Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara (Autonomous)

Undergraduate Programme

B. Sc. II Computer Science (Entire)

Syllabi of the course

Choice based credit system syllabus

(To be implemented w.e.f. from June 2022S)

Department of Computer Science (Entire)

Index

Preamble:

There are bright career prospects for computer science professionals or software professionals in recent scenario. With the opening of huge software and IT companies in India, the job opportunities for trained professionals have increased considerably. India is known to be a leader in software and IT sector.

Computer science graduates pass outs find job opportunities in a variety of environments in academia, research, industry, government, private, business organizations and so on. They are involved in analyzing problems for solutions, formulating and testing, using advanced communications or multi-media equipment, or working in teams for product development.

The software and IT companies are the major employers of computer science graduates. They offer the best packages to the young graduates which are unmatched with other branches of science.

General Objectives of the Programme:

1. To nurture academicians with focus and commitment to their subject.
2. To shape good and informed citizens from the students entering into the Programme.
3. To create a skilled workforce to match the requirements of the society.
4. To impart knowledge of Science is the basic objective of this Programme.
5. To develop scientific attitude is the major objective so as to make the students open minded, critical and curious.
6. To develop skill in practical work, experiments and laboratory materials and equipments along with the collection and interpretation of scientific data to contribute to science.

Programme Outcomes:

1. The students will graduate with proficiency in the subject of their choice.
2. The students will be eligible to continue higher studies in their subject.
3. The students will be eligible to pursue higher studies abroad.
4. The students will be eligible to appear for the examinations for jobs in government organizations.
5. The students will be eligible to apply for jobs with a minimum requirement of B.Sc. Programme.

Program Specific Objectives of the Course:

1. The content of the syllabus have been framed as per UGC norms of CBCS Pattern.
2. The students are expected to understand the fundamentals, principles, mathematical, recent IT concepts and recent developments in the subject area.

3. The practical course is in relevance to the theory courses to improve the understanding of the concepts.

4. It is expected to inspire and boost interest of the students towards Computer Science as the main subject.

5. To develop the power of appreciations, the achievements in Computer and role in nature and society.

6. To enhance student sense of enthusiasm towards IT and to involve them in an   intellectually stimulating experience of learning in a supportive environment.

Program Specific Outcomes:

After successful completion of B.Sc. Computer Science (Entire) Course student will be ableto:

1. Understand the basics of Computer Science.

2. Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learned in the classrooms.

3. Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Computer Science.

4. Identify their area of interest in academic, research and development.

5. Perform job in various fields' like IT, science, engineering, education, banking, business and public service, etc. or be an entrepreneur with precision, analytical mind, innovative thinking, clarity of thought, expression, and systematic approach.

B. Sc. Part II

Title: Computer Science (Entire)

1. **Year of Implementation:** The syllabus will be implemented from June, 2021onwards.

2. **Duration:** The course shall be a fulltime.

3. **Pattern: S**emester examination.

4. **Medium of Instruction:** English.

5. Structure of Course:
- **STRUCTUTRE OF COURSE** :

  - THIRD SEMESTER ----------- (NO OF THEORY & PRACTICAL COURSES)

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<tr><th>No. of lectures</th><th>Hours</th><th>Credits</th><th>Subject</th><th>No. of lectures</th><th>Hours</th><th>Credits</th></tr>
<tr><td>1</td><td>BCSET-301</td><td>Object Oriented Programming using C++</td><td>4</td><td>2.4</td><td>2</td><td>BCSEP-310: LAB IX- C ++</td><td>8</td><td>6.4</td><td>4</td></tr>
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<tr><td>4</td><td>BCSET-303</td><td>Cloud Computing-I (AI)</td><td>4</td><td>2.4</td><td>2</td></tr>
<tr><td>3</td><td>BCSET-304</td><td>Software Engineering</td><td>4</td><td>2.4</td><td>2</td><td rowspan="2">BCSEP-312: LAB XI- SE, Ele</td><td rowspan="2">4</td><td rowspan="2">3.2</td><td rowspan="2">2</td></tr>
<tr><td>5</td><td>BCSET-305</td><td>OP-AMP and Computer Peripherals</td><td>2</td><td>2.4</td><td>2</td></tr>
<tr><td>6</td><td>BCSET-306</td><td>Computational Algebra</td><td>2</td><td>2.4</td><td>2</td><td rowspan="2">BCSEP-313: LAB XII- Maths, Stat</td><td rowspan="2">4</td><td rowspan="2">3.2</td><td rowspan="2">2</td></tr>
<tr><td>7</td><td>BCSET-307</td><td>Computational Statistics II</td><td>2</td><td>2.4</td><td>2</td></tr>
<tr><td>8</td><td>AECC1</td><td>Environment Science</td><td>2</td><td>2.4</td><td>2</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="3">**Total of SEM III**</td><td>**24**</td><td>**19.2**</td><td>**16**</td><td></td><td>**24**</td><td>**19.2**</td><td>**12**</td></tr>
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Subject	Paper	ESE	Internal Exam			Subject	Practical-I		Submission	
			CCE-I	CCE-II (Online Test)	Activity (Seminar)		Exam	Journal	Case study/ Educational Tour/ Seminar/ Project	Day to day Performance
BCSET-301	Object Oriented Programming using C++	25	5	5	5	BCSEP-310: LabIX–C++	50	10	10	5
BCSET-302	Web Technology I (HTML)	25	5	5	5	BCSEP-311: LabX – WT, CC				
BCSET-303	Cloud Computing, I (AI)	25	5	5	5		50	10	10	5
BCSET-304	Software Engineering	25	5	5	5	BCSEP-312: LAB XI-CC, MP	25	5	5	5
BCSET-305	OP-AMP and Computer Peripherals	25	5	5	5					
BCSET-306	Computational Algebra	25	5	5	5	BCSEP-313: LAB XII-S,M	25	5	5	-
BCSET-307	Computational Statistics II	25	5	5	5					
AECC 1	Environment Science	30	5	5	5	-	-	-	-	-
Total of	TOTAL	205	40	40	40	-	150	30	30	15

SEM III	GRAND TOTAL	550							

B. Sc. II SEMESTER– IV (Duration – 6 Months)									
Sr. No.	SUBJT TITLE	PAPER NO AND TITEL	TEACHING SCHEME						
			Theory			Practical			
			No. of lectures	Hours	Credits	Subject	No. of lectures	Hours	Credits
1	BCSET -401	Data Structures using C++	4	2.4	2	BCSEP-410: LAB XII-DS	8	6.4	4
2	BCSET -402	Web Technology II CSS	4	2.4	2	BCSEP-411: LAB XIII-DS	8	6.4	4
	BCSET -403	Operating System Concepts	4	2.4	2				
4	BCSET -404	Cyber Security	4	2.4	2	BCSEP-412: LAB XIV – CC II,Ele	4	3.2	2
5	BCSET -405	Microprocessor and Microcontroller Interfacing	2	2.4	2				
6	BCSET - 406	Computational Mathematics	2	2.4	2	BCSEP-413: LAB XV – Maths ,Stat	4	3.2	2
7	BCSET - 407	Statistical Methods II	2	2.4	2				
8	AECC1	Environment Science	2	2.4	2	-	-	-	-
	Total of SEM IV		24	19.2	16		24	19.2	12

