



**Nizam College (Autonomous)  
Osmania University  
Hyderabad**

**Scheme of Instruction  
and  
Syllabi**

**Bachelor of Computer Applications (BCA)  
Semester I and II  
For Academic Year 2019 – 2020**



**Faculty of Informatics  
Osmania University  
2019**

With effect from the academic year 2019-2020

**PROPOSED SCHEME OF INSTRUCTION**  
**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

Semester - I						
Course Code	Course Title	Course Type	HrsPerWeek	Credits	Marks CIE+SEE	Duration CIE+SEE
BCA101	Environmental science	AECC-1	2T	2	10I+40E=50	30min+2hr
BCA102	English	CC-1A	4T	4	20I+80E=100	1hr+3hr
BCA103	Mathematical Foundations of Computer Science	CC-1B	4T	4	20I+80E=100	1hr+3hr
BCA104	Digital Principles	DSC-1A	4T	4	20I+80E=100	1hr+3hr
BCA105	Programming in C	DSC-1B	4T+3P=7	5	20I+80E=100T 0+50E=50P	1hr+3hr(T) 0+3hr(P)
BCA106	Introduction to Web Technology	DSC-1C	4T+3P=7	5	20I+80E=100T 0+50E=50P	1hr+3hr(T) 0+3hr(P)
BCA107	IT Workshop	DSC-1D	3P	1	0+50E=50P	0+3hr(P)
<b>Total</b>			<b>22T+9P= 31</b>	<b>25</b>	<b>110I+590E= 700</b>	<b>---</b>

With effect from the academic year 2019-2020									
BCA SEM I – THEORY			Hours /week		Credits	Scheme of Examination			
Course Code	Course Title	Type	L	P		SEE	CIE	SEE	CIE
BCA101	<b>Environmental Studies</b>	AECC-1	2	-	2	40	10	2	30 mins

**Unit - I: Ecosystem, Biodiversity & Natural Resources**

1. Definition, Scope & Importance of Environmental Studies.
2. Structure of Ecosystem – Abiotic & Biotic components Producers, Consumers, Decomposers, Food chains, Food webs, Ecological pyramids)
3. Function of an Ecosystem :Energy flow in the Ecosystem ( Single channel energy flow model )
4. Definition of Biodiversity , Genetic, Species & Ecosystem diversity , Hot-spots of Biodiversity, Threats to Biodiversity , Conservation of Biodiversity (Insitu & Exsitu )
5. Renewable & Non – renewable resources, Brief account of Forest , Mineral & Energy (Solar Energy & Geothermal Energy) resources
6. Water Conservation, Rain water harvesting & Watershed management.

**Unit – II: Environmental Pollution, Global Issues & Legislation**

1. Causes, Effects & Control measures of Air Pollution, Water Pollution
2. Solid Waste Management
3. Global Warming & Ozone layer depletion.
4. Ill – effects of Fire- works
5. Disaster management – floods, earthquakes & cyclones
6. Environmental legislation :-  
(a) Wild life Protection Act (b) Forest Act (c) Water Act (d) Air Act
7. Human Rights
8. Women and Child welfare
9. Role of Information technology in environment and human health

**Field Study:**

1. Pond Ecosystem
2. Forest Ecosystem

**Suggested reading:**

1. Environmental Studies - from crisis to cure – by R. Rajagopalan (Third edition) Oxford University Press.
2. Text book of Environmental Studies for undergraduate courses (second edition) by Erach Bharucha
3. A text book of Environmental Studies by Dr.D.K.Asthana and Dr. Meera Asthana

*With effect from the academic year 2019-2020*

BCA SEM I – THEORY			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
BCA102	<b>English</b>	CC-1A	4	-	4	80	20	3	1

**Unit I**

SHORT FICTION: "The Curb in the Sky" by James Thurber- PRONUNCIATION: Consonant sounds-**GRAMMAR: Noun-VOCABULARY: Word roots, prefixes and suffixes-SPELLING: Commonly misspelt words- PUNCTUATION: Capitalisation**  
 CONVERSATION: Introducing yourself in a formal situation- READING PASSAGE: Chindula Yelamma-**WRITING: Expansion of a sentence into a paragraph-SOFT SKILLS: Motivation and goal setting-VALUE ORIENTATION: Well begun is half done**

**Unit II**

PROSE: "Happy People" by William Ralph Inge -PRONUNCIATION: Vowels: monophthongs-**GRAMMAR: Pronoun-VOCABULARY: Word roots, prefixes, suffixes-SPELLING: Forming antonyms using un- and dis- PUNCTUATION: Capitalisation- CONVERSATION: Starting and sustaining a conversation - READING PASSAGE: The Million March-**WRITING: Sequencing-SOFT SKILLS: Self confidence - VALUE ORIENTATION: Doubt is the beginning of wisdom****

**Unit III**

POETRY: " A Psalm of Life" by Henry Wadsworth Longfellow-PRONUNCIATION: Vowels: diphthongs-**GRAMMAR: Auxiliary verbs-VOCABULARY: Homonyms, homographs, homophones-SPELLING: Words ending in -tion and -sion, PUNCTUATION: Full stop and comma-CONVERSATION: Describing your college and course of study-READING PASSAGE: Bathukamma-**WRITING: Descriptive writing-SOFT SKILLS: Non-verbal communication and body language-VALUE ORIENTATION: Actions speak louder than words****

**Unit IV**

DRAMA: "The Dear Departed" (an extract) by Stanley Houghton-PRONUNCIATION: Letters with varied pronunciations-**GRAMMAR: Main verbs and tenses VOCABULARY: Collocations-SPELLING: Words ending in -tion and -ment- PUNCTUATION: Question mark and exclamation mark-CONVERSATION: Leaving a voicemail, making an appointment over phone-READING PASSAGE: Husain Sagar-**WRITING: Dialogue writing-SOFT SKILLS: Interpersonal skills-VALUE ORIENTATION: faith can move mountains****

**Suggested Reading:**

English Made Easy- Editors: E. Suresh Kumar, Sumita Roy and A. Karunaker. Orient BlackSwan 2016.

*With effect from the academic year 2019-2020*

BCA SEM I – THEORY			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
BCA103	<b>Mathematical Foundations of Computer Science</b>	CC-1B	4	-	4	80	20	3	1

**Unit- I**

Fundamentals of Logic: Basic Connectives and Truth Tables, Logical Equivalence, Logical Implication, Use of Quantifiers, Definitions and the Proof of Theorems.

Set Theory: Set and Subsets, Set Operations, and the Laws of Set theory, Counting and Venn Diagrams.

Properties of the Integers: The well – ordering principle, Recursive Definitions, Division Algorithms, Fundamental theorem of Arithmetic.

**Unit-II**

Relations and Functions: Cartesian Product, Functions onto Functions, Special Functions, Pigeonhole Principle, Composition and Inverse Functions.

Relations: Partial Orders, Equivalence Relations and Partitions.

Principle of Inclusion and Exclusion: Principles of Inclusion and Exclusion, Generalization of Principle.

Generating Functions: Introductory Examples, Definition And Examples, Partitions of Integers.

**Unit–III**

Recurrence Relations: First – order linear recurrence relation, second – order linear homogenous recurrence relation with constant coefficients.

Algebraic Structures: Algebraic System – General Properties, Semi Groups, Monoids, Homomorphism, Groups, Residue Arithmetic.

**Unit-IV**

Graph Theory: Definitions and examples, sub graphs, complements and graph Isomorphism, Vertex degree, Planar graphs, Hamiltonian paths and Cycles.

Trees: Definitions, properties and Examples, Rooted Trees, Spanning Trees and Minimum Spanning Trees.

**Suggested Reading:**

- 1) Mott Joe L Mott, Abraham Kandel, and Theodore P Baker, Discrete Mathematics for Computer Scientists & Mathematicians, Prentice Hall NJ, 2nd Edition, 2015.
- 2) Jr. P. Tremblay and R Manohar Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill, 1987.
- 3) R.K.Bisht and H.S.Dhami, Discrete Mathematics Oxford Higher Education, 2015
- 4) Bhavanari Satyanarayana, Tumurukota Venkata Pradeep Kumar and Shaik Mohiddin Shaw, Mathematical Foundation of Computer Science, BSP, 2016
- 5) Ralph P. Grimaldi Discrete and Combinatorial Mathematics, 5th Edition, Pearson, 2004.

*With effect from the academic year 2019-2020*

BCA SEM I – THEORY			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
BCA104	<b>Digital Principles</b>	DSC-1A	4	-	4	80	20	3	1

**Unit - I**

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

Boolean Algebra and Logic Gates: Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates.

**Unit - II**

Minimization: K-Map Method – Table Method, POS - SOP, Don't Care Conditions, NAND, NOR Implementation.

Combinational Logic: Combinational Circuits, Analysis and Design Procedure, Binary Adder, Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

**Unit - III**

Synchronous Sequential Logic: Sequential Circuits - Latches, Flip-Flops, An analysis of Clocked Sequential Circuits, State Reduction and Assignment Design Procedure.

Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counters-Johnson Counter.

**Unit - IV**

Asynchronous Sequential Circuit : Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and flow tables, Race free state assignment, Hazards, Design Example.

**Suggested Reading:**

1. M.Morris Mano, "Digital Design", 3rd edition, Pearson Education, Delhi, 2007.
2. Donald P Leech, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications", Tata Mc Graw Hill, 2007.

With effect from the academic year 2019-2020									
BCA SEM I – THEORY and PRACTICAL			Hours /week		Cre-dits	Scheme of Examination			
Course Code	Course Title	Type	L	P		SEE	CIE	SEE	CIE
BCA105	<b>Programming in C</b>	DSC-1B	4	3	4+1=5	80(T) 50(P)	20(T) --	3 3	1 --
<b>Unit – I</b>									
Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts.									
Number Systems: Binary, Octal, Decimal, Hexadecimal									
Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements									
Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.									
<b>Unit - II</b>									
Conditional Control Statements: Bitwise Operators, Relational and Logical Operators, If, If-Else, Switch-Statement and Examples. Loop Control Statements: For, While, Do-While and Examples. Continue, Break and Goto statements									
Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing. Recursion- Recursive Functions.									
Storage Classes: Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.									
<b>Unit – III</b>									
Preprocessors: Preprocessor Commands. Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort.									
Pointers - Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, L-value and R-value, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command-line Arguments.									
<b>Unit - IV</b>									
Strings - Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions.									
Structures: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions, Type Definition (typedef), Enumerated Types.									
Input and Output: Introduction to Files, Modes of Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.									
<b>Suggested Reading:</b>									
1. B.A. Forouzan and R.F. Gilberg, “A Structured Programming Approach in C” , Cengage Learning, 2007									
2. Kernighan BW and Ritchie DM, “The C Programming Language”, 2nd Edition, Prentice Hall of India, 2006.									
3. Rajaraman V, “The Fundamentals of Computer”, 4th Edition, Prentice-Hall of India, 2006.									

