BCA SYLLABUS
2016 BATCH ONWARDS

Department of Computer Applications

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

(BCA 1st YEAR)
Total Contact Hours=25 Total Marks 700 Total Credits =21

SEMESTER 1ST		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCAP1-101	Problem Solving using C	3	1	0	40	60	100	4
BCAP1-102	Information Technology and Office Automation	3	1	0	40	60	100	4
BCAP1-103	Digital Electronics	3	1	0	40	60	100	4
BCAP1-104	Software Lab-I (Problem Solving using C based on BCAP1-101)	0	0	4	60	40	100	2
BCAP1-105	Software Lab-II (Information Techlonology and office Automation based on BCAP1-102)	0	0	4	60	40	100	2
BTUM0-101	Communicative English	2	1	0	40	60	100	3
BTUM0-103	Human Values and Professio-Ethics	2	0	0	40	60	100	2
	Total	**13**	**4**	**8**	**320**	**380**	**700**	**21**

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

(BCA 1st YEAR)
Total Contact Hours=28 Total Marks 700 Total Credits =24

SEMESTER 2nd		Contact Hrs			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCAP1-206	Object Oriented programming using C++	3	1	0	40	60	100	4
BCAP1-207	Computer Organization and Architecture	3	1	0	40	60	100	4
BCAP1-208	Internet and its Applications	3	1	0	40	60	100	4
BCAP1-209	Multimedia and its Applications	3	1	0	40	60	100	4
BCAP1-210	Software Lab-III (Object Oriented Programming Using C++ based on BCAP1-206)	0	0	4	60	40	100	2
BCAP1-211	Software Lab-IV (Internet And its applications based on BCAP1-208)	0	0	4	60	40	100	2
BMAT0-204	Fundamentals of Mathematics	3	1	0	40	60	100	4
	Total	**15**	**5**	**8**	**320**	**380**	**700**	**24**

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

BCA SYLLABUS 2016 BATCH ONWARDS

Total Contact Hours = 27 Total marks=700 Total Credits=23

Semester 3rd		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCAP1-312	Data Structures	3	1	0	40	60	100	4
BCAP1-313	Programming in Java	3	1	0	40	60	100	4
BCAP1-314	Discrete Structures	3	1	0	40	60	100	4
BCAP1-315	Software Lab-V (Data Struct-Ures based on BCAP1-312	0	0	4	60	40	100	2
BCAP1-316	Software Lab-VI (Programm -Ing in Java based on BCAP1 -313	0	0	4	60	40	100	2
BHUMO-106	Technical English	2	1	0	40	60	100	3
Departmental Elective-I (Select any one)		3	1	0	40	60	100	4
BCAP1-356	Introduction to Microprocessors							
BCAP1-357	Embedded System							
	Total	**14**	**5**	**8**	**320**	**380**	**700**	**23**

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

BCA SYLLABUS 2016 BATCH ONWARDS

Total Contact Hours = 27 Total marks=700 Total Credits=23

	Semester 4th	Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCAP1-417	Operating System	3	1	0	40	60	100	4
BCAP1-418	Android application Development	3	1	0	40	60	100	4
BCAP1-419	Data Base Management System	3	1	0	40	60	100	4
BCAP1-420	Software Lab-VII (Android Applicat -ion development based on BCAP1-418)	0	0	4	60	40	100	2
BCAP1-421	Software Lab-VIII (Database Mana- gement system based on BCAP1-419)	0	0	4	60	40	100	2
Departmental Elective-II (Select any one)		3	1	0	40	60	100	4
BCAP1-458	Software Engineering							
BCAP1-459	Soft Computing							
Open Elective-I (Select any One)		3	0	0	40	60	100	3
Total		**15**	**4**	**8**	**320**	**380**	**700**	**23**

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

BCA SYLLABUS 2016 BATCH ONWARDS

Total Contact Hours = 27 Total marks=700 Total Credits=23

Semester 5th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCAP1-522	Linux Administration	3	1	0	40	60	100	4
BCAP1-523	Programming in ASP.Net	3	1	0	40	60	100	4
BCAP1-524	Computer Networks	3	1	0	40	60	100	4
BCAP1-525	Software Lab-IX (Linux Administration based on BCAP1-522)	0	0	4	60	40	100	2
BCAP1-526	Software Lab-X (Programming in ASP.Net based on BCAP1-523	0	0	4	60	40	100	2
Departmental Elective-III (Select any one)		3	1	0	40	60	100	4
BCAP1-560	Network Security							
BCAP1-561	Artificial Intelligence							
Open Elective-II (Select any One)		3	0	0	40	60	100	3
Total		**15**	**4**	**8**	**320**	**380**	**700**	**23**

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

BCA SYLLABUS 2016 BATCH ONWARDS

Total Contact Hours = 27 Total marks=700 Total Credits=21

Semester 5th		Contact Hrs.			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCAP1-627	Computer Graphics	3	1	0	40	60	100	4
BCAP1-628	Emerging Trends in Information Technology	3	1	0	40	60	100	4
BCAP1-629	Major Project	0	0	4	60	40	100	2
BCAP1-630	Software Lab-XI (Computer Graphics based on BCAP1-627)	0	0	4	60	40	100	2
BESE0-101	Environmental Studies	2	0	0	40	60	100	2
Departmental Elective-IV (Select any one)		3	1	0	40	60	100	4
BCAP1-662	Big Data							
BCAP1-663	Cloud Computing							
Open Elective-III (Select any One)		3	0	0	40	60	100	3
Total		**14**	**3**	**8**	**320**	**380**	**700**	**21**

Overall

Semester	Marks	Credits
1st	700	21
2nd	700	24
3rd	700	23
4th	700	23
5th	700	23
6th	700	21
Total	**4200**	**135**

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Study Scheme For BCA (Batch 2016 Onwards)

PROBLEM SOLVING USING C

Subject Code: BCAP1-101

L	T	P	C	Duration: 45 Hrs.
3	1	0	4	

Course Outcomes

1. Students will learn to write algorithm for solutions to various real life problems and converting the algorithms into computer programs using C language.
2. To gain experience about structured programming.
3. To help Students to understand implementation of C language.
4. To understand various features in C.

UNIT-I (10 Hrs.)

Problem Solving and Programming Languages - Problem Solving Aspects, Program Development Steps, Introduction to Programming Languages, Types and Categories of Programming Languages, Program Development Environments.

Logic development and Algorithms -Types of Problems, Data Centric and Process Centric,Problem Solving Strategies, Problem Analysis, Top- Down design and BottomUp design, Algorithms, Flow Charts, Flow Chart Symbols, Pseudo Codes.

UNIT-II (13 Hrs.)

Introduction to C Programming Language - Introduction to C Language, Evolution and Characteristics of C Language, Compilation Model, Character Set, Keywords, Identifiers, Data Types, Variables, Constants, Operators, Expressions, Type conversion and Type Casting, Overview of Pre-processors, Structure of a C Program, Input and Output Statements.

Control Statements - Basic Programming Constructs, Sequence, Selection Statements 'if' Statement, Conditional / Ternary /?: Operator, Switch Statement, Iteration Statements, 'for' statement, 'while' statement, 'do - while' statement, break, continue Statement.

UNIT-III (12 Hrs.)

Arrays and Strings- Need for an Array, Memory Organization of an Array, Declaration and Initialization, Basic Operations on Arrays, Multi-dimensional Array, Strings.

Pointers- Introduction, Declaration and Initialization, Pointer Arithmetic, Pointers and Arrays, Dynamic Memory Allocation.

UNIT-IV (10 Hrs.)

Functions and Storage Classes - Need for Functions, Function Prototype, Function Definition, Function Call Passing Arguments, Functions and Arrays, Functions and Pointers, Command Line Arguments, Recursive Functions, String Functions, Automatic Storage Class, Register Storage Class, Static Storage Class, External Storage Class.

Structures - Declaration and Initialization, Structures and Arrays, Structures and Pointers, Structures and Functions, Introduction to Unions, Enumeration, Typedef Statement.

Files - Introduction, File Operations, Character I/O, String I/O, Numeric I/O, Formatted I/O, Block I/O.

Recommended Books

1. Shubhnandan Jamwal, 'Programming in C', 1st Edn., Pearson Education**, 2014**.
2. Brian Kernighan and Dennis Ritchie, 'C Programming Language', 2nd Edn., PHI, **1990.**
3. Byron S. Gottfried, Jitender Kumar Chhabra, 'Programming with C', 2nd Edn.**,** Tata McGraw Hill, **2006**.
4. ISRD Group, 'Programming and Problem Solving Using C', 1st Edn., Tata McGraw Hill, 2008.

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

Information Technology and Office Automation

Subject Code- BCAP1-102	**L**	**T**	**P**	**C**	**Duration- 45 Hrs.**
	3	**1**	**0**	**4**	

Course Outcomes

1. To gain and understanding of the core concepts and technologies which constitute information
2. The student should be able to demonstrate competency in a core set of applications, including Microsoft Word, Excel and PowerPoint.
3. The student should be able to demonstrate competency in using PC operating systems and using the Internet as a search tool
4. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology

UNIT-I (12 Hrs.)

Computer Fundamentals - Block diagram of a Computer, Characteristics of Computers, Hardware, Software, Machine Language, Assembly Language and Assembler, High Level Language and Compiler v/s Interpreter.

Input Devices - Keyboard, Mouse, Joystick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Speech Recognition Devices, Optical Recognition devices OMR, OBR, OCR.

Output Devices - Monitors, Impact Printers - Dot matrix, Character and Line printer, Non-Impact Printers DeskJet and Laser printing, Plotter.

Memories - Main Memories - RAM, ROM and Secondary Storage Devices - Hard Disk, Compact Disk and DVD.

UNIT-II (11 Hrs.)

Windows - Installing Windows, Starting and Quitting windows, Basic Elements of Windows, working with Menus Dialogue Boxes, Window Applications, Program Manager, File Manager, Print Manager, Control Panel, Write, Paint Brush, Accessories including Calculator, Calendar, Clock, Card file, Note pad, Recorder etc.

UNIT-III (11 Hrs.)

Word Processing Tool - Salient features of Word Processing, File, Edit, View, Insert, Format, Tools, Tables, Window, help options and all of their features, Options and Sub Options etc., Transfer of files between Word Processors and Software Packages.

Presentation Tool- Making Presentations, Inserting Objects, and Narration.

UNIT-IV (11 Hrs.)

Spreadsheet Tool - Excel Worksheet, Data Entry, Editing, Cell Addressing ranges, Commands, Menus, Copying & Moving Cell Content, Inserting and Deleting Rows and

Column, Column formats, Cell Protection, Printing, Creating, Displaying and Printing Graphs, Statistical Functions.

Introduction to Internet - Evolution of Internet, Internet Applications, WWW, E-mail, FTP, TELNET, Web Browsers.

Recommended Books

1. V. Rajaraman, 'Fundamentals of Computers', 5th Edn., PHI, **2010**.
2. Satish Jain, 'Information Technology Concepts', ns, 4th Edn., BPB Publications, **2006.**
3. Turban, Mclean and Wetherbe, 'Information Technology for Management', 4th Edn., John Wiley & Sons, **2006.**
4. G. Courter, 'Mastering MS Office 2000 Professional', 3rd Edn., BPB Publication, **2006.**
5. Steve Sagman, 'MS Office 2000 For Windows', 3rd Edn., Addison Wesley, **2008.**

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Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

DIGITAL ELECTRONICS

Subject Code: BCAP1-103	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
3	**1**	**0**	**4**

Course Outcomes

1. To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
2. To introduce the methods for simplifying Boolean expressions
3. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
4. To introduce the concept of memories, programmable logic devices and digital ICs.

UNIT I (12 Hrs.)

Number System and Logic Gates - Decimal, Binary, Octal and Hexadecimal Number System and Conversion, Codes: Straight Binary Code, BCD Code, Excess-3 Code, Grey Code, ASCII, Integer and Floating Point Representation, Binary Arithmetic, 1's Complement and 2's Complement, Overflow and Underflow, Logic Gates, Universal Gates.

UNIT II (13 Hrs.)

Boolean Algebra - Boolean Algebra Theorems, Truth-Table, Realization of Switching Functions using AND, OR, NOT Logic Gates, SOP and POS Forms, 2-Variable, 3-Variable, 4-Variable, Karnaugh Maps, Simplification of Expressions.

UNIT III (11 Hrs.)

