

Faculty Name	Science and Technology
BOS Name	Computer Science
Subject Name	Computer Science – BCA
Course Pattern	CBCS
Syllabus Implement from Academic Year	June-2018

Year of Course FY/SY/TY	Semester	Paper Code(Computer Code will be given by Computer Section)	Paper Code (BOS Code)	Paper Name (This name is displayed on mark sheet)	Paper Number (I/II/III)	Paper Type (1. Core/Compulsory 2. Fundamental/Optional/Elective)	Credits	Number of Lectures in Hr/WK	Total Lecture in Semester	Teaching Learning Method (Lecture/ Laboratory)	Assessment Method (Theory/Practical / Team work/ Oral /Viva/ Field Work/ Project/ Seminar)	Total Marks		Theory				Practical/Team Work/ Oral/ Viva/ Field Work/ Project/ Seminar			
												Max Marks	Min Marks	ESE(UA)		ICA(CA)		ESE(UA)		ICA(CA)	
														Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks
TY	V	BCA 501		Core Java		1	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	V	BCA 502		Visual Programming		1	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	V	BCA 503		Linux and Shell Programming		1	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	V	BCA 504		Computer Graphics		1	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	V	BCA 505-A		Data Warehouse and Data Mining		2	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	V	BCA 505-B		Theory of Computation		2	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	V	BCA 506		Lab 5 Based on 501, 502, 503 Mini Project using 501/502		1	4	12		Laboratory	Practical	100	40					50	20		

TY	VI	BCA 601		Advanced Java		1	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	VI	BCA 602		Dot Net Technology		1	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	VI	BCA 603		Recent Trends in IT		1	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	VI	BCA 604-A		Cryptography and Network Security		2	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	VI	BCA 604-B		System Programming		2	4	5		Lecture	Theory	100	40	70	28	30	12				
TY	VI	BCA 605		Lab 6 Based on 601, 602		1	4	8		Laboratory	Practical	100	40	70	28	30	12	70	28	30	12
TY	VI	BCA 606		Major Project Work based on any programming language in syllabus		1	4	8		Laboratory	Project	100	40	70	28	30	12	70	28	30	12

Third Year BCA (Under Science)
Semester V

Course Code: BCA 501
Teaching Scheme: Theory 5 Lect./week

Course Title: Core Java
Total Marks: 100

Unit No.	Description	No. of Lectures
I	Introduction to Java Programming <ul style="list-style-type: none"> • Overview of Java • Features of Java as programming language / Platform • JDK Environment and Tools 	03
II	Java Programming Fundamentals <ul style="list-style-type: none"> • Data types, Variables, Operators, Keywords, Naming Conventions • Structure of Java Program • Flow Control- Decision, Iterations • Arrays 	03
III	Classes and Objects <ul style="list-style-type: none"> • Class – Members access control, Objects, Constructors, Use of ‘this’ keyword • Static, non-static data members and methods. • public, private & protected data members 	03
IV	Inheritance & Polymorphism <ul style="list-style-type: none"> • Access/Scope specifiers protected • Super, extends, single, multiple inheritance • Method overriding • Abstract classes & ADT, ‘final’ keyword • Extending interfaces 	05
V	Exception Handling <ul style="list-style-type: none"> • Exceptions and Types, try. catch and finally block • throw & throws statement, user-defined exceptions 	06
VI	Threading <ul style="list-style-type: none"> • Java thread lifecycle • Thread class & run able interface Thread priorities & synchronization • Usage of wait & notify 	10
VII	Java I/O <ul style="list-style-type: none"> • Java I/O package, byte & character stream • Reader & writer, file reader & file writer 	10
VIII	Event Programming <ul style="list-style-type: none"> • Java awt components: window, Frame, Panel, Dialog, File Dialog, Label, Button, List, Check Box, Text Components, Choice, Menu Components • Layout Managers • Border, Flow, Grid, Event Model • Listeners / Adapters 	10
IX	JDBC <ul style="list-style-type: none"> • Introduction to JDBC • Feature & Architecture of JDBC • Types of drivers, its advantage & disadvantage • JDBC Statements & Methods : statement, PreparedStatement, CallableStatement, execute(), executeQuery(), executeUpdate(), Working with Resultset interface, Working with Resultset Metadata 	10

Reference Books:

1. Java 2 for professional developers [by Michael Morgen]
2. Jdbc, Servlets & JSP black book [by Santoshkumar K. Kogent Solution Inc.]
3. Core Java Vol 1 and Vol 2 [by Cay. S. Horstmann, Gray Cornell]
4. Java The complete Reference [by Herbert Schildt]

