

BCA Under CBCS with effect from the academic year 2017-18 course of study

Table-6: B.C.A. SEMESTER – VI

Sno	Course	Total Marks	Mid Sem Exam*	Sem End Exam	Teaching Hours	Credits
1	Ecommerce	100	25	75	5	4
2	Open Source Software	100	25	75	5	4
3	Cloud Computing	100	25	75	5	4
Elective – 1						
4.1	Hadoop & R Language	100	25	75	5	4
4.2	Network programming					
4.3	Cyber Laws					
Elective – 2						
5.1	Advanced Android	100	25	75	5	4
5.2	Design of Video Games					
5.3	Advanced Software Testing					
Project Lab						
6	Main Project	200	50	150	4	4
Total		700			29	24

## **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, Prospectus of E-commerce, Lessons from E-commerce Evolution, Scope of E-commerce.

#### **UNIT-II**

E-commerce Technical Architecture, E-Commerce Strategies, E-commerce Essentials, E-commerce applications, Foundation of E-commerce, Growth of E-Commerce, 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, one-to – one Marketing, Permission Marketing, pull and push technologies, B2B Hubs, B2B market places, B2B exchange.

#### **UNIT-V**

**ELECTRONIC BUSINESS:** Electronic Business applications Emerging applications, Electronic Business Architecture, AMR Model for Electronic Business, Evolution of Electronic Business Application, Dotcom companies, The Indian scenario for E-Business, 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, Location independent resource pooling , Rapid elasticity, Measured service

### **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  
Regularity issues: Government policies

### **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

Platform as a Service ( PaaS ): PaaS service providers – Right Scale – Salesforce.com – Rackspace – Force.com – Services and Benefits

### **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

Microsoft Implementation: Microsoft Hyper V – Vmware features and infrastructure – Virtual Box - Thin client

### **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 – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing)

## **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 – raw socket output – raw socket input – ping program – trace route program.

## **REFERENCES:**

1. W. Richard Stevens, B. Fenner, A.M. Rudoff, “Unix Network Programming – The SocketsNetworking 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 framework 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.