Combinational Circuits - Design of Binary Adder, Full Subtractor, Multiplexer, Demultiplexer, Decoder, Encoder.

Sequential Circuits- R-S, J-K, D and T Flip-flops, Clocks and Timers, Registers, Counters.

UNIT - IV (11 Hrs.)

Semiconductor Memories - Introduction, Static and Dynamic devices, Read only and Random Access Memory Chips, PROMS and EPROMS, Address Selection Logic, Read and Write Control Timing Diagrams for ICs.

Recommended Books:

1. R.P. Jain, 'Modern Digital Electronics', 4th Edn., Tata McGraw Hill, **2003.**
2. Albert Malvino, 'Digital Computer Electronics', 3rd Edn., Tata McGraw Hill, **2008.**
3. William H. Gothmann, 'Digital Electronics: An Introduction to Theory and Practice', 2nd Edn., Prentice Hall, **1992.**

4. Anil K. Maini, 'Digital Electronics: Principles and Integrated Circuit', 1st Edn., Wiley, **2007.**
5. T.C. Bartee, 'Digital Computer Fundamentals', 3rd Edn., Tata McGraw Hill, **1972.**

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Study Scheme For BCA (Batch 2016 Onwards)

PROBLEM SOLVING USING C BASED ON BCAP1-101
(SOFTWARE LAB.-I)

Subject Code: BCAP1-104

L	T	P	C
0	0	4	2

This laboratory course will comprise as exercises to supplement that is learnt under the paper BCAP1-101.

Department of Computer Applications

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

INFORMATION TECHNOLOGY AND OFFICE AUTOMATION BASED ON BCA1-102

(SOFTWARE LAB. II)

Subject Code: BCAP1-105	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise as exercises to supplement that is learnt under paper BCAP1-102.

Department of Computer Applications

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

COMMUNICATIVE ENGLISH

Subject Code: BHUM0-101	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
2	**1**	**0**	**3**

Course Outcomes

1. Understand and appreciate the need of communication training.
2. Use different strategies of effective communication and select the most appropriate mode of communication for a given situation.
3. Speak effectively and assertively and Correspond effectively through different modes of written communication.
4. Present himself/herself professionally through effective resumes and interviews.

UNIT-I (12 Hrs.)

Communication: Meaning, its types, Significance, Process, Channels, Barriers to Communication, Making Communication Effective, Role in Society.

Business Correspondence: Elements of Business Writing, Business Letters: Components and Kinds, Memorandum, Purchase Order, Quotation and Tenders, Job Application Letters, Resume Writing etc.

UNIT-II (10 Hrs.)

Discussion Meeting and Telephonic Skills: Group Discussion, Conducting a Meeting, Telephone Etiquettes, Oral Presentation: Role of Body Language and Audio Visual Aids.

Grammar: Transformation of Sentences, Words used as Different Parts of Speech One Word Substitution, Abbreviations, Technical Terms etc.

UNIT-III (11 Hrs.)

Reading Skills: Process of reading, Reading Purposes, Models, Strategies, Methodologies, Reading Activities.

Writing Skills: Elements of Effective Writing, Writing Style, Technical Writing: Report Writing.

UNIT-IV (12 Hrs.)

Listening Skills: The process of Listening, Barriers to Listening, Effective Listening Skills and Feedback Skills.

Speaking Skills: Speech Mechanism, Organs of Speech, Production and Classification of Speech Sound, Phonetic Transcription, Skills of Effective Speaking, Components of Effective Talk.

Recommended Books

1. M.V. Rodriques, 'Effective Business Communication', Concept Publishing Company New Delhi, **1992, reprint 2000.**
2. Adhikari Sethi, 'Business Communication', McGraw Hill.
3. Indrajit Bhattacharya, 'An Approach to Communication Skills', Dhanpat Rai Co., (Pvt.) Ltd., New Delhi.
4. L. Gartside, 'Modern Business Correspondence', Pitman Publishing London.
5. Rizvi M. Ashraf, 'Effective Technical Communication', Mc Graw Hill.

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Study Scheme For BCA (Batch 2016 Onwards)

HUMAN VALUES & PROFESSIONAL ETHICS

Subject Code: BHUM0-103 **L T P C Duration: 24 Hrs.**
2 0 0 2

Course Outcomes

1. Understanding the value education.
2. Understanding harmony in the human being, family and society.
3. Understanding harmony in the society, nature and existence.
4. Understanding of harmony on professional ethics

UNIT-I (6 Hrs.)

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration-what is it? - its content and process; "Natural Acceptance" and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in harmonyat various levels

UNIT-II (8 Hrs.)

Understanding Harmony in the Human Being - Harmony in Myself!
Understanding human being as a co-existence of the sentient "I" and the material "Body"
Understanding the needs of Self ("I") and "Body" - *Sukh*and *Suvidha*
Understanding the Body as an instrument of "I" (I being the doer, seer and enjoyer)
Understanding the characteristics and activities of "I" and harmony in "I"
Understanding the harmony of I with the Body: *Sanyam*and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure *Sanyam*and *Swasthya*
Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship
Understanding harmony in the Family- the basic unit of human interaction; Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship; Understanding the meaning of *Vishwas*; Difference between intention and competence Understanding the meaning of *Samman*, Difference between respect and

differentiation; the other salient values in relationship.

UNIT-III (6 Hrs.)

Understanding the Harmony in the Society (Society Being an Extension of Family) *Samadhan, Samridhi, Abhay, Sah-astitva*as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj),* Universal Order (*SarvabhaumVyawastha)*- from family to world family!

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence Understanding the harmony in the Nature; Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature; Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence.

UNIT-IV (4 Hrs.)

Implications of the above Holistic Understanding of Harmony on Professional Ethics Natural acceptance of human values Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics:

1. Ability to utilize the professional competence for augmenting universal human order,
2. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
3. Ability to identify and develop appropriate technologies and management patterns for above production systems;
4. Case studies of typical holistic technologies, management models and production systems; Strategy for transition from the present state to Universal Human Order:
5. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
6. At the level of society: as mutually enriching institutions and organizations

1. R.R. Gaur, R. Sangal, G.P. Bagaria, 'A Foundation Course in Value Education', 2009.
2. Ivan Illich, 'Energy & Equity', The Trinity Press, Worcester, and Harper Collins, USA, **1974.**
3. E.F. Schumacher, 'Small is Beautiful: A Study of Economics as if People Mattered', Blond & Briggs, Britain, **1973.**
4. A. Nagraj, 'Jeevan Vidyaek Parichay', Divya Path Sansthan, Amarkantak, **1998.**
5. Sussan George, 'How the Other Half Die's, Penguin Press. Reprinted, **1986, 1991.**
6. P.L. Dhar, R.R. Gaur, 'Science and Humanism', Common Wealth Publishers, **1990**.
7. A.N. Tripathy, 'Human Values', New Age International Publishers, **2003.**
8. Subhas Palekar, 'How to Practice Natural Farming', Pracheen (Vaidik) Krishi Tantra Shodh, Amravati, **2000.**

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9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 'Limits to Growth - Club of Rome's Report', Universe Books, **1972.**
10. E.G. Seebauer & Robert L. Berry, 'Fundamentals of Ethics for Scientists & Engineers', Oxford University Press, **2000.**
11. M. Govindrajran, S. Natrajan & V.S. Senthil Kumar, 'Engineering Ethics (including Human Values)', Eastern Economy Edn., Prentice Hall of India Ltd.
12. B.P. Banerjee, 'Foundations of Ethics and Management', Excel Books, **2005.**

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Study Scheme For BCA (Batch 2016 Onwards)

OBJECT ORIENTED PROGRAMMING USING C++

Subject Code: BCAP1-206	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
3	**1**	**0**	**4**

Course Outcomes

1. Creating class and objects in C++
2. Implementing inheritance, polymorphism and object relationship in C++
3. Designing methods and procedures
4. Constructor and destructor programs.

UNIT-I

Evolution of OOP - Procedure Oriented Programming, OOP Paradigm, Advantages and Disadvantages of OOP over its predecessor paradigms.

Characteristics of OOP - Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, Code Extensibility and Reusability, User defined Data Types. **Introduction to C++** - Identifier, Keywords, Constants

Operators - Arithmetic, Relational, Logical, Conditional, Assignment, Size of operator, Operator precedence and Associativity.

Type conversion, Variable declaration, Expressions, Statements, Manipulators, Input and Output statements, Stream I/O, Conditional and Iterative statements, Breaking control statements.

UNIT-II

Storage Classes - Automatic, Static, Extern, Register.

Arrays - Arrays as Character Strings, Structures, Unions, Enumerations and User defined types. **Pointers** - Pointer Operations, Pointer Arithmetic, Pointers and Arrays. **Functions** - Prototyping, Definition and Call, Scope Rules, Parameter Passing: by value, by address and by reference, Functions returning references, Const functions, Recursion, Function Overloading, Default Arguments, Const arguments.

Classes - Class Declaration and Class Definition, defining member functions, making functions inline, Nesting of member functions, Members access control, this pointer.

Objects - Object as function arguments, Array of objects, Functions returning objects, Const member functions, Static data members, Static member functions, Friend functions and Friend classes.

UNIT-III

Constructors - Properties, Types of constructors (Default, Parameterized and Copy), Dynamic constructors, Multiple constructors in classes.

Destructors - Properties, Virtual destructors, Destroying objects, Rules for constructors and destructors.

Array of objects, Dynamic memory allocation using new and delete operators, Nested and container classes.

Inheritance - Defining derived classes, Inheriting private members, Single inheritance, Types of derivation, Function redefining, Constructors in derived class. **Types of Inheritance** - Single, Multiple, Multilevel and Hybrid.

Types of Base classes - Direct, Indirect, Virtual, Abstract, Code Reusability.

UNIT - IV

Polymorphism - Methods of achieving polymorphic behavior.

Operator Overloading - Overloading binary operator, overloading unary operators, Rules for Operator Overloading, Operator Overloading using friend function, Function Overloading: Early binding, Polymorphism with pointers, Virtual functions, Late binding, Pure virtual functions and Abstract base class.

Files and Streams - Classes for file stream operations, Opening and Closing of files, Stream state member functions, Binary file operations, Structures and file operations, Classes and File operations, I/O with multiple objects, Error handling, Sequential and Random access file processing.

Recommended Books

1. E. Balagurusamy, 'Object Oriented Programming with C++', 14th Edn., Tata McGraw Hill, **2008**.
2. D. Ravichandran, 'Programming in C', 1st Edn., New Age International, **1996, reprint 2011**.
3. Herbert Schildt, 'C++: The Complete Reference', 4th Edn., Tata McGraw Hill, **2003**.
4. Stanley B. Lippman, Josee Lajoie, 'C++ Primer', 5th Edn., Pearson Education, **2011**.
5. Deital and Deitel, 'C++ How to Program', 7th Edn., Pearson Education, **2010.**

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Study Scheme For BCA (Batch 2016 Onwards)

COMPUTER ORGANIZATION AND ARCHITECTURE

Subject Code: BCAP1-207 **L T P C Duration: 45 Hrs.**
3 1 0 4

Course Outcomes

1. Introduction to Registers, Micro operations, Common Bus System
2. Introduction to Instruction, Instruction Cycle, Interrupt and Interrupt Cycle
3. Addressing Modes, Concept of I/O bus, DMA Controller.
4. Memory Hierarchy, Cache Memory, Replacement Algorithms, Mobile Devices Architecture & Synchronous and Asynchronous Data Transfer.

UNIT I (10 Hrs.)

Introduction to Computer Organization - Introduction to Computer and CPU (Computer Organization, Design and Architecture), Stored Program Concept - Von Neumann Architecture, Introduction to Flynn's Classification-SISD, SIMD, MIMD

Register Transfer - Introduction to Registers, Register Transfer Language, Data movement among Registers and Memory.

Micro Operations - Introduction to Micro Operations, Types of Micro Operations - Logic Operations, Shift Operations, Arithmetic and Shift Operations.

Common Bus System - Introduction to Common Bus System, Types of Buses (Data Bus, Control Bus, Address Bus), 16-bit Common Bus System, Data Movement among Registers using Bus.

UNIT - II (11 Hrs.)

Basic Computer Instructions - Introduction to Instruction, Types of Instructions, Instruction Cycle, Instruction Formats (Direct, Indirect, Zero, One, Two and Three-Address Instructions). **Interrupt -** Introduction to Interrupt and Interrupt Cycle.