Third Year BCA (Under Science)
Semester V

Course Code: BCA 502

Course Title: Visual Programming

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No	Description	No. of Lectures
I	<p>Introduction to Dot.Net Framework</p> <ul style="list-style-type: none"> • Introduction to DOTNET • DOT NET class framework • Common Language Runtime • Overview • Elements of .NET application • Memory Management • Garbage Collector : Faster Memory allocation, • Optimizations • Common Language Integration • Common type system • User and Program Interface 	08
II	<p>Introduction to C#</p> <ul style="list-style-type: none"> • C# Language elements • Data types -Reference Type and Value Type • Boxing and Unboxing • Enum and Constant • Operators • Control Statements • Working with Arrays and Strings • Parameter passing technique: • Pass by value and by reference, out parameters, Variable length parameter 	10
III	<p>Object oriented concepts</p> <ul style="list-style-type: none"> • Working with Indexer and Properties • Constructor & Destructor • Working with "static" Members • Inheritance & Polymorphism <ul style="list-style-type: none"> - Types of Inheritance - Constructor in Inheritance - Interface Implementation - Operator and method Overloading and overriding - Static and Dynamic Binding and • Virtual Methods • Abstract Class, sealed keyword 	10
IV	<p>Exception Handling</p> <ul style="list-style-type: none"> • What is Exception • Rules for Handling Exception • Exception classes and its important properties • Understanding & using try, catch keywords • Throwing exceptions • Importance of finally block 	04

V	USING I/O Class <ul style="list-style-type: none"> • Streams Class • Text Stream and Binary Stream • System.IO and Base classes of Stream • Console I/O Streams • Working with File System -File ,FileInfo, • Directory ,DirectoryInfo classes 	04
VI	Delegates <ul style="list-style-type: none"> • Introduction of Delegation • Types of delegate • Anonymous Methods 	03
VII	Collections & Generics <ul style="list-style-type: none"> • Collection classes: • ArrayList,Hashtable,stack,queue. • Writing custom generic classes. • Working with Generic Collection Classes 	05
VIII	Windows Forms <ul style="list-style-type: none"> • Controls: Common control Group, Data control Group, Dialog control Group, • Container control Group • Menus and Context Menus: Menu Strip, • Toolbar Strip. • SDI and MDI Applications 	10
IX	Data Access using ADO.NET <ul style="list-style-type: none"> • Evolution of ADO.NET • Connected and Disconnect Classes • Establishing Connection with Database • Executing simple Insert, Update and Delete Statements • DataReader and DataAdapter • What is Dataset? • Advantages of DataSet • Stored Procedures 	06

Reference Books:

1. "Programming C#" - Jesse Liberty , O'Reilly Press.
2. "Professional C#" -Robinson et al, Wrox Press, 2002.
3. "The Complete Reference: C#" -Herbert Schildt, Tata McGraw Hill.
4. "The Complete Reference: Ado.Net" - Jerke, Tata McGraw Hill.
5. "C# for programmer" -Deilte-Pearson

Third Year BCA (Under Science)

Semester V

Course Code: BCA 503

Course Title: Linux & Shell Programming

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No.	Description	No. of Lectures
I	Introduction to Linux History, Distributions, Features, Linux Architecture, Kernel, Types of Shells, Difference between Windows and Linux Working environments -KDE, GNOME , Xface4 etc	03
II	Installation of Linux Hardware requirement, Software requirements, Create partitions, Configuration of X system, Start-up configuration.	03
III	Linux File System File System, Hierarchy of File system, Devices and Drives in Linux, Mounting Devices File System parts- Boot Block, Super Block, Inode Block, Data Block	03
IV	Users, Groups and Permissions Create Users ,Create groups, Special groups, Assigning permissions to users and groups	05
V	Commands, Utilities and File Management Managing file and directories: mkdir, cd and pwd, ls, cat, more, less. Nested directories, File and Directory Operations: find, cp, mv, rm, ln etc. Filters: head, tail , pr, cut, paste , sort, uniq, grep, egrep, fgrep. Text Editors- vi,vim File and Directory permissions- chmod, chown, chgrp. Printing the files - lpr, lpq, lprm etc. Archive and File compression, Windows integration tools.	06
VI	Shell Programming and Process Management Shell Variables, Shell Scripts – Control and Loop structure, User defined commands, I/O and Redirection, Piping, Metacharacters Process Management : Shell process, Parent and children, Process status, System process, Multiple jobs in background and foreground, Changing process priority with nice. listing processes, ps, kill, Premature termination of process.	10
VII	Disk management and System Administration Boot Loaders-GRUB, LILO, Custom Loaders System administration – Common administrative tasks, Identifying administrative files, Configuration and log files, Chkconfig, Role of system administrator, Security Enhanced Linux. Configuration Apache and MySql, X Window, Communication.	10
VIII	Linux Networking Networking services and Configuration files, starting services, Network tools-ping, finger, traceroute, who, host, rlogin, slogin, rcp, rsh, ssh. Protocols and Services- SMB, FTP, DHCP, LDAP, NFS and NIS.	10

Reference Books:

- 1) Operating Systems by William Stallings(PHI)
- 2) Operating System by Achyut Godbole (TMH)
- 3) Linux the complete refrence by Richard Mathews(TMh)
- 4) Red Hat Linux :The Complete Reference by Peterson (TMH)
- 5) Unix Systems V 4 Concepts & Applications by Sumitabha Das
- 6) Using Linux by Bill Ball