Subject	Paper	ESE	Internal Exam			Subject	Practical-I		Submission	
			CCE-I	CCE-II (Online Test)	Activity (Seminar)		Exam	Journal	Case study/ Educational Tour/ Seminar/Project	Day to day Performance
BCSET-401	Data Structures	25	5	5	5	BCSEP-410: LabXII–DS	50	10	10	5
BCSET-402	Web Technology II CSS	25	5	5	5	BCSEP-411: LabXIII–DS				
BCSET-403	Operating System Concepts	25	5	5	5		50	10	10	5
BCSET-404	Cyber Security	25	5	5	5	BCSEP-412: LAB XIV-CC, MP	25	5	5	5
BCSET-404	Microprocessor and Microcontroller Interfacing	25	5	5	5					
BCSET-405	Computational Mathematics	25	5	5	5	BCSEP-413: LAB XV-Stat, Maths	25	5	5	-
BCSET-406	Statistical Methods II	25	5	5	5					
AECC1	Env. Sci.	30	5	5	5	-	-	-	-	-
Total	TOTAL	205	40	40	40	-	150	30	30	15

of SEM IV	GRAND TOTAL		550

Structure and Titles of Courses of B.Sc. Course:

B.Sc. II Semester III

Sr.No.	Course No.	Course Name
1	BCSET-301	Object Oriented Programming using C++
2	BCSET-302	Web Technology Part -I
3	BCSET-303	Cloud Computing
4	BCSET-304	Software Engineering
5	BCSET-305	OP-AMP and Computer Peripherals
6	BCSET-306	Computational Algebra
7	BCSET-307	Computational Statistics II
8	AECC1	Environment Science

B.Sc. II Semester IV

Sr.No.	Course No.	Course Name
1	BCSET-401	Data Structures using C++
2	BCSET-402	Web Technology Part -II
3	BCSET-403	Operating System Concepts
4	BCSET-404	Cyber Security
5	BCSET-405	Microprocessor and Microcontroller Interfacing
6	BCSET-406	Computational Mathematics
7	BCSET-407	Statistical Methods II
8	AECC1	Environment Science

3) **OTHER FEATURES**:
 SPECIFIC EQUIPMENTS :

1. Computers
2. Printer, Scanners
3. LCD Projector
4. LCD Projector Screen
5. Smart Board
6. Visualizer
7. CRO's
8. Regulated Power Supplies
9. Function Generators
10. Multimeter, Voltmeters, Ammeters
11. Resistance Boxes/Rheostats

Head
Dept. of Comp.Sci.(Entire)

BCSET-301: Object Oriented Programming Using C++

Course Objectives: Student will be able

1. To study the concept Object Oriented Programming
2. To understand the operators and control structure in C++
3. To study the constructors and destructors
4. To understand the concept of Inheritance, Polymorphism and it's types

Credits (Total Credits 2)	SEMESTER-III BCST301 Data Communications and Computer Networks	No. of hours per unit/credits
Unit I:	**Object Oriented Terminology**	**(10)**
	Concepts of OOP- C++: Terminology-Tokens, Keywords, Identifiers, constants, Operators, Basic data types, Structure of C++ program, Input and output streams, Control structures-Branching and looping statements .Classes and objects, Access modifiers, static data members and static member function, Array of objects, passing parameter to function, this pointer.	
Unit II	**Constructors, Destructors and Inheritance**	**(12)**
	Constructors: Definition, types- Default constructor, Copy constructor, Parameterized constructor. Destructors, Inheritance-Defining base and derived class, Types of Inheritance –Single , multiple, multilevel, hierarchical, hybrid. Friend function and friend class	
Unit III	**Polymorphism**	**(12)**
	Polymorphism-Definition, Types of polymorphism- Function Overloading & Operator Overloading-Definition, overloading unary and binary operators, Overloading operators using friend function, Rules for overloading operator, Virtual function, Method overriding	
Unit IV	**File Handling**	**(11)**
	Basics of files, Types of files-Text, Binary, File handling-Header Files, File Modes-Read, Write, ReadWrite, Append, Operations on Files- Open, Create, Edit, Delete, Append, Close.	

Course outcomes:

At the end of this course, the student should be able to:

1. Understand basic concepts of object oriented programming.
2. Use various control structures to improve programming logic.
3. Design classes and objects.
4. Use constructor and destructor.
5. Utilize the OOP techniques like operator overloading, inheritance, and polymorphism

References:
1. Object oriented programming With C++ , E. Balagurusamy, McGraw Hill Publication, 8 th Edition 2018
2. The complete Reference C++ , Herbert Schildt, McGraw Hill Publication 4th edition 2014

BCSET 302: Web Technology Part I

Course Objectives: Student will be
1. Understand basic concept of HTML.
2. Study Various HTML tags.
3. Imbite Link and Form tag.

Credits (Total Credits 2)	SEMESTER-III BCSET 302: Web Technology Part I	No. of hours per unit/credits
Unit I:	**Introduction to HTML**.	**(10)**
	Web site, W3C, HTTP & HTTPS, Five Golden rules of web designing, Web Page Design, Basic structure of HTML ,Fundamental Elements of HTML, Advantages and Disadvantages of HTML.	
Unit II	**Constructors, Destructors and Inheritance**	**(12)**
	Basic HTML Tags, Text Formatting Tags and List Tags HTML Tables:- Table Heading, Cellpadding and Cellspacing Attributes, Colspan and Rowspan Attributes, Tables Backgrounds, Table Height and Width, Table Caption, Table Header, Body, and Footer, Nested Tables, HTML List:- Unordered List, Ordered Lists, type Attribute	
Unit III	**HTML Link Tags**	**(12)**
	HTML Text Link:- Linking Documents, target Attribute, Use of Base Path, Linking to a Page Section, Setting Link Colors, HTML Image Link:- Mouse-Sensitive Images, Server-Side Image Maps, Client-Side Image Maps, HTML Email Link:- HTML Email Tag, HTML Frames:- Creating Frames, Tag Attributes, Disadvantages of Frames, HTML IFrames:- Tag Attributes, HTML Header tag.	
Unit IV	**Background and Form Tag**	**(11)**
	HTML Backgrounds:- Colors, Images, Patterned &Transparent Backgrounds , HTML Layout: Tables, Multiple Columns Layout - Using Tables, HTML Layouts - DIV, SPAN, HTML Forms:- Form Attributes, Form Controls, Text Input Controls, Single-line and Multiple-Line text input controls, Password Input controls, Checkbox Control, Radio Button Control, Select Box Control, File Upload Box, File Download, Button Controls, Scrollbar, Hidden Form Controls	

Course Outcomes: Students who complete this course should be able to:
1. Analyze a web page
2. Identify its elements and attributes.
3. Create web pages using HTML and its various Tags.