Design of Control Unit - Introduction to Control Unit, Types of Control Unit.

Addressing Modes - Introduction & different types of Addressing Modes.

UNIT III (12 Hrs.)

I/O Organization - I/O Interface Unit, Types of ports (I/O port, Network Port, USB port, Serial and Parallel Port), Concept of I/O bus, Isolated I/O versus Memory-Mapped I/O.

I/O Data Transfer Techniques - Programmed I/O, Interrupt Initiated I/O, DMA Controller and IOP.

Synchronous and Asynchronous Data Transfer - Concept of strobe and handshaking, Source and Destination initiated data transfer.

UNIT - IV (12 Hrs.)

Stack Organization - Memory Stack and Register Stack.

Memory organization - Memory Hierarchy, Main Memory (RAM and ROM chips, Logical and Physical Addresses, Memory Address Map, Memory Connection to CPU), Associative

Memory. **Cache Memory** - Cache Memory (Initialization of Cache Memory, Writing data into Cache, Locality of Reference, Hit Ratio), Replacement Algorithms (LRU and FIFO).

Cache Memory Mapping Techniques - Direct Mapping, Associative Mapping and Set-Associative Mapping, Harvard Architecture, Mobile Devices Architecture (Android, Symbian and Windows Lite), Layered Approach Architecture.

Recommended Books

1. M. Morris Mano, 'Computer System Architecture', 3rd Edn., Pearson, **1993**.
2. William Stallings, 'Computer Organization and Architecture', 9th Edn., Pearson, **2013**.
3. P.V.S. Rao, 'Computer System Architecture', 1st Edn., PHI, **2008**.

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Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

INTERNET AND ITS APPLICATIONS

Subject Code: BCAP1-208

L	T	P	C	Duration: 45 Hrs.
3	1	0	4	

Course Outcomes

1. Protocols and standards supporting Internet Applications design and security issues
2. Build tools that assist in automating data transfer over the Internet.
3. Knows basic Internet technologies, specification and tools for internet services implementation.
4. Knows how to design and implement Internet systems for enhancing education and engineering design, by means of efficient Internet technologies and services.

UNIT-I (10 Hrs.)

Introduction - Internet and its working, Business use of Internet, Services offered by Internet, Evaluation of Internet, Internet Service Provider (ISP), Windows environment for dial up networking (connecting to Internet), Audio on Internet, Internet Addressing (DNS) and IP addresses).

UNIT-II (11 Hrs.)

EMail - Introduction, Advantage and Disadvantage, Structure of an email message, working of email (sending and receiving messages), Managing email (creating new folder, deleting messages, forwarding messages, filtering messages), Implementation of Outlook Express.

Internet Protocol - Introduction, File transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCP/IP.

UNIT-III (12 Hrs.)

WWW - Introduction, Working of WWW, Web browsing (opening, viewing, saving, printing a web page and bookmark), Web designing using HTML, DHTML with programming techniques.

UNIT-IV (12 Hrs.)

Search Engine - About search engine, Component of search engine, working of search engine, Difference between search engine and web directory.

Intranet and Extranet - Introduction, Application of Intranet, Business value of Intranet, working of Intranet, Role of Extranet, working of Extranet, Difference between Intranet and Extranet.

Recommended Books

1. Keith Sutherland, 'Understanding the Internet', 1st Edn., Butterworth Heinemann, **2000**.
2. S.K. Bansal, 'Internet and Web Designing', 1st Edn., APH Publishing Corporation,**2013**.
3. Behrouz A. Forouzan, 'Data Communications and Networking', 4th Edn., Tata McGraw Hill, **2006**.
4. Paul, 'Multicasting on the Internet and Its Applications', 1st Edn., Springer, eBook, **1998**.

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Study Scheme For BCA (Batch 2016 Onwards)

MULTIMEDIA AND APPLICATIONS

Subject Code: BCAP1-209 **L T P C Duration: 45 Hrs.**
3 1 0 4

Course Outcomes

1. To understand multimedia systems and their applications
2. This course covers the different compression standards used in multimedia, some current technology and related issues
3. Identify and use hardware components (input and output devices) used in desktop publishing, graphics/animation and multimedia.
4. Model respect for intellectual property when manipulating, morphing, and editing video, graphics, sound, and text.

UNIT-I (9 Hrs.)

Introduction - Multimedia and its types, Introduction to Hypermedia, Hyper Text, Multimedia Systems and their Characteristics, Challenges, Desirable Features, Components and Applications, Trends in Multimedia.

Multimedia Technology - Multimedia Systems Technology, Multimedia Hardware devices, Multimedia software development tools, Multimedia Authoring Tools, Multimedia Standards for Document Architecture, Multimedia Software for different media.

UNIT-II (8 Hrs.)

Storage Media - Magnetic and Optical Media, RAID and its levels, Compact Disc and its standards, DVD and its standards, Multimedia Servers.

UNIT-III (9 Hrs.)

Audio - Basics of Digital Audio, Application of Digital Audio, Digitization of Sound, Sample Rates and Bit Size, Typical Audio Formats, Introduction to MIDI (Musical Instrument Digital Interface), Components of a MIDI System, Hardware Aspects of MIDI, MIDI Messages.

UNIT-IV (9 Hrs.)

Image and Graphics Compression - Color in Images, Types of Color Models, Graphic/Image File Formats: TIFF, RIFF, BMP, PNG, PDF, Graphic/Image Data, and JPEG Compression, GIF Compression.

Recommended Books

1. Ralf Steinmetz and Klara Nahrstedt, 'Multimedia Computing Communications and Applications', 3rd Edn., Pearson Educations, **2012**.
2. Parag Havaldar, Gerard Medioni, 'Multimedia Systems: Algorithms,

Standards and Industry Practices', 1st Edn., Cengage Course, **2009**.
3. John F. Koegel Buford, 'Multimedia Systems', 1st Edn., Pearson Educations, **1994**.
4. Jeffcoate, 'Multimedia in Practice', 1st Edn., Prentice Hall, **1995**.

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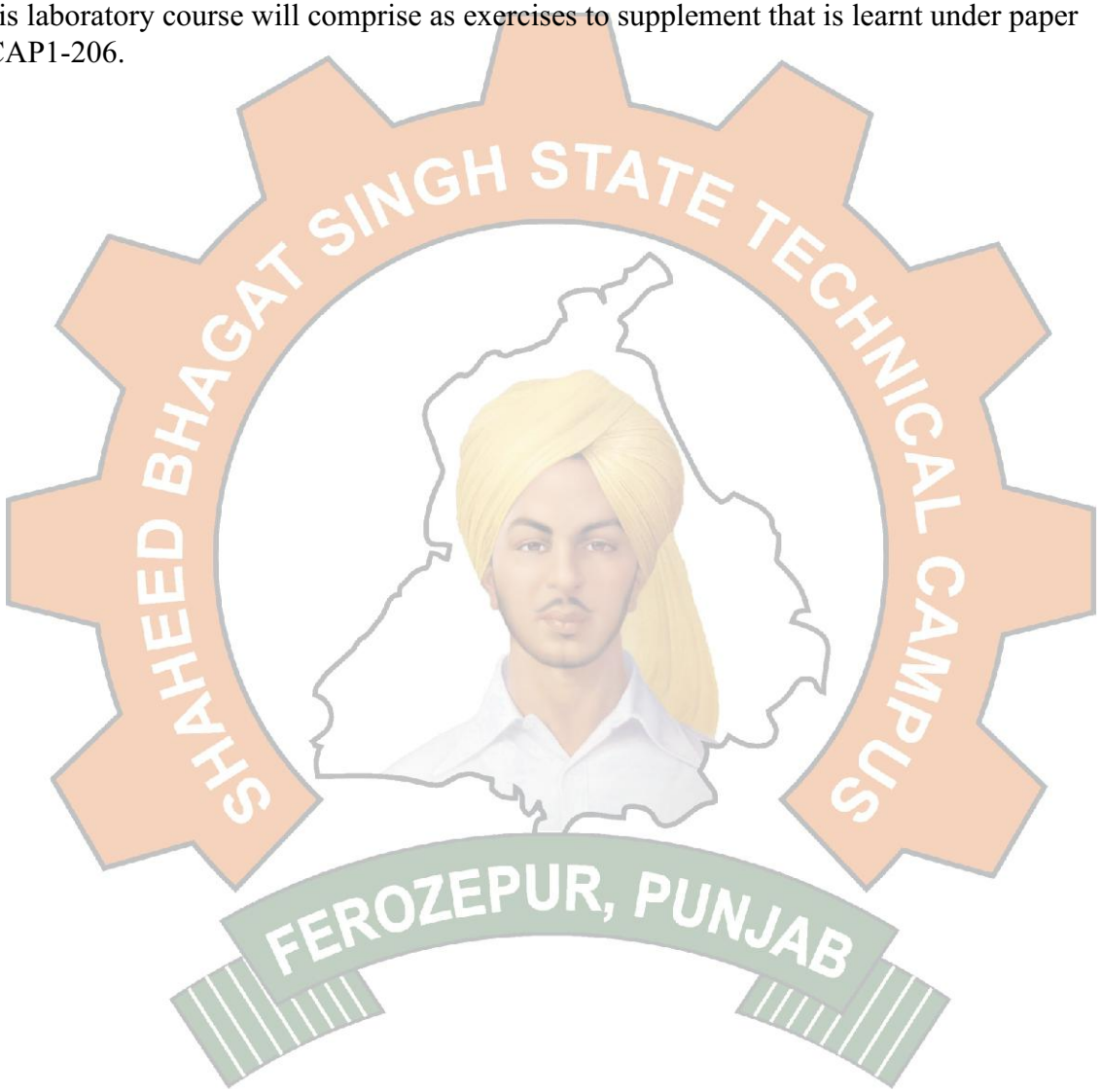
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

OBJECT ORIENTED PROGRAMMING USING C ++ BASED ON BCAP1-206
(SOFTWARE LAB. III)

Subject Code: BCAP1-210	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise as exercises to supplement that is learnt under paper BCAP1-206.



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Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

INTERNET AND ITS APPLICATIONS BASED ON BCAP1-208
(SOFTWARE LAB. IV)

Subject Code: BCAP1-211	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise as exercises to supplement that is learnt under paper BCAP1-208.

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Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

FUNDAMENTALS OF MATHEMATICS

Subject Code: BMAT0-204

L	T	P	C	Duration: 45 Hrs.
3	1	0	4	

Course Outcomes

1. Learn fundamental mathematical concepts of matrix and determinant and how to apply them for finding the solution of equations
2. Understand the concepts of differential calculus and how to apply them for finding the maxima and minima.
3. Learn the concepts of integral calculus in which they find integration by parts, By partial fraction, by substitution and learn about definite, indefinite integrals.
4. Understand the Trapezoidal method, Simpson's1/3 rule and Simpson's 3/8 rule using integration. Problems related to compound interest, depreciation and Annuities.

UNIT - I (11 Hrs.)

MATRIX ALGEBRA - Matrices, types of matrices, operations on matrices, determinants, inverse of a matrix, Elementary transformations, Rank of a matrix, solution of simultaneous linear equations using Crammer's rule and matrix inversion method.
Consistency of linear equations by Rank Method.

UNIT - II (10 Hrs.)

STATISTICS - Introduction to statistics, measures of central tendency - Mean, Median and Mode, measures of dispersion, mean deviation, standard deviation and coefficient of Variation, correlation and regression analysis. Definition of probability, Addition and Multiplication Laws. Simple problems.

UNIT - III (12 Hrs.)

DIFFERENTIAL CALCULUS - Introduction to differentiation, Differentiation of standard functions including trigonometric functions. Differentiation by method of substitution, maxima and minima.

UNIT - IV (12 Hrs.)

INTEGRAL CALCULUS - Indefinite Integral, Integration by substitution, Integration by parts, Integration by partial Fractions, Definite Integral. Numerical Integration: Trapezoidal rule, Simpson's 1/3 rules, Simpson's 3/8 rule.

Recommended Books

1. D.C. Sancheti and V.K. Kapoor, 'Business Mathematics', 11th Edn., Sultan Chand & Sons, **2015**.

2. B.S. Grewal, 'Higher Engineering Mathematics', 43rd Edn., Khanna Publishers, **2014**.
3. B.S. Grewal, 'Numerical Methods in Engineering & Science', Khanna Publishers, 10th Edn., **2010**.
4. Rajaraman, 'Computer Oriented Numerical Methods', 3rd Edn., PHI Publications, **2013**.

