepts, inventory, accounts receivables, cash and accounts payables, working capital requirements).

TEXT BOOKS

- *Robbins, Essentials of Management, Pearson Education*

REFERENCE BOOKS

- *Bhattacharya, S.K., and Dearden, John, Accounting for Management, Prentice Hall of India, New Delhi.*
- *Chadwick, The Essence of Financial Accounting, Prentice Hall of India, New Delhi.*

MCIA OE1123 Sustainable Development and Green Computing

Course Objectives:

Upon completion of the course, students should be able to:

1. Give an account of the concept green IT,
2. Give an account of environmental perspectives on IT use,
3. Give an account of standards and certifications related to sustainable IT products,
4. Describe green IT in relation to technology,

Unit – I

Overview and Issues:

Problems: Toxins, Power Consumption, Equipment Disposal,Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power.
Initiatives and Standards:Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia,Europe, WEEE Directive, RoHS, National Adoption, Asia: Japan,China, Korea.

Unit – II

Minimizing Power Usage:

Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, LowPower Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software.

Cooling:

Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised
Floors, Cable Management, Vapour Seal, Prevent Recirculation of Equipment Exhaust, Supply Air Directly to Heat Sources, Fans, Humidity, Adding Cooling, Fluid Considerations, System Design,
Datacentre Design, Centralized Control, Design for Your Needs, Put Everything Together.

Unit – III

Changing the Way of Work: Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Teleworkers and Outsourcing, Telecommuting, Outsourcing, how to Outsource.
Going Paperless: Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include,
Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles.

Unit – IV

Recycling:

Problems, China, Africa, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One,Checklist, Certifications, Hard Drive Recycling, Consequences,
cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online Hardware Considerations:
Certification Programs, EPEAT, RoHS, Energy Star, Computers Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers, Consolidation, Products, Hardware Considerations, Planned Obsolescence, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection, In Practice

Unit – IV

V Greening Your Information Systems:

Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling. Staying Green Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyse Data, Conduct Audits, Certifications, Benefits, Realities, Helpful Organizations

Learning out comes

The new syllabus is aimed to achieve the objectives. The syllabus spanning three years covers the industry relevant courses.The students will be ready for the jobs available in different fields like:

- Software Development (Programming)
- Website Development
- Mobile app development
- Embedded Systems Programming
- Embedded Systems Development
- Software Testing
- Networking
- Database Administration
- System Administration
- Cyber Law Consultant
- GIS (Geographic Information Systems)

- IT Service Desk

REFERENCE BOOKS

- Green IT Toby Velte,Anthony Velte,Robert Elsenpeter McGraw Hill,2008

- Green Data Center: Steps for the Journey,Alvin Galea,Michael Schaefer,Mike Ebbers Shroff Publishers and Distributers 2011

MCIA OE912 (ORGANIZATIONAL STRUCTURE AND PERSONAL MANAGEMENT)

Unit – I

Classical theories: Classical theories of organization-Elements of Weber's Ideal Bureaucracy, Henry Fayol's Principles of Management, Principles of Scientific Management. Organisation-Definitions, Features/Characteristics of organization, Types of organization-Formal Organisations, Informal Organisations, Features of Formal and Informal organizations; Organisatinal Goals/Objectives-General objectives and Specific objectives, Merits of objectives.

Unit – II

Organisational Behaviour: Definition, Disciplines contributing to the Organisational Behaviour field. Knowledge to management practices/ Role of Organisational behaviour /A managerial Perspective on Organisational Behaviour. Definition of Motivation, Maslow's need Heirarchy, Herzberg's Two-Factor Theory, Theory X and Y, Theory Z.

Unit – III

Personnel Management: Objectives and Principles of Personnel Management, Functions of Personnel Management-Managerial Functions, Operative Functions. Personnel Polices-Definition, Characteristics of a good Personnel Policy. Duties and Responsibilities of Personnel Manager, Future of Personnel Management in India.

Unit – IV

Manpower: Manpower Selection Process; Job Analysis –Job description and Job specification, Sources of Recruitment-Internal sources, External sources, Sources of recruitment commonly used in India. Selection Procedure: Steps in selection process, Qualities of a Personnel Manager

Unit – V

Human Resource: Objective and Scope of Human Resource Management, Functions of Human Resource Management. Purpose of Training and Development, Importance and Objective of Manpower/ Human Resource Training and Development.

TEXT BOOKS

- *Organizational Behavior: L.M. Prasad*
- *Organizational Behavior: Gregory Moorhead & Ricky W. Griffin*

REFERENCE BOOKS

- *Organizational Behavior: Stephen P. Robbins*
- *Human Resource & Personnel Management: K. Aswathappa*
- *Personnel Management: Edwin B. Flippo.*
- *Personnel Management: Garry Dessier.*