References:
1. Ivan Bayross ,"Teach Yourself Web Technologies" (BPB)
2. Ramesh Bangia ,"Web Technology Reprint 2008"(Laxmi Publications)
3. Rick Dranell" HTML4 Unleashed"(Techmedia)
4. Kris Jama and Konrad King "HTML and Web Designing" (McGraw-Hill)

BCSET 303: Cloud Computing - I

Course Objectives: Student will be able
1. To understand the concepts of Cloud Computing.
2. To study Taxonomy of Virtualization Techniques.
3. To imbibe Cloud Computing Architecture.
4. To acquire knowledge on Aneka Cloud Application Platform.
5. To learn Industry Cloud Platforms.

Credits (Total Credits 2)	SEMESTER-III BCSET 303: Cloud Computing - I	No. of hours per unit/credits
Unit I:	**Introduction to Cloud**	**(10)**
	Cloud Computing at a Glance, Vision of Cloud Computing, Defining a Cloud, Closer Look, Cloud Computing Reference Model. Characteristics and Benefits, Challenges Ahead	
Unit II	**Virtualization**	**(12)**
	Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples- VMware, Microsoft Hyper-V, AWT.	
Unit III	**Cloud Computing Architecture**	**(12)**
	Introduction, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Interoperability and Standards, Scalability and Fault Tolerance.	
Unit IV	**Cloud Applications and Its Recovery**	**(11)**
	Cloud Applications: Health care, Agriculture, Geoscience and Biology. CRM and ERP, Social Networking, Media Applications and Multiplayer Online Gaming. Cloud Disaster Recovery: Disaster Recovery Planning, Disasters in the Cloud, Disaster Management.	

Course Outcomes:
After completion of this course student will be able to:
1) Implement the concept of virtualization and how this has enabled the development of Cloud Computing
2) Know the fundamentals of cloud, cloud Architectures and types of services in cloud
3) Use cloud security and disaster management
4) Design different Applications in cloud
5) Explore some important cloud computing driven commercial systems

References:
1. "Cloud Computing: From Beginning to End", Ray Rafaels, Createspace Independent Publishing Platform, 2015.
2. "Cloud Computing for Programmers", D. Casal, Daniele Casal, 2014.
3. "Cloud Computing: Concepts, Technology & Architecture",Ricardo Puttini, Zaigham Mahmood, Thomas Erl, Prentice Hall, 2013.
4. "Cloud Computing", Dr. Kumar Saurabh, 2nd Edition, Wiley India 2012.

BCSET 304: Software Engineering

Course objectives: Student should be able to
1. To study basic concepts of Software Engineering.
2. To imbibe the Software Project Planning.
3. To acquire the Software Testing.
4. To understand UML.

Credits (Total Credits 2)	SEMESTER-III BCSET 304: Software Engineering	No. of hours per unit/credits
Unit I:	**Unit-I: Software Engineering Fundamentals:**	**(10)**
	Introduction of software , Characteristics of Good Quality software, Software Process Models: Waterfall Model, Prototyping Model, RAD Model, Evolutionary Software Process Models: Incremental Model, Spiral Model	
Unit II	**Software Project Planning**	**(12)**
	Software Project Planning, Size Estimation, Cost Estimation, Models - COCOMO, The Putnam Resource Allocation Model, Risk Identification and Projection: RMMM, Project scheduling and Tracking, Software Design Process, Design Principles, Design Documentation(SRS), Design Methods: Data Design, Architectural Design, Interface Design, Procedural Design.	

Unit III	Software Testing:	(11)
	Software Testing Fundamentals, White Box Testing, Black Box Testing, Software testing strategies, verification and Validation, System Testing, Unit testing, Integration testing and Debugging, Implementation types, Software Maintenance, Maintenance Tasks, Regression Testing.	
Unit IV	Unified Modeling Language (UML)	(12)
	Object- oriented concepts and principles, Unified Modeling Language, UML views, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, Advanced structured modeling, advanced classes and relationships, Interfaces, types and roles, Static diagrams-class diagram, object diagram, Component diagrams, Dynamic diagrams- Use case diagrams ,State diagrams, Interaction diagrams, Sequence diagrams.	

Course Outcome: After completion of this course student will be able to

1. Implement the problem domain to choose process models correctly.

2. Choose software projects using appropriate design notations.

3. Measure the product and process performance using various metrics.

4. Evaluate the system with various testing techniques and strategies

References:

1. Roger S Pressman, Bruce R Maxim, "Software Engineering: A Practitioner's Approach", KindleEdition,2014.
2. Ian Sommerville," Software engineering", Addison WesleyLongman,2014.
3. James Rumbaugh. Micheal Blaha "Object oriented Modeling and Design with UML",2004.

BCSET-305: OP-AMP and Computer Peripherals

Course objectives: Student should be able to

1. To learn the Operational Amplifier and its Applications

2. To learn the Filters and Data convertors

3. To understand concept of transducers and sensors

4. To understand Input and output devices

Credits (Total Credits 2)	SEMESTER-III BCSET-305: OP-AMP and Computer Peripherals	No. of hours per unit/credits
Unit I:	**OP-AMP as Analog System Block**	**(14)**
	Ideal OP-AMP, OP-AMP as an amplifier, OP-AMP as Instrumentation Amplifier, OP-AMP as Comparator, Virtual ground concept, OP-AMP Applications- Inverting amplifier, Unity gain Inverting amplifier, Non-inverting amplifier, Buffer, Adder, Subtractor, Integrator, Differentiator. Introduction to signal conditioning; Signal conditioning of passive sensors using bridge circuit: Wheatstone's bridge, Three OP-amp instrumentation amplifiers.	
Unit II	**Filters and Data Convertors**	**(11)**
	Active filters: Working principle of Single order Op-Amp Based Low Pass Filter, High Pass Filter, Band Pass Filter, Notch Filter, Band reject filter. Data Convertors: DAC- R-2R ladder, ADC- Dual Slope, Successive Approximation, Flash, ADC Characteristics- Linearity, Accuracy, Resolution, Monotoxity.	
Unit III	**Transducers and Sensors**	**(10)**
	Transducers, Sensors, Classification of transducers, Characteristics of Transducers, Temperature Transducers, Pressure Transducers, Force Transducers, Optical Transducers, Selection criterion for Transducers.	
Unit IV	**Peripheral Devices**	**(10)**
	Input Devices: Keyboard, Mouse, Joystick, Light pen, Scanner, Output Devices: Monitor, Printer, Plotter, Projector, CCTV, Wireless technology for Peripherals.	