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Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

DATA STRUCTURES

Subject Code: BCAP1-312

L	T	P	C	Duration: 45 Hrs.
3	1	0	4	

Course Outcomes

1. Understanding of data structures, its objectives, times and space complexity.
2. Understanding of various linear data structure, like linked list, stacks, queues and their implementation.
3. Understanding of non-linear data structures, trees and its implementation.
4. Implementation of various searching and sorting algorithms.

UNIT-I (10 Hrs.)

Basic concepts and notations - Types of data structures, Data structure operations, Problem Analysis, Algorithmic complexity, Big O notation, Time and space trade off.

Arrays - Linear array, representation of array in memory, Two-dimensional array, row major and column major orders, Traversal of Arrays, Insertion and Deletion from Array, Linear search, Binary search, Sorting of Arrays, sparse matrix.

UNIT-II (11 Hrs.)

Linked list - Representation of linked list using static and dynamic data structures, insertion and deletion of a node from linked list, searching in link list, searching in sorted link list.

UNIT-III (12 Hrs.)

Stacks - Representation of stacks in memory (linked and sequential), operations on stacks, Applications of stacks.

Queues - Representation of queues in memory (linked and sequential), operations on queues, Applications of Queues.

UNIT-IV (12 Hrs.)

Trees - Definition and basic concepts, linked representation and representation in contiguous storage, binary tree, binary tree traversal, Binary search tree, searching, insertion and deletion in binary search tree. Searching and sorting algorithms: Linear and binary search, bubble sort, insertion sort, selection sort, quick sort, merge sort.

Recommended Books

1. Shubhnandan Jamwal, 'Programming in C', 1st Edn., Pearson, **2014**.
2. E. Balagurusamy, 'Programming in ANSI C', 3rd Edn., Tata McGraw Hill, **2002**.

3. Brian Kernighan and Dennis Ritchie, 'C Programming Language', 2nd Edn., PHI, **1990.**
4. Byron Gottfried, 'Programming with C', 3rd Edn., Tata McGraw Hill, **2002.**

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Study Scheme For BCA (Batch 2016 Onwards)

PROGRAMMING IN JAVA

Subject Code: BCAP1-313	**L**	**T**	**P**	**C Duration: 45 Hrs.**
	3	**1**	**0**	**4**

Course Outcomes

1. Understand the concept of OOPs as well as the purpose and usage principles of Inheritance, polymorphism, encapsulation etc.
2. Understand JVM Concept, Data types and Operators, Strings.
3. Understand Internet Programming Using Java Applets.
4. Make use of array , constructors ,Inheritance, Packages and Interfaces

UNIT-I (11 Hrs.)

Basics of Java - History, Object Oriented Concepts: Object, Object oriented programming, Abstraction, Encapsulation, Inheritance, Polymorphism Security and portability, Byte Code, Java Virtual Machine, Basic Constructs: Data types, Variables, Array, Operators, Control Statements, Looping Statements.

UNIT-II (12 Hrs.)

Introduction to Classes - Classes, Declaring Objects, Methods in a Class, Constructors, Inner and Outer class, Access Control: Public, Private and Protected, static, this, super, final keywords.

UNIT-III (11 Hrs.)

Interfaces & Packages - Interfaces and Implementing Multiple Inheritance through Interfaces, Packages, Multithreaded Programming, Synchronization, Exception Handling.

UNIT-IV (11 Hrs.)

Applet and Graphics Programming - Introduction to Interface, Packages, Exception Handling, Multithreaded Programming, Applets, Event Handling.

Recommended Books

1. E. Balagurusamy, 'Programming with Java', 5th Edn., Tata McGraw Hill, **2014**.
2. Herbert Schildt, 'Java: The Complete Reference', 9th Edn., Tata McGraw Hill, **2014**.
3. Cay Horstmann, 'Computing Concepts with Java 2 Essentials', 2nd Edn., Wiley, **2006**.
4. Matha Mahesh P, 'Core Java: A Comprehensive Study', 1st Edn., PHI, **2011**.

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

DISCRETE STRUCTURES

Subject Code: BCAP1-314	L	T	P	C	Duration: 45 Hrs.
	3	1	0	4	

Course Outcomes

1. It is to learn that how to remember some fundamental mathematical concepts and terminology; how to apply and analyze recursive definitions; Permutations;Connectives, well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, predicates, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theory Proving; how to count some different types of discrete structures; how to create techniques for constructing mathematical proofs, illustrated by discrete mathematics examples.
2. It is to model ,evaluate and analyze computational processes using analytic and combinatorial methods, Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram, Functions, Inverse functions, Composition of functions, Recursive functions, Lattice and its properties and to apply principles of discrete probability to calculate probabilities and expectations of simple random processes
3. It is to understand the necessary back ground of discrete structures with particular reference to the relationships between discrete structures and their data structure counterparts including algorithm development and to create a complete knowledge on various discrete structures available in literature.
4. It is to learn that how to apply sub graphs, connected components, cyclic graph, Bipartite graph, Planar graph, Euler's formula, Euler circuit, Hamiltonian Graph, Chromatic number, Trees, Spanning tree of a Graph, Breadth First & Depth First Spanning trees, Binary Tree, Conversion of a tree to binary tree. Tree traversals, Representation of Expressions by Binary tree, Forest, Binary search treesand to gain knowledge on discrete structures in literature.

UNIT-I (10 Hrs.)

Mathematical Logic - Connectives, well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, predicates, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theory Proving.

UNIT-II (11 Hrs.)

Set Theory - Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram, Functions, Inverse functions, Composition of functions, Recursive functions, Lattice and its properties.

UNIT-III (12 Hrs.)

Graph Theory - Definition, Representation, path Matrix Warshalls. Algorithm, MINIMA Algorithm, Isomorphism, sub graphs, connected components, cyclic graph, Bipartite graph, Planar graph, Euler's formula, Euler circuit, Hamiltonian Graph, Chromatic number, Trees, Spanning tree of a Graph, Breadth First & Depth First Spanning trees, Binary Tree, Conversion of a tree to binary tree. Tree traversals, Representation of
Expressions by Binary tree, Forest, Binary search trees.

UNIT-IV (11 Hrs.)

Combinatorics & Recurrence Relations - Disjunctive & Sequential counting, Combinations & Permutations, Enumeration without repetition Recurrence relation, Fibonacci relation, solving recurrence relation by substitution, solving non-linear recurrence relation by conversion to linear recurrence relation.

Recommended Books

1. J.P. Trembly, P. Manohar, 'Discrete Mathematical Structures with Applications to Computer Science', 1st Edn., McGraw Hill, 2001.
2. J.L. Mott, A. Kandel, T.P. Baker, 'Discrete Maths for Computer Scientists & Mathematicians', 2nd Edn., Prentice Hall, 1986.

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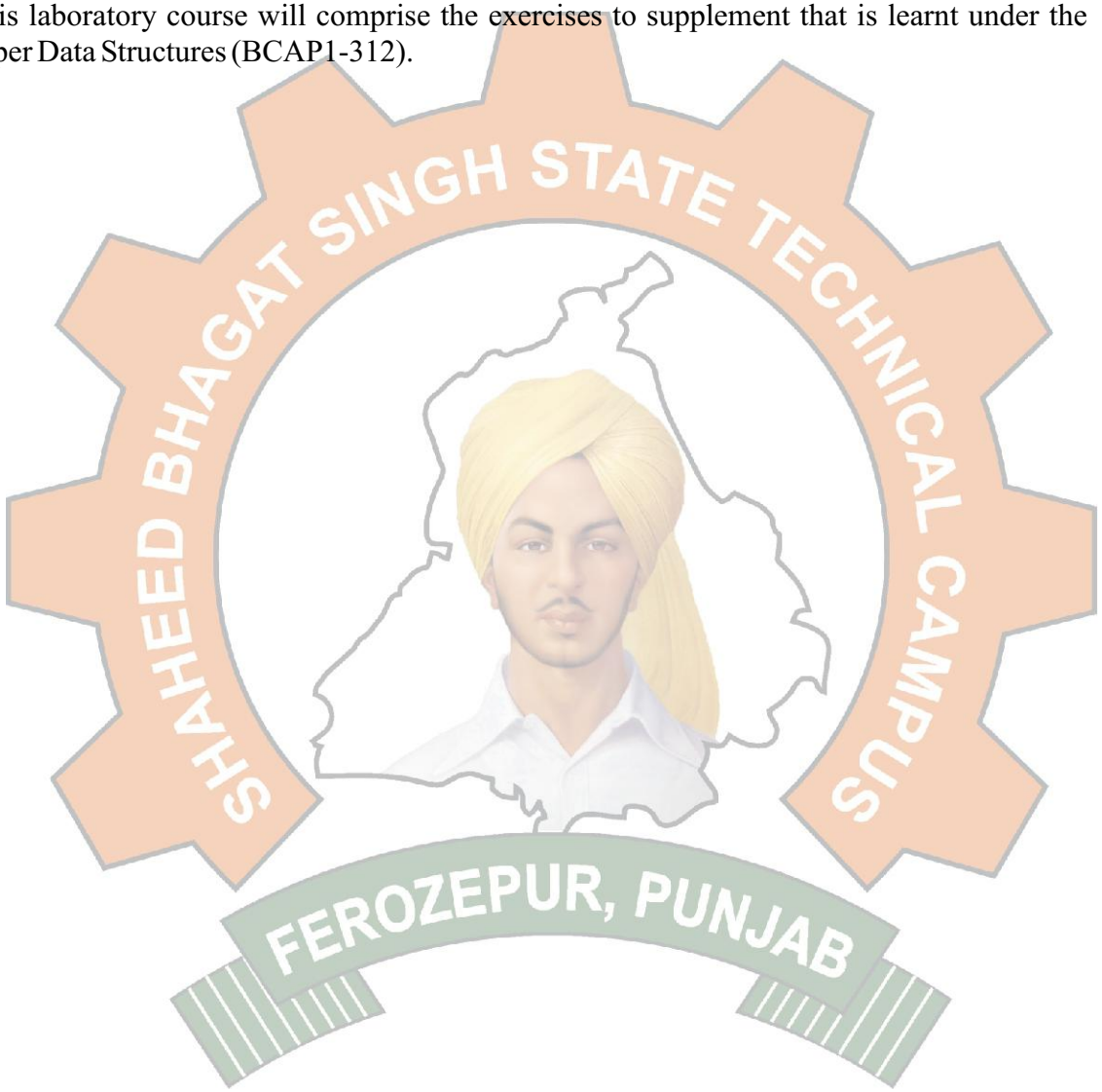
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

DATA STRUCTURES BASED ON BCAP1-312
(SOFTWARE LAB. V)

Subject Code: BCAP1-315	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise the exercises to supplement that is learnt under the paper Data Structures (BCAP1-312).



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Study Scheme For BCA (Batch 2016 Onwards)

PROGRAMMING IN JAVA BASED ON BCAP1-313
(SOFTWARE LAB. VI)

Subject Code: BCAP1-316	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise the exercises to supplement that is learnt under the paper Programming in Java (BCAP1-313).

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Study Scheme For BCA (Batch 2016 Onwards)

TECHNICAL ENGLISH

Subject Code: BHUM0-106 | **L** | **T** | **P** | **C** | **Duration: 37 Hrs.**
2 | **1** | **0** | **3**

Course Outcomes

1. Understand the importance of communication in business.
2. Produce effectively different forms of business writing such as letters, email and phone conversation.
3. Practice a prescribed set of grammar items in suitable context.
4. Improve the interview skills/ presentation skills with the help of speaking Skills.

UNIT-I

Concepts & Fundamentals: Introduction to technical communication, communication models and theories. Essentials of good communication- The seven as of communication. Factor responsible for growing importance of communication listening skills: good listening for improved communication, types & importance.

UNIT-II

Language Skills: Improving command in English, improving vocabulary, choice of words, grammar, sentence and paragraph construction; Introduction to Business English. **Reading Skills:** Advanced reading activities.

UNIT-III

Written Communication: Drafting of Business letters, Enquiries and replies, Placing & fulfilling orders, Complaints and follow up, sales letters, circular letter, resume writing. **Information Technology for Communication:** Word processor, Email, Voice mail, internet, Multi-media, Teleconferencing, Teleconferencing-mobile, Phone conversation-Video conferencing-SMS-, Telephone answering machine-advantages and limitations of these types.

