

BENGALURU CENTRAL UNIVERSITY
BACHELOR OF COMPUTER APPLICATIONS,
SYLLABUS (2019-20 ONWARDS)

Title of Papers and Scheme of Study & Examination for BCA, Under Choice Based Credit
System - Semester System (Revised w.e.f. 2019-2020)

Sem	Part	Paper Code	Title of Paper	Hours/ Week	Marks			Credits	
					IA	Exam	Total	Subject	Semester
I	Part 1	BCA 101T	Indian Language	4	30	70	100	2	16
		BCA 102T	English	4	30	70	100	2	
	Part 2	BCA 103T	Problem Solving Techniques using C	4	30	70	100	2	
		BCA 104T	Computer Organizations	4	30	70	100	2	
		BCA 105T	Discrete Mathematics	5	50	100	150	3	
		BCA 103P	C Programming Lab	3	15	35	50	1	
		BCA 104P	Office Automation	3	15	35	50	1	
	Part 3		Foundation Course	3	30	70	100	2	
			CC & EC		50		50	1	
II	Part 1	BCA20 1T	Indian Language	4	30	70	100	2	16
		BCA20 2T	English	4	30	70	100	2	
	Part 2	BCA20 3T	Data Structures	4	30	70	100	2	
		BCA20 4T	Database Management System	4	30	70	100	2	
		BCA20 5T	Numerical and Statistical Methods	5	50	100	150	3	
		BCA20 3P	Data Structures using C lab	3	15	35	50	1	
		BCA20 4P	DBMS Lab Using Oracle	3	15	35	50	1	

	Part 3		Foundation Course	3	30	70	100	2	
			CC & EC		50		50	1	
Sem	Part	Paper Code	Title of Paper	Hours/Week	Marks			Credits	
					IA	Exam	Total	Subject	Semester
III	Part 1	BCA301T	Indian Language	4	30	70	100	2	16
		BCA302T	English	4	30	70	100	2	
	Part 2	BCA303T	Object oriented Programming using C++	4	30	70	100	2	
		BCA304T	Financial Accounting and Management	4	30	70	100	2	
		BCA305T	Operating System	5	50	100	150	3	
		BCA303P	OOPS Using C++ Lab	3	15	35	50	1	
	Part 3		Foundation Course	3	30	70	100	2	
			CC & EC		50		50	1	
	IV	Part 1	BCA401T	Indian Language	4	30	70	100	
BCA402T			English	4	30	70	100	2	
Part 2		BCA403T	VB.NET Programming	4	30	70	100	2	
		BCA404T	Unix and Shell Programming	4	30	70	100	2	
		BCA405T	Software Engineering	5	50	100	150	3	
		BCA403P	VB.NET Lab	3	15	35	50	1	
Part 3			Skill Development	3	30	70	100	2	
			CC & EC		50		50	1	

Sem	Part	Paper Code	Title of Paper	Hours/Week	Marks			Credits	
					IA	Exam	Total	Subject	Semester
V	Part 2	BCA501T	Data Communication and Networks	5	50	100	150	3	20
		BCA502T	Artificial Intelligence	5	50	100	150	3	
		BCA503T	Java Programming	4	30	70	100	2	
		BCA504T	Analysis and Design of Algorithm	4	30	70	100	2	
		BCA505T	Elective 1	5	50	100	150	3	
		BCA503P	Java Programming Lab	3	15	35	50	1	
		BCA504P	Analysis and Design of Algorithm Lab	3	15	35	50	1	
		BCA506P	Project	6	50	100	150	3	
	Part 3		Skill Development Course	3	30	70	100	2	
VI	Part 2	BCA601T	System Programming	5	50	100	150	3	20
		BCA602T	Professional and Business Communication	5	50	100	150	3	
		BCA603T	WEB Programming	4	30	70	100	2	
		BCA604T	Elective 2	5	50	100	150	3	
		BCA605T	WEB Programming Lab	3	15	35	50	1	
		BCA605P	Project Work	12	100	200	300	6	
	Part 3		Skill Development Course	3	30	70	100	2	