Course Outcome: After completion of this course student will be able to

1. Design and analyze Operational amplifiers.

2. Make ADC and DAC circuits.

3. Build the applications of transducers.

4. Troubleshoot the input and output devices.

References:
1. Electronic Instrumentation, H.C. Kalsi, McGraw Hill (India) Pvt. Ltd. New Delhi, Twelfth Edition,2014
2. OP-AMP and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning Pvt. Ltd. Delhi, Fourth Edition, 2014
3. Instrumentation Devices and Systems, C. S. Rangan, G.R. Sarma, McGraw Hill Eduction (India) Pvt. Ltd. New Delhi, Second Edition, 2014
4. Transducer and Instrumentation, D. V. S. Murthy, Prentice Hall of India Pvt. Ltd. New Delhi, Twelfth Edition, 2005
5. Computer Fundamentals, Pradeep K. Sinha, Priti Sinha, BPB Publications India, Sixth Edition, 2011

BCSET 306: Computational Algebra

Course objectives: Student should be able to

1. To study the concept of Linear equations and Matrices

2. To understand the concept of Eigen values of Matrix

3. To learn the basic concept of number theory

4. To study real vector spaces and linear transformation

Credits (Total Credits 2)	SEMESTER-III BCSET 306: Computational Algebra	No. of hours per unit/credits
Unit I:	**Linear Equations and Matrices**	**(12)**
	Matrices, Types of Matrix- Row Matrix, Column Matrix, Rectangular Matrix, Square Matrix, Diagonal Matrix, Symmetric and Skew-Symmetric Matrix, Matrix Operations, Elementary row and Column transformations, Row-echelon form of matrix, Rank of a Matrix, System of linear equations- Homogeneous and Non-Homogeneous systems, Solutions of Systems of Linear Equations, Gaussian Elimination method, Gauss-Jordan method, LU- Factorization method	
Unit II	**Eigen values, Eigen vectors and diagonalization**	**(10)**
	Eigen values and Eigen vectors of a matrix: Definitions and Examples, Properties of Eigen values, Eigen Space, Diagonalization of Matrices, Cayley Hamilton theorem (Statement only) and examples.	

Unit III	Divisibility of integers &Groups	(10)
	Divisibility: Definition and properties, Division algorithm (with proof), Greatest Common Divisor (g.c.d.), Least Common Multiple (L.C.M), Euclidean algorithm(Statement only & examples), Binary operation Group : Definition and examples.:-Simple properties of groups, Sub – Group, Semi group and Monoids : Definition and examples	
Unit IV	Real Vector spaces and Linear Transformations	(13)
	Vector Spaces, Subspaces, Linear Independence, Basis and Dimension, Coordinates: Definitions and Examples, The Kernel and Range of a Linear transformation, The Matrix of a Linear Transformation.	

Course Outcome: After completion of this course student will be able to

1. Evaluate the system of linear system by using matrix operations

2. Evaluate Eigen values and Eigen vectors of the matrix

3. Analyze and demonstrate properties of divisibility of positive integers

4. Construct basis of vector space and matrix of linear transformation

References:
1. Seymour Lipschutz, SCHAMU'S Outline Linear Algebra (USA: McGraw-Hill,2009)
2. Kunze R. and Hoffman K., Linear Algebra (India: Pearson India Education Services Pvt. Ltd, 2018)
3. Song Y Yang, Number Theory for Computing (New York: Springer, 2002)
4. Gilberte Strange, Linear Algebra And Its Applications (USA: Thomson Learning, Inc, 2005)

BCSET 307: Computational Statistics II

Course objectives: Student should be able to

1) To study the relation of bivariate data.

2) To estimate the value of unknown variable.

3) To fit simple and multiple regression equations.

4) To find multiple and partial correlation coefficients.

Credits (Total Credits 2)	SEMESTER-III BCSET 307: Computational Statistics II	No. of hours per unit/credits
Unit I:	**Correlation (for ungrouped data)**	**(12)**
	Concept of bivariate data, Concept of correlation, Types of Correlation: Positive correlation, Negative correlation, Zero or No correlation, Cause and effect relation, Methods of Computation of Correlation Coefficient: Scatter diagram, Karl Pearson's coefficient of correlation, Spearman's Rank Correlation coefficient (formula with and without ties), Interpretation of correlation coefficient, Properties of correlation coefficient, Numerical problems.	
Unit II	**Regression (for ungrouped data)**	**(12)**
	Concept of regression, Derivation of lines of regression by method of least squares, Regression Coefficients and their significance, Properties of regression coefficients, Point of intersection and acute angle between regression lines (without proof), Numerical problems.	
Unit III	**Multiple Regression (For Trivariate Data)**	**(11)**
	Concept of multiple regression, Yule's Notations, Fitting of multiple regression planes, Partial regression coefficients, Interpretations, Residual: definition, order, properties, mean and variance of residual, Numerical Problems.	

Unit IV	Multiple and Partial Correlation (For Trivariate Data)	(10)
	Concept of multiple correlation, Definition of multiple correlation coefficients and its formula, Properties of multiple correlation coefficients (Statements only), Interpretation of multiple correlation coefficient when it is equal to zero and one, Concept of partial correlation, Definition of partial correlation coefficients and its formula, Properties of partial correlation coefficients (Statement only), Numerical Problems.	

Course Outcome: After completion of this course student will be able to

1) Compute and understand the relation between bivariate data.
2) Estimate the value of unknown variable.
3) Fitting of simple and multiple regression equations.
4) Compute partial and multiple correlation coefficients.

References:
1.S. C. Gupta.Fundamental of Statistics (7th Edition), Mumbai, Himalaya Publishing House,2018.

2. J.E. Freund, Mathematical Statistics (8th Edition), London, Prentice Hall, Pearson Publication, 1985.

3. B. L. Agarwal Basic Statistics (6th Edition), Delhi, New Age International Private Ltd. 2013.

4. J. N. Kapur, H. C. Saxena,Mathematical Statistics, New Delhi,Sultan Chand and Sons.

5. D. N. Sancheti, V. K. Kapoor, Fundamentals of Mathematical Statistics, London, Prentice Hall, Sultan Chand and Sons, 1979.

BCSEP 310: Object Oriented Programming using C++
Lab: Based on BCSET-301

Course Objectives: Student will be able to

1. To study the concept Object Oriented Programming.
2. To understand the operators and control structure in C++.
3. To study the constructors and destructors, Inheritance, Polymorphism and its types.

Credits (Total Credit 04)	SEMESTER-III BCSEP 310: Object Oriented Programming using C++ Lab : Based on BCSET-301	No. of hours per unit/credits
	Data Communications and Computer Networks	
	List of Practical's: 1. Programs based on branching and looping statements. 2. Programs based on constructor and destructor. 3. Programs based on inheritance concept. 4. Program based on Static data member and static member function. 5. Programs based on function overloading concept. 6. Programs based on operator overloading concept. 7. Programs based on function overriding. 8. Programs based on Friend Class and Friend Function. 9. Programs based on Virtual Function. 10. Programs based on File handling.	****

Course Outcomes:

At the end of this course, the student should be able to:

1. Use various control structures to improve programming logic, Design classes and objects.
2. Use constructor and destructor, operator overloading, inheritance, and polymorphism.