### **C Lab Experiments:**

1. Write programs using arithmetic, logical, bitwise and ternary operators.
2. Write programs simple control statements: Roots of a Quadratic Equation.
3. Reversing digits.
4. Printing multiplication tables,
5. Armstrong numbers.
6. Checking for prime.
7. Sin x and Cos x values using series expansion
8. Conversion of Binary to Decimal, Octal, Hexa and Vice versa
9. Generating a Pascal triangle and Pyramid of numbers
10. Recursion: Factorial.
11. Recursion: Fibonacci.
12. Finding the maximum, minimum, average and standard deviation of given set of numbers using arrays
13. Reversing an array, removal of duplicates from array
14. Matrix addition
15. Matrix Multiplication.
16. Matrix transpose using functions
17. String Functions: inputting and outputting string , using string functions such as strlen(), strcat( ),strcpy( ).....etc
18. Writing a simple program for strings without using string functions.
19. Finding the no. of characters, words and lines of given text file
20. File handling programs: student memo printing



*With effect from the academic year 2019-2020*

BCA SEM I – THEORY and PRACTICAL		Type	Hours /week		Cre-dits	Scheme of Examination			
			L	P		MaxMarks		Duration(hrs)	
Course Code	Course Title					SEE	CIE	SEE	CIE
BCA106	<b>Introduction to Web Technology</b>	DSC-1C	4	3	4+1=5	80(T)	20(T)	3	1
						50(P)	--	3	--

**Unit – I**

Introduction to World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, HTTP.

HTML5: Introduction, Links, Images, Multimedia, Lists, Tables, Creating Forms, Styling Forms.

**Unit - II**

Dynamic HTML – Cascading Style Sheets, Inline Styles, Style Elements, External Style Sheets, Object Model and Collections – Object Referencing, Collections, Children Frames, Navigator Objects

Event Model - ONCLICK, ONLOAD, Error Handling, ONERRORS, ONMOUSEMOVE, ONMOUSEOVER, ONMOUSEOUT, ONFOCUES, ONBLUR, ONSUBMIT

**Unit - III**

Introduction to Java script, Java Script and Forms Variables, Functions, Operators, Conditional Statements and Loops, Arrays DOM, Strings, Event and Event Handling, Java Script Closures.

**Unit - IV**

Introduction to XML, XML document structure, Document Type Definition, Namespaces, XML Schemas, XPath Basics, XSLT, XML Processors.

**Suggested Reading:**

1. Robert W.Sebesta, Programming the World Wide Web, 3rd Edition, Pearson Education, 2006
2. Wendy Willard, HTML5, McGraw Hill Education (India) Edition, 2013
3. John Pollock, Java Script, 4th Edition, McGraw Hill Education (India) Edition, 2013
4. R. Nageswara Rao, Corer Python Programming, Dreamtech Press

## **Web Tehnology Experiments**

1. Creating HTML Page using Headers
2. Creating HTML Page Ordered and Unordered Lsits
3. Creating HTML Page using Linking Images
4. Creating HTML Page using Table Formatting
5. Creating HTML Page using Images as Anchors
6. Creating HTML Page using Frames
7. Demonstrate Internal CSS
8. Demonstrate Embedded CSS
9. Demonstrate External CSS
10. Develop HTML form with email validation using Java Script
11. Develop HTML form with mobile validation using Java Script
12. Develop HTML form with DOB validation using Java Script
13. Develop HTML form with password validation using Java Script
14. Methods of date and time objects
15. Demonstrating object hierarchy using collection
16. Using Java Script events
17. Develop College Website using HTML5 and CSS
18. Develop Time Table Website using HTML5 and CSS
19. Write basic XML programs on DTD
20. Write basic XML programs on Schema

With effect from the academic year 2019-2020									
BCA SEM I – PRACTICAL			Hours /week			Scheme of Examination			
Course Code	Course Title	Type	L	P	Credits	MaxMarks		Duration(hrs)	
						SEE	CIE	SEE	CIE
BCA107	<b>IT Workshop</b>	DSC-1D	-	3	1	50	--	3	--
<p>1. System Assembling , Disassembling and identification of Parts / Peripherals</p> <p>2. Operating System Installation – Install Operating Systems like Windows, Linux along with necessary Device Drivers.</p> <p>3. Introducing to programming Environment(Linux commands, editing tools such as vi editor, sample program entry, compilation and execution )</p> <p>4. <b>MS-Office / Open Office</b></p> <p style="padding-left: 20px;">a. Word – Formatting Page Borders, Reviewing Equations, symbols</p> <p style="padding-left: 20px;">b. Spread Sheet – organize data, usage of formula graphs charts</p> <p style="padding-left: 20px;">c. Power point – features of power point, guidelines for preparing an effective presentation</p> <p style="padding-left: 20px;">d. Access – creation of database, validate data</p> <p>5. <b>Network Configuration &amp; Software Installation: Configuring TCP/IP, proxy and firewall settings. Installing application software system software &amp; tools.</b></p> <p>6. Internet and World Wide Web-Search Engines. Types of search engines, netiquette, Cyber hygiene.</p> <p>7. <b>Trouble Shooting – Hardware trouble shooting, Software trouble shooting.</b></p> <p><b>Suggested Reading:</b></p> <p>1. K. L. James, Computer Hardware, Installation, Interfacing Troubleshooting and Maintenance, Eastern Economy Edition.</p> <p>2. Gary B.Shelly, Misty E Vermaat and Thomas J. Cashman, Microsoft Office 2007 Introduction Concepts and Techniques, Windows XP Edition, 2007, Paperback.</p> <p>3. Leslie Lam port, LATEX-User’s Guide and Reference manual, Pearson, LPE, 2<sup>nd</sup> Edition.</p> <p>4. Rudraprathap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Oxford University Press, 2002.</p> <p>5. Scott Mueller’s, Upgrading and Repairing PCs, 18<sup>th</sup> Edition, Scott. Mueller, QUE, Pearson, 2008.</p> <p>6. Cherry A Schmidt, The Complete Computer Upgrade and Repair Book, 3<sup>rd</sup> Edition, Dream tech.</p> <p>7. Vikas Gupta, Comdex Information Technology Course Tool Kit, WILEY Dream tech.</p>									

**PROPOSED SCHEME OF INSTRUCTION**  
**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

Semester - II						
Course Code	Course Title	Course Type	HrsPerWeek	Credits	Marks CIE+SEE	Duration CIE+SEE
BCA201	Human Values and Ethics	AECC-2	2T	2	10I+40E=50	30min+2hr
BCA202	English	CC-2A	4T	4	20I+80E=100	1hr+3hr
BCA203	Fundamentals of Probability and Statistics	CC-2B	4T	4	20I+80E=100	1hr+3hr
BCA204	Object Oriented Programming	DSC-2A	4T+3P=7	5	20I+80E=100T 0+50E=50P	1hr+3hr(T) 0+3hr(P)
BCA205	Data Structures with CPP	DSC-2B	4T+3P=7	5	20I+80E=100T 0+50E=50P	1hr+3hr(T) 0+3hr(P)
BCA206	Data Communications	DSC-2C	4T	4	20I+80E=100T	1hr+3hr(T)
BCA207	Web Programming with PHP	DSC-2D	3P	1	0+50E=50P	0+3hr(P)
<b>Total</b>			<b>22T+9P=</b> <b>31</b>	<b>25</b>	<b>110I+590E=</b> <b>700</b>	<b>---</b>

<i>With effect from the academic year 2019-2020</i>									
BCA SEM II – THEORY			Hours /week			Scheme of Examination			
Course Code	Course Title	Type	L	P	Credits	MaxMarks		Duration(hrs)	
						SEE	CIE	SEE	CIE
BCA201	<b>Human Values and Ethics</b>	AECC-2	2	-	2	40	10	2	30min
<p><b>Unit I</b> Definition, nature and scope of ethics; concept, definition and nature of values; religious, cultural and constitutional values (fundamental duties and rights, directive principles)</p> <p><b>Unit II</b> Family values – role of family in character development; structure and functions of family – changes and emerging trends</p> <p><b>Unit III</b> Life skills – the need for life skills during teenage; life skills perspective; coping with life stresses; suicidal tendencies and peer pressure</p> <p><b>Unit IV</b> Environmental ethics; professional ethics (media, medical, public sector, business, legal ethics, engineering)</p>									

With effect from the academic year 2019-2020									
BCA SEM II – THEORY			Hours /week			Scheme of Examination			
Course Code	Course Title	Type	L	P	Credits	MaxMarks		Duration(hrs)	
						SEE	CIE	SEE	CIE
BCA202	<b>English</b>	CC-2A	4	-	4	80	20	3	1
<p><b>Unit - I</b>            SHORT FICTION: " A Visit of Charity" by Eudora Welty-PRONUNCIATION: Plosive-GRAMMAR: Non-finite verbs- VOCABULARY: Simile and metaphor SPELLING: Use of ie and ei - PUNCTUATION: Semicolon -CONVERSATION: Asking for information- READING PASSAGE: Hyderabad-WRITING: Notemaking-SOFT SKILLS: Time management-VALUE ORIENTATION: Time and tide wait for no one</p> <p><b>Unit - II</b>            PROSE: "Benares" by Aldous Huxley-PRONUNCIATION: Fricative -GRAMMAR: Adjective-VOCABULARY: Oxymoron and hyperbole-SPELLING: Words ending in -able or -ible-PUNCTUATION: Colon and em-dash-CONVERSATION: Requests-READING PASSAGE: Burrakatha-WRITING: Informal letters- SOFT SKILLS: Leadership-VALUE ORIENTATION: The pen is mightier than the sword</p> <p><b>Unit - III</b>            POETRY: 'Stanzas Written in Dejection, Near Naples' by Percy Bysshe Shelley PRONUNCIATION: Affricate and nasal-GRAMMAR: Article- VOCABULARY: Portmanteau words and loan words- SPELLING: Words ending in -al, -ance, -ence, - ic, -ity, and-ive - PUNCTUATION: Hyphen - CONVERSATION: Conducting a meeting- READING PASSAGE: 'Flower boat' by Sunkara Ramesh-WRITING: Formal letters-SOFT SKILLS: Stress management-VALUE ORIENTATION: Practice makes perfect</p> <p><b>Unit - IV</b>            DRAMA: Shakespeare Retold: Julius Caesar (extract)- PRONUNCIATION: Approximant-GRAMMAR: Adverb-VOCABULARY: Palindromes-SPELLING: Derived forms of words-PUNCTUATION: Inverted comma-CONVERSATION: Interview skills- READING PASSAGE: The handicrafts of Telangana-WRITING: Formal letters-SOFT SKILLS: Etiquette and grooming-VALUE ORIENTATION: Necessity is the mother of invention.</p> <p><b>Suggested Reading:</b>            English Made Easy- Editors: E. Suresh Kumar, Sumita Roy and A. Karunaker. Orient BlackSwan 2016.</p>									

With effect from the academic year 2019-2020									
BCA SEM II – THEORY			Hours /week			Scheme of Examination			
Course Code	Course Title	Type	L	P	Cre-dits	MaxMarks		Duration(hrs)	
						SEE	CIE	SEE	CIE
BCA203	<b>Fundamentals of Probability and Statistics</b>	CC-2B	4	-	4	80	20	3	1

### Unit - I

**Descriptive Statistics:** Concept of primary and secondary data, Methods of collection and editing of primary data, Designing a questionnaire and a schedule, Sources and editing of secondary data, Classification and tabulation of data, Measures of central tendency (Arithmetic mean, median, mode, geometric mean and harmonic mean) with simple applications, Absolute and relative measures of dispersion (range, quartile deviation, mean deviation, standard deviation and variance) with simple applications, Importance of moments, central and non-central moments, their interrelationships, Sheppard's correction for moments for grouped data, Measures of skewness based on quartiles and moments, kurtosis based on moments with real life examples.

### Unit - II

**Probability:** Basic concepts of probability, deterministic and random experiments, trial, outcome, sample space, event, operations of events, mutually exclusive and exhaustive events, equally likely and favorable events with examples, Mathematical, Statistical and Axiomatic definitions of probability, their merits and demerits. Properties of probability based on axiomatic definition, Conditional probability and independence of events, Addition and multiplication theorems for 'n' events, Boole's inequality and Bayes' theorem, Problems on probability using counting methods and theorems.