**Third Year BCA (Under Science)
Semester- V**

Course Code: BCA 504

Course Title: Computer Graphics

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No.	Description	No. of Lectures
I	Introduction – applications of computer graphics, operations of computer graphics, graphics software packages.	04
II	Graphical input – output devices- graphical input devices, graphical output devices, raster scan video principles- raster scan monitors, color raster scan systems, plasma panel display, LCD panels, hard copy raster devices. Random scan devices- monitor tube displays, plotters.	10
III	Scan conversion – scan conversion methods, polynomial method for line, polynomial method for circle, DDA algorithm for line, circle and ellipse, Bresenham’s algorithm for line drawing and circle. Midpoint methods for line and circle, problems of scan conversion.	10
IV	Scan conversion for solids- solid areas or polygons, inside-outside test – odd even method, winding number method. Solid area filling algorithms- boundary fill algorithm, scan line fill algorithm, scan line seed fill algorithm, ordered edge list algorithm.	10
V	2D geometrical transformations – basic transformations- translation, rotation, scaling, homogeneous co-ordinate system – transformations in homogeneous notation, inverse of basic transformations, scaling about a reference point, rotation about an arbitrary point. Other transformations – reflection about any arbitrary line, shearing, combined transformation- computational efficiency, visual reality, inverse of combined transformations.	10
VI	3D geometrical transformations- basic 3D transformation- 3D translation, 3D scaling. 3D rotation, rotation about an arbitrary axis in space, other 3D transformations- 3D reflection, reflection about any arbitrary plane, 3D shearing	06
VII	Projection – introduction, parallel projection- orthographic projection, axonometric projection, oblique projection, perspective projection – standard perspective projection, vanishing points. Image formation inside a camera.	04
VIII	2D viewing and clipping- windows and viewports, viewing transformation, clipping of lines in 2D- cohen-sutherland clipping algorithm, midpoint subdivision method, polygon clipping – Sutherland – hogan polygon clipping.	06

Reference Book:

1. Computer Graphics, Multimedia and Animation by Malay K Pakhira
2. Computer Graphics, Donald Hearn, M. Pauline Baker, Prentice-Hall
3. Computer Graphics, Roy A. Plastock, Gordon Kalley, Schaum’s Outlines, McGraw Hill

**Third Year BCA (Under Science)
Semester- V**

Course Code: BCA 505

Course Title: Data Warehouse and Data Mining

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No.	Description	No. of Lectures
I	<p>Introduction to Data Warehouse</p> <ul style="list-style-type: none"> ✓ Introduction to Data warehouse, ✓ Difference between operational database systems and data warehouses. ✓ Data warehouse Characteristics, ✓ Data warehouse Architecture and its Components, ✓ Extraction – Transformation – Loading, Logical (Multi – Dimensional), ✓ Data Modelling - Schema Design, Star and Snow – Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi – Addictive, ✓ Non Addictive Measures; Fact Consultation, Fact Table, Fully Addictive, Semi – Addictive, Non Addictive Measures; Fact – Less – Facts, ✓ Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture – ROLAP, MOLAP and HOLAP. 	12
II	<p>Introduction to Data Mining</p> <ul style="list-style-type: none"> ✓ What is Data Mining, Difference between Database Management System, Data Warehouse and Data Mining ✓ KDD, Challenges, Data Mining Tasks, ✓ Need for Pre-processing the Data ✓ Data Summarization ✓ Data Cleaning ✓ Data Integration and Transformation, ✓ Data Reduction ✓ Discretization and Concept Hierarchy ✓ Generation ✓ Binaryzation ✓ Data Transformation; Measures of Similarity and Dissimilarity – Basics. 	12
III	<p>Association Rule</p> <ul style="list-style-type: none"> ✓ problems Definition, ✓ Frequent Item Set Generation, ✓ The APRIORI Principle, Support and Confidence Measures, ✓ Association Rule Generation; APRIORI Algorithm, ✓ The Partition Algorithms, FP- Growth Algorithms, ✓ Compact Representation of Frequent Item set- Maximal Frequent Item Set, ✓ Closed Frequent Item Sets. 	10

IV	<p>Classification</p> <ul style="list-style-type: none"> ✓ Problem Definition, ✓ General Approaches to solving a classification problem, ✓ Evaluation of classifiers, Classification Techniques, ✓ Decision Tree – Decision tree Construction, Methods for ✓ Expressing attribute test conditions, ✓ Measures for Selecting the Best Split, ✓ Algorithm for Decision tree Induction; Naive Bayes Classifier, ✓ Rule base classification ✓ Bayesaian Belief Networks; K – N earnest neighbour classification – Algorithm and Characteristics. 	10
V	<p>Clustering</p> <ul style="list-style-type: none"> ✓ Problem Definition, Clustering Overview, ✓ Evaluation of Clustering Algorithms, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, ✓ PAM Algorithm; ✓ Hierarchical Clustering – Agglomerative Methods and divisive methods, ✓ Basic Agglomerative Hierarchical Clustering, Strengths and Weakness; ✓ Outlier Detection. 	10
VI	<p>Application and trends in Data Mining</p> <ul style="list-style-type: none"> ✓ Spatial Data Mining ✓ Text Data Mining ✓ Multimedia Data Mining ✓ Web Data Mining ✓ Application of data mining 	06

