

ADIKAVI NANNAYA UNIVERSITY

BCA Under CBCS with effect from the academic year 2016-2017 course of study

Table-5: B.C.A. SEMESTER – V

Sno	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours	Credits
1	Skill Development Course – Subject Seminar	50	0	50	2	2
2	Network Security	100	25	75	5	4
3	Software Engineering	100	25	75	5	4
4	OOAD	100	25	75	5	4
Elective – 1						
5.1	Data Mining & Ware Housing	100	25	75	3	2
5.2	Computer Networks					
5.3	Computer Forensics					
Elective – 2						
6.1	Android Basics	100	25	75	3	2
6.2	Principles of Animation					
6.3	Software Testing Methodologies					
Elective – 1 (LAB)						
7.1	Data Mining Lab	50	0	50	2	2
7.2	Computer Networks Lab					
7.3	Cyber Forensics Lab					
Elective – 2 (Lab)						
8.1	Android Basics Lab	50	0	50	2	2
8.2	Computer Animation Lab					
8.3	Testing Tools Lab					
Total		650			27	22

ADIKAVI NANNAYA UNIVERSITY

BCA Under CBCS with effect from the academic year 2016-2017 course of study

Table-6: B.C.A. SEMESTER – VI

Sno	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours	Credits
1	Skill Development Course – 2 Seminar on Project	50	0	50	2	2
2	Ecommerce	100	25	75	5	4
3	Open Source Software	100	25	75	5	4
4	Cloud Computing	100	25	75	5	4
Elective – 1						
5.1	Hadoop & R Language	100	25	75	5	4
5.2	Network programming					
5.3	Cyber Laws					
Elective – 2						
6.1	Advanced Android	100	0	50	5	4
6.2	Design of Video Games					
6.3	Advanced Software Testing					
Project Lab						
7	Main Project	100	0	100	2	2
Total		650			29	24

BCA III Year V Semester

NETWORK SECURITY

Course Objectives:

1. Understand Security: Attacks, Services & Mechanisms
2. Study of various security algorithm available for security and protection
3. Ciphering of plain text
4. Study of conventional encryption algorithm, key management issues
5. Cryptography and various encryption methods
6. Knowledge and implementation of hash function to messages
7. Digital signature and its importance in transaction processing
8. Concept of network security, directory authentication, e-mail
9. Viruses and their implication to business applications
10. Firewalls and network security principle

UNIT – I

INTRODUCTION:OSI Security Architecture - Classical Encryption techniques - Cipher Principles - Data Encryption Standard - Block Cipher Design Principles and Modes of Operation.

UNIT - II

PUBLIC KEY CRYPTOGRAPHY: Key Management - Diffie-Hellman key Exchange - Elliptic Curve Architecture and Cryptography - Introduction to Number Theory - Confidentiality using Symmetric Encryption - Public Key Cryptography and RSA.

UNIT – III

AUTHENTICATION AND HASH FUNCTION: Authentication requirements - Authentication functions - Message Authentication Codes - Hash Functions.

UNIT - IV

NETWORK SECURITY : Authentication Applications: Kerberos - X.509 Authentication Service - Electronic Mail Security - PGP - S/MIME - IP Security - Web Security.

UNIT – V

SYSTEM LEVEL SECURITY: Intrusion detection - password management - Viruses and related Threats - Virus Counter measures - Firewall Design Principles - Trusted Systems.

REFERENCES

1. William Stallings, "Cryptography And Network Security - Principles and Practices", Prentice Hall of India, Third Edition, 2003.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
3. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
4. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.

Student Activity:

1. Create password verification using images
2. Create password verification using multimedia

**BCA III Year V Semester
Software Engineering**

Course Objectives

The Objective of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project.

Course outcomes

1. Ability to gather and specify requirements of the software projects.
2. Ability to analyze software requirements with existing tools
3. Able to differentiate different testing methodologies
4. Able to understand and apply the basic project management practices in real life projects
5. Ability to work in a team as well as independently on software projects

UNIT I

INTRODUCTION: Software Engineering Process paradigms - Project management - Process and Project Metrics – software estimation - Empirical estimation models – Planning.

UNIT II

REQUIREMENTS ANALYSIS: Requirement Engineering Processes – Feasibility Study – Problem of Requirements – Software Requirement Analysis – Analysis Concepts and Principles – Analysis Process – Analysis Model

UNIT III

SOFTWARE DESIGN:Software design - Abstraction - Modularity - Software Architecture - Effective modular design - Cohesion and Coupling - Architectural design and Procedural design - Data flow oriented design.

UNIT IV

USER INTERFACE DESIGN AND REAL TIME SYSTEMS :User interface design - Human factors - Human computer interaction - Human - Computer Interface design - Interface design - Interface standards.

UNIT V

SOFTWARE QUALITY AND TESTING :Software Quality Assurance - Quality metrics - Software Reliability - Software testing - Path testing – Control Structures testing - Black Box testing - Integration, Validation and system testing.