### Unit - III

**Random Variables:** Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations. Distribution function and its properties, Transformation of one-dimensional random variable (simple 1-1 functions only), Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables.

### Unit - IV

**Mathematical Expectation:** Mathematical expectation of a function of a random variable, Raw and central moments, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Definitions of moment generating function (m.g.f), characteristic function (c.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and statements of their properties with applications, Chebyshev's and Cauchy-Schwartz's inequalities and their applications.

### Suggested Reading:

1. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
2. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. Goon A M, Gupta M K, Das Gupta B: Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.
4. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
5. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan, New Delhi.

6. Hogg, Tanis, Rao: Probability and Statistical Inference, ( 7th edition), Pearson.
7. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI.
8. Gerald Keller: Applied Statistics with Microsoft Excel, Duxbury, Thomson Learning.
9. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel (4th edition), Pearson Publication.



With effect from the academic year 2019-2020									
BCA SEM II – THEORY and PRACTICAL			Hours /week			Scheme of Examination			
Course Code	Course Title	Category	L	P	Credits	MaxMarks		Duration(hrs)	
						SEE	CIE	SEE	CIE
BCA204	<b>Object Oriented Programming</b>	DSC-2A	4	3	4+1=5	80(T) 50(P)	20(T) --	3 3(P)	1 --

### Unit - I

**Introduction to OOP:** Procedure oriented programming, object oriented programming, basic concepts of OOP, benefits and applications of OOP, simple C++ program, namespace scope, structure of C++ Program, creating, compiling and linking a file.

**Tokens :** Keywords, identifiers, constants, basic data types, user defined data types, storage classes, derived data types, dynamic initialization of variables, reference variables, operators in C++, scope resolution operator, member dereferencing operators, memory management operators.

### Unit - II

**Control Structures:** if, if...else, elseif ladder, nested if, switch, for, while, do...while, break, continue, exit, goto.

**Functions in C++:** Main function, function prototyping, call by reference, return by reference, inline functions, default arguments, Function overloading.

**Classes and Objects:** Specifying a class, defining member functions, C++ program with class, private member functions, arrays within class, memory allocation for objects, static data members, static member functions, arrays of objects, returning objects.

**More about Functions:** friend function, a function friendly to two classes, objects as function arguments.

### Unit - III

**Constructors & Destructors:** Constructors, parameterized constructors, multiple constructors in a class, constructors with default arguments, copy constructors, dynamic constructors, destructors.

**Inheritance:** Introduction to inheritance, single inheritance, multi-level inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance.

**Operator Overloading:** Rules for overloading operators, overloading unary operators, overloading binary operators.

**Pointers:** Introduction to pointers, declaring and initializing pointers, arithmetic operations on pointers, pointers with arrays, arrays of pointers, pointers to objects, 'this' pointer.

### Unit - IV

**Polymorphism and Virtual Functions:** Compile-time polymorphism, runtime polymorphism, virtual functions.

**Templates:** Introduction, function templates, class templates.

**Exception Handling:** Introduction, exception handling mechanism, throwing mechanism, catching mechanism.

### Suggested Reading:

1. E. Balagurusamy, Object Oriented Programming with C++, 6/e, McGraw Hill, 2013.
2. Behrouz A. Forouzan and Richard F. Gilberg, Computer Science: A Structured Approach Using C++, 2/e, Cengage Learning, 2003.

3. Ashok N. Kamthane, Object Oriented Programming with ANSI and Turbo C++, 1/e, Pearson Education, 2006.

### **CPP Experiments**

1. Write a program to perform arithmetic operations using functions.
2. Write a program on call by value and call by reference using functions.
3. Write a program on inline functions.
4. Write a program to implement function overloading.
5. Write a program to implement a class for student.
6. Write a program to implement friend function.
7. Write a program to implement friend function to two classes.
8. Write a program to implement different types of constructors.
9. Write a program to implement a destructor.
10. Write a program to implement multi-level inheritance.
11. Write a program to implement multiple inheritance.
12. Write a program to implement hierarchical inheritance.
13. Write a program to implement hybrid inheritance.
14. Write a program to implement unary operator.
15. Write a program to implement binary operator.
16. Write a program to implement this pointer.
17. Write a program to implement virtual functions.
18. Write a program to implement function template.
19. Write a program to implement class template.
20. Write a program to implement exception handling.

*With effect from the academic year 2019-2020*

BCA SEM II – THEORY and PRACTICAL		Type	Hours /week			Scheme of Examination			
			L	P	Cre-dits	MaxMarks		Duration(hrs)	
Course Code	Course Title					SEE	CIE	SEE	CIE
BCA205	<b>Data Structures with CPP</b>	DSC-2B	4	3	4+1 5	80(T)	20(T)	3	1
						50(P)	--	3	--

**Unit-I**

Introduction to Data Structures: Definition, Uses, Types.

Arrays: Abstract Data Types and the C++ Class, Array as an Abstract Data Type, Representation of Arrays, Matrices, Special Matrices Sparse Matrices, Strings.

**Unit-II**

Stacks and Queues: Representation of Stacks, Representation of Queue,

Operations on Stacks, Operations on Queues, Types of Queues.

Linked Lists: Singly Linked Lists, Doubly Linked Lists, Circular Lists.

**Unit-III**

Hashing: Static Hashing, Hash Tables, Hash Functions, Overflow Handling.

Trees: Introduction, Binary Trees, Representation of Binary Tree, Binary Tree Traversal, Binary Search Tree, Operations on Binary Search Tree, Heap tree, B-tree.

**Unit-IV**

Graphs: Terminology, Types, Representation of Graph, Elementary Graph operations - DFS and BFS.

Sorting: Bubble, Selection, Insertion sort, Quick sort, Merge sort, Heap sort, shell sort.

Searching Techniques: Linear Search, Binary Search

**Suggested Reading:**

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press. 2007.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education 2006.
3. Michael T. Goodrich, Roberto Tamassia, David Mount, Data Structures and Algorithms in C++, Wiley India Pvt. Ltd, 2004.

**Data Structures Experiments:**

1. Write a C++ program for the implementation of Array.
2. Write a C++ program for the implementation of Special Matrices.
3. Write a C++ program for the implementation of Sparse Matrices.
4. Write a C++ program for the implementation of String.
5. Write a C++ program to implement the Stack using array.
6. Write a C++ program to implement the Queue using array.
7. Write a C++ program to implement the single linked list.
8. Write a C++ program to implement the doubly linked list.
9. Write a C++ program to implement the Circular linked list.
10. Write a C++ program to implement stack using linked list.
11. Write a C++ program to implement queue using linked list.
12. Write a C++ program to implement operations on a binary tree. .
13. Write C++ program to implement Bubble sort.
14. Write C++ program to implement Selection sort.
15. Write C++ program to implement Insertion sort.
16. Write C++ program to implement Quick sort.
17. Write C++ program to implement Shell Sort.
18. Write C++ program to implement Merge Sort.
19. Programs on Linear Search.
20. Programs on Binary Search.

With effect from the academic year 2019-2020									
BCA SEM II – THEORY				Hours /week		Scheme of Examination			
Course Code	Course Title	Type	L/T	P	Cre-dits	SEE	CIE	SEE	CIE
BCA206	<b>Data Communications</b>	DSC-2C	4	-	4	80	20	3	1
<p><b>Unit - I</b>            Data communication, Data networking and the Internet: A communication model, data communications, networks, the internet.            Protocol Architecture: Need for protocol architecture, TCP/IP protocol architecture, OSI model, TCP/IP Vs OSI model.</p> <p><b>Unit - II</b>            Data transmission: Concepts and terminology, analog and digital data transmission, transmission impairments.            Transmission Media: Guided and unguided.            Signal encoding techniques: Digital data to digital signals, digital data to analog signals, analog data to digital signals, analog data to analog signals.</p> <p><b>Unit - III</b>            Digital Data Communication Techniques: Asynchronous and synchronous transmission, types of errors, error detection techniques.            Data link control protocols: Flow control, error control, high level data link control (HDLC) protocol.</p> <p><b>Unit - IV</b>            Multiplexing: Frequency division multiplexing, characteristics, synchronous time division multiplexing, characteristics. Statistical time division multiplexing, characteristics.</p> <p><b>Suggested Readings:</b>            1. William Stallings, Data and Computer Communications, 8/e, Pearson Education., 2013.            2. Fred Harshall, Data Communications, Computer Networks and Open systems, 4/e, Pearson Education, 2005.            3. Behrouz A Forouzan, Data Communications and Networking, 4/e, McGraw Hill, 2012.</p>									

*With effect from the academic year 2019-2020*

BCA SEM II – PRACTICAL			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
BCA207	<b>Web Programming with PHP</b>	DSC-2D	-	<b>3</b>	<b>1</b>	<b>50</b>	--	<b>3</b>	--

### **PHP Experiments**

1. Introduction to Web server and Server side programming using PHP.
2. Create a PHP Webpage and print “Hello World” using echo and print.
3. Addition of two numbers.
4. Find whether a number is odd or Even.
5. Maximum of three numbers.
6. Swapping of two numbers.
7. Printing 1 to 10 using while loop
8. Printing of Mathematical Table using for loop.
9. Printing of 10 to 1 using for each loop.
10. Program to find whether a number is prime or not.
11. Program on gettype() and settype() functions.
12. Program on isset() and unset() functions.
13. Program on strval() floatval() and intval() functions.
14. Program on print\_r() and var\_dump() functions.
15. Program on substr() functions.
16. Program on strcmp() functions.
17. Program on strcasecmp() functions.
18. Program on strpos() functions.
19. Program on sizeof(), is\_array(), and in\_array().
20. Program on associative array.



**Nizam College (Autonomous)**

**Osmania University  
Hyderabad**

**Scheme of Instruction  
and  
Syllabi**

**Bachelor of Computer Applications (BCA)**

**Semester III and IV**

**For Academic Year 2020 – 2021**



**Faculty of Informatics**

**Osmania University**

**2020**

*With effect from the academic year 2020-2021*

**PROPOSED SCHEME FOR  
BACHELOR OF COMPUTER APPLICATIONS (BCA) for A.Y 2020-2021**

Semester - III						
Course Code	Course Title	Course Type	HrsPerWeek	Credits	Marks CIE+SEE	Duration CIE+SEE
<b>BCA301</b>	Multi-Disciplinary Course	<b>SEC-1</b>	2T	2	10I+40E=50	30min+2hr
<b>BCA302</b>	Applied Mathematics-I	<b>BSC</b>	4T	4	20I+80E=100	1hr+3hr
<b>BCA303</b>	Computer Architecture	<b>DSC-3A</b>	4T	4	20I+80E=100	1hr+3hr
<b>BCA304</b>	Java Programming	<b>DSC-3B</b>	4T+3P=7	5	20I+80E=100T 0+50E=25P	1hr+3hr(T) 0+3hr(P)
<b>BCA305</b>	Database Design	<b>DSC-3C</b>	4T+3P=7	5	20I+80E=100T 0+50E=25P	1hr+3hr(T) 0+3hr(P)
<b>BCA306</b>	Operating System Concepts	<b>DSC-3D</b>	4T+3P=7	5	20I+80E=100T 0+50E=25P	1hr+3hr(T) 0+3hr(P)
<b>Total</b>			<b>22T+9P=31</b>	<b>25</b>	<b>110I+590E=</b> <b>700</b>	<b>---</b>

	Abbreviations
<b>GE</b>	Generic Elective
<b>DSC</b>	Discipline Specific Course
<b>DSE</b>	Discipline Specific Elective
<b>SEC</b>	Skill Enhancement Course
<b>AECC</b>	Ability Enhancement Compulsory Course
<b>T / P</b>	Theory / Practical
<b>CIE</b>	Continuous Internal Evaluation
<b>SEE</b>	Semester End Evaluation
<b>I/E</b>	Internal / External
<b>BSC</b>	Basic Science Course



*With effect from the academic year 2020-2021*

BCA SEM III – THEORY			Hours /week			Scheme of Examination			
Course Code	Course Title	Type	L	P	Credits	MaxMarks		Duration(hrs)	
						SEE	CIE	SEE	CIE
<b>BCA301</b>	<b>Multi- Disciplinary Course</b>	<b>SEC-1</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>40</b>	<b>10</b>	<b>2</b>	<b>30 mins</b>

Same as Nizam College

*With effect from the academic year 2020-2021*

BCA SEM III – THEORY			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
<b>BCA303</b>	<b>Applied Mathematics - I</b>	<b>BSC</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>80</b>	<b>20</b>	<b>3</b>	<b>1</b>

### Unit I

Partial Differentiation: Introduction - Functions of two variables - Neighbourhood of a point (a, b) - Continuity of a Function of two variables, Continuity at a point - Limit of a Function of two variables - Partial Derivatives - Geometrical representation of a Function of two Variables - Homogeneous Functions.