Reference Books:

1. Data Mining – Concepts and Techniques – Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang – Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education.
3. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
4. Data Warehouse Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.
5. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

**Third Year BCA (Under Science)
Semester- V**

Course Code: BCA 505

Course Title: Theory of Computation

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No.	Description	No. of Lectures
I	Introduction to the theory of computation: Symbol, alphabet, sets, relations and functions, strings and languages, application of finite automata	10
II	Finite state machines: Finite automata definition and description, transition system, DFA, NFA, nfa to dfa conversion, equivalence of DFA and NFA , minimization of finite automata, nfa with epsilon moves to nfa to dfa, finite automata with outputs, Moore machine, Melay machine ,equivalence between Moore and Melay machines.	15
III	Regular expressions and regular grammars: Regular expressions, equivalence of regular expressions and FA. Regular sets and properties: Pumping lemma for regular sets, closure properties of regular sets.	15
IV	Context free languages: Introduction, context free grammars, derivation trees, leftmost and rightmost derivations, ambiguity in CFG, simplification of CFG, normal forms-Chomsky normal form CNF, Greibach normal form GNF, dfa to right linear regular grammar, right linear grammar to dfa, chomsky classification for grammar, properties of context-free language.	20

Reference Books:

1. Hopcroft, and Ullman, Introduction to Automata Theory, Languages and Computation, Addison-Wesley,
2. Introduction to Languages and the theory of Computation John C. Martin, Tata McGraw-Hill-Edition
3. Introduction to Formal Languages, Automata theory and Computation Kamala Krithivasan, Rama R. Pearson Education
4. Theory of Computer Science – K.L.P. Mishra, N. Chandra Sekaran, PHI

**Third Year BCA (Under Science)
Semester- V**

**Course Code: BCA 506
Total Marks: 100 (60 Practical)**

**Course Title: Lab 5 Based on 501, 502, 503
Total Credits: 04**

Lab 5

1) Practical on Course Code BCA – 501

1. WAP to demonstrate the use of various data types.
2. WAP to print following pattern.
 - a. A
 - b. A B
 - c. A B C
 - d. A B C D
3. WAP which will check number for Armstrong, prime, palindrome & perfect number.
4. WAP USING arrays to sort player name along with timing of Athlete (sort using two dimensional array).
5. WAP to demonstrate the use of Access Control.(Public, private , protected).
6. WAP using static & nonstatic data members.
7. WAP using Interface.
8. WAP to demonstrate use of Exception Handling.
9. WAP which will create user defined Exception.
10. WAP which will accept string and calculate how many vowels present in it.
11. WAP which will accept range of years from users and print leap years between them.
12. WAP to reverse the number.
13. WAP which will accept number and displays it in words.
 - a. e.g.- If number-123 as one two three.(use switch).
14. WAP which will create following threads.
 - a. Print even & odd numbers.
 - b. Print Hello 15 times.
 - c. Print the prime number.
15. WAP which will demonstrate overloading & Inheritance.
16. WAP to display the following pattern.
 - a. *1
 - b. **2
 - c. ***3
17. WAP to show demo of parameterized constructor.
18. Create an Applet which contains one combobox for font name, one listbox , for font size and three radiobutton for font style i.e. Bold, Italic and Normal.
The applet also displays some string message by label.
WAP such that user will be able to change the font type, font size and font style of the text displayed as label caption.
19. WAP to append the contents of one file with another file.
20. WAP to develop a calculator using Applet (functions showing addition, subtraction, Multiplication and Division.
21. WAP which will insert student records into database having fields roll no, name, marks of five subjects, total marks and percentage and display the same.

2) Practical on Course Code BCA – 502

1. WAP program to check entered number is even or odd.
2. WAP program to get number and display sum of digits.
3. WAP program to check whether entered year is leap year or not.
4. WAP program to display date in various formats.
5. WAP program to Illustrate the Use of Access Specifiers.
6. WAP to create sealed class.
7. WAP to perform boxing and unboxing operation.
8. WAP to demonstrate multilevel inheritance.
9. WAP to demonstrate single level inheritance.
10. WAP to demonstrate multilevel inheritance with virtual methods.
11. WAP to get lower bound and upper bound of an array.
12. WAP to demonstrate jagged array.
13. WAP to find Minimum and Maximum of numbers.
14. WAP to search elements of an array.
15. WAP to copy a section of one array to another.
16. WAP to demonstrate abstract properties.
17. WAP to implement delegates.
18. WAP to combine two delegates.
19. WAP to implement multicast delegate.
20. WAP to demonstrate DivideByZero Exception.
21. WAP to demonstrate Multiple exceptions.
22. WAP to create a file.
23. WAP to Read the Contents of File.
24. WAP to Create Directory.
25. WAP to implement BinaryReader.
26. WAP to Read Line from File until end of file is reached.
27. WAP to Design user interface using all windows controls.
28. WAP to design MDI application.
29. WAP to demonstrate ADO.NET.
30. WAP to demonstrate Insert, Update and Delete Statements.