BCA501T: DATA COMMUNICATIONS AND NETWORKS

Total Teaching Hours : 65

No of Hours / Week : 05

Unit – I

Introduction: Communication Network and services, Approaches to Network Design, Network Functions and Network Topology, Message ,packet and circuit Switching , Internet, Packet Switching ; Key factors in Communication Network Evolution ; Layered Architecture and Applications – Examples of Layering , OSI Reference Model, TCP/IP Model Telnet FTP and IP Utilities. Digital Transmission: Digital Representation of Information: Properties of digital transmission: Characterization of Communication Channels Frequency Domain and Time Domain : Fundamental limits in Digital Communication – The Nyquist Signalling rate, The Shannon channel capacity : Line coding , Modems & digital Modulations [13 Hours]

Unit - II

Transmission Systems: properties of media and digital transmission Systems – Twisted Pair , Coaxial Cable, Optical Fibre, Radio Transmission Intrared Light Error detection and correction – Error detection , Two – dimensional parity checks , Internet checksum , Polynomial code; standardized Polynomial codes , Error detecting capability of a polynomial code, Multiplexing – frequency – Division , Time – Division , SONET; Wavelength Division Multiplexing Circuit switches; Telephone network , signalling Traffic and Overload control in Telephone networks – Concentration, Routing Control, Overload controls Cellular Telephone Networks, Satellite Cellular networks. [13 Hours]

Unit – III

Peer –to-Peer Protocols:- Peer-to peer Protocols and service models ARQ Protocols stop and wait , Go –back-N Selective Repeat , Transmission efficiency of ARQ Protocols, Other adaptation functions , - Sliding window flow control Timing Recovery in Synchronous Services Reliable Stream Service, Data Link Control, HDLC, PPP ; Statistical Multiplexing. [13 Hours]

Unit - IV

Local Area Networks and Medium access Control Protocols:- Multiple access communications; Local Area network – LAN Structure, MAC Sublayer, Logical link control layer, Random Access protocols ALOHA , Slotted ALOHA, CSMA, CSMA/CD, Scheduling approaches to medium access control – Reservation Systems, polling , Token passing rings, comparison of Random access & Scheduling access control Comparison of Radom access & SHEDULING MEDIUM access controls; Channelization – FDMA, TDMA, CDMA; [13Hours]

Unit - V

LAN Standard –Ethernet and IEF, 802.3 LAN Standard ; Token Ring and IEEE 8025 LAN standard , FDDI, Wireless LAN's and IEEE 802.11 Standards; LAN Bridges – Transparent Bridges , Source Routing Bridges , Mixed – media Bridges. Packet Switching Networks :- Network services & Internal Network Operation; Packet Network Topology; Datagrams & VIRTUAL circuits ; structure of switch/ Router, Connectionless packet switching ; Virtual – Circuit packet switching ; Overview of Routing and congestion in packet networks – Routing algorithms classification , Routing tables, shortest path routing algorithms, Flooding , Hierarchical routing , Distance vector routing Link state routing , congestion control algorithms. [13 Hours]

Text Books:

1. Stallings, "Data and Computer Communications", 7th Edition, Pearson Education, 2012

Reference Books:

1. Andrew S Tanenbaim, "Computer Networks", 4th Edition, Pearson Education.
2. Behrouz Ferouzan, Introduction to Data Communication & Networking TMH, 1999.
3. Larry & Peterson & Bruce S Davis; Computer networks Second Edition , Morgan Kaufman, 2000.

BCA502T – Artificial Intelligence

Total Teaching Hours: 65

No. of Hours / Week: 05

UNIT-I [13 Hours]

Introduction to Artificial Intelligence: Definition, AI Applications, AI representation, Properties of internal Representation, Heuristic search techniques. Best first search, mean and end analysis, A* and AO* Algorithm, Game Playing, Minimize search procedure, Alpha beta cutoffs.

UNIT-II [13 Hours]

Knowledge representation using predicate logic: predicate calculus, Predicate and arguments. Knowledge representation using non monotonic logic: TMS (Truth maintenance system), statistical and probabilistic reasoning, fuzzy logic, structure knowledge representation, semantic net, Frames, Script, Conceptual dependency.

UNIT-III [13 Hours]

Planning: block world, strips, Implementation using goal stack, Non linear planning with goal stacks, Hierarchical planning, list commitment strategy. Perception: Action, Robot Architecture, Vision, Texture and images, representing and recognizing scenes.