### Unit II

Theorem on Total Differentials - Composite Functions - Differentiation of Composite Functions - Implicit Functions - Equality of  $f_{xy}(a, b)$  and  $f_{yz}(a, b)$  - Taylor's theorem for a function of two Variables - Maxima and Minima of functions of two variables.

### Unit III

Vector Spaces: vector spaces and subspaces- Null Spaces, Column Spaces, and –Linear Transformations, Linearly Independent and Dependent Sets – Bases – Coordinate System,

### Unit IV

The Dimension of a Vector Space – Rank – Change of Basis – Eigen Values and Eigen Vectors – The Characteristic Equations – Determinants

**TextBooks:**

1. Shanti Narayan, P.K. Mittal Differential Calculus, S.CHAND, NEW DELHI
2. David C Lay, Linear Algebra and its Applications

**References:**

1. S Lang, Introduction to Linear Algebra, Spring New York 2012
2. Gilbert Strang, Linear Algebra and its Applications, Thomson Learning Inc. , London
3. Joseph Edwards , Differential calculus for beginners
4. Hari Kishan, Differential Calculus

*With effect from the academic year 2020-2021*

BCA SEM III – THEORY			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
<b>BCA302</b>	<b>Computer Architecture</b>	<b>DSC-3A</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>80</b>	<b>20</b>	<b>3</b>	<b>1</b>

#### **UNIT I**

##### **Basic Structure of Computers**

Functional units, Basic operational concepts, Bus structures, Software performance, Memory locations and addresses, Memory operations, Instruction and instruction sequencing, Addressing modes, Assembly language, Basic I/O operations.

#### **UNIT II**

##### **Basic Processing Unit**

Fundamental concepts, Execution of a complete instruction, Hardwired control, Microprogrammed control, Pipelining, Basic concepts, Data hazards, Instruction hazards, Influence on Instruction sets, Data path and control consideration.

#### **UNIT III**

##### **Memory System**

Basic concepts, Semiconductor RAMs, ROMs, Speed, size and cost, Cache memories, Performance consideration, Virtual memory, Memory Management requirements, Secondary storage.

#### **UNIT IV**

##### **I/O Organization**

Accessing I/O devices, Interrupts, Direct Memory Access, Buses, Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB).

##### **Suggested Reading:**

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5<sup>th</sup> Edition “Computer Organization”, McGraw-Hill, 2002.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 6<sup>th</sup> Edition, Pearson Education, 2003.
3. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The hardware/software interface”, 2<sup>nd</sup> Edition, Morgan Kaufmann, 2002.
4. John P. Hayes, “Computer Architecture and Organization”, 3<sup>rd</sup> Edition, McGraw Hill, 1998.

*With effect from the academic year 2020-2021*

BCA SEM III – THEORY and PRACTICAL			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
<b>BCA304</b>	<b>Java Programming</b>	<b>DSC-3B</b>	<b>4</b>	<b>3</b>	<b>4+1=5</b>	<b>80(T) 50(P)</b>	<b>20(T) --</b>	<b>3 3</b>	<b>1 --</b>

### **Unit I**

OOPS concepts, History of java, Features of java, data types, variables, scope and lifetime of variables, operators, expressions, control statements, type conversion and casting. Defining classes, adding objects & methods, Access Modifiers, Method Overloading, Constructors, Constructor Overloading, use of this, static, final keywords, Arrays-How to create and define.

### **Unit II**

String, StringBuffer classes. Inheritance- basics, Super class object, subclass, member access rules, super uses, Method Overriding, Abstract Classes. Interfaces - Defining and Implementing an Interface, Differences between Classes and Interfaces, Extending interfaces. Packages- Defining, Creating and Accessing a Package, importing packages.

### **Unit III**

Exception handling- Concepts and benefits of exception handling, usage of try, catch, throw, throws and finally, java's built in exceptions. Multi-threading- Difference between multi-threading and multi-tasking, thread lifecycle, Creating threads. Basic I/O- Streams- Byte Streams & Character Streams, Reading Console Input.

### **Unit IV**

AWT- Introduction, the AWT class hierarchy, AWT controls - Buttons, Labels, TextField, Checkbox, Layout Managers. Event handling- Event delegation model, Events, Event classes, Event Sources. Introduction to Swings, Collection Framework. Applet- Introduction, Lifecycle methods, drawing graphics in applet.

### **Suggested readings**

1. Java The Complete Reference, 8th Edition, Herbert Schildt, Tata McGraw Hill Publications.
2. Understanding OOP with java, updated edition, T.Budd, Pearson education.
3. The Java Programming Language, K.Arnold and J.Gosling.
4. Core Java Volume-I Fundamentals , Cay S. Horstmann, Gary Cornell

### **Java Programming Lab Programs**

1. Programs on if-else, if-else-if
2. Program on switch
3. Program on while
4. Program on for loop
5. Program on do-while
6. Program to demonstrate class concept.
7. Program to demonstrate methods
8. Program to demonstrate method overloading
9. Program to demonstrate constructors
10. Program to demonstrate constructor overloading
11. Program to demonstrate an Array
12. Program to demonstrate multidimensional array
13. Program to demonstrate Strings
14. Program to demonstrate inheritance
15. Program to demonstrate method overriding
16. Program to demonstrate abstract class
17. Program to demonstrate reading console input
18. Program to demonstrate interfaces
19. Program to demonstrate packages
20. Program to demonstrate exceptional handling
21. Program to demonstrate creating a thread by extending Thread class
22. Program to demonstrate creating a thread by implementing Runnable interface
23. Program to demonstrate AWT controls
24. Program to demonstrate Layout Manager
25. Program to demonstrate Events
26. Program to demonstrate applets

*With effect from the academic year 2020-2021*

BCA SEM III – THEORY and PRACTICAL			Hours /week			Scheme of Examination			
						MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
BCA305	Database Design	DSC-3C	4	3	4+1=5	80(T)	20(T)	3	1
						50(P)	--	3	--

### Unit I

Database System Architecture, overview on database concepts, definitions, Types of databases and models, Advantages and limitations of database, Range of database applications, components of database, data abstraction, data independence, three schema Architecture, database development process, Data Manipulation Language, Data Definition Language. Data Models: E-R Models, Entities, Types of Entities, Attributes, Keys, Relationships, Degree of Cardinality. Enhanced E -R Model: Super type, sub type, specialization, Generalization, super type/ subtype hierarchies, constraints.

### Unit II

Relation Model: Definition, Integrity constraints, Transforming EER diagram into relations, merging relations. Normalization: Functional dependencies, normal forms 1NF, 2NF, 3NF, 4NF, BCNF, SQL: Queries, constraints, Set Operators, Aggregate Operators, Procedures and functions, Triggers.

### Unit III

Transaction Management: ACID Properties, Transaction and schedules, concurrent execution of transactions, Lock-Based concurrency control, 2PL, Deadlock and dealing with deadlocks. Database Security: Challenges in database security, Authentication, Authorization, Access control DAC and MAC, intrusion detection, Backup and Recovery.

### Unit IV

Parallel and Distributed Databases – Introduction, Architectures for Parallel Databases, Introduction to Distributed Databases, Types of Distributed Databases, Distributed DBMS Architectures, Client-Server Systems, Collaborating Server Systems, Middleware Systems.

### **Suggested Readings**

1. Raghu Ramakrishnan, Johannes Gehrke, “Database Management System”, Third Edition
2. Fred R Me Fadden. Jeffrey A Hoffer, Mary B Prescott- Modern Database Management, fifth edition, Addison Wesley 1999

### **DBMS Lab Experiments**

1. Create command for creating a table using primary key
2. Alter command for altering the column name and datatype of a column in the table
3. Alter command to add new column to the existing table
4. Alter command to modify the existing name of the column in the table
5. Drop command of the table
6. Truncate command for the table
7. Insert command for storing the records in the database table
8. Update command for updating a particular record by using where clause
9. Delete command for removing a particular record from the table
10. Select command for selecting data from the table
11. Select command for selecting the specific data from the data by using where clause and select distinct statement
12. Select command for selecting the records by using ORDER BY clause ASC
13. Select command for selecting the records by using ORDER BY clause DESC
14. SQL Built in functions (MIN, MAX, COUNT, AVG, SUM)
15. SQL Query to perform AND Operator and OR Operator
16. SQL Query to perform GROUPBY Clause
17. SQL Query to perform HAVING Clause
18. SQL Queries to perform integrity constraints
19. SQL Query to perform SQL BETWEEN Operator
20. Joins – Equi Join, Non-Equi Join, Outer Join and Self Join
21. Stored Procedures
22. Triggers



*With effect from the academic year 2020-2021*

BCA SEM I – THEORY and PRACTICAL		Type	Hours /week		Cre-dits	Scheme of Examination			
			L	P		MaxMarks		Duration(hrs)	
Course Code	Course Title					SEE	CIE	SEE	CIE
BCA306	Operating System	DSC-3D	4	3	4+1=5	80(T)	20(T)	3	1
	Concepts					50(P)	--	3	--

### Unit I

Introduction: Definition, Computer system Architecture, Operating system Architecture, Operating system services, Types of Operating systems, System Calls, Types of System calls  
 Process and Threads: Process concept, Process scheduling, Operations on process, inter process communication, Threads, Multithreading models, threading issues

### Unit II

CPU Scheduling: Scheduling criteria, scheduling algorithms, Process Synchronization: Critical section problem, Mutex Locks, Hardware mutex, Semaphores, Classical problem of synchronization  
 Deadlock: definitions, Deadlock Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.

### Unit III

Main Memory: swapping, contiguous memory allocation, Segmentation, Paging, structure of page tables.  
 Virtual Memory: Demand Paging, Page replacement, Allocations of frames, Thrashing, Memory Mapped files, Mass storage structure, Disk structure, Disk attachment and disk scheduling, Disk formatting.

### Unit IV

File System Implementation: File system structure, File system Implementation, Directory Implementation, Allocation methods, Free-Space Management, Efficiency and Performance.  
 Protection and Security: Goals of protection, Principles of protection, Security problem, Program threats, System and network threats, Cryptography as a security tool, User Authentication.