REFERENCE BOOKS:

1. Roger Pressman S., “Software Engineering: A Practitioner's Approach”, 7th Edition, McGraw Hill, 2010.
2. Software Engineering Principles and Practice by Deepak Jain, Oxford University Press
3. Sommerville, “Software Engineering”, Eighth Edition, Pearson Education, 2007
4. Pfleger, “Software Engineering-Theory & Practice”, 3rd Edition, Pearson Education, 2009
5. Carlo Ghazi, Mehdi Jazayari, Dino Mandrioli, “Fundamentals of Software Engineering”, Pearson Education, 2003

Student Activity:

1. Develop requirement analysis report to develop software for any financial organization
2. Develop risk analysis report for any organization using software for its day to day transactions

**BCA III Year V Semester
OOAD**

Course Objective

- To develop background knowledge as well as core expertise in object oriented system.
- To provide the importance of the software design process.
- To assess the unified process and Unified Modeling Language

Course Outcome

- To describe the three pillars of object-orientation methodologies and explain the benefits of each .
- To create use case documents that capture requirements for a software system.
- To create class diagrams that model both the domain model and design model of a software system.
- To design the interface between the classes and objects.
- To create interaction diagrams that model the dynamic aspects of a software system.
- To understand the facets of the Unified Process approach to designing and building a software system.
- To describe how design patterns facilitate development and list several of the most popular patterns.
- To design the Axioms and corollaries.
- To build a model for the user interface (UI) of a software application
- To measure the Level of User satisfaction and software quality assurance.

UNIT I

Introduction to OOAD – What is OOAD? – What is UML? What are the United process(UP) phases - Case study – the NextGen POS system, Inception -Use case Modeling - Relating Use cases – include, extend and generalization.

UNIT II

Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class hierarchies- Aggregation and Composition.

UNIT III

UML activity diagrams and modeling - System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture

UNIT IV

UML package diagram – Logical architecture refinement - UML class diagrams - UML interaction diagrams

UNIT V

UML state diagrams and modeling - Operation contracts- Mapping design to code -UML deployment and component diagrams

REFERENCE BOOKS:

1. Object Oriented Analysis and Design By Grady Booch.
2. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005
3. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons, 2005.
4. James W- Cooper, Addison-Wesley, "Java Design Patterns – A Tutorial", 2000.
5. Micheal Blaha, James Rambaugh, "Object-Oriented Modeling and Design with UML", Second Edition, Prentice Hall of India Private Limited, 2007
6. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design patterns: Elements of Reusable object-oriented software", Addison-Wesley, 1995.

Student Activity:

1. Develop a class diagram for the flight services available in your near by air port
2. Develop a sequence diagram of activities of any automated device

BCA III Year V Semester

ELECTIVE - I

5.1 Data Mining & Ware Housing

Course Objectives

The Objective of this course is to understand data mining principles and techniques: Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modeling, and identifying new trends and behaviors. Develop and apply critical thinking, problem-solving, and decision-making skills

Course Outcomes

1. Examine the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
2. Apply preprocessing statistical methods for any given raw data
3. Discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems , make predictions of outcomes
4. Comprehend the roles that data mining plays in various fields and manipulate different data mining techniques
5. Select and apply proper data mining algorithms to build analytical applications.
6. Evaluate and implement a wide range of emerging and newly-adopted methodologies and technologies to facilitate the knowledge discovery.

Unit I

Introduction to Data Mining, Fundamentals of data mining, data mining functionalities, data and attribute types, statistical description of data.

Data Preprocessing:

Data cleaning, data integration, data reduction, data transformation and data discretization.

Unit II

Data Warehousing: Basic concepts, data ware house modeling data cube and OLAP, data warehouse design and implementation.

Unit III

Mining Frequent Patterns and Associations: Basic methods, frequent Item set mining methods any two algorithms, pattern evaluation methods.

Unit IV

Classification: Basic concepts, decision tree induction, Bayes classification, any two advanced methods, model evaluation.

Unit V

Cluster Analysis: Basic concepts, clustering structures, major clustering approaches, partitioning methods, hierarchical methods, density based methods, the expectation maximization method, cluster based outlier detection Essential Reading.

References:

1. 1.Data Mining by Vikram Pudi, P.Radha Krishna, Oxford University Press
2. Data Warehousing by Reema Thareja , Oxford University Press
3. 1.J. Han , M. Kamber and J. Pei , Data Mining: Concepts and Techniques , 3rd.ed Morgan Kaufmann, 2011
4. Introduction to data mining –G.K.Gupta, PHI
5. 3.Data mining, Data warehouse & Olap-Berson, Tata McGraw Hill

Student Activity:

- 1.Predict the course taken by a student based on his activities and way of learning
2. Learn visual patterns of any real time data

ELECTIVE – I (LAB)

7.1 Data Mining Lab

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
10. Demonstration of clustering rule process on dataset student.arff using simple k-means.

BCA III Year V Semester

ELECTIVE - I

5.2 COMPUTER NETWORKS

Course Objectives

1. To provide an introduction to the fundamental concepts on data communication and the design of computer networks.
2. To get familiarized with the basic protocols of computer networks.

Course Outcomes

After this course, the student will be able to

1. Identify the different components in a Communication System and their respective roles.
2. Describe the technical issues related to the local Area Networks
3. Identify the common technologies available in establishing LAN infrastructure.

