



*Rayat Shikshan Sanstha's*

**Yashwantrao Chavan Institute of Science, Satara (Autonomous)  
(Lead College of Karmaveer Bhaurao Patil  
University, Satara)**

**Undergraduate Program**

**Department of Computer Application**

**B. Sc. Computer Application - II**

**Syllabi**

**(To be implemented from academic year 2024-25)**

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## **Preamble:**

There are bright career prospects for computer application 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 application graduates pass out 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 Program:**

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 Application Course student will be able to:

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 Application

1. **Year of Implementation:** The syllabus will be implemented from June, 2024 onwards.
2. **Duration:** The course shall be a fulltime.
3. **Pattern:** Semester examination.
4. **Medium of Instruction:** English.
5. **Structure of Course:**

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

Level	Sem	Major				Minor				GE/OE		VSEC			AES,VEC,IKS			OJT,FP,CEP,CC,RP,RM					Total
		DSC		DSE		T	P	T	P	T	P	VSE	SEC	AES	IKS	VEC	CC	FP	CEP	OJ T	RM		
		T	P	T	P	T	P	T	P	...	...	...	...	...	...	...	...	...	...	...	...		
4.5	I	4	2			4	2	4	2	...	...	...	2	...	2	...	...	...	...	...	22		
	II	4	2			4	2	4	2	....	2	...	...	2	...	...	...	...	...	...	22		
5	III	4	4			2	2	...	...	2	2	4	...	2	...	...	...	...	...	...	22		
	IV	4	4			2	2	...	...	2	2	4	...	...	...	...	...	...	...	...	22		

### B.Sc. II SEM - III Computer Application

Sr.no	Course Category	Paper Code	Name of Course
1	Major -I	BCAT 231	Computer Programming - II
2	Major-II	BCAT 232	Web Designing
3	Major Practical III	BCAP 233	Based on BCAT 231
4	Major Practical IV	BCAP 234	Based on BCAT 232
5	Minor-I	BCAT 235	Electronic Programming Device
6	Minor Practical III	BCAP 236	Based on BCAT 235
7	VSC	BCATVSC 1	Vocational Skill Course: WordPress Framework
8	SEC	BCATSEC 2	Skill Enhancement Course – Ethical Hacking
9	AEC	BCATAEC 1	English I
10		BCATAEC 2	English II
11	VEC	BCATVEC 2	Value Education Course – Computer Application for Environmental Awareness

### B.Sc. II SEM - IV Computer Application

Sr.no	Course Category	Paper Code	Name of Course
1	Major -I	BCAT 241	RDBMS
2	Major-II	BCAT 242	Web Development
3	Major Practical V	BCAP 243	Based on BCAT 241
4	Major Practical V	BCAT 244	Based on BCAT 242
4	Minor-I	BCAT 245	Embedded System Design
5	Minor Practical IV	BCAP 246	Based on BCAT 245
6	VSC	BCATVSC 2	Vocational Skill Courses: Laravel Framework
7	SEC	BCATSEC 3	Skill Enhancement Course – Information Security
8	AEC	BCATAEC 3	English 3
9		BCATAEC 4	English 4
10	CC	BCAT CC 2	Sports and Exercise

# Semester III

## BCAT-231: Computer Programming - II

**Course objectives:** Student should be able...

1. Learn the Object-Oriented Programming
2. Understand operators and control structure in C++
3. Study constructors and destructors
4. Familiarize the concept of Inheritance, Polymorphism and its types

No of Credits: 2	SEMESTER-III BCSET-231: Computer Programming - II	No of Hours (30)
<b>Unit I</b>	<b>Introduction to OOP</b>	<b>8</b>
	Difference between POP & OOP, Structure of C++ Program, Basic Concepts of OOP – Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Benefits & Features of OOP, Data types, Keywords and Operators, Control Structure – Conditional and Looping	
<b>Unit II</b>	<b>Object, Classes &amp; Constructor</b>	<b>8</b>
	Class Definition, Function Definition and Declaration, Arguments to a Function - Passing Arguments to a Function, Default Arguments, Calling Functions, Inline Functions, Scope Rules of Functions and Variables, Member Function Definition – Inside class and outside the class using scope Resolution Operator, Accessing Members from Object(S), Static Class Members - Static Data Member, Static Member Function, Declaration and Definition of a Constructor & Destructor	
<b>Unit III</b>	<b>Inheritance</b>	<b>8</b>
	Concept of Inheritance, Base Class & Derived Class, Types of Inheritance – Single, Multiple, Hierarchical, Multilevel, Hybrid Inheritance, Dynamic Memory Allocation / Deallocation using New and Delete Operator	
<b>Unit IV</b>	<b>Polymorphism</b>	<b>6</b>
	Concept of Polymorphism, Static Polymorphism and Dynamic (Compile time) Polymorphism, this pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Function.	