UNIT-IV

Speaking Skills: Presentation skills, Multimedia presentation. Interview Skills, Kinesics, Proxemics. Business Etiquettes.

Course Outcomes: At the end of the course, the student will understand the importance of communication in enhancing his/her employability. It will also train them for effective interviews and presentations.

RECOMMENDED BOOKS

1. Raymond Murphy, 'Essential English Grammar-A Self-study Reference and Practice Book for Elementary Students of English', 2nd Edn., Cambridge University Press.

2. Herta A. Murphy, Herbert W. Hildebrandt and Jane P. Thomas, 'Effective Business Communication', 7th Edn., McGraw Hill.
3. P.D. Chaturvedi and Mukesh Chaturvedi, 'Business Communication-Concepts, Cases and Applications', 2nd Edn., Pearson.
4. Martin Hewings, 'Advanced Grammar in Use', Cambridge University Press, **2013**.

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Study Scheme For BCA (Batch 2016 Onwards)

INTRODUCTION TO MICROPROCESSORS

Subject Code: BCAP1-356

L	T	P	C	Duration: 45 Hrs.
3	1	0	4	

Course Outcomes

1. Describe the basic architecture of Microprocessor and Microcontroller system.
2. Discuss 8085 Assembly Language Programming, Programming model of 8085.
3. To describe a typical I/O interface& to discuss timing diagrams.
4. To describe different types of memory used in Microcontroller system.

UNIT-I (10 Hrs.)

Basic Concepts- Microcomputer Structure and Operation, Organization of a Microprocessor-based System, Instruction Set and Computer Languages, 8085 Assembly Language Programming, Programming model of 8085, Instruction Set, Instruction word size and data formats.

UNIT-II (12 Hrs.)

Assembly Language- Assembly Language Programming, Data Transfer, Arithmetic and Logical Instructions, branching Instructions

Functional Block Diagram: Pin description, Bus Structure. De-multiplexing the Bus, Generating Memory Control Signals.

UNIT-III (12 Hrs.)

Operations 8085 - Microprocessor-initiated Operations, Internal Data Operations, Externally-initiated Operations

Memory and I/O Devices- Introduction to Memory devices, I/O devices, Logic Devices for Interfacing, Interfacing Memory with 8085.

UNIT- IV (12 Hrs.)

I/O Interfacing- Interfacing I/O Devices: Peripheral-I/O instructions and I/O Execution, IN/OUT Instructions and Timing Diagrams, Device Selection and Data Transfer. Interfacing Output displays & Input devices

Advance Microprocessors- Introduction to 8086, 80386 and 80486.

Recommended Books

1. Douglas V. Hall, 'Microprocessors and Interfacing', Tata McGraw Hill, 2nd Edn., **2013.**
2. Ramesh Goankar, 'Microprocessor Architecture, Programming and Applications with 8085', 5th Edn., PHI, **1999**.

3. A.K. Ray and K.M. Bhurchandi , 'Advanced Microprocessors and Peripherals', Tata McGraw Hill, 3rd Edn., **2013**.
4. Barry B. Brey, 'The Intel Microprocessors', 7th Edn., Pearson, **2006**.

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Study Scheme For BCA (Batch 2016 Onwards)

EMBEDDED SYSTEM

Subject Code: CAP1-357

L	T	P	C	Duration 45 hrs
3	1	0	4	

Course Outcomes

1. Describe he differences between the general computing systems and the embedded system, also recognize the classificationof embedded systems.
2. Become aware of the recent trends in embedded systems design and embedded software design issues.
3. Design real time embedded system using the PIC microcontroller 16F877A.
4. Analyze various examples of embedded systems based on PIC Microcontroller 16F877A.
5. Understand the different applications of embedded s ystems.

Unit-I (12 hrs)

Introduction to Embedded Systems:- Overview of embedded systems, features, requirements and applications of embeded systems, recent trends in the embedded system design common architectures for the ES design, embedded software design issues, introduction to development and testing tools.

Unit-II (11 hrs)

Embeded System Architecture:- Basics of 8 bit and 16 bit Low Pin Count PIC microcontrollers, Pin Diagram, Architecture, memory organization, Special Function Registers, GPIO Timer Comparator and A/D convertor, Bus Architecture, data operations, addressing modes, timers and counters.

Unit-III (11 hrs)

Assembly Language Programming:- Memory-mapped I/O, interrupt handling PIC16F877A Instruction Set, Assembler Directives, Programming of PIC Microcontrollers.

Unit-IV (11 hrs)

Appications of Embedded Systems:- Industrial and control applications, networking and telecom applications, digital signal processing and multimedia applications, Applications in the area of consumer appliances.

Recommended Books

1. Steve Heath, 'Embedded Systems Design', 2nd Edn. Newnes **2002.**
2. Jane W.S. Liu, 'Real-Time Systems', 1st Edn., Prentice hall **2000.**
3. John B. Peatman, 'Design with PIC Microcontrollers, 2nd Edn., Pearson Education, **1998.**
4. Pearson Education, 1997 PIC 12F629/675 Manual.

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Study Scheme For BCA (Batch 2016 Onwards)

OPERATING SYSTEM

Subject Code: BCAP1-417	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
	3	**1**	**0**	**4**	

Course Outcomes

1. Understand functions, Role, different structures and views of Operating system.
2. Understand Process management in operating system.
3. Understand Memory Management in operating system.
4. Understand Device Management in operating system

UNIT-I (10 Hrs.)

Introduction: Computer-System Architecture, Operating-System Structure, Operating-System Operations, Types of Operating Systems, System Structures: Operating System Services, System Calls, Types of System Calls.

UNIT-II (12 Hrs.)

Processes: Process Concept, Process Scheduling, Operation on Processes, Interprocess Communication, Multithreaded Programming, Threading Issues, Process Scheduling, Scheduling Criteria, Scheduling Algorithms (FCFS, SJF, Round Robin, Priority), Thread Scheduling, Multiprocessor Scheduling, Process Synchronization: Background, The Critical Section Problem, Semaphores, Classical Problems of Synchronization, Deadlocks:, Deadlock Characterization, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT-III (12 Hrs.)

Memory Management Strategies Swapping, Contiguous Memory Allocation, Paging, Segmentation, Demand Paging, Page Replacement, Memory Mapped Files, Thrashing.

UNIT-IV (11 Hrs.)

Protection and Security Security Problems, Program Threats, System and Network Threads, User Authentication, Firewalls to Protect Systems, Computer Security Classification, Case Study of Linux and Windows XP.

Recommended Books

1. Silberschatz, Galvin and Gagne, 'Operating System Concepts', 9th Edn., Wiley, **2015.**
2. Mukesh Singhal and Niranjan Shivaratri, 'Advanced Concepts in Operating Systems', 1st Edn., Tata McGraw Hill, **2001**.
3. Achyut Godbole and Atul Kahate, 'Operating Systems', 3rd Edn., Tata McGraw Hill, **2010**.

4. Dhananjay Dhamdhere, 'Operating Systems a Concept Based Approach', 3rd Edn., Tata McGraw Hill, **2012**.

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Study Scheme For BCA (Batch 2016 Onwards)

ANDROID APPLICATION DEVELOPMENT

Subject Code: BCAP1-418	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
3	**1**	**0**	**4**

Course Outcomes

1. Describe the basic components of an Android application.
2. Build user interfaces with fragments, views, form widgets, text input, lists, tables, and more.
3. Support user-specific preferences using the Android Preferences API, JSON & Use AsyncTaskLoader.
4. Store application data on the mobile device, in internal or external storage locations.

UNIT-I (12 Hrs.)

Introduction to Android - Installing Android Studio, Layouts, Views and Resources, Scrolling Views, Working with TextView Elements.

Activities and Intents - Create and Start Activities, Lifecycle and State Callbacks, Testing and Debugging, and Backwards Compatibility: Debugging and Testing app, Support libraries.

UNIT-II (9 Hrs.)

User Interaction and Navigation - User Input Controls: Use Keyboards, Input Controls, Alerts, and Pickers, Menus and Radio Buttons, Screen Navigation. **Themes and Styles:** Theme, Custom Styles, Drawables.

UNIT-III (13 Hrs.)

Connect to the Internet -Google APIs Explorer, JSON, Use AsyncTaskLoader, Triggering, Scheduling, and Optimizing, Background Tasks: Alarm Manager.

UNIT- IV (11 Hrs.)

Data Saving, Retrieving, Loading - Storing Data using SQLite, Sharing Data: Implement a Content Provider, Loading Data using Loaders, Publishing app: Permissions and Libraries, Making and publishing APKs.

1. Jeff Mcwherter, Scott Gowell, 'Professional Mobile Application Development', 1st Edn., Wrox Publisher, **2012**.
2. Lauren Darcy and Shane Conder 'Teach Yourself Android Application Development in 24 Hrs', 1st Edn., Sams publications, **2009.**
3. Himanshu Dwivedi, Chris Clark, David Thiel, 'Mobile Application Security', 1st Edn., Tata McGraw Hill, **2010**.

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Study Scheme For BCA (Batch 2016 Onwards)

DATABASE MANAGEMENT SYSTEM

Subject Code: BCAP1-419	L	T	P	C	Duration: 45 Hrs.
	3	1	0	4	

Course Outcomes

1. Describe fundamental elements of DBMS.
2. Explain the basic concepts of data models and database language SQL.
3. Design E-R diagram to represent simple database applications scenarios.
4. Criticize a database and improve the design by normalization.

UNIT-I (11 Hrs.)

Introduction: DBMS: Characteristics, Advantages of DBMS, Database Architecture, Conceptual, Physical and Logical database models, Role of DBA, Keys: super key, candidate key, primary key.

UNIT-II (11 Hrs.)

Relational Data Model and Languages: Relational data Model Concepts, Tuple domain Calculus. Generalization and Specialization, Aggregation, Extended ER diagrams.

UNIT-III (12 Hrs.)

Functional Dependencies: First Normal Form, Pitfalls in Relational-Database Design, Decomposition, Desirable properties of Decomposition, Normal Forms: Second, Third, BCNF, Fourth and Fifth normal forms.

UNIT-IV (11 Hrs.)

My SQL - Operators in MySQL, Retrieving, Updating, Inserting, Deleting, Sorting and Filtering User Data, Advanced Filtering, Grouping Data, Using Subqueries, Joining Tables, Using Views, Using Cursors, Using Transactions.

Recommended Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 'Database System Concepts', 6th Edn., Tata McGraw Hill, **2010**.
2. Ramez Elmasri and Shamkant B. Navathe, 'Fundamentals of Database Systems', 6th Edn., Pearson, **2010**.
3. Ivan Bayross, 'SQL, PL/SQL the Programming Language of Oracle', 2nd Edn., BPB Publications, **2003**.