UNIT I

Network architecture – layers – Physical links – Channel access on links – Hybrid multiple access techniques - Issues in the data link layer - Framing – Error correction and detection – Link-level Flow Control.

UNIT II

Medium access – CSMA – Ethernet – Token ring – FDDI - Wireless LAN – Bridges and switches

UNIT III

Circuit switching vs. packet switching / Packet switched networks – IP – ARP – RARP –DHCP – ICMP – Queueing discipline – Routing algorithms – RIP – OSPF – Subnetting – CIDR – Interdomain routing – BGP – Ipv6 – Multicasting – Congestion avoidance in network layer

UNIT IV

UDP – TCP – Adaptive Flow Control – Adaptive Retransmission - Congestion control – Congestion avoidance – QoS

UNIT V

Email (SMTP, MIME, IMAP, POP3) – HTTP – DNS- SNMP – Telnet – FTP – Security – PGP - SSH

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, “Computer Networks”, Fourth Edition, 2003
2. Computer Networks by Bhushan Trivedi, Oxford University Press
3. James F. Kuross, Keith W. Ross, “Computer Networking, A Top-Down Approach

Featuring the Internet”, Third Edition, Addison Wesley, 2004.

4.Nader F. Mir, “Computer and Communication Networks”, Pearson Education, 2007

5.Comer, “Computer Networks and Internets with Internet Applications”, Fourth Edition, Pearson Education, 2003.

6. William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson vi, 2000

Student Activity:

1. Learn the functioning of various network devices used in your college network
2. Compare 2G,3G,4G and 5G networks
3. Prepare LAN deployment diagram of your organization

ELECTIVE - I (LAB)

7.2 Computer Networks lab

1 Implementation of Stop and Wait Protocol and Sliding Window Protocol

2 Study of Socket Programming and Client – Server model

3 Write a code simulating ARP /RARP protocols.

4. Write a code simulating PING and TRACEROUTE commands

5. Create a socket for HTTP for web page upload and download.

6. Write a program to implement RPC (Remote Procedure Call).

7. Implementation of Subnetting.

8. Applications using TCP Sockets like

- a. Echo client and echo server b. Chat C. File Transfer

9. Applications using TCP and UDP Sockets like DNS, SNMP and File Transfer.

10. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS

11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.

BCA III Year V Semester

ELECTIVE – I

5.3 COMPUTER FORENSICS

Course Objectives

- Explain the responsibilities and liabilities of a computer forensic investigator
- Plan and prepare for an incident requiring computer forensic skills
- Seize a computer from a crime scene without damaging it or risking it becoming inadmissible in a court of law
- Explain where digital evidence resides on computer storage devices
- Hire experts to perform detailed forensic analysis and expert testimony

Course Outcomes

1. understand the role of computer forensics in the business and private world
2. identify some of the current techniques and tools for forensic examinations
3. describe and identify basic principles of good professional practice for a forensic computing practitioner
4. Apply forensic tools in different situations.

Unit I

Introduction to Computer Forensics : Computer forensics definitions ,Computers' roles in crimes ,Computer forensics tasks ,Prepare for an investigation, Collect evidence ,Preserve evidence ,Recover evidence, Document evidence Challenges associated with making "cybercrime" laws, Jurisdictional issues.

Unit II

Computer Crimes :Crimes ,Violent crimes where computers are used include terrorism, assault threat, stalking, child pornography ,Nonviolent crimes where computers are used include trespass, theft, fraud, vandalism , Where evidence often resides for different types of crimes ,Address books, chat logs, e-mail, images, movies, Internet browser history, etc.

Unit III

Computer Criminals: Using evidence to create a crime timeline , Modify Access Create (MAC) dates associated with files ,Problems with using these (they don't change in a logical fashion in some cases) ,Criminals and crime fighters ,Understanding "cyber criminals" and their victims ,Understanding "cyber investigators.

Unit IV

Building a Cybercrime Case: Bodies of law ,Constitutional law ,Criminal law ,Civil law ,Administrative regulations ,Levels of law ,Local laws ,State laws ,Federal laws ,International laws ,Levels of culpability ,Intent ,Knowledge ,Recklessness ,Negligence , Level and burden of proof ,Criminal versus civil cases ,Vicarious liability ,Laws related to computers ,CFAA, DMCA, CAN Spam, etc.

Unit V

Preserving and Recovering Digital Evidence: Disk imaging ,Creating a message digest or hash code for a disk ,Where data hides; deleted and erased data ,File systems ,Files ,Modify Access Create (MAC) dates to establish time line ,File headers - info about file type

References books

1. Guide to Computer Forensics and Investigations ,By Bill Nelson, Amelia Phillips, christopher Steuart
2. Scene of the Cybercrime, by Debra Littlejohn Shinder.
3. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles River Media, 2005
4. Christof Paar, Jan Pelzl, Understanding Cryptography: A Textbook for Students and Practitioners, 2 nd Edition, Springer's, 2010
- 5 . Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts, Ali Jahangiri, 2009
6. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series: Computer Forensics), 2010

Student Activity:

1. Collect calls made from a cell tower and analyze them
2. Trace the IP address of the machine from which you received a email

ELECTIVE – I(LAB)

7.3 Computer Forensics lab

The Sleuth Kit and Autopsy

The Sleuth Kit (TSK) and the Autopsy Forensic Browser are open source Unix-based tools . TSK is a collection of over 20 command line tools that can analyze disk and file system images for evidence. To make the analysis easier, the Autopsy Forensic Browser can be used. Autopsy is a front end to the TSK tools and provides a point-and-click type of interface.