3) Practical on Course Code BCA – 503

1. Creating a Linux Partition, Creating boot disks for LINUX and Installing LINUX. Login and logout, shutting down the server. (This may be a demonstration experiment, the demo to be given by the teacher.)
2. Basic LINUX commands I: Logging on to LINUX, Creating a user account. File System: ls command with flags, pwd, cd, ls, cat, mkdir, rmdir, chmod Basic LINUX commands II: General Purpose Utilities: more, file, wc, od, cmp, comm, diff, lp, banner, cal, date, who, tty, sty.
3. Basic LINUX commands III: Simple Filters: pr, head, tail, cut, paste, sort, uniq, nl, and kill, commands. Line editing with ex command, Logging out.
4. To study vi editor: Create a file, Enter the text, Edit Text, Moving around, Save the file. Customizing ex/vi, exrc file and Exinit, options to vi, splitting a file using split command. (Study all important commands and key combinations)
5. Shell programming
 1. Use the Commands - ls with options, pwd, cd, cat, mkdir, rmdir, chmod, cp, rm, mv, more, file, wc, od,cmp, comm, diff, lp, banner, cal, date, who, tty, sty, pr, head, tail, cut, paste,sort, uniq, nl & kill commands.
 2. Use the commands - grep, egrep, fgrep, sed, tr, join
 3. Write Shell scripts as Menu driven program
 4. First 10 odd numbers & First 10 Even numbers
 5. First 10 Fibonacci Numbers
 6. Write Shell scripts to Checking Prime No.
 7. Write Shell scripts for File Handling
 8. Write Shell scripts to Display Armstrong numbers from 1 to 1000.
 9. Write Shell scripts to Display perfect numbers upto range.
 10. Write Shell scripts to change mode of file.
 11. Write Shell scripts to check mode of entered file name.
 12. Write a shell script to print following patter
1
2 3
4 5 6
7 8 9 10
 13. Create an archive file & compress the same
Write a shell script to check whether entered file is directory, ordinary or directory file
 14. Write a menu driven shell script.
 15. Write a shell script to display first five palindrome numbers
 16. Write a shell to print the pyramid
 17. Write a shell script to print fibonacci series upto N numbers
 18. Write a shell script to print a string in reverse order

**Third Year BCA (Under Science)
Semester- VI**

Course Code: BCA 601

Teaching Scheme: Theory 5 Lect./week

Course Title: Advanced Java

Total Marks: 100

Unit No.	Description	No. of Lectures
I	<p>Servlet</p> <ul style="list-style-type: none"> • Introducing CGI • Introducing Servlet • Advantages of Servlet over CGI • Features of Servlet • Introducing Servlet API • Javax.servlet package • Javax.servlet.http package • Introducing Servlet • Advantages of Servlet over CGI • Features of Servlet • Servlet life Cycle • Init() • Service() • Destroy() • Working with GenericServlet and HttpServlet • RequestDispatcher interface • Include() and forward() • Use of RequestDispatcher • Session in Servlet • Introducing session • Session tracking mechanism • Cookies • Advantages & disadvantages • use of cookies • Hidden form filed • Advantages & disadvantages • use of Hidden form filed • URL rewritten • disadvantages • use of URL rewritten • HttpSession • Advantages & disadvantages • use of URL HttpSession 	18
II	<p>JSP</p> <ul style="list-style-type: none"> • Introduction to JSP • Advantages of JSP over Servlet • JSP architecture • JSP life cycle • Implicit objects in JSP- request, response, out, page, pageContext, application, session, config, exception • JSP tag elements- Declarative, Declaration, scriptlet, expression, action. 	18

	<ul style="list-style-type: none"> • Java Bean- Advantages & Disadvantages, • useBean tag- setProperty and getProperty • Bean In Jsp • JSTL core tag: General purpose tag, • conditional tag, networking tag • JSTL SQL tags • JSTL formatting tags • JSTL xml tags • Custom tag: empty tag, body content tag, • iteration tag, simple tag • Introducing internationalization & Java: local class, ResourceBundle class 	
III	Hibernate <ul style="list-style-type: none"> • Introduction Hibernate(HB) • Architecture of HB • Application of HB: HB with annotation, • HB web application • Inheritance mapping: Table per Hierarchy (TPH), TPH using annotation, Table Per Concrete (TPC), TPC using annotation, • Table Per Subclass (TPS), • TPS using annotation. • Collection mapping: • Mapping list, one to many by list, • one to many by bag, • one to many by set, one to many by map. 	12
IV	Spring <ul style="list-style-type: none"> • Introduction to spring • Spring modules. • Spring application • Dependency injection: constructor Injection (CI), • CI dependant object, • CI with collection, • CI with map, • CI inheriting bean • Spring JDBC: JDBC template, • PreparedStatement, ResultSetExtractor, • RowMapper, NamedParameter, • Simple JDBC template. • Spring with Hibernate 	12

Reference Books:

1. “JDBC, Servlet and JSP Black Book”- Santosh Kumar K.
2. “Java EE Server programming”- Sharanam Shah and Vaishali Shah.
3. “Java Server Programming Black book”
4. “Hibernate”- Sharanam Shah & Vaishali Shah
5. “Spring Persistence with Hibernate”- Paul Tepper Fisher, Brian D Murphy.