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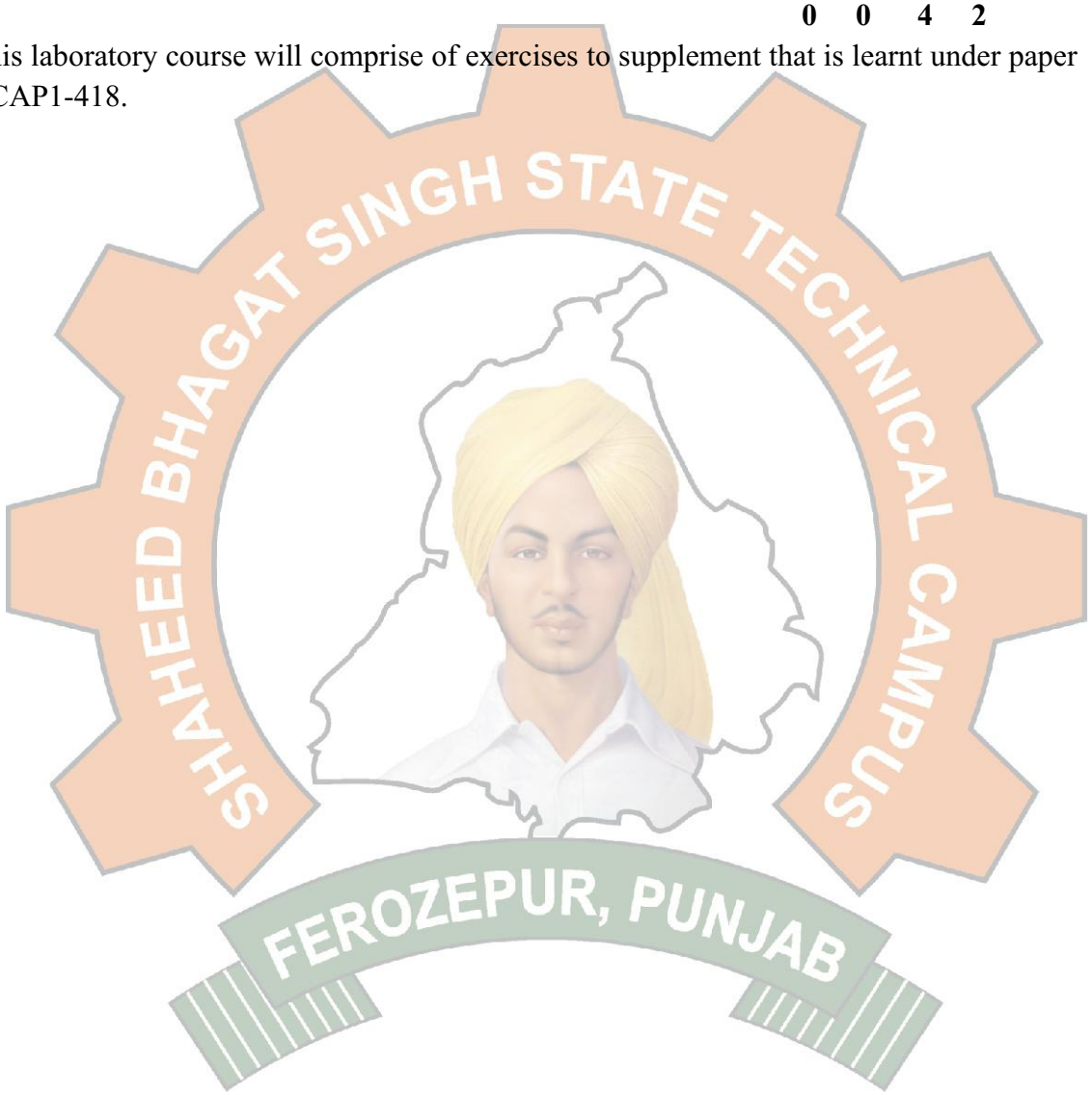
Study Scheme For BCA (Batch 2016 Onwards)

SOFTWARE LAB.-VII
(ANDROID APPLICATION DEVELOPMENT BASED ON BCAP1-418)

Subject Code: BCAP1-420	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise of exercises to supplement that is learnt under paper BCAP1-418.



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Study Scheme For BCA (Batch 2016 Onwards)

SOFTWARE LAB.-VIII
(DATABASE MANAGEMENT SYSTEMS BASED ON BCAP1-419)

Subject Code: BCAP1-421	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise of exercises to supplement that is learnt under paper BCAP1-419.

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Study Scheme For BCA (Batch 2016 Onwards)

SOFTWARE ENGINEERING

Subject Code: BCAP1-458	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
3	**1**	**0**	**4**

Course Outcomes

1. Understand the process to be followed in SDLC..
2. Apply design and testing principles to software project development & Design Methodologies.
3. Apply the testing principles to software project development.
4. Apply the maintenance process to software project development.

UNIT-I (12 Hrs.)

Introduction - Software Crisis, software Myths, Software Processes & Characteristics, Software Life Cycle Models: Waterfall, Prototype, Evolutionary, Spiral and Agile Models (Scrum, XP).

UNIT-II (11 Hrs.)

Software Requirements Analysis & Specifications - Requirement Engineering, Requirements Analysis using DFD (with case studies), Data Dictionaries, Requirements Documentation, Nature of SRS, Characteristics & Organization of SRS.

UNIT-III (11 Hrs.)

Software Testing - Testing Process, White Box Testing: Basis Path, Control Structure, Black Box Testing: Graph Based Testing Models, Equivalence Partitioning Functional, Unit Testing, Integration Testing and System Testing.

UNIT-IV (11 Hrs.)

Software Maintenance - Management of Maintenance, Maintenance Process, Reverse Engineering, Software Re-engineering, Configuration Management.

Recommended Books

1. K.K. Aggarwal & Yogesh Singh, 'Software Engineering', 2nd Edn., New Age International, **2005**.
2. Rajib Mall, 'Fundamental of Software Engineering', 3rd Edn., PHI, **2009**.
3. I. Sommerville, 'Software Engineering', 9th Edn., Pearson, **2010**.
4. R.S. Pressman, 'Software Engineering A Practitioner's Approach', 5th Edn., McGraw Hill, **2001**.

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Study Scheme For BCA (Batch 2016 Onwards)

SOFT COMPUTING

Subject Code: BCAP1-459	L	T	P	C	Duration: 45 Hrs.
	3	1	0	4	

Course Outcomes

1. To know about the basics of soft computing techniques and also their use in some real life situations.
2. To learn the key aspects of computing.
3. To understand the features of neural network and its applications.

UNIT-I (10 Hrs.)

Introduction - Soft Computing, Introduction to fuzzy sets and fuzzy logic systems, Introduction to Genetic Algorithm, Genetic Operators and Parameters, Genetic Algorithms in Problem Solving.

UNIT-II (13 Hrs.)

Artificial Neural Networks - Different artificial neural network models, Course in artificial neural networks, Neural network applications in control systems, Neural Nets and applications of Neural Network.

Machine Course - Course Form Examples - Inductive Concept Course - Sequence Prediction - Effect of Noise in Input.

UNIT-III (11 Hrs.)

Fuzzy Systems - Fuzzy sets, Fuzzy reasoning, Fuzzy inference systems, Fuzzy control, Fuzzy clustering, Applications of fuzzy systems, Neuro-fuzzy systems, Neuro-fuzzy modeling, Neuro-fuzzy control.

UNIT-IV (11 Hrs.)

Preambles - Pattern Recognitions, Image Processing, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

Recommended Books

1. S. Rajasekaran and G.A. Vijaylakshmi Pai, 'Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications', 1st Edn., Prentice Hall India, **2007**.
2. J.S.R. Jang, C.T. Sun and E. Mizutani, 'Neuro-Fuzzy and Soft Computing', Pearson Education, 1st Edn., **2015**.
3. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', 3rd Edn., Wiley, **2011**.

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Study Scheme For BCA (Batch 2016 Onwards)

Linux Administration

Subject Code: BCAP1-522	L	T	P	C	Duration: 45 Hrs.
	3	1	0	4	

Based on Industrial Collaboration

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Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

Programming in ASP.Net

Subject Code: BCAP1-523	L	T	P	C	Duration: 45 Hrs.
	3	1	0	4	

Course Outcomes

1. Set up a programming environment for ASP.net programs.
2. Configure an asp.net application.
3. Creating ASP.Net applications using standard .net control
4. Develop a data driven web application.

UNIT-I (11 Hrs.)

Introduction - ASP.Net Introduction-The .Net framework, The .Net Languages, CLR, Types, Objects and Namespaces, Settings for ASP.Net and IIS.

UNIT-II (12 Hrs.)

Developing ASP.Net Application - Developing ASP.Net Application - Asp.Net Application, Differences Between Web based and Windows Based Application, Web from fundamentals, Web Controls, Working with Events Rich Web Controls Custom Web Controls.

UNIT-III (10 Hrs.)

Form Validation - Form Validation: Client Side Validation, Server Side Validation, Validation Controls: Required Field Comparison Range. Calendar Control, Ad rotator Control, Internet Explorer Control. State Management - View State, Session State, Application State.

UNIT-IV (12 Hrs.)

Architecture of ADO.NET - Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, DataAdapter Class, Dataset Class. Display data on Data Bound Controls and Data Grid. Database Accessing on Web Applications: Data Binding Concept with Web, Creating Data Grid, Binding Standard Web Server Controls. Display Data on Web Form using Data Bound Controls.

Recommended Books

1. Mridula Parihar, Essam Ahmed, Jim Chandler, Bill Hatfield, Rick Lassan, Peter MacIntyre, Dave Wanta 'ASP. NET Bible', 2nd Edn., Wiley-Dreamtech India Pvt. Ltd., **2002**.
2. Andrew Troelsen, 'C# and the .Net Platform', Apress, Special Edn., **2001**. (Unit I and II)

3. David S. Platt, 'Introducing.Net', 3rd Edn., Microsoft Press, **2003**.
4. Alex Homer et. al. 'Professional ASP .NET 1.1', 2nd Edn., Wiley-Dreamtech India Pvt. Ltd., **2005**.

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Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

COMPUTER NETWORKS

Subject Code: BCAP1-524	L	T	P	C	Duration: 45 Hrs.
	3	1	0	4	

Course Outcomes

1. Understanding network models.
2. Understand different network technologies.
3. Understand the effects of using different networking topologies.
4. Be updated with different advanced network technologies that can be used to connect different networks.

UNIT-I (11 Hrs.)

Basic Concepts - Components of Data Communication, Distributed Processing, Topology, Transmission Mode, and Categories of Networks. OSI and TCP/IP Models: Layers and their Functions, Comparison of Models.

UNIT-II (11 Hrs.)

Transmission Media - Guided and unguided, Attenuation, Data Link Control Protocols, Flow Control, Error Control, Overview of Synchronous and Asynchronous Protocols.

UNIT-III (12 Hrs.)

Devices - Repeaters, Bridges, Gateways, Routers, Network Layer, Design Issues, Network Layer Addressing and Routing Concepts (Forwarding Function, Filtering Function), Routing Methods (Static and dynamic routing, Distributed routing, Hierarchical Routing).

UNIT-IV (11 Hrs.)

Multiplexing, Error Detection and Correction - Many to One, one to Many, WDM, TDM, FDM, Circuit Switching, Packet Switching and Message Switching.

Recommended Books

1. Andrew S. Tanenbaum, 'Computer Networks', 4th Edn., Prentice Hall, **2007**.
2. Behrouz A. Forouzan, 'Data Communication and Networking', 4th Edn., Tata McGraw Hill, **2006**.
3. Douglas E. Comer, 'Internetworking with TCP/IP Principles, Protocols, and Architecture', 4th Edn., PHI, **2013**.
4. William Stallings, 'Cryptography and Network Security', 3rd Edn., Pearson, **2002**.

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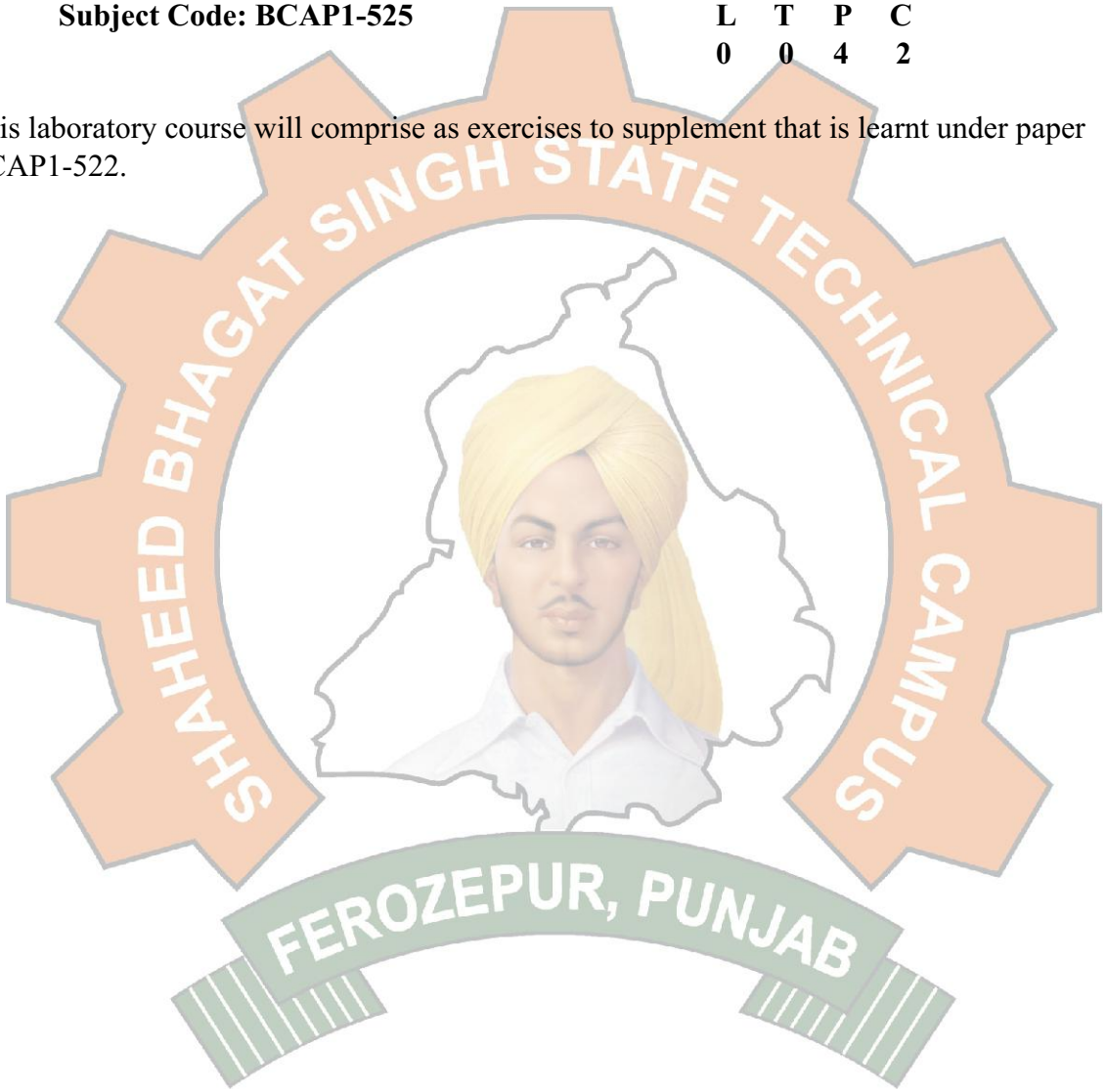
Study Scheme For BCA (Batch 2016 Onwards)