- 1) Use of disk tools to analyze the tool displays the total number of sectors and the user-accessible sectors.
- 2) Use of volume system tools to analyze the disk volume and partitions , whether they are allocated properly or not
- 3) File system tools to analyze the file system , its type and its description
- 4) Content category tool to analyze the data in the directory
- 5) Meta data category tool to analyze the data that describes a file
- 6) File name category tool to analyze The file name category of data includes the data that associates a name with a metadata entry.
- 7) Multiple category tool to analyze that combine the data from the various categories to produce the data sorted in a different order
- 8) Experiment to use the searching tools

BCA III Year V Semester

Elective -II

6.1 ANDROID BASICS

Course Objectives:

1. Describe the platforms upon which the Android operating system will run.
2. Create a simple application that runs under the Android operating system.
3. Access and work with the Android file system.
4. Create an application that uses multimedia under the Android operating system.
5. Access and work with databases under the Android operating system.

Course Outcomes

After completion of this course students should make Android apps for Android devices. Students will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.

UNIT-I

What is Android, Android Tools, Your First Android Application, Anatomy of Android Application, Workspaces, Editors in Eclipse, Eclipse Perspective, Refactoring

UNIT-II

Creating Android Emulator, Creating Snapshot, SD Card Emulation, Sending SMS Messages to the Emulator, Transferring Files into and out of the Emulator, Resetting the Emulator

UNIT-III

Activity, Linking Activity using Intent, Fragments, Calling Build-In Application using Intent, Notifications

UNIT-IV

Components of a Screen, Display Orientation, Action Bar, Listening for User Inter

UNIT-V

Basic Views, Picker Views, List View, Specialized Fragment, Gallery and Image View, Image Switcher, Grid View, Options Menu, Context Menu, Clock View, Web view

Reference Books:

1. *Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides)* By: **Bill Philips & Brian Hardy**

2. *Android Design Patterns: Interaction design solutions for developers* by Greg Nudelman

3. *Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps*

By: Ian G. Clifton

4. *Android Recipes: A Problem-Solution Approach* By: Dave Smith & Jeff Friesen

5. *Hello, Android: Introducing Google's Mobile Development Platform (Pragmatic Programmers)* By: Ed Burnette

Student Activity:

1. Create a mobile APP for your college

2. Create a mobile APP for any rural application

ELECTIVE -II(LAB)

8.1 Android basics lab

Exercise 1

- *Developing Simple Applications for Android*

Exercise 2

- *Creating Applications with Multiple Activities and a Simple Menu using ListView*

Exercise 3

- *Creating Activities For Menu Items and Parsing XML Files*

Exercise 4

- *Writing Multi-Threaded Applications*

Exercise 5

- *Using WebView and Using the Network*

Exercise 6

- *Using Audio Functions in Android*

Exercise 7

- *Graphics Support in Android*

Exercise 8

- *Preferences and Content Providers*

Exercise 9

- *Location Services and Google Maps in Android*
- *Data Storage*

Exercise 10

- *Simulating Sensors*

BCA III Year V Semester

Elective -II

6.2 PRINCIPLES OF ANIMATION

Course Objectives

Students can expect to learn basic principles and relevant techniques for comprehending the underlying

Course Outcome

- Understanding of the key principles of animation.
- Understanding of the concept of timing for animation and its application as a means of communication.
- Ability to creatively manipulate frame time as a means of emphasizing and actualizing action and expressing an idea.

UNIT-I

What is Animation: Its definition, early examples of Animation. History of Animation: Stop Motion Photo Animation, Zoetrope, Thaumatrope, Cell and Paper Animation, early Disney's Cell Animation Processes

UNIT-II

Types of Animation: Cell Animation, Stop Motion Animation, Computer Animation, 2-D Animation, 3-D Animation. Skills for an Animation Artist: Visual and creative development of an Artist, importance of observation with minute details, efficiency to draw gestures, facial expressions, good listener, hard work and patience, creative and innovative.

UNIT-III

Basic Principles of Animation: Illusion of Life, straight action and pose to pose Timing, Exaggeration, Drama and Psychological Effect, Fade in and Fade out, Squash and Stretch, Anticipation, staging, follow through and overlapping action, Arcs, Solid Drawing, Appeal, slow in and slow out, Secondary Action.

UNIT-IV

Various Terms: Animation Drawings/Cels, Rough Drawings , Clean ups, Color reference drawings, Layout, Model Sheet, Key Drawings and in Betweens, Master Background, Concept Piece, Character drawing , Story Board.