BCSEP 311: (Web Technology Part I and Cloud Computing I)
Lab : Based on BCSET-302 and BCSET 303

Course Objectives: Student will be able

1) To study HTML Tags.
2) To design Web Pages.
3) To imbibe Cloud Services.
4) To use Cloud Applications.

Credits (Total Credit 04)	SEMESTER-III BCSEP 311: (Web Technology Part I and Cloud Computing I) Lab : Based on BCSET-302 and BCSET 303	No. of hours per unit/credits
	Part A: (BCSET-302)	

	Part A: (BCSET-302)
	1. Write code to create a web page using following tags:
	  a) Text b) Marquee c) Character formatting tags such as B , I , U.
	2. Write a code to create a web page using font Color , font face , font size ,background color.
	3.Write a code to create a web page using Paragraph tags such as P tag and BR tag.
	4. Write a code to create a web page using Nesting of lists
	5. Write a code to create a web page using Image tags with height and width and also Used for
	  background image
	6. Write a code to create a web page using Table tags a)Create table of 3 rows
	andColumns b)Having border , border size,border color c)Image in a particular cell.
	7.Write a code to create a web page using Table tags a)Using rowspan and columnspan b)Background Image in a table
	8. Write a code to create a web page using Form tag. Example:-Admission Form
	9. Create a web page using frame tag a)rows And columns b)border and border color.	

	Part B: (BCSET-303) 1. To identify types of clouds. 2. To create a cloud. 3. To identify and use Cloud Service Saas. 4. To identify and use Cloud Service Paas. 5. To identify and use Cloud Service Iaas. 6. To identify and use Cloud Service IDaas. **7.** To manage a Cloud.	

Course Outcomes:

At the end of this course, the student should be able to:

1. Implement various HTML tags.
2. Design the Form tag.
3. Manage a Cloud.
4. Use Cloud Services in application.

BCSEP-312: (Software Engineering and OP-AMP and Computer Peripheral)
Lab : Based on BCSET 304 and BCSET-305

Course Objectives: Student will be able
1. To learn Management Systems.
2. To learn the operation of data convertors.
3. To understand working of LM35 temperature sensor.

Credits (Total Credit 02)	SEMESTER-III BCSEP-312: (Software Engineering and OP-AMP and Computer Peripheral) Lab : Based on BCSET 304 and BCSET-305	No. of hours per unit/credits
	Part A: (BCSET-304)	
	Prt A: (BCSET-304)	
	Part B: (BCSET-305) 1. Study the OP-AMP Parameters. 2. Study of OP-AMPas Adder. 3. Study of OP-AMPas Subtractor. 4. Study of OP-AMP as Integrator. 5. Study of Instrumentation amplifier using OPAMP 6. Study the R-2Rladder D/A Convertor. 7. Study the 3-bit Flash A/D Convertor. 8. Study of Temperature Sensor using LM35. 9. Demonstration of input devices. **10.** Demonstration of output devices.	

Course Outcomes: At the end of this course, the student should be able to:

1. Implement Management systems.

2. Build the application of temperature sensor.

3. Make and Analyze ADC and DAC circuits.

Course Objectives: Student will be able

1) To study the methods of solving system of linear equations

2) To study the applications of properties of Groups and vector spaces

3) To draw Scatter diagram and compute Correlation coefficients for bivariate data.

4) To obtain regression equations and regression planes. Also, compute partial

and multiple correlation coefficients.

Credits (Total Credit 02)	SEMESTER-III BCSEP-313:(Computational Algebra and Computational Statistics II) Lab : Based on BCSET 306 and BCSET-307	No. of hours per unit/credits
	Part A: (BCSET-306) 1. Gaussian Elimination method 2. Gauss-Jordan method 3. Eigen values and Eigen vectors of a matrix 4. Cayley's Hamilton theorem 5. Euclidean algorithm 6. Examples of Group 7. Examples on Vector Space and Subspaces 8. Matrix of a Linear Transformation	
	Part B: (BCSET-307) 1. Scatter diagram. 2. Computation of correlation coefficient. 3. Fitting of lines of regression and estimation.(Ungrouped data). 4. Fitting of regression planes and estimation (For Trivariate data). 5. Computation of partial correlation coefficients. 6. Computation of multiple correlation coefficients.	

Course Outcomes: At the end of this course, the student should be able to:
1) Evaluate solution of system of linear equations

2) Apply properties of Groups and Vector spaces on given set together with defined binary

operations.

3) Compute the correlation coefficients and identify the relation between bivariate data.

4) Estimate unknown values by regression equations and regression planes. Also, compute

partial and multiple correlation coefficients.

SEM IV
BCSET-401: Data structure

Course objectives: Student should be able :

 1. To study the concept of Data Structure

2. To understand the Searching and Sorting Methods

3. To study the Concept of Stack and Queue.

4. To study Linked list and trees

Credits (Total Credits 2)	SEMESTER-IV BCSET-401: Data structure	No. of hours per unit/credits
Unit I:	**Concepts of Data structure**	**(09)**
	Concept of Data Structure, Basic operations of Data structure, Abstract data type (ADT), Array Definition, Searching algorithms- Linear search, binary search, Sorting algorithm-Bubble Sort, insertion sort, selection sort, quick sort , Space complexity, time complexity	
Unit II	**Stack and Queue**	**(12)**
	Concept of Stack, Operations on Stack-push(),pop(),peek(),isfull(),isempty(), Applications of Stack-Recursion, Infix, Prefix, Postfix, conversion from Infix to Prefix and Infix to Postfix., Concepts of queue, Operations on Queue- Insert, Delete, peek, Types of Queue-Linear, Circular and Priority, Applications of Queue.	
Unit III	**Linked List**	**(12)**
	Concept of LinkedList, Memory representation of LinkedList, Operations on LinkedList (Insertion, Deletion, Display and Search), Types of LinkedList: Singly, Doubly LinkedList& Circular LinkedList, Applications.	
Unit IV	**Tree**	**(12)**
	Concept of Tree, Tree terminology (root, child, parent, sibling, descendent, ancestor, leaf/external node, branch node/internal node, degree, edge, path, level, depth, height of node, height of tree, forest), Binary Tree- definition and types, Binary search tree, Representation, Operations on BST – Create, Insert, Search, Delete, traversals(Preorder, Inorder, Postorder)	

 Course Outcome: After completion of this course student will be able to

1. Basic aspects of data structures including Stacks, Queue, Linked list and Tree.

2. Different sorting and searching algorithms.

3. Implementations of linked list.

4. Implementations of stack and queue

References:

1. Data structure using C++ ,D.S. Malik , Course Technology ,Second Edition2010
2. Data Structure Through C++, Yashwant Kanitkat,BPB Publication, Second Edition 2003

BCSET 402: Web Technology-II

Course objectives: Student should be able to

1. Understand basic concept of CSS.
2. Learn concept of Box Model.
3. Understand Client Side Scripting.
4. Understand concept of Web Hosting.