### **Suggested Readings**

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating system concepts", Ninth edition, John Wiley and Sons publication 2013
2. William Stallings, "Operating Systems", fifth edition, Pearson Education, 2005.
3. A. Tanenbaum, "Modern Operating Systems", Third Edition, Pearson Education, 2008

### **OS Lab practical programs**

1. Process System Calls
2. IO System Calls
3. IPC using Pipe Processing
4. First Come First Serve Scheduling
5. Shortest job first Scheduling
6. Priority Scheduling
7. Round Robin Scheduling
8. Simulate Page Replacement Algorithms FIFO
9. Simulate Page Replacement Algorithms LRU
10. Simulate Page Replacement Algorithms OPTIMAL

*With effect from the academic year 2020-2021*

**PROPOSED SCHEME FOR  
BACHELOR OF COMPUTER APPLICATIONS (BCA) for A.Y 2020-2021**

Semester - IV						
Course Code	Course Title	Course Type	HrsPerWeek	Credits	Marks CIE+SEE	Duration
<b>BCA401</b>	Disaster Managment	<b>SEC-2</b>	2T	2	10I+40E=50	30min+2hr
<b>BCA402</b>	Distributed and Cloud Computing	<b>ETC-4A</b>	4T	4	20I+80E=100	1hr+3hr
<b>BCA403</b>	Artificial Intelligence	<b>ETC-4B</b>	4T	4	20I+80E=100	1hr+3hr
<b>BCA404</b>	DataScience using Python	<b>DSC-4A</b>	4T+3P=7	5	20I+80E=100T 0+50E=50P	1hr+3hr(T) 0+3hr(P)
<b>BCA405</b>	Software Engineering	<b>DSC-4B</b>	4T+3P=7	5	20I+80E=100T 0+50E=50P	1hr+3hr(T) 0+3hr(P)
<b>BCA406</b>	Computer Networks	<b>DSC-4C</b>	4T+3P=7	5	20I+80E=100T 0+50E=50P	1hr+3hr(T) 0+3hr(P)
<b>Total</b>			<b>22T+9P=31</b>	<b>25</b>	<b>110I+590E=700</b>	<b>---</b>

	Abbreviations
<b>GE</b>	Generic Elective
<b>DSC</b>	Discipline Specific Course
<b>ETC</b>	Emerging Technological Course
<b>DSE</b>	Discipline Specific Elective
<b>SEC</b>	Skill Enhancement Course
<b>AECC</b>	Ability Enhancement Compulsory Course
<b>T / P</b>	Theory / Practical
<b>CIE</b>	Continuous Internal Evaluation
<b>SEE</b>	Semester End Evaluation
<b>I/E</b>	Internal / External

*With effect from the academic year 2020-2021*

BCA SEM IV – THEORY		Type	Hours /week			Scheme of Examination			
Course Code	Course Title		L	P	Cre-dits	SEE	CIE	SEE	CIE
<b>BCA401</b>	<b>Disaster Management</b>	<b>SEC-2</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>40</b>	<b>10</b>	<b>2</b>	<b>30min</b>

Same as Nizam College

*With effect from the academic year 2020-2021*

BCA SEM IV – THEORY		Type	Hours /week		Cre- dits	Scheme of Examination			
Course Code	Course Title		L	P		SEE	CIE	SEE	CIE
ETC402	<b>Distributed and Cloud Computing</b>	ETC 4B	4	-	4	70	30	3	1

### Unit I

**Distributed Systems:** Trends in Distributed Systems – Focus on resource sharing – Challenges.  
**Case study:** World Wide Web, System Model – Inter process Communication – the API for internet protocols – External data representation and multicast communication, Overlay Networks, Group Communication, Introduction to RMI, Publish-subscribe systems and Introduction to Corba.

### Unit II

**Introduction to Cloud Computing:** Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

### Unit III

**Virtual Machines and Virtualization of Clusters and Data Centers:** Levels of Virtualization, Virtualization Structures Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data center Automation. Case studies: VMware Features.

### Unit IV

**Cloud computing architectures over Virtualized Data Centers:** Data center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

### Suggested Readings

1. Pradeep K Sinha, Distributed Operating Systems: Concepts and Design, Prentice Hall of India,2007.
2. Tanenbaum A.S., Van Steen M., Distributed Systems: Principles and Paradigms, Pearson Education,2007.
3. John W. Rittinghouse, Cloud Computing: Implementation, Management, and Security. James F. Ransome, CRC Press2009.
4. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, Distributed and Cloud Computing From Parallel Processing to the Internet of Things, Elsevier,2012.
5. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley Publisher,2011

*With effect from the academic year 2020-2021*

BCA SEM IV – THEORY		Type	Hours /week		Credits	Scheme of Examination			
Course Code	Course Title		L	P		SEE	CIE	SEE	CIE
<b>BCA403</b>	<b>Artificial Intelligence</b>	<b>ETC-4B</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>80</b>	<b>20</b>	<b>3</b>	<b>1</b>

**Unit I**

Introduction & Problem Solving: AI problems, AI Technique, Defining problem as a State Space Search, Production Systems, Problem Characteristics. Heuristic Search Techniques: Generate and test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction.

**Unit II**

Game Playing: Overview, Min-Max search Procedure, Iterative Deepening. Knowledge Representation Issues: Approaches, Issues, Frame Problem, Using Predicate Logic: Representing simple facts in logic, Representing Instance and ISA Relationships, Computable Functions and predicates, Resolution, Natural Deduction.

**Unit III**

Uncertainty and Reasoning Techniques: Non monotonic reasoning, Logics for Non monotonic reasoning, Implementation issues, implementation of Depth First Search and Breadth first search. Statistical reasoning: Probability and Bayes theorem, Certainty factors and Rule-based systems, Bayesian Networks.

**Unit IV**

Learning: What is Learning, Rote learning, Learning by taking advice, Learning in problem solving, Induction, Learning by Decision trees. Expert System: Representing and Using Domain Knowledge, Expert systems shells, Explanation, Knowledge Acquisition. Perception and Action: Real Time Search, Vision, Speech Recognition,

**Suggested Readings**1. Elaine Rich, Edition.,2008 Kevin Night, Shivashankar 23 BNair,—Artificial Intelligencel,3 rd

*With effect from the academic year 2020-2021*

BCA SEM IV – THEORY and PRACTICAL		Hours /week	Scheme of Examination						
			MaxMarks		Duration(hrs)				
Course Code	Course Title	Cate-gory	L	P	Cre-dits	SEE	CIE	SEE	CIE
<b>BCA404</b>	<b>Data Science using Python</b>	<b>DSC-4A</b>	<b>4</b>	<b>3</b>	<b>4+1=5</b>	<b>80(T)</b>	<b>20(T)</b>	<b>3</b>	<b>1</b>
						<b>50(P)</b>	<b>--</b>	<b>3(P)</b>	<b>--</b>

**Unit I**

Introduction to data science – Introduction to data science, Data Science Components, DataScience Process, Data Science Jobs Roles, Tools for Data Science, Difference between DataScience with BI (Business Intelligence),Applications of Data science,Challenges of Datascience Technology.Data analysis – Introduction to data analysis, Data Analysis Tools, Types of Data Analysis:Techniques and Methods,Data Analysis ProcessIntroductiontoPython,Pythonfeatures,PythonInterpreter,modesofPythonInterpreter,Valu es and Data types, Variables, Key words, Identifiers,Statements.

**Unit II**

Expressions, Input & Output, Comments, Lines & Indentation, Quotations, Tuple assignment, Operators, Precedence of operators.Functions: Definition and use, Types of functions, Flow of execution, Parameters and Arguments, Modules.Conditionals: Conditional(if), Alternative(if-else), Chained Conditionals(if-elif-else), Nested conditionals; Iteration/Control statements: while, for, break, continue, pass; fruitful function vs void function, Parameters/Arguments, Return values, Variables scope (local, global), Function composition.

**Unit III**

Strings: Strings, String slices, Immutability, String functions & Methods, String module; List as array: Array, Methods of array.Lists:Listoperations,Listlices,Listmethods,Listloops,Mutability,aliasing,Cloninglist,List parameters; Tuple: Benefit of Tuple, Operations on Tuple, Tuple methods, Tuple assignment, Tuple as return value, Tuple as argument; Dictionaries: Operations on Dictionary, methods in Dictionary, Difference between List, Tuple and Dictionary; Advanced List processing: List comprehension, NestedList.

## **Unit IV**

Introduction to Numpy – The basics of numpy array, computation on numpy arrays, aggregations, computations on arrays, comparisons, masks and Boolean logic, fancy indexing, sorting arrays, structured data. Data Manipulation with Pandas – Introducing pandas objects, data indexing and selection, operating on data in pandas, handling missing data, hierarchical indexing, combining datasets, aggregation and grouping

### **Suggested Readings**

1. Allen B Downey, "Think Python: How to think like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, - An Introduction to Python - Revised and Updated for Python 3.2, Network Theory Ltd 2011.
3. Grus, Joel. Data science from scratch: first principles with python. O'Reilly Media, 2019.



## **Python Programming Lab Programs**

### **Python**

1. Write a program to demonstrate different numbers data types in python.
2. Write a python program to design simple calculator using functions.
3. Write a python program to check whether a given number is Armstrong number or not.
4. Write a python program to generate prime numbers between different intervals.
5. Write a python program to find factorial of a number using recursion.
6. Write a python program to check whether a string is palindrome or not.
7. Write a python program to count the number of characters present in a word.
8. Write a python program to create, append and remove lists.
9. Write a program to demonstrate working with tuples in python.
10. Write a program to demonstrate dictionaries in python.

### **Numpy**

11. Python program to demonstrate basic array characteristics
12. Python program to demonstrate array creation techniques
13. Python program to demonstrate indexing in numpy
14. Python program to demonstrate basic operations on single array
15. Python program to demonstrate unary operators in numpy

### **Pandas**

16. Python code demonstrate to make a Pandas DataFrame with two-dimensional list
17. Python code demonstrate creating DataFrame from dictionary of ndarray and lists
18. Python code demonstrate creating a Pandas dataframe using list of tuples
19. Python code demonstrate how to iterate over rows in Pandas DataFrame
20. Python code demonstrate how to get column names in Pandas dataframe

*With effect from the academic year 2020-2021*

BCA SEM IV – THEORY and PRACTICAL			Hours /week			Scheme of Examination			
			L	P		MaxMarks		Duration(hrs)	
Course Code	Course Title	Type	L	P	Cre-dits	SEE	CIE	SEE	CIE
BCA405	Software Engineering	DSC-4B	4	3	4+1	80(T)	20(T)	3	1
					5	50(P)	--	3	--

### Unit I

Software Engineering – Introduction, Program Versus Software, Software Engineering, Software Development Process and its Stages, Generic Software Development Process Models, Code of Ethics and Professional Practice, Software Development and Maintenance Cost Breakup. Requirement Engineering Processes – Requirement Engineering Process, Feasibility Study, Cost and Benefit Analysis.

### Unit II

Requirement Specification, Characteristics of a Good Requirement and Validation Techniques, Requirements Management Planning, Process of Requirement Change Management. Software Requirement Specifications – Introduction, Stakeholder Analysis, Software Requirements Document, IEEE Standard of Software Requirement Specifications, Organizing Functional Requirements, Traceability and Validation of Specifications.

### Unit III

Architectural Styles – Introduction, Architecture Styles, Object Oriented Architecture, Inter-organizational Communication, Cloud Computing Architecture Style, Core, Configurable and Customizable Architecture, Design Models, Architectural Design Principles. Object Oriented System Analysis – Introduction, Object Oriented Design, Object Oriented Design Models, Object Oriented Analysis, Data Modeling, Comparison Between Top Down Structured and Object Oriented Analysis, Description of Logical and Static Modeling, Identification of Class Relationships.