References:

- 1.The complete animation course by Chris Patmore -Baron's Educational Series.(New York)
2. Animation Unleashed by Ellen Bessen, Michael Weise Productions,2008(U.S.A)
- 3.The Animator's Survival Kit by Richard Williams, Arrar Straus & Giroux Pub.(U.S.A)

Student Activity:

1. Develop a simple animated short film
2. Develop a simple animated short film with back ground music

Elective -II (LAB)

8.2 Computer Animation lab

ADVANCED 2D ANIMATION

1: Action scripting

Using actions to control a timeline - Using frame labels - Creating button symbols - Creating animated buttons using movie clips – Movie Clip Controls – Browser / network.

2: Advanced Animation Methods

Creating movies playing within movies (movie clips and .swf) - Controlling multiple timelines (movies) through action scripting - Critique storyboards.

3: Streamlining Files for Use on the Web, Publishing Files to the Internet & Pre loaders

Pre loaders - Controlling sound with script - Exploring types of output - Work on final project in class - Importing video - Publishing demo (video) reels on web - Publishing and exporting files - Trouble shooting sites.

Suggested books for Reading:

Flash books

- The Illusion of Life: Disney Animation by Frank Thomas, Ollie Johnston

(Contributor), Collie Johnston.

- Adobe Flash CS3
- The Animator's Survival Kit: A Manual of Methods, Principles, and Formulas for Classical, Computer, Games, Stop Motion, and Internet Animators by Richard Williams

BCA III Year V Semester

Elective - II

6.3 SOFTWARE TESTING METHODOLOGIES

Course Objectives

The Objective of this course is to enable a clear understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry. The course will prepare students to be leaders in software testing. Whether you are a developer or a tester, you must test software. We can learn strengths and weaknesses of a variety of software testing techniques.

Course Outcomes

After completion of this course the student will be able to plan, develop, and execute an automated test plan.

UNIT-I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of Bugs.

Flow Graphs and Path testing: Basics concepts of path testing, predicates, path predicates and Achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II

Transaction Flow Testing: Transaction flow, transaction flow testing techniques.

Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III

Domain Testing: domains and paths, Nice & ugly domains, domain testing domains and interfaces Testing, domain and interface testing, domains and testability.

UNIT-IV

Paths, Path products and Regular Expressions: Path products & path expression, reduction procedure, Applications, regular expressions & flow anomaly detection.

Logic Based Testing: Overview, decision tables, path expressions kv charts, specifications.

UNIT-V

State, State Graphs and Transition testing: State graphs, good & bad state graphs state testing, Testability tips.

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, Node reduction algorithm, building tools. (Student should be given an exposure to a tool like J Meter or Win runner.)

Reference Books

1. Software Testing techniques –Baris Beizerm Dreamtech, Second edition.
2. Software Testing Tools – Dr. K.V.K.K. Prasad, Dreamtech.
3. Software Testing Principles and Practices by Naresh Chauhan, Oxford University Press
3. The craft of software testing – Brain Matrick, Pearson Education.
4. Software Testing Techniques – SPD (Oreille)
5. Software Testing in the Real World-Edward Kit, Pearson.
6. Effective methods of Software Testing, Peery, John Wiley.
7. Art of Software Testing – Meyers, John Wiley.

Student Activity:

1. Prepare a chart for guidelines for data security in your organization
2. Test the performance of any software that is used by your organization under maximum load

Elective – II(LAB)

8.3 Testing Tools Lab

1. Introduction to win runner testing tool
2. Recording test in context sensitive & analog mode
3. Synchronizing test.
4. Checking gui objects
5. Checking bitmap objects.
6. Programming test with tsl

7. Creating data driven test
8. Maintaining test script
9. Batch test
10. Project (creating test report)

BCA III Year VI Semester

E-commerce

Course Objectives

1. To develop an understanding of scope of E-Commerce.
2. To develop an understanding of electronic market and market place.
3. To develop an understanding of business models.
4. To develop an understanding of legal issues, threats of E-Commerce.

Course Outcomes

1. Students would be able to analyze the concept of electronic market and market place.
2. Students would be able to understand the business models.
3. Students would be able to understand the business standards.
4. Students would be able to understand the legal and security issues.

Unit-I

Overview of Electronic Commerce: Main Activities of E-Commerce, Broad Goals of E-Commerce, E-Commerce technical Components, Functions of E-Commerce - Scope of E-commerce.

Unit-II

E-commerce Technical Architecture, E-Commerce Strategies, E-commerce Essentials, E-commerce applications, Advantages of E-Commerce, Disadvantages of E-commerce, progress of E-commerce in India.

Unit-III

Driving the E-commerce Revolution. E-commerce Activities, Matrix of E-commerce models, B2C, B2B, B2B Boom, E-commerce opportunity Frame work, Developing an E-commerce Strategy, International E-commerce, International Strategy Development, Dotcom Companies.

Unit-IV

Electronic Market:-Online Shopping, Online Purchasing, Electronic Market, Three models of Electronic Market, Markets category, International Marketing, B2B Hubs, B2B market places, B2B exchange.

Unit-V

Electronic Business: Electronic Business applications Emerging applications, Electronic Business Architecture, Dotcom companies, Electronic business implementations, B2B E-commerce, B2C E-commerce, B2B Market Place..