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

1. Evaluate object-oriented programming and advanced C++ concept.
2. Analyze the concepts of object, classes and constructor.
3. Design C++ Programs based on object, class, inheritance, abstraction, encapsulation, dynamic binding and polymorphism.
4. Implement concept of polymorphism in program.

### References:

1. "C++ Primer" by Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo. (Latest Edition: 2020)
2. "Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14" by Scott Meyers. (Latest Edition: 2014)
3. "The C++ Programming Language" by Bjarne Stroustrup. (Latest Edition: 2013)
4. "Accelerated C++: Practical Programming by Example" by Andrew Koenig and Barbara E. Moo. (Latest Edition: 2000)

### BCSEP-233: Lab Course Based on BCAT- 231

**Course Objectives:** Student will be able...

1. Familiarize the concept Object Oriented Programming.
2. Learn the operators and control structure in C++.
3. Inculcate the constructors and destructors, Inheritance, Polymorphism and its types.

<b>Credits (Total Credits 2)</b>	<b>SEMESTER - I LAB COURSE – I: BCAP 233 Computer Programming – II</b>	<b>Total No. of hours 60 Hrs.</b>
<b>Sr. No</b>	<b>Title of Experiment</b>	<b>No. of hours</b>
1	Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.	3
2	Write a C++ program to declare Struct. Initialize and display contents of member variables.	3
3	Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.	3
4	Write a C++ Program To Calculate Factorial Of A Given Number.	3
5	Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).	3
6	Write a C++ to illustrate the concepts of console I/O operations.	3
7	Write a C++ program to use scope resolution operator. Display the various values of the same.	3
8	Write a C++ program to allocate memory using new operator.	3
9	Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)	3
10	Write a C++ program to create an array of pointers. Invoke functions using array objects.	3
11	Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.	3
12	Write a C++ Program to Check Year Is Leap Year Or Not Using If/Else Statements.	3
13	Write a C++ Program to Print A Message Multiple Times Using Loop	3
14	Write a C++ Program to Find Area of a Triangle / Square / Circle / Rectangle Using Switch Statement.	3
15	Write a C++ Program to Convert Lower Case To Upper Case	3
16	Write a C++ Program to Read A Line By Line and Write Line By Line Using File	3
17	Write a C++ Program to Print A Given STAR Pattern	3
18	Write a C++ Program to Print Half Pyramid Using *	3
19	Write a C++ Program to Print Half Pyramid Alternative Using ( * ) Star And Alphabet	3
20	Write a C++ Program to Print Half Pyramid Using Alphabet.	3

**Course Outcomes:** After completion of this course student will be able to...

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

**References:**

1. *The C++ Programming Language, 3rd Edition, B. Stroutstrup, Pearson Education. C++ Programming Lab Manual / II-I SEM / 2019-20 Page 9*



2. *OOP in C++, 3rd Edition, T. Gaddis, J. Walters and G. Muganda, Wiley Dream Tech Press.*
3. *Object Oriented Programming in C++, 3rd Edition, R. Lafore, Galigotia Publications Pvt Ltd*

## BCSET 212: Web Designing

**Course Objectives:** Student will be able to ...

1. Understand HTML, CSS, Java script
2. Learn about choose the appropriate web tools/languages for creating state-of-the art web sites
3. Familiar current trends and styles in web design and applications.
4. Study simple website using HTML

<b>No of Credits: 2</b>	<b>Topic</b>	<b>No of Hours (30)</b>
<b>Unit I</b>	<b>Introduction to HTML</b>	<b>7</b>
	Introduction to HTML Editors, Applications of HTML, Difference between HTML and XML, Basic HTML Elements, Headings HTML, Paragraphs, Image Formatting	
<b>Unit II</b>	<b>Elements of HTML</b>	<b>7</b>
	HTML Tags, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls	
<b>Unit III</b>	<b>Concept of CSS</b>	<b>8</b>
	Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties)	
<b>Unit IV</b>	<b>CSS Advanced</b>	<b>8</b>
	Grouping, Dimension, Display, Positioning, Floating, Align, CSS Color, Creating page Layout and Site Designs.	