### Unit IV

Object Oriented Design Using UML – Introduction, Sequence Diagram, State Machine Diagram, Timing Diagram, Describing Detailed Object Oriented Design, Decision Tree and

Decision Table, Composite Structure Diagram, Generating Test Cases, Moving Towards Physical Design, Structured Methods. Software Development – Introduction, Good Coding Practices, Code Reuse, Design Pattern, Generator Based Reuse, Application/Software Developed on Product Lines Approach, Component Based Software Engineering, Agile Methods. Software Quality Assurance – Introduction, Software Verification and Validation Process, Software Testing, System Testing, Object Oriented Testing Strategy, Test Cases, Equivalence Partitioning (Black Box Testing), Art of Debugging.

### **Suggested Readings**

1. Rajesh Narang, Software Engineering: Principles and Practices
2. Ian Sommerville, Software Engineering
3. R. Mall, Fundamentals of Software Engineering
4. Pankaj Jalote, An Integrated Approach to Software Engineering
5. Frank Tsui, Orlando Karam, Barbara Bernal, Essentials of Software Engineering
6. Roger S Pressman, B R Maxim, Software Engineering – A Practitioner's Approach
7. Grady Booch, The Unified Modeling Language User Guide

## **Software Engineering Lab**

### Case Studies

1. BankingSystem
2. Hotel managementsystem
3. Inventory ControlSystem
4. Library managementsystem
5. Railway ReservationSystem

Choose any two of above case studies and do the following exercises for that case studies

1. Write the complete problemstatement
2. Write the software requirements specificationdocument
3. Draw the entity relationshipdiagram
4. Draw the data flowdiagrams
5. Draw use casediagrams
6. Draw activity diagrams for all usecases
7. Draw sequence diagrams for all usecases
8. Draw collaboration diagram
9. Assign objects in sequence diagrams to classes and make class diagram.

Note - To draw dataflow diagrams using Microsoft Visio Software, SmartDraw  
To draw UML diagrams using Rational Rose Software,StarUML

*With effect from the academic year 2020-2021*

BCA SEM IV – THEORY AND PRACTICAL		Hours /week	Scheme of Examination						
			MaxMarks		Duration(hrs)				
Course Code	Course Title	Type	L/T	P	Cre-dits	SEE	CIE	SEE	CIE
<b>BCA406</b>	<b>Computer Networks</b>	<b>DSC-4C</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>80</b>	<b>20</b>	<b>3</b>	<b>1</b>

**Unit I**

**Multiple Access:** Wired LAN-Ethernet IEEE 802.3LAN, CSMA/CD protocol, Binary exponential backoff algorithm. Comparison of Switched, Fast and Gigabit Ethernet. **Wireless LAN-**IEEE 802.11 architecture. CSMA/CA protocol, Bridges and types of bridges, ARP and RARP

**Unit II**

**Network Layer:** Logical Addressing-IPv4, Subnetting, and supernetting, CIDR, introduction to IPv6, ICMP, IGMP. Routing-Distance Vector Routing Link State Routing, OSPF and BGP.

**Unit III**

**Transport Layer:** TCP State diagram, Window Management, Congestion Control, Timer Management and UDP protocol **Socket Programming:** Primitive and Advanced Systems Calls, TCP Iterative and Concurrent programs

**Unit IV**

**Socket Programming:** UDP systems calls, socket options, IO Multiplexing, Asynchronous IO **Application Layer:** Domain Name System, Simple Mail Transfer Protocol (SMTP), File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP)

**Suggested Readings**

1. Data Communications and Networking-Behrouz A.Fourouzan, Fourth Edition TMH,2006.
2. Computer Networks--Andrew S Tanenbaum,4th Edition,PearsonEducation.
3. Advance UNIX Programming Richard Stevens, Second Edition PearsonEducation
4. Advance UNIX Programming, N.B. Venkateswarlu, BSPublication.

### **Networking concepts demonstration**

1. Demonstrations of IP address and ports in computersystem.
2. Explanation of settings in networkconnections
3. Testing of networking connectivity using ping,tracepath
4. Checking network statistics withnetstat
5. Demonstration of static and dynamic IP addresssettings
6. Understanding ethernet cabling and switchednetworks
7. Comprehension of routers andfirewalls

### **Network programming**

1. Implement the following forms of IPC. a) Pipes b)FIFO
2. Implement file transfer using Message Queue form ofIPC
3. Design TCP iterative Client and server application to reverse the given inputsentence
4. Design TCP iterative Client and server application to reverse the given inputsentence
5. Design TCP client and server application to transferfile
6. Design UDP Client and server application to reverse the given inputsentence
7. Design UDP Client and server application to reverse the given inputsentence
8. Design UDP Client server to transfer afile

### **Suggested Reading**

1. Advance UNIX Programming Richard Stevens, Second Edition PearsonEducation
2. Advance UNIX Programming, N.B. Venkateswarlu, BSPublication.

**RULES AND REGULATIONS & SYLLABUS**

**(3rd YEAR)**

**FOR**

**BACHELOR OF COMPUTER APPLICATIONS (BCA)**

**With effect from the Academic Year**

**2018-2019**



**FACULTY OF INFORMATICS  
OSMANIA UNIVERSITY,  
HYDERABAD, TELANGANA  
INDIA – 500 007**

S.No	Course Code	Course Title	Pg. No.
1	BCA501	Programming using ASP Dot NET	5
2	BCA502	Unix Programming	6
3	BCA503	Object Oriented Analysis Design	7
4	BCA504	Software Quality Testing	8
5.	BCA#	Elective I BCA 510 Mobile Application Development BCA 511 Internet Protocols BCA 512 Data Mining	9 10 11
6	BCA350	OOSD Lab	12
7	BCA351	Unix Programming Lab	13
8.	BCA 352	DOT NET Lab	14

S.No	Course Code	Course Title	Pg. No.
1	BCA601	Information Security	15
2	BCA602	Advanced JAVA	16
3	BCA#	Elective-II BCA 604 Big Data Analytics BCA 605 Artificial Intelligence BCA 606 Cloud Computing	17 18 19
4	BCA680	Advanced Java Programming-Lab	20
5	BCA681	Project work	21



## SCHEME OF INSTRUCTION

### BCA (BACHELOR OF COMPUTER APPLICATIONS)

**Proposed scheme with effect from the academic year 2018-19**

#### SEMESTER-V

S.No	Course Code	Course Title	Category	Contact Hour/week			No. of Credits	Scheme of Exam Duration(hrs)		Scheme of Examination (Max Marks)	
				L	T	P		SEE	CIE	SEE	CIE
<b>THEORY</b>											
1	BCA501	Programming using ASP Dot NET	PE	4	0	0	4	3	1	70	30
2	BCA502	Unix Programming	SEC	4	0	0	4	3	1	70	30
3	BCA503	Object Oriented Analysis Design	CC	4	0	0	4	3	1	70	30
4	BCA504	Software Quality Testing	CC	4	0	0	4	3	1	70	30
5.	BCA#	Elective I BCA 510 Mobile Application Development BCA 511 Internet Protocols BCA 512 Data Mining	PE	4	0	0	4	3	1	70	30
<b>PRACTICALS</b>											
6	BCA350	OOSD Lab	PC	0	0	4	2	3	1	50	25
7	BCA351	Unix Programming Lab	PC	0	0	4	2	3	1	50	25
8.	BCA 352	DOT NET Lab	PC	0	0	4	2	3	1	50	25
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>12</b>	<b>32</b>			<b>500</b>	<b>225</b>

#### SEMESTER - VI

S.No	Course Code	Course Title	Category	Contact Hour/week			Credits	Scheme of Exam Duration(hrs)		Scheme of Examination (Max Marks)	
				L	T	P		SEE	CIE	SEE	CIE
<b>Theory</b>											
1	BCA601	Information Security	CC	4	0	0	4	3	1	70	30
2	BCA602	Advanced JAVA	CC	4	0	0	4	3	1	70	30
3	BCA#	Elective-II BCA 604 Big Data Analytics BCA 605 Artificial Intelligence BCA 606 Cloud Computing	CC	4	0	0	4	3	1	70	30
<b>PRACTICALS</b>											
4	BCA680	Advanced Java Programming-Lab	PC	0	0	4	2	3	1	50	25
5	BCA681	Project work	PC	0	0	6	4	-	-	150	50
<b>TOTAL</b>				<b>12</b>	<b>0</b>	<b>10</b>	<b>16</b>			<b>360</b>	<b>165</b>

*Instruction: (3L) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

**UNIT-I**

Asp.Net Overview- Introduction to ASP.Net, Introduction to web Applications with web servers, web server role-IIS,APACHE etc, Web-browsers, web support languages, understanding ,http, TCP/IP role in web development.ASP.Net role:-ASP.Net framework, Name spaces ,New scenario in development process with IDE.

**UNIT-II**

ASP.Net web forms-Introduction to web forms, page directives and its use, separating code & design, new code behind techniques, ASP.Net server controls-Working with server controls, applying styles to controls, themes, skins etc.

**UNIT-III**

Web form validation controls-Required field validation Control Computer Validation Control, Custom Validation Control, Group Validation and Accounting Validation.ADO.Net Database Services- Overview of ADO.Net XML, XML to HTML, XML & Databases XML Support in .Net retrieve data with datasets & Data Adapters.

**UNIT-IV**

Presenting Data Using ASP.Net-Bound Controls- Data Source Controls, Repeater and its uses, Data list control, data grid control view and its importance, form view detail's view, list view. User controls- Adding member to user controls , registering user control ,properties & methods ,Dynamically loading user controls, master pages.

**UNIT-V**

ASP .Net Error Handling & Debug- Error handling & .Net returns, Structured Error handling, Catching General Exception, Catching Specific Exceptions, Throwing Exception Custom Exceptions ,Page level Error handling, Application level Error Handling. Configuring ASP.Net- Web machine Configuration, Global Assembly cache, working with Assembling information, Managing Application State, Http handlers, Applications & Server Events.

**Suggested Readings:**

1. **C#.NET Black Book** by stevenholzner –dreamtech
2. **ASP.NET Unleashed**
3. **C# programming** – wrox publication
4. **C# programming Black Book** by Matt telles

*Credits: 4*

*Instruction: (3L +1T) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

**UNIT-I**

Unix: Introduction, commands, file system, security and file permission, regular expression and grep, shell programming, awk

**UNIT-II**

The Unix Model, signal, process control, daemon process. **Interprocess Communication:** Introduction, file and record locking, other unix locking techniques, pipes, FIFOs, streams and messages, namespaces, message queues, semaphores and shared memory.

**UNIT-III**

Socket programming, Socket address, elementary socket system calls, advanced socket system calls, reserved ports, socket options, asynchronous I/O, Input/ Output Multiplexing, out-of band. data, sockets and signals, Internet super server.

**UNIT-IV**

Introduction to PHP: Overview, syntactic characteristics, primitives, operations and expressions, output, control statements, arrays, functions. pattern matching, form handling files, cookies and session tracking.

**UNIT-V**

Python Basics, Python Objects, Numbers, Sequences: Strings, Lists, and Tuples, Mapping and Set Types, Conditionals and Loops, Files and Input/Output, Errors and Exceptions, Functions and Functional Programming, Modules, Object oriented programming.