References:

1. E-Commerce Concepts. Models, Strategies C.S.V Murthy, Himalaya Publishing House
 - 2..The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based Business by Janice Reynolds
 - 3..E-Commerce: Fundamentals and Applications by Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang November 2001
- Student Activity:
1. Study the activities of any E-Commerce website and give suggestions to improve their business
 2. Prepare your own E-commerce business site

BCA III Year VI Semester
Open Source Software

Course Objective

This course provides an overview of the historical and modern context and operation of free and open source software (FOSS) communities and associated software projects. The practical objective of the course is to teach students how they can begin to participate in a FOSS project in order to contribute to and improve aspects of the software that they feel are wrong. Students will learn some important FOSS tools and techniques for contributing to projects and how to set up their own FOSS projects.

Course Outcomes

Ability to install and run open-source operating systems. Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet. Ability to build and modify one or more Free and Open Source Software packages. Ability to use a version control system and to interface with version control systems used by development communities. Ability to contribute software to and interact with Free and Open Source Software development projects.

UNIT-I

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources.

UNIT-II

Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode. Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals

UNIT-III

OPEN SOURCE DATABASE: MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time– Sorting Query Results

UNIT-IV

OPEN SOURCE PROGRAMMING LANGUAGES : PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression.

UNIT-V

PERL : Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules- Working with Files – Data Manipulation.

REFERENCE BOOKS:

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
2. Wesley J. Chun, “Core Python Programming”, Prentice Hall, 2001
3. Martin C. Brown, “Perl: The Complete Reference”, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
4. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
5. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw -Hill Publishing Company Limited, Indian Reprint 2009

Student Activity:

1. Suggest list of open source softwares for the commercial software you come across

BCA III Year VI Semester

Cloud Computing

Objectives:

1. Discuss, with confidence, what is cloud computing and what are key security and control considerations within cloud computing environments.
2. Identify various cloud services.
3. Assess cloud characteristics and service attributes, for compliance with enterprise objectives.
4. Explain the four primary cloud category “types”.
5. Evaluate various cloud delivery models.
6. Contrast the risks and benefits of implementing cloud computing.
7. Specify security threat exposure within a cloud computing infrastructure.
8. Recognize steps and processes used to perform an audit assessment of a cloud computing environment.

Course Outcome:

- 1) Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing
- 2) Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost
- 3) Discuss system virtualization and outline its role in enabling the cloud computing system model
- 4) Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS
- 5) Analyze various cloud programming models and apply them to solve problems on the cloud

Unit 1

Cloud Computing Overview – Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service , Broad network access.

Unit II

Cloud scenarios – Benefits: scalability , simplicity , vendors ,security.

Limitations – Sensitive information - Application development – Security concerns - privacy concern with a third party - security level of third party - security benefits

Unit III

Cloud architecture: Cloud delivery model – SPI framework , SPI evolution , SPI vs. traditional IT Model

Software as a Service (SaaS): SaaS service providers – Google App Engine, Salesforce.com and google platform – Benefits – Operational benefits - Economic benefits – Evaluating SaaS

Unit IV

Infrastructure as a Service (IaaS): IaaS service providers – Amazon EC2 , GoGrid – Microsoft soft implementation and support – Amazon EC service level agreement – Recent developments – Benefits

Cloud deployment model : Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing

Unit V

Virtualization : Virtualization and cloud computing - Need of virtualization – cost , administration , fast deployment , reduce infrastructure cost - limitations

Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization
Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization

REFERENCES:

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter
TATA McGraw- Hill , New Delhi – 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate
Online - Michael Miller - Que 2008

Student Activity:

- 1.Prepare a list of companies that provide different cloud services
- 2, Create your own cloud using a local server

**BCA III Year VI Semester
Elective- I
Hadoop & R Language**

Course Objectives

- Apply Data Mining and understand Decision Trees and Random Forests
- Master the concepts of Hadoop 2.7 framework and its deployment in a cluster environment
- Learn to write complex MapReduce programs
- Perform Data Analytics using Pig & Hive
- Acquire in-depth understanding of Hadoop Ecosystem including Flume, Apache Oozie workflow scheduler, etc.
- Master advance concepts of Hadoop 2.7 : Hbase, Zookeeper, and Sqoop
- Get hands-on experience in setting up different configurations of Hadoop cluster
- Work on real-life industry based projects using Hadoop 2.7

Course Outcomes

Hadoop and R Language will prepare you to perform analytics and build models for real world data science problems. It is the world's most powerful programming language for statistical computing and graphics making it a must know language for the aspiring Data Scientists. 'R' wins strongly on Statistical Capability, Graphical capability, Cost and rich set of packages.

UNIT I

Introduction to BIG'Data '&' Hadoop Introduction to MapReduce '&' HDFS

UNIT II

The Hadoop MapReduce API & Algorithms. How to get started writing programs with Hadoop's API. Programming methodologies and paradigms in Map Reduce Beyond basics: The flow; APIs; Creating Input Formats and Output Formats; Driver; Mapper; Reducer; Streaming

UNIT III

Introduction to The'Hadoop'Ecosystem'Components An introduction to components surrounding Hadoop, which complete the greater ecosystem of available, processing tools.

UNIT IV

R over view, basic syntax, data types, variable, operators, decision making, loops, functions

UNIT V

String, vectors, list, matrices, data frames, reshaping, packages, graphics.