**Course Outcomes:** After completion of this course student will be able to...

1. Analyze Interface of Dream viewer.
2. Use Dream viewer to create HTML web pages
3. Create HTML Form elements.
4. Understand Input Attributes

### References:

1. *"HTML and CSS: Design and Build Websites"* by Jon Duckett (2011)
2. *"Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics"* by Jennifer Niederst Robbins (2018)
3. *"CSS: The Missing Manual"* by David Sawyer McFarland (2015)
4. *"Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages"* by Elisabeth Robson and Eric Freeman (2012).

## BCSEP-214: Lab Course Based on BCAT- 212

**Course Objectives:** Student will be able ...

1. Understand HTML, CSS, Java script
2. Impart necessary ability to choose the appropriate web tools/languages for creating state-of-the art web sites
3. Familiar current trends and styles in web design and applications.
4. Analyze how tools works like Dream viewer

Credits (Total Credits 2)	<b>SEMESTER - III</b> <b>LAB COURSE – I: BCAP 314</b> <b>Web Designing</b>	No. of hours <b>60 Hrs.</b>
Sr. No	Title of Experiment	No. of hours
1	Practicing basic HTML tags, text tags test styles, paragraph styles, headings, lists.	<b>3</b>
2	Tables in HTML, Frames in HTML, nested frames, Link and Anchor Tags.	<b>3</b>
3	Including graphics, video and sound in web pages, including Java applets.	<b>3</b>
4	Layers & Image Maps.	<b>3</b>
5	Creating animated Gifs.	<b>3</b>
6	Cascading Style sheets.	<b>3</b>
7	Write an HTML code to illustrate the usage of the following: • Ordered List • Unordered List • Definition List	<b>3</b>
8	Write an HTML code to demonstrate the usage of inline CSS.	<b>3</b>
9	Write an HTML code to demonstrate the usage of internal CSS.	<b>3</b>
10	Write an HTML code to demonstrate the usage of External CSS.	<b>3</b>
11	HTML forms and Fields.	<b>3</b>
12	Exercises covering basic introduction to JavaScript.	<b>3</b>
13	Write a Java script to prompt for users name and display it on the screen.	<b>3</b>
14	Design HTML form for keeping student record and validate it using Java script.	<b>3</b>
15	Write a code for html webpage which displays all practical on Border , Margin , Padding of elements.	<b>3</b>
16	Create a registration and login form using html, CSS.	<b>3</b>
17	Create some links to various search engines (Google, Yahoo, Facebook, Instagram, etc.).	<b>3</b>
18	Display an image that, when clicked, will link to itself and display the image in the browser by itself.	<b>3</b>
19	Create animation and multimedia files in Java Script.	<b>3</b>
20	Development of a web site involving a variety of tools practiced above.	<b>3</b>

**Course Outcomes:** After completion of this course student will be able to...

1. Analyze Interface of Dream viewer.
2. Use Dream viewer to create HTML web pages
3. Create HTML Form elements.
4. Understand Input Attributes.

**References:**

1. *"HTML and CSS: Design and Build Websites" by Jon Duckett (2011)*
2. *"Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins (2018)*
3. *"CSS: The Missing Manual" by David Sawyer McFarland (2015)*
4. *"Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages" by Elisabeth Robson and Eric Freeman (2012)*

## BCAT 215: Embedded System Design

**Course Objectives:** Student will be able...

1. Understand Fundamentals of Electronics – hardware
2. Learn How to Design hardware.
3. Familiarize the basic of logic.
4. Study Digital electronics.

Credits (Total Credits =2)	<b>BCAT 215: Electronic Programming Devices</b>	No. of hours per unit - 30
Sr. No.	Title of Experiment	No. of hours
<b>Unit I</b>	<b>Introduction to Microprocessor 8085</b>	<b>8</b>
	Introduction of microprocessor, Block diagram and pin out diagram of 8085, Arithmetic and logic unit, Microprocessor families, Stack, addressing mode, Instruction format and categories, Instruction set, Arithmetic operation, Logical operation, Data transfer, Branch operation.	
<b>Unit II</b>	<b>Filters and Data Convertors</b>	<b>8</b>
	Active filters: Working principle of Single order Op-Amp, Low Pass Filter, High Pass Filter, Band Pass Filter, Notch Filter Band reject filter, Data Convertors: DAC- R-2R ladder, ADC	
<b>Unit III</b>	<b>Transducers and Sensors</b>	<b>7</b>
	Transducers, Sensors, Classification of transducers, Characteristics of Transducers, Temperature Transducers, Pressure Transducers, Force Transducers, Optical Transducers, Selection criterion for Transducers.	
<b>Unit IV</b>	<b>Peripheral Devices</b>	<b>7</b>
	CCTV, Dome camera, Bullet camera, c-mount camera, Day/night camera, Scanners, types of scanners, Web camera, Wireless technology for Peripherals. Wi-Fi, Bluetooth	