**Suggested Readings:**

1. Behrouz A. Forouzan and Richard F. Gilberg, "*Unix and Shell Programming: a Text book*" Cengage learning, 2008.
2. W. Richard Stevens, "*Unix Network Programming*", Pearson Education, 2009.
3. Robert W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 2008.
4. Wesley J. Chun, "*Core Python Programming*", Prentice Hall.
5. Sumitabha Das, "*Unix concepts & Applications*", Fourth Edition, Tata McGraw hill, 2006.

**BCA 503**

**OBJECT ORIENTED SYSTEM DEVELOPMENT**

*Credits: 4*

*Instruction: (3L) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

**UNIT-I**

UML Introduction : Why we model, Introducing the UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams. Advanced Structural Modeling : Advanced Classes, Advanced Relationships, Relationships, Interfaces, Types and Roles, Packages, Instances, Object Diagrams , Components.

**Unit-II**

Basic Behavioral Modeling: Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams. Advanced Behavioral Modeling: Events and signals, State Machines, Processes and Threads, Times and space, State Chart Diagrams.

**Unit-III**

Architectural Modeling: Artifacts, Deployment Collaborations, Patterns and Frame works, Artifact diagrams, Deployment diagrams, Systems and models.

**Unit-IV**

Unified Software Development Process: The Unified Process, The Four Ps, A Use- Case- Driven Process, An Architecture, An Architecture – Centric Process, An Iterative and incremental Process.

**Unit-V**

Core Workflows: Requirements Capture , Capturing Requirements as Use Cases, Analysis, Design, Implementation, Test.

**Suggested Reading:**

1. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language – User Guide, (Covering UML 2.0) 2nd Edition , Pearson Education, India, 2007.
2. Ivor Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, India, 2008.

**Credits: 4**

*Instruction: (3L) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

**UNIT I**

INTRODUCTION TO SOFTWARE QUALITY Ethical Basis for Software Quality – Total Quality Management Principles – Software Processes and Methodologies – Quality Standards, Practices & Conventions –Improving Quality with Methodologies – Structured/Information Engineering – Measuring Customer Satisfaction– Software Quality Engineering – Defining Quality.

**UNIT II**

SOFTWARE QUALITY METRICS AND RELIABILITY Writing Software Requirements and Design Specifications – Analyzing Software Documents using Inspections and Walkthroughs – Software Metrics – Lines of Code, Cyclomatic Complexity, Function Points, Feature Points – Software Cost Estimation.

**UNIT III**

TEST CASE DESIGN Testing as an Engineering Activity – Testing Fundamentals – Defects – Strategies and Methods for Black Box Test Case Design – Strategies and Methods for White-Box Test Case Design – Test Adequacy Criteria – Evaluating Test Adequacy Criteria – Levels of Testing and different Types of Testing .

**UNIT IV**

TEST MANAGEMENT Testing and Debugging Goals and Policies – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – The Role of Three Groups in Test Planning and Policy Development – Process and the Engineering.

**UNIT V**

CONTROLLING AND MONITORING Measurement and Milestones for Controlling and Monitoring – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of Reviews – Developing a Review Program – Components of Review Plans – Reporting Review Results.

**Suggested Readings:**

1. Ilene Burnstein, Practical Software Testing, Springer International Edition, 2003.
2. Stephen Kan, Metrics and Models in Software Quality, Addison-Wesley, Second Edition, 2004.
3. Milind Limaye, Software Quality Assurance, McGraw Hill, 2011.
4. M G Limaye, Software Testing – Principles, Techniques and Tools, McGraw Hill, 2011

**BCA 510**

**MOBILE APPLICATION DEVELOPMENT**

*Credits: 4*

*Instruction: (4L) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

**UNIT-I**

Applications, history of mobile communications, reference model Wireless transmission - Frequencies, Signals, Antennas, Signal propagation, Multiplexing Modulation, Spread spectrum, cellular systems Medium access layer - Motivation, SOMA, FDMA, COMA Wireless LAN - Infrared vs radio transmission, infrastructure, IEEE802.11. HIPERLAN, Bluetooth

**UNIT-II**

Key services for mobile internet. Mobile IP - Goals, assumptions, requirements, entities, IP packet delivery. Agent advertisement and discovery, Registration. Tunnelling. Optimization, reverse tunneling, DHCP, Adhoc networks, Mobile transport Layer - Traditional TCP, Indirect TCP .Snooping TCP, Mobile TCP, Fast transmit Fast recovery, Transmission timeout freezing, transaction oriented TCP

**UNIT-III**

Wireless Application Protocol - Overview of WAR WAP architecture, components. Network infrastructure Design principles WML - Document model, Basics, basic content, events, tasks and binding, variables, other content, controls, application security, other data

**UNIT-IV**

Wireless binary extensible markup language WML Script - language basics, standard libraries, script libraries, script development User interface design - structured usability methods, design guidelines - user interface, selected WML elements

**UNIT-V**

Tailoring content to client Push messaging Wireless telephony applications Building and deploying End-to-End WAP services

**Suggested Reading**

1. Sundeep Singh etc. Wireless Application Protocol - Addison Wesley 2001
2. Jochen Schiller - Mobile communications, Addison-Wesley 2001

**BCA 511**

## **INTERNET PROTOCOLS**

*Credits 4*

*Instruction: (3L) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

### **UNIT-I**

**Protocols and Standards:** Protocols, Standards, TCP/IP- Protocol Suite, Addressing.

**IP Addressing** - Decimal Notation, Classes, Special Addresses, Unicast- Multicast and Broadcast Addresses.

**Sub Netting and Super Netting** – Sub Netting, Masking, Super Netting.

**Delivery and Routing of IP Packets** - Connection Oriented Versus Connectionless Services, Direct Versus Indirect Delivery, Routing Methods, Static Versus Dynamic Routing.

### **UNIT-II**

**Internet Protocol** - Datagram, Fragmentation, Options, Checksum.

**ARP and RARP** –ARP, Packet Format, Encapsulation, Operation, Proxy ARP, RARP Packet Format.

**Internet Control Message Protocol (ICMP)** - Types of Messages, Message Format, Error Reporting, Query.

**Transmission Control Protocol (TCP)** - Process To Process Communication, Services, Segment, Options, Checksum, Flow Control, Error Control, Timers, Connection.

### **UNIT-III**

**Routing Protocols:**

**OSPF**- Areas, Metric, Link State Routing, Types of Links.

**BGP**-Path Vector Routing-Path Vector Messages.

**Client-Server Model** - Concurrency, BOOTP, DHCP.

**Domain Name System (DNS)** - Name Space, Domain Name Space, Distribution, DNS in Internet.

### **UNIT-IV**

**Telnet**- Concepts, NVT, Options, Escape Character, Mode of Operation, User Interface, Rlogin.

**File Transfer Protocol (FTP)**-Connections, Communication, Command Processing, File Transfer.

**Simple Mail Transfer Protocol (SMTP)** - User Agent, Addresses, Delayed Delivery, Aliases, MTA, Commands and Responses, Mail Transfer Phases, Mime, Pop.

**Next Generation Ipv6**:Ipv6, Addresses, Packet Format, Comparison between Ipv4 and Ipv6 Headers

### **Suggested Readings:**

1. Behrouz A. Forouzan - TCP/IP Protocol suite, McGraw 2000.
2. Douglas E .Comer, TCP/IP Protocol suite, 2004, Prentice Hall India Publications.
3. Libor Dostalele, TCP/IP Protocol suite, 2006, Pearson New International Edition.

**BCA 512**

**DATA MINING**

*Credits 4*

*Instruction: (3L) hrs per week*

*Duration of SEE: 3 hours*

*CIE: 30 marks*

*SEE: 70 marks*

## **UNIT I**

INTRODUCTION : Introduction to Data Mining – Kind of Data – Functionalities – Interesting Patterns – Task Primitives – Issues In Data Mining - Data Preprocessing: Why Preprocessing

## **UNIT II**

ASSOCIATION RULES: Mining Frequent Patterns: Associations And Correlations - Basic Concepts – Frequent Item Set Mining Methods – Mining Various Kinds Of Association Rules

## **UNIT III**

CLASSIFICATION AND PREDICTION: Issues Regarding Classification and Prediction – Decision Tree Induction Classification – Bayesian, Rule Based Classification – Support Vector Machine

## **UNIT IV**

CLUSTER ANALYSIS- What Is Cluster Analysis, Types Of Data In Cluster Analysis – A Categorization Of Major Clustering Methods – Hierarchical Methods

## **UNIT V**

APPLICATIONS AND TRENDS IN DATA MINING: Applications and Trends in Data Mining: Data Mining Applications – Products And Research Prototypes – Additional Themes on Data Mining – Social Impacts of Data Mining

### **Suggested Readings:**

1. Jiawei Han and Micheline Kamber, “Data Mining – Concepts and Techniques”, Second Edition, Morgan Kaufmann Publishers, 2006.
2. M. H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education. 2001.
3. D. Hand, H. Mannila and P. Smyth, “Principles of Data Mining”, PrenticeHall. 2001.



**BCA 550**

**OBJECT ORIENTED SYSTEMS DEVELOPMENT LAB**

*Credits: 2*

*Instruction: (4 P) hrs per week*

*CIE: 25 marks*

*Duration of SEE: 3 hours*

*SEE: 50 marks*

**Students have to perform the following OOSD steps for the given List of Programs:**

Select one Information System/Approach and device the following using UML tool:

1. Structured Diagrams (Data Flow Diagrams, Entity-Relationship Diagrams etc..)
2. Preparation of Software Requirement Specification Document for a given Case Study.

UML Diagrams

1. Use Case Diagrams
2. Class Diagrams
3. Object Diagrams
4. Sequence Diagrams
5. Collaboration Diagrams
6. Activity Diagrams
7. State Chart Diagrams
8. Component Diagrams
9. Deployment Diagrams

**BCA 551**

**UNIX PROGRAMMING LAB**

*Credits: 2*

*Instruction: (4 P) hrs per week*

*CIE: 25 marks*

*Duration of SEE: 3 hours*

*SEE: 50 marks*

1. Examples using Shell scripts.
  2. Programming using IPC.
  3. Socket programs.
  4. PHP Programs using form handling using cookies.
  5. Develop Python programs for the following: (Prerequisite)
    - a) Demonstrate user-defined functions
    - b) Demonstrate Control Structures
    - c) Demonstrate Caching a Template Fragment
    - d) Programs based on object oriented design.
  6. Examples using IPC
  7. Echo Server using TCP (Concurrent or Iterative) and UDP
  8. Time of the day server
  9. Talker and Listener
  10. Ping routine
  11. Trace route
  12. Mini DNS
- Note:** The above experiments [7-12] have to be carried out using socket programming interface. Multi- threading has to be employed wherever it is required.