(Software Lab-IX)

LINUX ADMINISTRATION BASED ON BCAP1-522

Subject Code: BCAP1-525	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise as exercises to supplement that is learnt under paper BCAP1-522.



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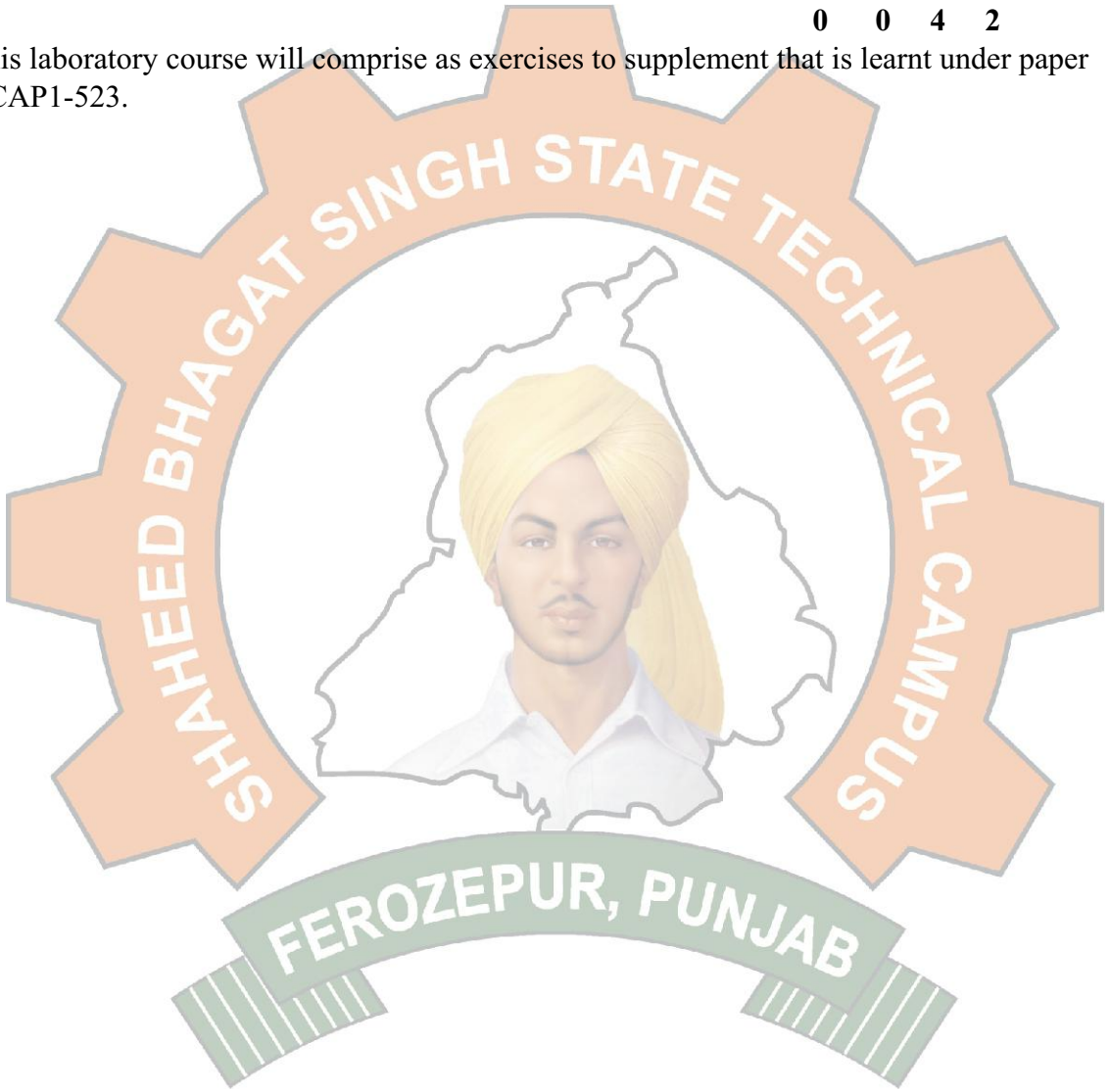
SOFTWARE LAB.-X
(PROGRAMMING IN ASP.NET BASED ON BCAP1-523)

Subject Code: BCAP1-526	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise as exercises to supplement that is learnt under paper BCAP1-523.



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Study Scheme For BCA (Batch 2016 Onwards)

NETWORK SECURITY

Subject Code: BCAP1-560	**L**	**T**	**P**	**C**	**Duration 45 Hrs.**
	3	**1**	**0**	**4**	

Course Outcomes

1. Understand Security Concepts, Ethics in Network Security.
2. Understand Security Threats, and the Security Services and Mechanisms to counter them.
3. Comprehend and apply Authentication Services and Mechanisms.

UNIT-I (11 Hrs.)

Basic Concepts - Introduction: Attack, Services and Mechanism, Model for Internetwork Security. Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

UNIT-II (11 Hrs.)

IP Security Architecture - Overview, Authentication Header, Encapsulating Security Pay Load combining Security Associations, Key Management. Web Security: Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

UNIT-III (12 Hrs.)

Network Management Security - Overview of SNMP Architecutre-SMMPVI1 Communication Facility, SNMPV3.

UNIT-IV (11 Hrs.)

System Security - Intruders, Viruses and Relate Threats, Firewall Design Principles. Comprehensive Examples using available Software Platforms/case tools, Configuration Management.

Recommended Books

1. W. Stallings, Networks Security Essentials: Application & Standards, 2nd Edn., Pearson Education, **2000**.
2. W. Stallings, 'Cryptography and Network Security, Principles and Practice', 3rd Edn., Pearson Education, **2000**.
3. John E. Canavan, 'The Fundamentals of Network Security', 2nd Edn., Artech House, **2001**.

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Study Scheme For BCA (Batch 2016 Onwards)

ARTIFICIAL INTELLIGENCE

Subject Code: BCAP1-561

L	T	P	C	Duration: 45 Hrs.
3	1	0	4	

Course Outcomes

1. Understand different types of AI Agents.
2. Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms.
3. Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving.

UNIT-I (12 Hrs.)

Basic Concepts - Introduction to AI, Importance of AI, AI Techniques, Criteria for Success, Problem Space and Search, Production System and its Characteristics, Issues in the Design of the Search Problem.

UNIT-II (12 Hrs.)

Heuristic Search Techniques: Hill Climbing, Best First Search Technique: OR GRaph, A*, Problem Reduction: AND-OR Graph, AO*, Constraint Satisfaction.

UNIT-III (11 Hrs.)

Knowledge Representation - Definition and Importance of Knowledge, Knowledge Representation, Various Approaches used in Knowledge Representation, Issues in Knowledge Representation.

UNIT-IV (10 Hrs.)

Expert System - Introduction, Architecture, Types of Experts System, representing using Domain Specific Knowledge, Expert System Shells, LISP and other AI Programming Language.

Recommended Books

1. E. Rich and K. Knight, 'Artificial Intelligence', 2nd Edn., McGraw Hill, **1999**.
2. David W. Rolston, 'Principles of Artificial Intelligence and Expert System Development', 2nd Edn., McGraw Hill, **2003**.
3. D.W. Patterson, 'Introduction to AI and Expert Systems', 1st Edn., PHI, **1999**.
4. Nils J. Nilsson, 'Artificial Intelligence -A New Synthesis', Harcourt Asia Ltd, 2nd Edn., **2000**.

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Study Scheme For BCA (Batch 2016 Onwards)

COMPUTER GRAPHICS

Subject Code: BCAP1-627	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
3	**1**	**0**	**4**

Course Outcomes

1. Understand the foundations of Computer graphics.
2. Understand the concept of Geometric, mathematical and algorithmic concepts necessary for programming computer graphics.
3. Understand the comprehension of window clipping and view port object representation in relation to images displayed on screen.
4. Understand the concepts of geometric and composite transformations on objects.

UNIT-I (12 Hrs.)

Basic Concepts - Graphics Primitives, Introduction to Computer Graphics, Application Areas of Computer Graphics, Overview of Graphics Systems, Video-display Devices, and Raster-Scan Systems, Random Scan Systems, Graphics Monitors and Workstations and Input Devices.

UNIT-II (11 Hrs.)

Output Primitives - Points and Lines, Line Drawing Algorithms: Direct Use of Line Equation, DDA, Bresenham Mid-Point Circle and Ellipse Algorithms.

UNIT-III (10 Hrs.)

Filled Area Primitives: Scan Line Polygon Fill Algorithm, Boundary Fill and Flood Fill Algorithms.

Geometrical Transforms - Translation, Scaling, Rotation, Reflection and Shear Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transforms Transformations Between Coordinate Systems.

UNIT-IV (12 Hrs.)

2-D Viewing - The Viewing Pipeline, Viewing Coordinate Reference Frame, window to Viewport Coordinate Transformation, Viewing Functions, Cohen-Sutherland Line Clipping Algorithms, Sutherland Hodgeman Polygon Clipping Algorithm.

Recommended Books

1. Donald Hearn and M. Pauline Baker, 'Computer Graphics', 2nd Edn., PHI, **2004**.

2. Plastock, 'Theory & Problem of Computer Graphics', 2nd Edn., Schaum Series, McGraw Hill, **2011**.
3. Foley & Van Dam, 'Fundamentals of Interactive Computer Graphics', 1st Edn., Addison Wesley, **1982**.

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Study Scheme For BCA (Batch 2016 Onwards)

EMERGING TRENDS IN INFORMATION TECHNOLOGY

Subject Code: BCAP1-628 **L T P C** **Duration: 45 Hrs.**
3 1 0 4

Course Outcomes

1. Recognize the concepts of emerging technologies.
2. Analyze the components of cloud computing.
3. Critically analyze case studies to derive the best practice model to apply when developing and deploying parallel, distributed, cloud and IoT based applications.
4. To understand the basics of soft computing.

UNIT-I (10 Hrs.)

Introduction to Computing- Emerging Trends in Computing like Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Utility Computing, Cloud Computing, High Performance Computing.

UNIT-II (10 Hrs.)

Cloud Computing- Web 2.0 and the Cloud, Cloud Types, Uses of Cloud, Components of Cloud Computing - Software as a Service, Platform as a Service, Infrastructure as a Service.

UNIT-III (12 Hrs.)

Soft Computing- Soft Computing VS Hard Computing; Introduction to Neural Networks Intelligence, Neurons, Artificial Neural Networks, Application Scope of Neural Network, Brain VS Computer.

UNIT-IV (12 Hrs.)

IoT architecture- Topologies, Edge Routers, Client-Server Architecture, P2P, M2M.