Credits (Total Credits 2)	SEMESTER-IV BCSET 402: Web Technology-II	No. of hours per unit/credits
Unit I:	**Introduction to Cascading Style Sheets**	**(11)**
	Concept of CSS ,Working with block elements and objects ,Working with Lists and Tables ,CSS Id and Class ,Creating Style Sheet, CSS Properties ,CSS Styling (Background, Text Format, Controlling Fonts)	
Unit II	**Box Model**	**(12)**
	Box Model (Introduction, Border properties, Padding Properties, Margin properties) ,CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) CSS Color, Creating page Layout and Site Designs.	
Unit III	**Client Side Scripting with JavaScript**	**(12)**
	Structure of JavaScript Program; Variables and Data Types; Statements, Expression, Keyword, Operators, Looping, Functions, built in function ,Event Handling and Form Validation,Error Handling, Handling Cookies, jQuery Syntax; jQuery Selectors, Events and Effects	
Unit IV	**Web Hosting**	**(10)**
	Web Browser, DNS, Web Hosting, Web Services, Local Server.	

Course Outcome: After completion of this course student will be able to

1. Understand basic concept of HTML.
2. Learn how to use HTML tags.
3. Understand relationship of HTML and CSS.
4.Make web hosting.

References:
1. Ivan Bayross ,"Teach Yourself Web Technologies" (BPB)
2. Ramesh Bangia ,"Web Technology Reprint 2008"(Laxmi Publications)
3. Rick Dranell" HTML4 Unleashed"(Techmedia)
4. Kris Jama and Konrad King "HTML and Web Designing" (McGraw-Hill)

BCSET 403: Operating System

Course objectives: Student should be able to
1. To make aware of different types of Operating System and their services.
2. To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
3. To understand Memory management Concepts
4. To learn Deadlock and Concurrency concepts.

Credits (Total Credits 2)	SEMESTER-IV BCSET 403: Operating System	No. of hours per unit/credits
Unit I:	**Introduction**	**(12)**
	Introduction and Definition of operating system, Operating system Services, Simple monitor, buffering, spooling, Protection: I/O, Memory, CPU protection, System calls: types of system call, system call implementation, System programs, Interrupts in operating system	
Unit II	**Scheduling concept**	**(11)**
	Process Concept – The process, Process states, Scheduling concept-- Scheduling queues, CPU scheduler, Scheduling criteria (Terminologies used in scheduling),Scheduling algorithms (FCFS, SJF, Priority, Round Robin, Multiple queue, multilevel feedback queue) Disk scheduling: FCFS, Shortest seek time first, Scan, C-Scan, Look, C Look	
Unit III	**Memory Management & File System**	**(12)**
	Memory Management: Relocation, Swapping, Overlapping, Partitioning and Segmentation Paging: Page overlaps, demand paging, Page replacement algorithm (FIFO, Optimal, and LRU), virtual memory, File concept, directory structure (Single level, two level, Tree structure, acyclic graph, General graph directory) Access Methods--Sequential, Direct Allocation Methods – Contiguous allocation, Linked allocation, Indexed allocation	

Unit IV	Deadlocks & Concurrent processing	(10)
	Deadlock Characterization – Necessary conditions, Resource allocation graph ,Deadlock Prevention, Deadlock Avoidance - Safe state, Banker's Algorithm , Deadlock Detection, Recovery from Deadlock – Process termination, Resource pre-emption ,Concurrent processing: Precedence Graph, fork and join, Semaphore	

Course Outcome: After completion of this course student will be able to

1. Understands the different services provided by Operating System at different level.
2. They learn real life applications of Operating System in every field.
3. Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
4. They will learn different memory management techniques like paging, segmentation and demand paging etc.

References:
1. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
2. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
3. Tanenbaum, Modern Operating Systems, PHI.
4. Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

BCSET 404: Cyber Security Essentials

Course objectives: Student should be able to
1. To study the concept of cyber Security
2. To understand the Security Management
3. To study the Concept Threats and Access Control.
4. To study of Risk Management

Credits (Total Credits 2)	SEMESTER-IV BCSET 404: Cyber Security Essentials	No. of hours per unit/credits
Unit I:	Introduction to Cyber Security	(11)
	Definition, Importance ,Computer ethics, Cyber Security Policy, Data Security, Mobile Device Security, User Security, File Security, Password Security, Browser Security, Email Security, Phishing Encryption, Decryption, Digital Signature, Firewall, Configuring Windows Firewall.	

Unit II	Types of Security and Security Management	(12)
	Types of Security: Background and Current Scenario, Types of Attacks, DoS attack, Goals for Security, E-commerce Security, dimensions of E-commerce security, Security protocols, Computer Forensics, Steganography, Security Management- Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Ethics and Best Practices.	
Unit III	Security Threats and Access Controls	(11)
	Security Threats: Definition, Types of Threats - Virus, Worms, Trojan horse, Malware, Ransom ware, Identity theft etc, Torrent and infected websites, Antivirus- Definition, Types, features, advantages, limitations. Access Controls: Overview of Authentication and Authorization, Overview of Intrusion Detection Systems, Intrusion Detection Systems and Intrusion Prevention Systems.	
Unit IV	Wireless Network Security	(11)
	Wireless Network Security- Components of wireless networks, Security issues in wireless, Wi-Fi Security, Risk of Using Unsecured Wi-Fi, Bluetooth and its security, Firewall, types of firewall.	

Course Outcome: After completion of this course student will be able to
1. Understand importance of cyber security and security management.
2. Learn different security threats.
3. Understand cyber security laws and importance of security audit.
4. Learn concept of wireless network security.

References:

1. "Cyber Security for Beginners: Everything you need to know about it", Harry Colvin , 1st Edition,2017.
2. "Cyber Security", James Graham, Richard Howard, Ryon Olson, ,1st Edition, Auerbach Publications,2016.
3. "Computer Networks", Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, 6th Edition, Pearson Education, 2013.

BCSET 405: Microprocessor and Microcontroller Interfacing

Course objectives: Student should be able to
1. To learn the instructions of 8085 microprocessor.

2. To understand memory organization.

3. To learn architecture and instruction set of 8051 microcontroller.

4. To understand interfacing of microcontroller.

Credits (Total Credits 2)	SEMESTER-IV BCSET 405: Microprocessor and Microcontroller Interfacing	No. of hours per unit/credits
Unit I:	**Introduction to Microprocessor 8085**	**(12)**
	Introduction and Evolution of Microprocessor, Microprocessor Development w.r.t. CISC/ RISC families, Intel, Power PC, CPU registers- Arithmetic and Logic Unit, GPR's and SPR's, Stack, Addressing Modes, Instruction formats and categories, Instruction Set – Data transfer, Arithmetic, Logical, Branch operations.	
Unit II	**Microprocessor Memory Organization**	**(10)**
	Memory Management, data and Code memory, interfacing memory with microprocessor, Computer Peripherals and Interfacing (Peripheral Control Signals), Peripheral Mapping-Memory Mapped, I/O Mapped. Ports- Parallel and Series.	
Unit III	**Introduction to Microcontroller 8051**	**(11)**
	Introduction and Evolution of Microcontroller, Architecture of 8051: Block Diagram of 8051 and Study of Internal Blocks, Reset and Clock, Registers, Flags and Internal Memory, Special Function Registers, I/O Ports.	
Unit IV	**Interfacing of microcontroller**	**(12)**
	Study of 8051 Instruction Set and Addressing Modes, Timer and Counter, Time delay generation, Serial Ports, Interfacing LED, LCD, 7- Segment display, Stepper Motor.	