**Third Year BCA (Under Science)
Semester- VI**

Course Code: BCA 602

Course Title: Dot Net Technology

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No.	Description	No. of Lectures
I	Introduction of Asp.Net <ul style="list-style-type: none"> • Evaluation of Asp.Net • Fundamentals of ASP.NET • Understanding architecture ASP.NET • Compilation Technique of ASP.Net • Application Location • Web Page and Web Site life cycle • ASP.Net Page Structure • Page Directives • Self-page and Cross page posting • Postback and ViewState concepts • Application Folders 	08
II	Web Server Control <ul style="list-style-type: none"> • Creating ASP.NET Pages – Web Forms • Working with web controls – Standard control group, Rich Controls. • Different type of List controls • FileUpload, AdRotator, MultiView, Calendar • Create Web User Control 	10
III	Validation controls <ul style="list-style-type: none"> • Introduction of validation • Types of validation • Validation Controls • Validation Groups 	06
IV	Master Pages & Themes <ul style="list-style-type: none"> • Need of Master Pages • Basics of master pages • Creating Master and Content pages • Programmatically assign master pages • Nested Master pages • Event ordering of master pages • Basic Themes and Skins • Creating and Using Themes • Defining multiple skins • Programmatically working with themes 	08
V	Site Navigation <ul style="list-style-type: none"> • Site Navigation technique • SiteMapPath, TreeView and Menu Control • Nesting sitemap file • Attach XML file to treeview and menu 	04
VI	State Management <ul style="list-style-type: none"> • Introduction of state management technique • Types of State Management technique 	04

	<ul style="list-style-type: none"> • Client side and server side State Management 	
VII	Personalization <ul style="list-style-type: none"> • Personalization Model • Creating Personalization Properties 	03
VIII	AJAX <ul style="list-style-type: none"> • What is AJAX and need for AJAX • Client side and server side AJAX • Implementing AJAX with JavaScript • Using ASP.NET Ajax Control toolkit • Working with AJAX's Server side controls. • ScriptManager, ScriptMangerProxy, • Updatepanel, UpdateProgress, Timer 	06
IX	Web Services <ul style="list-style-type: none"> • What is Web Service? • Understanding SOAP, WSDL, Proxy etc. • Creating Web services • How to consume web services • To build an WebService application and Client 	05
X	Storing and Retrieving Data with ADO.NET <ul style="list-style-type: none"> • Accessing Data with ADO.NET • Using Data Sets on Web Forms • Processing Transactions • Working with DML commands 	06

Reference Books:

1. "Unlashed Asp.Net" - Walther , SAMS Pearson.
2. "Professional ASP.Net"-Evjen, Sivkumar, Wrox Press.
3. "The Complete Reference: Asp.Net"-MacDonald, Tata McGraw Hill.
4. "The Complete Reference: Ajex"- Powell, Tata McGraw Hill.
- 5."Pro Asp.Net in C#" -MacDonald, Szpuszta-APress
- 6."Asp.Net Step by step"- George Shephera-Microsoft Press
7. "Professional Ajex"-Zakas, NxPeak, fawcett, Wrox Press
8. complete reference crystal reports-Geogre Peak

**Third Year BCA (Under Science)
Semester- VI**

Course Code: BCA 603
Teaching Scheme: Theory 5 Lect./week

Course Title: Recent Trends in IT
Total Marks: 100

Unit No.	Description	No. of Lectures
I.	<p><u>GREEN IT</u> INTRODUCTION Environmental Impacts of IT, Holistic Approach to Greening IT, Green IT Standards and Eco-Labeling, Enterprise Green IT Strategy , Green IT: Burden or Opportunity? Hardware: Life Cycle of a Device or Hardware, Reuse, Recycle and Dispose. Software: Introduction, Energy-Saving Software Techniques, Evaluating and Measuring Software Impact to Platform Power.</p>	10
II.	<p><u>BIG DATA AND HADOOP</u> 1: Introduction to Big Data Topics - What is Big Data and where it is produced? Rise of Big Data, Compare Hadoop vs traditional systems, Limitations and Solutions of existing Data Analytics Architecture, Attributes of Big Data, Types of data, other technologies vs Big Data. 2: Hadoop Architecture and HDFS Topics - What is Hadoop? Hadoop History, Distributing Processing System, Core Components of Hadoop, HDFS Architecture, Hadoop Master – Slave Architecture, Daemon types - Learn Name node, Data node, Secondary Name node.</p>	10
III.	<p><u>DATA SCIENCE</u> Definition, working, benefits and uses of Data Science, Data science vs BI, The data science process, Role of a Data Scientist, Populations and samples, Statistical modeling, probability distributions</p>	10
IV.	<p><u>MACHINE LEARNING</u> INTRODUCTION TO MACHINE LEARNING(8) Why Machine learning, Examples of Machine Learning Problems, Structure of Learning, Learning versus Designing, Training versus Testing, Characteristics of Machine learning tasks, Predictive and descriptive tasks, Features: Feature types, Feature Construction and Transformation, Feature Selection.</p>	10
V.	<p><u>CLOUD COMPUTING</u> INTRODUCTION TO CLOUD COMPUTING (8) Defining Cloud computing, Essential characteristics of Cloud computing, Cloud deployment model, Cloud service models, Multitenancy, Cloud cube model, Cloud economics and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines. VIRTUALIZATION, SERVER, STORAGE AND NETWORKING Virtualization concepts, types, Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, Internals of virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, HyperV Different hypervisors and features.</p>	10