References:

Hadoop: The Definitive Guide By: Tom White *Hadoop in Practice* (By: Alex Holmes)

Hadoop Operations (By: Eric Sammer) *Instant MapReduce Patterns - Hadoop Essentials How-to* (By: Srinath Perera)

An Introduction to R: A Programming Environment for Data Analysis and Graphics **Author(s)** William N Venables, David M Smith.

The Art of R Programming: A Tour of Statistical Software Design Author(s) Norman Matloff

**BCA III Year VI Semester
Elective- I**

NETWORK PROGRAMMING

Course Objectives

1. To understand inter-process and inter-system communication
2. To understand socket programming in its entirety
3. To understand usage of TCP/UDP / Raw sockets
4. To understand how to build network applications

Course Outcomes

1. Analyze the security requirements of a networked programming environment and identify the issues to be solved;
2. come up with conceptual solutions to those issues;
3. implement a programming solution;
4. understand the key protocols that support the Internet;
5. be familiar with several common programming interfaces for network communication;
6. have a detailed knowledge of the TCP/UDP Sockets

UNIT I

INTRODUCTION : Overview of UNIX OS - Environment of a UNIX process - Process control – Process relationships Signals – Inter-process Communication- overview of TCP/IP protocols

UNIT II

ELEMENTARY TCP SOCKETS: Introduction to Socket Programming –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write , close functions – Iterative Server – Concurrent Server.

UNIT III

APPLICATION DEVELOPMENT:TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients –boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function.

UNIT IV

SOCKET OPTIONS, ELEMENTARY UDP SOCKETS:Socket options – getsockopt and setsockopt functions – generic socket options – IP socketoptions –ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function.

UNIT V

ADVANCED SOCKETS: Ipv4 and Ipv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – raw socket creation.

REFERENCES:

1. W. Richard Stevens, B. Fenner, A.M. Rudoff, “Unix Network Programming – The Sockets Networking API”, 3rd edition, Pearson, 2004.
2. W. Richard Stevens, S.A Rago, “Programming in the Unix environment”, 2nd edition, Pearson, 2005.

BCA III Year VI Semester

Elective- I

CYBER LAWS

Course Objectives: The objectives of this course is to:

1. Enable learners to understand, explore, and acquire a critical understanding of Cyber Law
2. Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber crimes for example, child pornography etc. that are taking place via the Internet.
3. Make learners conversant with the social and intellectual property issues emerging from 'Cyberspace'.
4. Explore the legal and policy developments in various countries to regulate Cyberspace;
5. Develop the understanding of relationship between commerce and cyberspace; and give learners in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection.

Course outcomes

At the end of the course, students should be able to:

1. Critically evaluate ongoing developments in law relating to information technologies
2. Display an understanding of how these developments relate to one another.
3. Examine areas of doctrinal and political debate surrounding rules and theories;
4. Evaluate those rules and theories in terms of internal coherence and practical outcomes;
5. Draw on the analysis and evaluation contained in primary and secondary sources

Unit I

Introduction: Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, *Cyber Jurisprudence* at International and Indian Level.

Unit II

Cyber Law- International Perspectives: UN &International Telecommunication Union (ITU)Initiatives, Council of Europe -Budapest Convention on Cybercrime, Asia-Pacific

Economic Cooperation(APEC), Organization for Economic Co-operation and Development(OECD), World Bank, Commonwealth of Nations.

Unit III

Constitutional & Human Rights Issues in Cyberspace: Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace – Access to Internet, Right to Privacy, Right to Data Protection.

Unit IV

Cyber Crimes & Legal Framework: Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act, 2000.

Unit V

Cyber Torts: Cyber Defamation, Different Types of Civil Wrong under the IT Act, 2000, Intellectual Property Issues in Cyber Space, Interface with Copyright Law, Interface with Patent Law, Trade marks & Domain Names Related issues

Reference Books

1. Chris Reed & John Angel, *Computer Law*, OUP, New York, (2007).
2. Justice Yatindra Singh, *Cyber Laws*, Universal Law Publishing Co, New Delhi, (2012).
3. Verma K, Mittal Raman, *Legal Dimensions of Cyber Space*, Indian Law Institute, New Delhi, (2004)
4. Jonathan Rosenoer, *Cyber Law*, Springer, New York, (1997).
5. Sudhir Naib, *The Information Technology Act, 2005: A Handbook*, OUP, New York, (2011)
6. S.R. Bhansali, *Information Technology Act, 2000*, University Book House Pvt. Ltd., Jaipur (2003).
7. Vasu Deva, *Cyber Crimes and Law Enforcement*, Commonwealth Publishers, New Delhi, (2003).