UNIT-IV [13 Hours]

Learning: Learning as induction matching algorithms. Failure driver learning, learning in general problem solving concept learning. Neural Networks: Introduction to neural networks and perception-qualitative Analysis only, neural net architecture and applications.

UNIT-V [13 Hours]

Natural language processing and understanding and pragmatic, syntactic, semantic, analysis, RTN, ATN, understanding sentences. Expert system: Utilization and functionality, architecture of expert system, knowledge representation, two case studies on expert systems.

Reference

1. E. Charniak and D. McDermott, "Introduction to artificial Intelligence", Pearson Education, 2012.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI,

2013.

3. E. Rich and K. Knight, "Artificial Intelligence", Tata McGraw Hill, 2013.

4. Nils J. Nilson, "Principles of Artificial Intelligence", Narosa Publishing Co. 2002.

5. M. Timjones "Artificial Intelligence a Systems Approach" University Science Press 2010

BCA503T- JAVA PROGRAMMING

Total Teaching Hours: 52

No. of Hours / Week: 04

Unit - I

Introduction to JAVA: JAVA Evolution: Java History, Java Features, How Java Differs from C and C++, Java and Internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Support Systems, Java Environment. Overview of JAVA Language: Introduction, Simple Java program, More of Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. Constants, Variables, and Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversion and Associativity, Mathematical Functions. Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if....else Statement, Nesting of if.....Else Statements, The else if Ladder, The Switch Statement, The ?: Operator. Decision Making and Looping: Introduction. The while Statement, The do Statement, The for Statement, Jumps in Loops Labeled Loops. [12 hours]

Unit -II

Classes, Arrays, Strings and Vectors: Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class Overriding Methods, Final Variables and Methods, Finalizer methods, Abstract Methods and Classes, Visibility Control. Arrays, Strings and Vectors: Arrays, One-dimensional Arrays, Creating an Array, Two -Dimensional Arrays, Creating an Array, Two – dimensional Arrays, Strings, Vectors, Wrapper Classes. [10 Hours]

Unit - III

Interfaces, Packages, and Multithreaded Programming: Interfaces: Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. Packages: Putting Classes together: Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface. [10 Hours]

Unit - IV

Managing Exceptions, Applet Programming: Managing Errors and Exception: Introduction, Types of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging. Applet Programming: Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, running the Applet, More About HTML Tags, Displaying Numerical Values, Getting Input from the User. [10 Hours]

Unit - V

Graphics Programming, Input/Output: Graphics programming: Introduction, The Graphics Class, Lines and rectangles, circles, and Ellipses, Drawing Arcs, Drawing Polygons, Lines Graphs, Using Control Loops in Applets, Drawing Bar Charts. Managing Input/Output Files in JAVA: Introduction, Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, Using the File Class, Input / Output Exceptions, Creation of Files, Reading / Writing Characters, Reading / Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Interactive Input and output, Other Stream Classes. [10 Hours]

Text Books:

1. A.Balaguruswamy, "Programming with JAVA", A Primer, TMH, 1999.
2. P Radha Krishna, "Object Oriented Programing through JAVA", University Press, 2017

Reference Books:

1. Thomas Boutel, "CGI programming in C and Perl", Addison – Wesley, 1996.
2. Jefry Dwight et al, Using CGI, Second Edition, Prentice Hall, India, 1997.
3. Patrick Naughton & Herbert Schildt, JAVA 2: The Complete Reference, THM, 1999.
4. Schildt, "JAVA The Complete Reference", 7th Edition.

BCA504T- Analysis and Design of Algorithm

Total Teaching Hours: 52

No. of Hours / Week: 04

Unit 1 Introduction: Definition of algorithm, Characteristic of algorithm, Different Control Structures, Writing Structured Programs, Analysis of algorithm (12 hrs)

Unit 2 Divide and Conquer: General Method, Binary Search, Finding Maximum & Minimum., Merge Sort, Quick Sort. (10 hrs)

Unit 3 Greedy Method: General method, Knapsack Problem, Job Sequencing with deadline, Minimum – cost Spanning trees, Single – Source Shortest Paths (10 hrs)

Unit 4 Dynamic Programming: Introduction to Graphs, Definition types, Terms related to graph, General Method, Multistage Graphs, All pair Shortest Paths, 0/1 – knapsack, The traveling salesperson problem, Flow Shop Scheduling. (10 hrs)

Unit 5 Basic traversal & Search techniques: Search & traversal techniques for trees, Search & traversal techniques for graphs.