**Course Outcomes:** 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

**Books Recommended: -**

1. *Electronic Instrumentation*, H.C. Kalsi, McGraw Hill Pvt. Ltd. New Delhi, 12<sup>th</sup> Edition, 2014
2. *OP-AMP and Linear Integrated Circuits*, Ramakant A. Gayakwad, PHI Learning Pvt. Ltd. Delhi, Fourth Edition, 2014 (India) Pvt. Ltd. New Delhi, Second Edition, 2014
3. *Transducer and Instrumentation*, D. V. S. Murthy, Prentice Hall of India Pvt. Ltd. New Delhi, Twelfth Edition, 2005

**Lab Course Based on BCAT 215**  
**BCAP 216: Lab Course Embedded System Design**

**Course Objectives:** Students should be able to ...

1. Understand Fundamentals of Electronics – hardware
2. Learn How to Design hardware.
3. Study Digital electronics.
4. Familiarize different Network devices.

Credits (Total Credits 2)	SEMESTER - III LAB COURSE – I: BCAP 316 Electronic Programming Devices	No. of hours 60 Hrs.
Sr. No	Title of Experiment	No. of hours
1	Study of arithmetic operations of 8085 microprocessor.	3
2	Study of pressure transducer.	3
3	Study of logical operations of 8085 microprocessor.	3
4	Study of instruction set of 8085 microprocessor.	3
5	Study of different types of camera.	3
6	Study the R-2R ladder D/A Converter.	3
7	Study of the Temperature Transducer.	3
8	Study of wireless networking devices	3
9	Demonstration of input devices.	3
10	Demonstration of output devices.	3
11	Study of Tuned amplifier.	3
12	Study of Astable multivibrator.	3
13	Study of Monostable multivibrator.	3
14	Study of Pin configuration of 8085 microprocessor.	3
15	Study the Instruction sets.	3
16	Study of architecture of 8085 microcontroller.	3
17	Study of Addressing modes of 8085 microprocessor.	3
18	To find smallest and largest number from the given series in 8085 microprocessor.	3
19	Write assembly language code in 8085 microprocessor to find factorial of given number.	3
20	To find smallest and largest number from the given series in 8085 microprocessor.	3

**Course Outcomes:** After completion of this course student will be able to...

1. Implement Management systems.
2. Build the application of temperature sensor.
3. Make and Analyze ADC and DAC circuits.

**Books Recommended: -**

1. Sedha.R.S. (New Delhi: S Chand Publication,2012) "A text of Applied Electronics".
2. Thereja.B.L. (New Delhi: S. Chand & Company LTD,2005) "Basic Electronics Solid State".
3. Streetman Ben Z and S. Banerjee, (New Delhi: Pearson Education, 2006) "Solid State Electronic Devices".
4. Mithal.G.K , (Delhi: Khanna publication,1997) "Electronic Devices and Circuits".

## BCATVSC 1: WordPress Framework

**Course Objectives:** Students should be able to ...

1. Familiar with wordpress.
2. Understand concepts of design and developing a website.
3. Gain knowledge of plugins.
4. Learn information of wordpress themes

Credits (Total Credits 2)	SEMESTER-III BCATVSC 1: WordPress Framework	No. of hours per unit/credits 60
Sr. No	Title of Experiment	No. of hours
1	Wordpress – Overview	3
2	Installation of wordpress	3
3	Wordpress – Dashboard	3
4	Wordpress – General Settings	3
5	Wordpress – Reading Settings	3
6	Wordpress – Discussion Settings	3
7	WordPress themes.	3
8	Introduction of wordpress plugins.	3
9	Adding plugin.	3
10	Upload the plugin.	3
11	Installing a WordPress Plugin.	3
12	Adding plugins.	3
13	Add a page to wordpress.	3
14	Apply customization to pages.	3
15	Adding custom CSS.	3
16	Auto-Update Plugins	3
17	Add a Site Title and Tagline.	3
18	Configure Theme Settings.	3
19	Create a Webpage using wordpress	3
20	Apply customization to pages.	3