VI.	<p><u>INTERNET OF THINGS</u></p> <p>INTRODUCTION</p> <p>What is the Internet of Things? : History of IoT, About IoT, Overview and Motivations, Examples of Applications, Internet of Things Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities</p>	10
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Reference Books:

1. San Murugesan, G. R. Gangadharan: Harnessing Green IT,WILEY 1st Edition-2013
2. Data science and big data analytics, EMC
3. Doing Data Science, *Rachel Schutt and Cathy O'Neil*
4. Introducing Data Science, Davy Cielen
5. Data Science for Business, Foster Provost and Tom Fawcett, O'Reilly.
6. Peter Flach: Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press, Edition 2012.
7. Hastie, Tibshirani, Friedman: Introduction to Statistical Machine Learning with Applications in R, Springer, 2nd Edition-2012.
8. Barrie Sosinsky, " Cloud Computing Bible", Wiley
9. Gautham Shroff, "Enterprise Cloud Computing", Cambridge.
10. Stefan Poslad, "Ubiquitous Computing: Smart Devices, Environments and Interactions" by John Wiley & Sons, 2011.
11. A.Shrinivasan, J.Suresh, "Cloud Computing: A practical approach for learning and implementation", Pearson
12. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
13. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
14. Parikshit N. Mahalle& Poonam N. Railkar, "Identity Management for Internet of Things", River Publishers, ISBN: 978-87-93102-90-3 (Hard Copy)

**Third Year BCA (Under Science)
Semester- VI**

Course Code: BCA 604

Course Title: Cryptography and Network Security

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No.	Description	No. of Lectures
I	Introduction: Security Goals, Cryptographic Attacks, Services and Mechanism, Techniques. Mathematics of Cryptography: Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence	08
II	Traditional Symmetric-Key Ciphers: Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers. Data Encryption Standard (DES): Introduction, DES Structure, DES Analysis, Security of DES, Multiple DES, Examples of Block Ciphers influenced by DES. Advanced Encryption Standard: Introduction, Transformations, Key Expansion, The AES Ciphers, Examples, Analysis of AES.	15
III	Encipherment using Modern Symmetric-Key Ciphers: Use of Modern Block Ciphers, Use of Stream Ciphers, Other Issues. Mathematics of Asymmetric-Key Cryptography: Primes, Primality Testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm. Asymmetric Key Cryptography: Introduction, RSA Cryptosystem, Rabin Cryptosystem, Elgamal Cryptosystem, Elliptic Curve Cryptosystems.	15
IV	Cryptography Hash Functions: Introduction, Description of MD Hash Family, Whirlpool, SHA-512. Digital Signature: Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Schemes, Variations and Applications. Key Management: Symmetric-Key Distribution, Kerberos, Symmetric-Key Agreement, Public-Key Distribution, Hijacking.	15
V	Security at the Application Layer: PGP and S/MIME: Email, PGP, S/MIME. Security at the Transport Layer: SSL and TLS: SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security. Security at the Network Layer: IPsec: Two modes, Two security protocols, Security association, security policy, Internet Key exchange, ISAKMP	07

Reference Books:

1. Behrouz A. Forouzan, Debdeep Mukhopadhyay: Cryptography and Network Security, 2nd Edition, Special Indian Edition, Tata McGraw-Hill, 2011.
2. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Thomson, Cengage Delmar Learning India Pvt., 2012.
3. William Stallings: Network Security Essentials: Applications and Standards, 4th Edition, Pearson Education, 2012.