Backtracking: General method, The 8- Queens Problem, Sum of subsets, Graph Coloring.

(10 hrs)

Text books:

1. Aho Ullman & Hopkraft "Design & analysis of Algorithms".
2. Sara Baase, Allen Van Gelder, Computer Algorithms , Introduction to design and Analysis, 3rd edn (9th reprint), Pearson, 2005.
3. Design & Analys of alogorithm- Horowitz & Sahni 4. Fundamentals of Computer algorithm – Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran.

References: 1. Berman : Algorithms , 1st Edition 2008, Cengage Learning India

BCA505T-Elective 1

Total Teaching Hours: 65

No. of Hours / Week: 05

BCA503P- JAVA PROGRAMMING LAB

BCA504P- ANALYSIS AND DESIGN OF ALGORITHM LAB

Part A 10 Programs

Part B

BCA505P-PROJECT

The Project work should be carried out in groups. Each group shall not exceed three members.

SIXTH SEMISTER

BCA601T: SYSTEM PROGRAMMING

Total Teaching Hours: 65

No. of Hours / Week: 05

Unit - I

13 Hours

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

Unit - II

13 Hours

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.

Unit - III**13 Hours**

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 assembles.

Unit – IV**13 Hours**

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.

Unit - V**13 Hours**

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 complier. PHASES OF COMPILERS: Simple Structure of Compiler, Brief introduction to 7 Phases of Compilers.

BCA602T: PROFESSIONAL AND BUSINESS COMMUNICATION**Total Teaching Hours: 65****No of Hours / Week: 05****BCA603T: WEB PROGRAMMING****Total Teaching Hours: 52****No of Hours / Week: 04****Unit - I****12 Hours**

Fundamentals of Web: Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables.

Unit - II**10 Hours**

HTML and XHTML: Forms, Frames in HTML and XHTML, Syntactic differences between HTML and XHTML. CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and <div> tags, Conflict resolution.

Unit - III**10 Hours**

Java Script: Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, Operations, and expressions; Screen output and keyboard input; Control statements; Object creation and Modification; Arrays; Functions; Constructor; Pattern matching using expressions; Errors in scripts; Examples.

Unit – IV**10 Hours**

Java Script and HTML Documents: The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification.

Unit - V**10 Hours**

Dynamic Documents with JavaScript: Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements. XML: Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML Processors; Web services.

BCA604T: ELECTIVE-2

Total Teaching Hours: 65

No. of Hours / Week: 05

BCA605P: WEB PROGRAMMING LAB

1 Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.

2 Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.

3 Create a page with dynamic effects. Write the code to include layers and basic animation.

4 Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.

5 Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.

6 Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.

7 Create a form consists of a two Multiple choice lists and one single choice list (a) The first multiple choice list, displays the Major dishes available (b) The second multiple choice list, displays the Starters available. (c)The single choice list, displays the Soft drinks available.

8 Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers.

- 9 Write a program to convert lowercase string to uppercase string.
- 10 Write a program to validate username and password
- 11 Create a web page to display mouse position.
- 12 Write a program to replace string using regular expression.

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 8 Programs has to be prepared).

Note:

- a) The candidate has to write two the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.
- b) A minimum of 10 Programs has to be done in Part-B and has to be maintained in the Practical Record.
- c) Scheme of Evaluation is as follows:

Writing two programs - 10 Marks

Execution of one program - 10 Marks

Formatting the Output - 05 Marks

Viva - 05 Marks

Record - 05 Marks

Total - 35 Marks

BCA605P: PROJECT WORK

Guidelines for Project Work

The objective of the project is to motivate students to work in emerging/latest technologies, help the students to develop their ability by applying theoretical knowledge and practical techniques to solve real life problems related to industry, academic and research field.

Students are expected to do planning, analysis, design, code and implementation of the project. The initiation of project should be with the project proposal. The Project work should be done in a group not more than two members.

The project carries 300 marks is distributed as follows:

* Internal Marks:100

(Note: Implemented project will be given full internal Marks)

* External Marks: 200

- o Demonstration and Presentation 130 Marks
- o Viva-voce 50 Marks
- o Project Report 20 Marks