Course Outcome: After completion of this course student will be able to

1. Design and develop programs based on 8085 microprocessor.

2. Elaborate microprocessor memory organization.

3. Design and develop programs based on 8051 microcontroller.

4. Interface with LED, LCD and Steeper motor using 8051.

References:
1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar, PenRam International Publishing Pvt. Ltd. (India), Fifth Edition, 2009
2. Microprocessor and Microcontroller, Krishna Kant, PHI Learning Pvt. Ltd. Delhi, Eleventh Edition, 2013
3. Fundamentals of Microprocessor and Microcontroller, B. Ram, Dhanpat Rai Publications Ltd. New Delhi, Eighth Edition, 2016
4. The 8051 Microcontroller and Embedded Systems, Muhammad A. Mazidi, J.G. Mazidi, R.D. Mckinlay, Pearson India Education Services Pvt. Ltd., Seventeenth Edition, 2017
5. The 8051 Microcontroller, Kenneth Ayala, Cengage Learning India Pvt. Ltd., Third Edition, 2014

BCSET 406: Computational Mathematics

Course objectives: Student should be able to
1. To understand propositional logic and basic concept of fuzzy set
2. To learn the concept of rounding off a digit and interpolation
3. To understand the concept of two-dimensional transformation
4. To study the concept of three-dimensional transformation

Credits (Total Credits 2)	SEMESTER-IV BCSET 406: Computational Mathematics	No. of hours per unit/credits
Unit I:	**Logic**	**(10)**
	Introduction to Logic. Propositional Logic, Truth tables, Deduction, Resolution, Predicates and Quantifiers, Argument, Validity of an argument using truth table, Mathematical Proofs-Direct, Indirect, Contrapositive, Implication, Double Implication, Mathematical Induction	
Unit II	**Numerical Methods**	**(12)**
	Rounding off numbers to n significant digits, to n decimal places. Error-Absolute error, Relative error, Percentage error, Operators- Forward, Backward Shift, Interpolation, Newton - Gregory Forward & Backward Interpolation, Newton's divided difference interpolation formula & examples	
Unit III	**Two dimensional transformations**	**(10)**
	Introduction to transformations, Representation of points, Transformation matrices, Transformation of points, Two-Dimensional transformation: rotations, reflections, scaling, shearing, Homogenous Coordinates, Combined transformations, Translation, Rotation about an arbitrary point	

Unit IV	Three dimensional transformations	(13)
	Introduction, Three dimensional – Scaling, shearing, rotation, reflection, translation, Multiple transformations, Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space, Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes	

Course Outcome: After completion of this course student will be able to

1. Apply logic when creating system
2. Analyze various kind of numerical errors such as Rounding error, Truncation error & numerical methods
3. Apply two dimensional transformations in two dimensional space
4. Formulate the matrix representation of three dimensional transformations

References:

1. Numerical Methods in Engineering and Science: Dr. B.S.Grewal,Khanna Publishers, 2002
2. Mathematical Elements for Computer Graphics: David F. andAlan Adams J.,McGraw Hill, 2017
3. Mathematics for Computer Graphics: VinceJohn, Springer-Verlag,5th Edition 2017.
4. Elements of Discrete Mathematics, C. L Liu, McGraw-Hill Inc, 2007

BCSET 407: Statistical Methods II

Course objectives: Student should be able to

1) To compute probabilities by using discrete probability distributions.

2) To fit various continuous probability distributions.

3) To study the small sample and large sample tests in various situations.

4) To study the Simulation techniques for various distributions.

Credits (Total Credits 2)	SEMESTER-IV BCSET 407: Statistical Methods II	No. of hours per unit/credits
Unit I:	Continuous Univariate Distributions	(13)
	Definitions: continuous random variable, probability density function(p.d.f.), cumulative distribution function(c.d.f.),properties of c.d.f., Expectation of random variable, expectation of function of a random variable, variance, m.g.f. and examples, Uniform distribution: p.d.f., c.d.f., mean, variance and examples, Exponential distribution: p.d.f., c.d.f., mean, variance, lack of memory property and	

	examples, Normal distribution: p.d.f., standard normal distribution, properties of normal curve, distribution of aX+bY, where X and Y are independent normal variates, normal distribution as a limiting case of Binomial and Poisson distributions (without proof),examples.	
Unit II	**Exact sampling distributions**	**(11)**
	Chi-square distribution: definition, chi-square variate as the sum of square of i.i.d. S.N.V., statement of p.d.f., mean , variance, additive property, approximation to normal distribution and examples, Student's t distribution: definition, nature of probability curve, statement of mean and variance, approximation to normal, examples, Snedecor's F-distribution: definition, mean and variance, inter-relationships between chi-square, t and F distributions, examples.	
Unit III	**Test of Hypothesis**	**(14)**
	Definitions: random samples, parameter, statistic, standard error of a statistic, Concept of null and alternative hypothesis, types of error, critical region, level of significance, one sided and two sided tests, general procedure of testing of hypothesis, Large sample tests: i) population mean ii) equality of population mean iii) population proportion, Small sample tests: i) test for population variance, Chi-square test for goodness of fit and test for independence of attributes using 2×2 contingency table, ii) t-test for testing population mean, equality of population mean and Paired t-test, iii) F-test for equality of two population variances, Examples.	
Unit IV	**Simulation**	**(7)**
	Introduction to simulation, Definition of Simulation, Merits and demerits, Pseudo-random number generator, Model sampling from uniform and exponential distribution, Model sampling from normal distribution using Box-Muller transformation, Examples.	

Course Outcome: After completion of this course student will be able to

1) Compute probabilities by using continuous probability distributions.

2) Fit and model various continuous probability distributions.

3) Compute small sample and large sample tests in various situations.

4) Use Simulation techniques for various distributions.

References:-

1. S. C. Gupta. Fundamental of Statistics (7th Edition), Mumbai, Himalaya Publishing

House,2018.

2. Edward J. Dudewicz, Satya N. Mishra.Modern Mathematical Statistics New York, Wiley,

1988.

3. J.E. Freund, Mathematical Statistics (8th Edition), London, Prentice Hall, Pearson Publication,

1985.