Recommended Books

1. Joshy Joseph, Craig Fellenstein, 'Grid Computing', 1st Edn., Prentice Hall Professional, **2004.**
2. Rajkumar Buyaa, James Broberg, Andrzej Goscinski, 'Cloud Computing Principles and Paradigms', 1st Edn., Wiley, **2011.**
3. Tettamanzi, Andrea, Tomassini and Macro, 'Soft Computing', Springer, **2001**.
4. Rajkumar Buyaa, Vecchiola, Selvi, 'Mastering Cloud Computing', 1st Edn., McGraw Hill, **2013**.
5. Arshdeep Bahga, Vijay Madisetti, 'Internet of Things (A Hands -on-Approach)', 1st Edn., VPT, **2014**.

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Study Scheme For BCA (Batch 2016 Onwards)

MAJOR PROJECT

Subject Code: BCAP1-629	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

Live Major Project based on technologies studied so far.

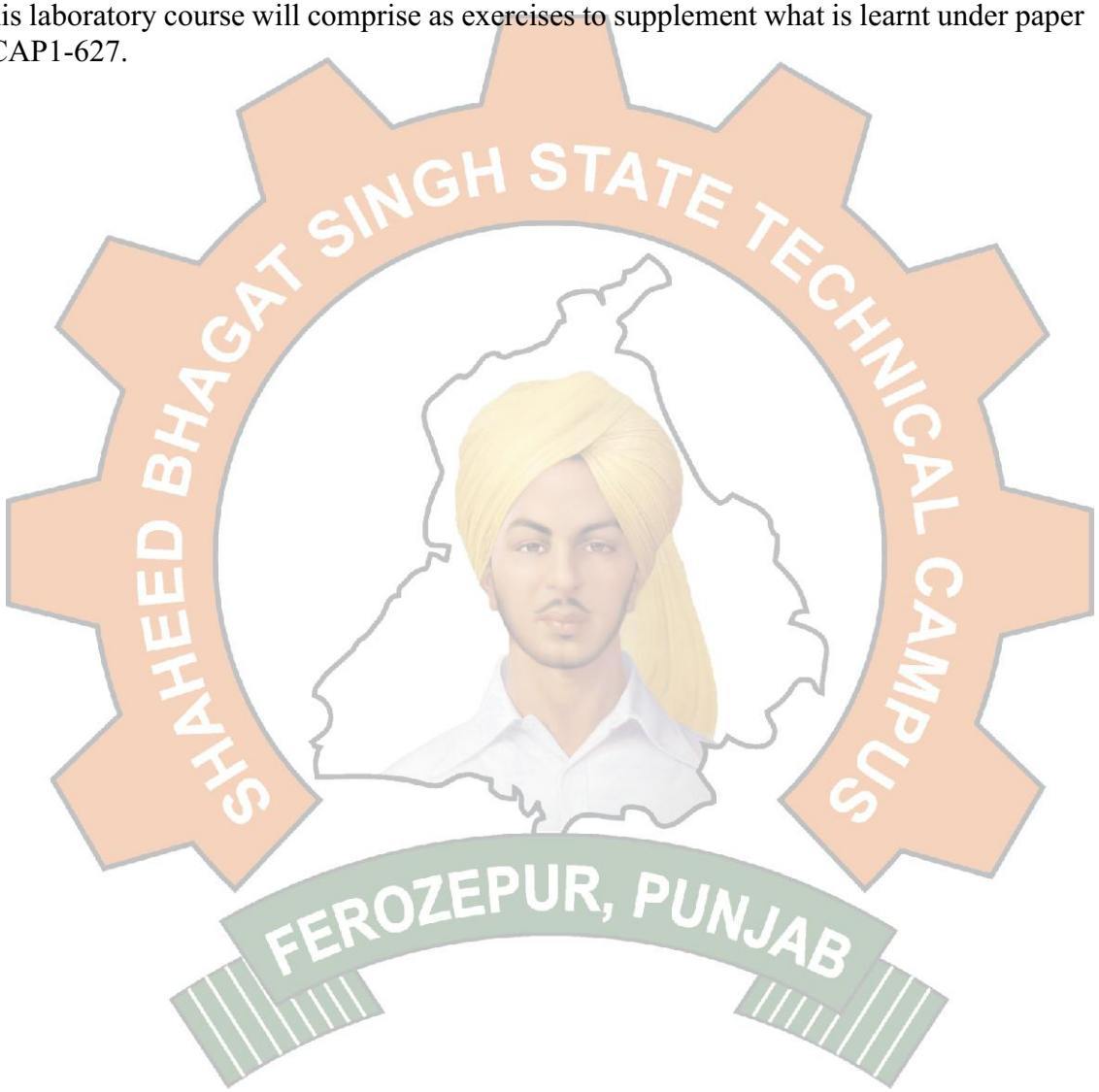
Department of Computer Applications

Shaheed Bhagat Singh State Technical Campus
Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

SOFTWARE LAB.-XI
(COMPUTER GRAPHICS BASED ON BCAP1-627)

Subject Code: BCAP1-630	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

This laboratory course will comprise as exercises to supplement what is learnt under paper BCAP1-627.



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Study Scheme For BCA (Batch 2016 Onwards)

ENVIRONMENTAL STUDIES

Subject Code: BESE0-101	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
2	**0**	**0**	**2**

Course Outcomes:

1. To identify global environmental problems arising due to various engineering/industrial/ and technological activities and the science behind these problems
2. To realize the importance of ecosystem and biodiversity for maintaining ecological balance.
3. To identify the major pollutants and abatement devices for environmental management and sustainable development.
4. To estimate the current world population scenario and thus calculating the economic growth, energy requirement and demand.
5. To understand the conceptual process related with the various climatologically associated problems and their plausible solutions.

UNIT-I

1. The Multi disciplinary Nature of Environmental Studies (2 Hrs.) Definition, scope and importance. Need for public awareness.

2. Natural Resources (Hrs.)

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

(g) Role of an individual in conservation of natural resources.

(H) Equitable use of resources for sustainable lifestyles.

UNIT-II

3. Ecosystems (8 Hrs.)

(a) Concept of an ecosystem.
(B) Structure and function of an ecosystem.
(c) Producers, consumers and decomposers.
(d) Energy flow in the ecosystem.
(e) Ecological succession.
(f) Food chains, food webs and ecological pyramids.
(G) Introduction, types, characteristic features, structure and function of the following ecosystem:
  i) Forest ecosystem.
  ii) Grassland ecosystem.
  iii) Desert ecosystem.
  iv) Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries).

4. Biodiversity and its Conservation (6 Hrs.)

(a) Introduction Definition: genetic, species and ecosystem diversity.
(b) Biogeographical classification of India.
(c) Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and
(d) option values.
(e) Biodiversity at global, national and local levels.
(f) India as a mega-diversity nation.
(g) Hot-spots of biodiversity.
(h) Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts.
(i) Endangered and endemic species of India.
(j) Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III

5. Environmental Pollution (8Hrs.) Definition

(a) Causes, effects and control measures of:
  i) Air pollution
  ii) Water pollution
  iii) Soil pollution
  iv) Marine pollution
  v) Noise pollution
  vi) Thermal pollution
  vii) Nuclear pollution
(b) Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.
(c) Role of an individual in prevention of pollution.
(d) Pollution Case Studies.
(e) Disaster management: floods, earthquake, cyclone and landslides

6. Social Issues and the Environment (8 Hrs.)

(a) From unsustainable to sustainable development
(b) Urban problems and related to energy
(c) Water conservation, rain water harvesting, Watershed Management
(d) Resettlement and rehabilitation of people; its problems and concerns. Case studies.
(e) Environmental ethics: Issues and possible solutions
(f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
(g) Wasteland reclamation
(h) Consumerism and waste products
(i) Environmental Protection Act
(J) Air (Prevention and Control of Pollution) Act
(k) Water (Prevention and control of Pollution) Act
(l) Wildlife Protection Act
(m) Forest Conservation Act
(n) Issues involved in enforcement of environmental legislation
(o) Public awareness

UNIT-IV

7. Human Population and the Environment (7 Hrs.)

(a) Population growth, variation among nations
(b) Population explosion Family Welfare Programmes
(c) Environment and human health
(d) Human Rights
(e) Value Education
(f) HIV/AIDS
(g) Women and Child Welfare
(h) Role of Information Technology in Environment and Human Health
(i) Case Studies

8. Field Work (6 Hrs.)

(a) Visit to a local area to document environmental assets river/
(b) forest/grassland/hill/mountain
(c) Visit to a local polluted site Urban / Rural / Industrial / Agricultural
(d) Study of common plants, insects, birds
(e) Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Recommended Books

1. J.G. Henry and G.W. Heinke, 'Environmental Sc. & Engineering', Pearson Education, **2004.**
2. G.B. Masters, 'Introduction to Environmental Engg. & Science', Pearson Education, **2004.**
3. Erach Bharucha, 'Textbook for Environmental Studies', UGC, New Delhi.

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Moga Road, Ferozepur-152004 (Punjab)
Study Scheme For BCA (Batch 2016 Onwards)

BIG DATA

Subject Code: BCAP1-662	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
	3	**1**	**0**	**4**	

UNIT-I (10 Hrs.)

Introduction to Big Data - Introduction distributed file system Big Data and Its Importance, Four Vs, Drivers for Big Data, Big Data Applications, Algorithms using Map Reduce, Clustering

UNIT-II (10 Hrs.)

Big Data Technology Landscape - Fundamentals of Big Data Types, Big data Technology Components, Big Data Architecture, Big Data Warehouses.

UNIT-III (10 Hrs.)

Big Data Analytics - Approaches for Analysis of Big Data, ETL in Big Data, Introduction to Hadoop Ecosystem, HDFS, Understanding Text Analytics and Big Data, Predictive analysis on Big Data.

UNIT-IV (15 Hrs.)

Big Data Implementation - Big Data Workflow, Operational Databases, Graph Databases in a Big Data Environment, Real-Time Data Streams and Complex Event Processing, Applying Big Data in a Business Scenario, Security and Governance for Big Data.

Recommended Books

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, 'Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses', 1stEdn., Wiley, **2013**.
2. T. White, Hadoop: The Definitive Guide', 3Rd Edn., O' Reilly Media, **2012**.

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Study Scheme For BCA (Batch 2016 Onwards)

CLOUD COMPUTING

Subject Code: BCAP1-663

L	T	P	C	Duration: 45 Hrs.
3	1	0	4	

Course Outcomes

1. To understand the basic concepts cloud computing.
2. To understand the taxonomy and types of Cloud Computing.
3. To understand different hypervisors of clouds for the virtualization.
4. To understand the basics of advancement in cloud computing.

Cloud Computing - Vision of Cloud Computing, Definition, Deployment models, Reference models, Benefits and challenges to cloud computing, Characteristics of Clouds, Historical developments; Distributed Systems, Virtualization, Web 2.0, Service Oriented Computing, Utility oriented Computing, Building Cloud Computing Environments; Application development, Infrastructure and System development.

Virtualization - Introduction, Characteristics of Virtualized Environment; Increased Security, Managed Execution, Portability, Taxonomy of Virtualization techniques; Execution of Virtualization, Other types of Virtualization. Pros and Cons of Virtualization, Taxonomy of virtualization, XEN, QEMU, VMware, Hyper-V etc., Server Consolidation.

Data Center - Classic Data Center, Virtulaized Data Center (Compute, Storage, Networking and Application), Business Continuity in VDC.

Cloud Monitoring - Architecture for Federated Cloud Computing, Service Oriented Architecture, Foundation for SLA, Components of the SLA, Selected Business Use Cases.

Advanced Topics in Cloud Computing - Energy efficiency in Clouds, Market-based Management of Clouds, Federated Clouds/InterCloud, Third-Party Cloud Services.

1. Rajkumar Buyaa, James Broberg, Andrzej Goscinski, 'Cloud Computing Principles and Paradigms', 1stEdn., Wiley, **2011.**
2. David E.Y. Sarna, 'Implementing and Developing Cloud Computing Applications', 1stEdn.,CRC, **2011**.
3. Chris Wolf, Erick M. Halter, 'Virtualization: From the Desktop to the Enterprise', 1st Edn., A Press, **2005**.
4. George Reese, 'Cloud Application Architectures: Building Applications and Infrastructurein the Cloud', 1stEdn., O'Reilly Publishers, **2009**.