**Third Year BCA (Under Science)
Semester- VI**

Course Code: BCA 604

Course Title: System Programming

Teaching Scheme: Theory 5 Lect./week

Total Marks: 100

Unit No.	Description	No. of Lectures
I	Background: Machine Structure, Evolution of the Components of a Programming System, Assembler, Loaders, Macros, Compilers, Formal Systems. Machine Structure, Machine Language and assembly language: General Machine Structure, Machine Language, Assembly Language	12
II	Assemblers: General Design Procedure, Design of assembler, Statement of Problem, Data structure, Format of databases, algorithm, look for modularity, Table Processing: Searching and Sorting. The Problem, Searching a table, linear Search, binary Search, Sorting, interchange sort, Shell Sort, Bucket Sort, Radix Exchange Sort, address calculation sort, comparison of sorts, hash or random entry searching.	12
III	MACRO LANGUAGE AND THE MACRO PROCESSOR: Macroinstruction, Features of macro Facility, Macro instruction arguments, conditional macro Expansion, macro calls within macros, macro Instructions defining macros, Implementation, Statement of problem, implementation of a restricted facility, A two pass algorithm. A single pass algorithm, implementation of macro calls within macros. Implementation within an assembler.	12
IV	LOADERS: Loader schemes, Compile & go, General loading Scheme, absolute loaders, Subroutine Languages, Relocating loaders, Direct linking loaders, other loading Schemes – Binders, linking loaders, Overlays, Dynamic binders. Design of absolute loader, Design of a Direct linking loader Specification of problem, Specification of data structure, format of data bases, algorithm..	12
V	COMPILERS: Statement of problem, Problem1: Recognizing basic Elements, Problem2: Recognizing Syntactic cutis & interpreting meaning, Problem3: Storage Allocation, Problem4: Code Generation. Optimization (machine independent) optimization (machine dependent), Assembly Phase, General Model of compiler. PHASES OF COMPILERS: Simple Structure of Compiler, Brief introduction to 7 Phases of Compilers.	12

Reference Books:

1. John J. Donowon, System Programming, TATA McGraw-Hill.
2. Dhamdhare: System programming and Operating System TMH
3. Beck: System Software, 3/e Pearson Education

Third Year BCA (Under Science)

Semester- VI

Course Code: BCA 605

Course Title: Lab 6 Based on 601, 602

Total Marks: 100 (60 Practical's)

Total Credits: 04

Lab 6

1) Practical on Course Code BCA –601

1. Write a programme which demonstrates life cycle of Servlet
2. Write a programme by using GenericServlet
3. Write a programme by using HttpServlet
4. Write a Servlet programme to send request to another page
5. Write a Servlet programme to track the user by using (Cookies, URL-rewriting, Hidden form field & HttpSession)
6. Write Jsp programme which will display its life cycle
7. Write a Jsp programme by using its implicit objects like request, response, out, page, pageContext, application, session, config, exception
8. Write a Jsp programme which will use scriptlet, expression and declarative tag.
9. Write a Jsp programme which will create bean and calculate simple interest
10. Write a Jsp programme to create bean to check account balance(from database)
11. Write a Jsp programme to insert data into database
12. Write a Jsp programme which will use JSTL core tag, JSTL SQL tags, JSTL formatting tags, JSTL xml tags, Custom tag: empty tag, body content tag, iteration tag, simple tag
13. Write a programme to display a message in different languages (use java internationalization)
14. Write a simple Hibernate programme
15. Write a HB with annotation
16. Write a HB web application
17. Write a HB Inheritance mapping: Table per Hierarchy (TPH), TPH using annotation, Table Per Concrete (TPC), TPC using annotation, Table Per Subclass (TPS), TPS using annotation. Collection mapping: Mapping list, one to many by list, one to many by bag, one to many by set, one to many by map.
18. Write simple Spring programme.
19. Write a Spring programme to show Dependency injection: constructor Injection (CI), CI dependant object, CI with collection, CI with map, CI inheriting bean
20. Write a Spring Spring JDBC programme using : JDBC template, PreparedStatement, ResultSetExtractor, RowMapper, NamedParameter, Simple JDBC template. Spring with Hibernate

2) Practical on Course Code BCA –602

1. Design web page for student admission which uses Label, TextBox, RadioButton, CheckBox, ListClass, ButtonClass, Calendar, Image, FileUpload etc. controls.
2. Design scientific calculator.
3. Design web page which demonstrate command name property.
4. Design web page which demonstrate which code is execute at first either server side or client side.
5. Design web page for Self Page Posting and Cross Page Posting.
6. Design web page which demonstrate App_code using class library. Class library contains methods which checks odd, even, prime, Armstrong, Palindrome, Strong and Magic number.
7. Design web page which demonstrate App_GlobalResources and App_LocalResources.
8. Design web page which demonstrate page lifecycle and website lifecycle.
9. Design simple application which displays selected checkboxes and radio button.
10. Design a web page for image mapping using static and dynamic method.
11. Demonstrate all methods of insertion of item in list class.
12. Design web page which displays all system fonts, system colors, font size in List Class. Display text message according to the selected font, size and color.
13. Display Current Year calendar. This calendar shows all holidays in Red color with information.
14. Display selected date in at least 10 different formats.
15. Designs XML file which shows
College - Stream - Department - Staff - name - quali - exp - subject.
16. Display at least 10 different advertisements.
17. Design a web page for Wizard and MultiView control.
18. Design a web page which displays 10 textbox controls by using control array method.
19. Design web page which uses all validation controls with validation group property.
20. Design Nested master pages using themes.
21. Design web page which demonstrate working of DML Queries.

Third Year BCA (Under Science)

Semester- VI

Course Code: BCA 606

Course Title: Major Project Work

Internal Assessment: 30

External Assessment: 70

Instructions: Team size for major project not exceed than two students.