**BCA 551**

**DOT NET LAB**

***Credits: 2***

*Instruction: (4 P) hrs per week*

*CIE: 25 marks*

*Duration of SEE: 3 hours*

*SEE: 50 marks*

1. Installing .Net Framework
2. Installing Visual Studio 2013
3. Hello world in Visual Studio
4. GUI form Design for student attendance
5. GUI form design Form Controls
6. For loops Execution for drop Down List
7. while loop execution for pop up menu
8. ADO.Net Connecting to Data Source
9. ADO.Net connectivity for Accessing MSSQL Table for select and Create
10. ADO.Net for Insert and Update using Grid
11. Asp.net for student marks using HTML along with Form Cotrols
12. Asp.Net displaying Student details with ADO.NET and AJAX Controls

**SCHEME OF INSTRUCTION**  
**BCA (BACHELOR OF COMPUTER APPLICATIONS)**  
**Proposed scheme with effect from the academic year 2018-19**

**SEMESTER - VI**

S.No	Course Code	Course Title	Category	Contact Hour/week			Credits	Scheme of Exam Duration(hrs)		Scheme of Examination (Max Marks)	
				L	T	P		SEE	CIE	SEE	CIE
<b>Theory</b>											
1	BCA601	Information Security	CC	4	0	0	4	3	1	70	30
2	BCA602	Advanced JAVA	CC	4	0	0	4	3	1	70	30
3	BCA#	Elective-II BCA 604 Big Data Analytics BCA 605 Artificial Intelligence BCA 606 Cloud Computing	CC	4	0	0	4	3	1	70	30
<b>PRACTICALS</b>											
4	BCA680	Advanced Java Programming-Lab	PC	0	0	4	2	3	1	50	25
5	BCA681	Project work	PC	0	0	6	4	-	-	150	50
<b>TOTAL</b>				<b>12</b>	<b>0</b>	<b>10</b>	<b>16</b>			<b>360</b>	<b>165</b>

**BCA 601**

**INFORMATION SECURITY**

*Credits: 4*

*Instruction: (3L) hrs per week*

*CIE: 30 marks*

*Duration of SEE: 3 hours*

*SEE: 70 marks*

**UNIT-I**

Introduction: History, Critical characteristics of information, NSTISSC security model, Components of an information system, Securing the components, Balancing security and access, The SDLC, The security SDLC. Need for Security: Business needs, Threats, Attacks-secure software development.

**UNIT-II**

Legal, Ethical and professional Issues: Law and ethics in information security, Relevant U.S laws international laws and legal bodies, Ethics and information security.

Risk Management: Overview, Risk identification, Risk assessment, Risk control strategies, selecting a risk control strategy, Quantitative versus qualitative risk control practices, Risk management discussion points, Recommended risk control practices.

**UNIT-III**

Planning for Security: Security policy, Standards and practices, Security blue print, Security education, Continuity strategies. Security Technology: Firewalls and VPNs: Physical design, Firewalls, Protecting remote connections

**UNIT-IV**

Security Technology: Intrusion detection, access control and other security tools: Intrusion detection and prevention systems, Scanning and analysis tools, Access control devices.

Cryptography: Foundations of cryptology, Cipher methods, Cryptographic Algorithms, Cryptographic tools, Protocols for secure communications, Attacks on cryptosystems.

**UNIT- V**

Implementing Information Security: Information security project management, Technical topics of implementation, Non technical aspects of implementation, Security certification and accreditation. Security and Personnel: Positioning and staffing security function, Employment policies and practices, Internal control strategies. Information security maintenance : Security management models, The maintenance model, Digital forensics

**Suggested Reading:**

1. Michel E Withman and Herbert J Mattord, Principles and Practices of Information Security, Cengage Learning, 2009.
2. Thomas R Peltier, Justin Peltier, John Blackley, Information Security Fundamentals, Auerbach Publications, 2010.
3. Detmar W Straub, Seymour Goodman, Richard L Baskerville, Information Security, Policy, Processes and Practices, PHI , 2008.

*Instruction: (3L) hrs per week*

*CIE: 30 marks*

*Duration of SEE: 3 hours*

*SEE: 70 marks*

**Unit-1**

Introducing JDBC: Describing Components of JDBC , Features of JDBC , JDBC Architecture: Types of Drivers, Advantages and disadvantages of Drivers ,Use of Drivers , JDBC Statement and Methods: Statement ,PreparedStatement ,CallableStatement ,Working with ResultSet interface , Working with ResultSet with metadata

**Unit-2**

Introducing CGI , Introducing Servlet , Advantages of Servlet over CGI , Features of Servlet , Introducing Servlet API :Javax.servlet package , Javax.servlet.http package ,Servlet life ,Working with GenericServlet and HttpServlet , RequestDispatcher interface ,Use of RequestDispatcher , Session in Servlet: Introducing session , Session tracking mechanism ,Cookies : Advantages & disadvantages ,use of cookies , Hidden form field ,URL rewritten , HttpSession.

**Unit-3**

Introduction to JSP :Advantages of JSP over Servlet , JSP architecture , JSP life cycle , Implicit objects in JSP,JSP tag elements- Declarative, Declaration, scriptlet, expression, action. Java Bean- Advantages & Disadvantages, useBean tag- setProperty and getProperty , Bean In Jsp

**Unit-4**

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, web application

**Unit – V**

Working with JSF, Java Server Faces, Web Design Patterns, Security in web Application, Introduction to Frameworks in java: struts, springs, hibernate.

**Suggested Reading:**

1. JDBC, Servlets and JSP Black Book, Dreamtech Publication, Santhosh Kumar.k

*Instruction: (3L) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

**Unit- I**

Introduction: What Is Big Data and Why Is It Important? A Flood of Mythic “Start-Up” Proportions, Big Data Is More Than Merely Big Why Now? A Convergence of Key Trends , Relatively Speaking , A Wider Variety of Data, The Expanding Universe of Unstructured Data.

**Unit-II**

Big Data Technology: The Elephant in the Room: Hadoop’s Parallel World. Old vs. New Approaches, Data Discovery: Work the Way People’s Minds Work, Open-Source Technology for Big Data Analytics, The Cloud and Big Data, Predictive Analytics Moves into the Limelight.

**Unit-III**

A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem. MapReduce: Analyzing the Data with Hadoop, Map and Reduce, Java MapReduce, Scaling Out, Data Flow, Combiner Functions, Running a Distributed MapReduce Job, Hadoop Streaming, The Hadoop Distributed File system ,The Design of HDFS, HDFS Concepts, Blocks, Namenodes and Datanodes

**Unit-IV**

HDFS Federation, HDFS High-Availability, The Command-Line Interface, Basic Filesystem Operations, Hadoop Filesystems. Information Management: The Big Data Foundation, Big Data Computing Platforms, Big Data Computation, More on Big Data Storage, Big Data Computational Limitations

**Unit-V**

Big Data Emerging Technologies, Business Analytics : The Last Mile in Data Analysis, Geospatial Intelligence Will Make Your Life Better, Consumption of Analytics, From Creation to Consumption, Data Privacy and Ethics : The Privacy Landscape, The Great Data Grab Isn’t New, Preferences, Personalization, and Relationships, Rights and Responsibility

**Suggested Readings:**

1. Michael Minelli, Michele Chambers, Big Data, Big Analytics, Wiley Publications, 2013
2. Tom White, Hadoop: The Definitive Guide, 3/e, O’Reilly Publications. (MODULE –III)
3. Bill Franks, Taming The Big Data Tidal Wave, 1/e, Wiley, 2012. 2. Frank J. Ohlhorst, Big Data Analytics, 1/e, Wiley, 2012

*Instruction: (3L) hrs per week*  
*CIE: 30 marks*

*Duration of SEE: 3 hours*  
*SEE: 70 marks*

**UNIT I**

Introduction & Problem Solving: AI problems, AI Technique, Defining problem as a StateSpace Search, Production Systems, Problem Characteristics, Production System Characteristics. Heuristic Search Techniques: Generate – and – test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis.

**UNIT II**

Game Playing: Overview, Min-Max search Procedure, Adding Alpha-beta Cutoffs, Additional Refinements, Iterative Deepening. Knowledge Representation Issues: Approaches, Issues, Frame Problem, Using Predicate Logic: Representing simple facts in logic, Representing Instance and ISA Relationships, Computable Functions and predicates, Resolution, Natural Deduction.

**UNIT III**

Uncertainty and Reasoning Techniques: Non monotonic reasoning, Logics for Non monotonic reasoning, Implementation issues, Augmenting a problem solver, implementation of Depth First Search and Breadth first search. Statistical reasoning: Probability and Bayes theorem, Certainty factors and Rule-based systems, Bayesian Networks, Dempster-Shafer Theory.

**UNIT IV**

Learning: What is Learning, Rote learning, Learning by taking advice, Learning in problem solving, learning from examples: Induction, Learning by Decision trees. Expert System: Representing and Using Domain Knowledge, Expert systems shells, Explanation, Knowledge Acquisition.

**UNIT V**

Perception and Action: Real Time Search, Vision, Speech Recognition, ACTION: Navigation, Manipulation, Robot architectures. Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Statistical NLP, Spell Checking.

**Suggested Readings:**

1. Elaine Rich, Kevin Night, Shivashankar B Nair, "Artificial Intelligence", 3rd Edition, 2008
2. Russell Norvig, "Artificial Intelligence-Modern Approach", 3rd edition, 2009.
3. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2012.
4. Nelson M. Mattos, "An Approach to Knowledge Base Management", Springer Berli



*Instruction: (3L) hrs per week  
CIE: 30 marks*

*Duration of SEE: 3 hours  
SEE: 70 marks*

**UNIT I**

Introduction to Cloud Computing: Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

**UNIT II**

Virtual Machines and Virtualization of Clusters and Data Centers: Levels of Virtualization, Virtualization Structures Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation. Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products- VMware Features.

**UNIT III**

Cloud computing architectures over Virtualized Data Centers: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

**UNIT IV**

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, CryptDb: Onion Encryption layers- DET, RND, OPE, JOIN, SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

**UNIT V**

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments. Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging.

**Suggested Readings:**

1. John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley Publishing ©2011

*Credits: 2*

*Instruction: (4 P) hrs per week  
CIE: 25 marks*

*Duration of SEE: 3 hours  
SEE: 50 marks*

1. Jdbc Program to connect the Oracle Database
2. Create a new Database table using JDBC.
3. Jdbc program to insert the records into database.
4. Jdbc program to read the data from Database using ResultSet
5. Jdbc program to update the records into database
6. Jdbc program to delete the records into database
7. Jdbc program to demonstrate PreparedStatement
8. Jdbc program to demonstrate PreparedStatement
9. Installation and configuring Apache Tomcat Server.
10. Installation and configuring Netbeans, MyEclipse IDEs.
11. Servlet Program to demonstrate Life cycle methods using GenericServlet
12. Servlet Program to demonstrate RequestDispatcher
13. Servlet Program to demonstrate Session Tracking
14. Servlet Program to demonstrate Cookies
15. Servlet Program to demonstrate Filters
16. JSP program to demonstrate JSP tag elements
17. JSP program to demonstrate implicit objects
18. JSP program to demonstrate useBean tag
19. JSP program to demonstrate JSTL
20. JSP program to Process the Form
21. Develop simple application to process the registration form using jsp and jdbc with the help of IDE.(Real time application development using MVC architecture)

## **BCA P1**

## **PROJECT WORK**

*Credits 6*

*Instruction: (6P) hrs per week*

*Duration of SEE: 3Hours*

*CIE: 50 Marks*

*SEE:150 Marks*

Sixth Semester of the MCA course is exclusively meant for project work. Project has to be carried out by each student individually in a period of 15 weeks of duration. Students should submit a synopsis at the end of 2<sup>nd</sup> week in consultation with the Project Guide. The synopsis should consist of definition of the problem, scope of the problem and plan of action. After completion of eight weeks students are required to present a Project Seminar on the topic covering the aspects of analysis, design and implementation of the project work.

At the end of the semester the students are required to present themselves for a University Vive-voce examination.

A committee consisting of two faculty members of the respective college along with a guide will evaluate the project and award CIE marks.

### **Each student will be required to:**

1. Submit one page of synopsis on the project work for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the project.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of CIE marks which will be on the basis of performance in all the 3 items stated above.

The project seminar presentation should include the following components of the project:

- Problem definition and specification.
- Literature survey, familiarity with research journals.
- Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of bar (activity) charts
- Presentation both oral and written.