**BCA III Year VI Semester
Elective- II**

Advanced Android

Course Objective

The objective is to help learners to create applications using Google's Android open-source platform. The course explains what Android is and how it compares to other mobile environments, the setup of the Android™ Eclipse-based development tools, the Android SDK, all essential features, as well as the advanced capabilities and APIs such as background services, accelerometers, graphics, and GPS

Course Outcomes

1. Build your own Android apps
2. Explain the differences between Android and other mobile development environments
3. Understand how Android™ applications work, their life cycle, manifest, Intents, and using external resources
4. Design and develop useful Android applications with compelling user interfaces by using, extending, and creating your own layouts and Views and using Menus.
5. Take advantage of Android's APIs for data storage, retrieval, user preferences, files, databases, and content providers
6. Tap into location-based services, geo-coder, compass sensors, and create rich map-based applications
7. Utilize the power of background services, threads, and notifications.
8. Use Android's communication APIs for SMS, telephony, network management, and internet resources (HTTP).
9. Secure, tune, package, and deploy Android applications

Unit-I

Data Persistence: User Preferences, Persisting Data to Files, Using SQLite Databases

Unit-II

Messaging: SMS Messaging, Sending E-mail

Unit-III

Location-Based Services: Displaying Maps, Getting Location Data, Monitoring a Location, Building a Location Tracker

Unit-IV

Android Services: Create your Own Service, Communication between Services and Activity, Binding Activities to Services, Threading.

Unit-V

Exception Handling in Android: Handling Errors, Handling Exceptions Using Try, Catch and Finally

Publishing Android Application: Prepare for Publishing; Deploy APK Files, Publishing on the Android Market

Reference Books:

1. Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) By: Bill Philips & Brian Hardy
2. Android Design Patterns: Interaction design solutions for developers by Greg Nudelman
3. Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps By: Ian G. Clifton
4. Android Recipes: A Problem-Solution Approach By: Dave Smith & Jeff Friesen
5. Hello, Android: Introducing Google's Mobile Development Platform (Pragmatic Programmers) By: Ed Burnette
6. Beginning Android Games By: Mario Zechner
7. Programming Android By: Zigurd Mednieks, Laird Dornin, G. Blake Meike & Masumi Nakamura

BCA III Year VI Semester

Elective- II

Design of Video Games

Course Objectives

1. Discuss and define the terms and principles of game design and development.
2. Select and evaluate programming and scripting languages to develop particular games.
3. Define the structure and duties of the game development team.
4. Practice animation production and creation tools.
5. Apply the mathematics used in game design.
6. Apply the physics needed to design computer games.
7. Apply artificial intelligence to developing computer games.

Course Outcomes

After completing this course, students will be able to understand all game development problems and issues, such as story creation, selection of programming language, mathematical analysis, physical analysis, graphics, multimedia, artificial intelligence, and others.

UNIT I

History of video games, game genres, The games industry, Theory of funativity: what is fun?

UNIT II

Game design teams and processes, Level design, Modeling

UNIT III

Human-computer interaction (HCI) & interface design, Computer graphics, collision detection, lighting, and animation

UNIT IV

Game scripting and programming, Game data structures and algorithms

UNIT V

Artificial intelligence, Play testing

Reference Books

1. Introduction to Game Development Edited by: Steve Rabin ISBN: 1- 58450-377-7 Charles River Media, May 2005.
2. Game Development Essentials: An Introduction. 3rd Edition
3. *A Theory of Fun for Game Design*, by Koster
4. *Understanding Comics: The Invisible Art*, by McCloud

**BCA III Year VI Semester
Elective- II**

Advanced software Testing

Course Objectives

The Objective of this course is to learn and apply basic skills needed to create and automate the test plan of a software project., to know how to plan, develop, and execute an automated test plan. Students should learn testing concepts, Test planning, Creating a test plan in Test Director , Breaking the test plan into manageable components , Designing test cases and test steps, Analyzing the test plan, Developing Win Runner automated test scripts, Creating a script through recording, Synchronizing the test, Adding verification of GUI objects, bitmaps and text, and Managing the GUI map

Course Outcomes:

- 1 To be able to apply various test processes and continuous quality improvement
- 2 To be able to define the types of errors and fault models
- 3 To be able to use methods of test generation from requirements
- 4 To be able to use UML.
- 5 To be able to Test generation from FSM models

Unit-I

Basic Aspects of Software Testing: Testing in the Software Life Cycle, Product Paradigms, Metrics and Measurement

Unit-II

Testing Processes: Processes in General, Test Planning and Control, Test Analysis and Design, Test Implementation and Execution, Evaluating Exit Criteria and Reporting, Test Closure

Unit-III

Test Management: Business Value of Testing, Test Management Documentation, Test Estimation, Test Progress Monitoring and Control, Testing and Risk,

Unit-IV

Test Techniques: Specification-Based Techniques, Structure-Based Techniques, Defect-Based Techniques, Experience-Based Testing Techniques, Static Analysis, Dynamic Analysis, Choosing Testing Techniques,

Unit-V

Testing of Software Characteristics: Quality Attributes for Test Analysts,. Quality Attributes for Technical Test Analysts.

References:

1. Guide to Advanced Software Testing by Anne Mette Jonassen Hass

PROJECT & VIVA-VOCE

The objective of the project is to motivate them to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

The project is of 2 hours/week for one (semester VI) semester duration and a student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The project proposal should include the following:

- Title
- Objectives
- Input and output
- Details of modules and process logic
- Limitations of the project
- Tools/platforms, Languages to be used
- Scope of future application

The Project work should be either an individual one or a group of not more than three members and submit a project report at the end of the semester. The students shall defend their dissertation in front of experts during viva-voce examinations.