4. B. L. Agarwal Basic Statistics (6th Edition), Delhi, New Age International Private Ltd. 2013.

5. S.C.Gupta and V.K.Kapoor Fundamental of Mathematical Statistics (12th Edition),

Delhi,Sultan Chand and Sons, 2020.

BCSEP-410: Data Structure through C++
Lab Course Based on BCSET- 401

Course Objectives: Student will be able
1. To study the concept of Data Structure
2. To understand the Searching and Sorting Methods
3. To study the Concept of Stack and Queue.
4. To study Linked list and trees

Credits (Total Credit 04)	SEMESTER-IV BCSEP-410: Data Structure through C++ Lab Course Based on BCSET- 401	No. of hours per unit/credits
	(BCSET-401)	
	(BCSET-401) 1. Write C++ programs to implement Searching Operations. 2. Write C++ programs to implement Sorting Operations. 3. Write a C++ programs to implement Stack using an array. 4.Write a C++ programs to implement Queue using an array 5. Write C++ programs to implement operations on Linked list: a) Insert an element into a list. b) Delete an element from list c) Search for a key element in list d)count number of nodes in list 6. Write a C++ program to perform the following operations on Tree: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree	

Course Outcomes: At the end of this course, the student should be able to:
1. Basic aspects of data structures including Stacks, Queue, Linked list and Tree.
2. Different sorting and searching algorithms.
3. Implementations of linked list.
4. Implementations of stack and queue

BCSEP 411: (Web Technology Part II and Operating System Concepts)
Lab: Based on BCSET-402 and BCSET 403

Course Objectives: Student will be
1) To learn Cascading Style Sheet.
2) To learn JavaScript Concept.
3) To learn Multitasking concept and Distributed OS Concept.
4) To learn Unix Commands and shell script

Credits (Total Credit 04)	SEMESTER-IV BCSEP 411: (Web Technology Part II and Operating System Concepts) Lab: Based on BCSET-402 and BCSET 403	No. of hours per unit/credits
	Part A: (BCSET 402)	
	1. Write an HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size)	
	2. Write a java script program to test the first character of a string is uppercase or not.	
	3. Write a pattern that matches e-mail addresses.	
	4. Write a java script function to print an integer with commas as thousands separators.	
	5. Write a java script program to sort a list of elements using quick sort.	
	6. Write a java script for loop that will iterate from 0 to 15 for each iteration, it will check if the current number is odd or even, and display a message to the screen.	
	7. Write a java script program which compute, the average marks of the following students then this average is used to determine the corresponding grade.	
	8. Write a java script program to sum the multiple s of 3 and 5 under 1000.	
	9. To design the scientific calculator and make event for each button using java script.	
	10. To host college website.	

| | **Part B: (BCSET 403)**
1. Comparative Study of different operating systems
2. Demonstration of multitasking concept
3. Experiments to understand operating system (Ubuntu) installation process, file system
partioning and dual boot setup.
4. Experiment to learn command line interface (shell) and exploring various commands
of UNIX.
5. Writing programs to create and execute shell script.
6. Implementing various process creation algorithms (FCFS,SJF and Round-Robin
Scheduling)
7. Demonstration of working of distributed OS environment | |

Course Outcomes:

At the end of this course, the student should be able to:

1. Making Website by using CSS and Html Tags.

1. Hosting Websites.

2. Experiment with Unix commands and shell programming.

3. Able to build shell program

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BCSEP-412:(Cyber Security Essentials and Microprocessor and Microcontroller Interfacing)
Lab : Based on BCSET-404 and BCSET 405

Course Objectives: Student will be able

1. To implement security techniques.
2. To implement cryptographic techniques.

3. To learn various programs of 8085Microprocessor

4. To learn various programs of 8051 Microcontroller

Credits (Total Credit 02)	SEMESTER-IV BCSEP-412:(Cyber Security Essentials anMicroprocessor and Microcontroller Interfacing) Lab : Based on BCSET-404 and BCSET 405	No. of hours per unit/credits
	Part A: (BCSET 404)	
	Part A: (BCSET 404) 1. Practical on Physical Security. 2. Practical on Web browser Security. 3. Practical on cryptographic techniques. 4. Practical on steganographic techniques. 5. Practical on Email security. 6. Practical on Mobile security. 7. Installation of Firewalls	

	Part B: (BCSET 405)	
	1. Arithmetical operation using8085microprocessor.	
	2. Shifting of data 8 bit numbers using8085microprocessor.	
	3. To find smallest and largest number from the given series in8085microprocessor.	
	4. Write assembly language code in 8085 microprocessor to find factorial of a given number.	
	5. Write assembly language code in 8085 microprocessor to implement stack instruction.	
	6. Arithmetical operation using 8051	
	7. Logical operation using 8051	
	8. Time Delay generation using timers 8051.	
	9. Stack operation in 8051 microcontroller.	
	10. Interfacing of LED using 8051 microcontroller.	
	11. Interfacing of LCD with 8051microcontroller.	
	12. Interfacing of 7-Segment display with 8051 microcontroller.	

Course Outcomes:

At the end of this course, the student should be able to:

1. Implement security techniques.
2. Implement cryptographic techniques.
3. Design and develop programs based on 8085 microprocessor.
4. Design and develop programs based on 8051 microcontroller.

BCSEP-413:(Computational Mathematics and Statistical Methods II)
Lab: Based on BCSET-406 and BCSET 407

Course Objectives: Student will be able

1) To study how to check validity of an argument

2) To study the application of two dimensional and three-dimensional transformations on given points.

3) To fit and model various continuous probability distributions.

4) To compute large and small sample test and study association between two variables.

Credits (Total Credit 02)	SEMESTER-IV BCSEP-413:(Computational Mathematics and Statistical Methods II) Lab: Based on BCSET-406 and BCSET 407	No. of hours per unit/credits

	Part A: (BCSET 406)	
	Part A: (BCSET 406) 1. Validity of an argument 2. Newton - Gregory Forward and Backward Interpolation 3. Newton's divided difference interpolation 4. Plane linear transformation: Scaling, shearing, rotation about origin, Reflection 5. Plane linear transformation: Rotation about an arbitrary point 6. Space linear transformation- Scaling, Shearing, Rotation About co-ordinate axes, Reflection through co-ordinate planes	
	Part B: (BCSET 407) 1) Fitting of Uniform distribution. 2) Fitting of Exponential distribution. 3) Fitting of Normal distribution. 4) Model sampling from Normal distribution using: i) Normal table and ii) Box- Muller transformation. 5) Model sampling from Uniform distribution. 6) Model sampling from Exponential distribution. 7) Computation on Large sample test. 8) Computation on Chi-square test. 9) Computation of t-test. 10) Computation of F-test.	

Course Outcomes:

At the end of this course, the student should be able to:

1) Evaluate interpolation and numerical differentiation and integration

2) Apply two dimensional and three dimensional transformations on given points.

3) Fitting and model sampling of various continuous probability distributions.

4) Compute large and small sample test and understand the association between two variables.