**Course Outcomes:** After completion of this course student will be able to...

1. Demonstrate ability to use wordpress.
2. Explain use of wordpress themes.
3. Formulate different tasks.

**References:**

1. *Lisa Sabin-Wilson, “WordPress For Dummies (For Dummies Series)”, Published by For Dummies (April 7, 2014).*
2. *Stephen Burge, Mikall Angela Hill , Robbie Adair , “WordPress Explained: Your Step-by-Step Guide to WordPress (2<sup>nd</sup> Edition)”, Published by independently published (November 7, 2017).*
3. *Lisa Sabin-Wilson WordPress All-in-One For Dummies (For Dummies (Computer/Tech))”, Published by For Dummies(April 9, 2019)*

## BCAT-SEC-II: Ethical Hacking

**Course Objectives:** Students should be able to ...

1. Familiar students with ethical hacking.
2. Understand concepts of hacking Techniques.
3. Gain knowledge of malware.
4. To know information of Penetration Testing.

Credits (Total Credits 2)	SEMESTER-III BCAT-SEC - II -: Ethical Hacking	No. of hours (60 Hrs.)
Sr. No	Title of Experiment	No. of hours
1	Introduction of footprinting	3
2	Performing footprinting using google hacking	3
3	Website information	3
4	To trace any received email	3
5	To fetch DNS information	3
6	Port scanning	3
7	Network scanning	3
8	Ids (intrusion detection systems) tool	3
9	Network sniffing	3
10	Using cryptool to encrypt and decrypt password using rc4 algorithm.	3
11	Using traceroute, ping, ifconfig, netstat command	3
12	Creating a virus	3
13	Creating a tojran	3
14	Creating the dns payload	3
15	File inclusion attack simulation using dwwa, lamp stack in debian	3
16	Disguise as google bot to view hidden content of a website	3
17	Kaspersky lifetime validity	3
18	SQL injection	3
19	SQL injection for website hacking	3
20	Creating the dns payload	3

**Course Outcomes:** After completion of this course student will be able to...

1. Define ethical hacking and explain their characteristics.
2. Use of penetration, Footprinting.
3. Demonstrate ability to use System Hacking Concepts.
4. Formulate different SQL injection and virus concepts.

### Reference books:

1. *Matthew Hickey, Jennifer Arcuri , "Hands on Hacking: Become an Expert at Next Gen Penetration Testing and Purple Teaming", Published by Wiley (4 September 2020).*
2. *Dr. Allen Harper, "GREY HAT HACKING: THE ETHICAL HACKERS HANDBOOK", Published by McGraw Hill (1 November 2020) .*
3. *Thirumalesh , "The Complete Ethical Hacking Book: A Comprehensive Beginner's Guide to Learn and Master in Ethical Hacking Paperback", Published by OrangeBooks Publication (9 September 2022).*
4. *Jon Erickson , "Hacking: The Art of Exploitation, 2nd Ed", Published by No Starch Press, US (1 February 2008).*



## BCATVEC-II: Environmental Awareness in Computer Application

**Course Objectives:** Student will be able...

1. Study the Environmental Issues
2. Understand the Role of Computer in creation of environmental issues
3. Learn Environmental Laws
4. Impart the Sustainable development goals

Credits (Total Credits 2)	<b>BCATVEC-II Environmental Awareness in Computer Application</b>	No. of hours per unit/credits <b>30</b>
<b>Unit I</b>	<b>Introduction to Environmental Studies</b>	<b>(8)</b>
	Multidisciplinary nature of Environmental Studies, Scope & Importance, Environmental ethics, Concept of sustainability and sustainable development.	
<b>Unit II</b>	<b>Environmental laws and ethics</b>	<b>(8)</b>
	Types of Resources-Exhaustible & Inexhaustible, Renewable & Non-Renewable-Forest-Mineral Water-Land, Energy Resources, Usage, Reasons for Their Degradation, Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity 04 and tribal populations, Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).	
<b>Unit III</b>	<b>Computer Application for Sustainable Environment</b>	<b>(7)</b>
	How Can Computer Science Change the World into Better Place? Computer science enables surgical robots. Food Chain & Food Web.Computer science is mapping ancient Amazon rainforest villages? Artificial Intelligence and Climate Change. Computer application in Energy and Environment. Green IT Sustainable Environment.	
<b>Unit IV</b>	<b>Computer Application in environmental health technology</b>	<b>(7)</b>
	Environmental monitoring, Modelling and simulation, Risk assessment, Geographic information systems (GIS), Communication and outreach,	

**Course outcomes:**

**The student should be able to...**

1. Understand importance of environmental awareness.
2. Analyze environmental issues.
3. Create storytelling techniques that promotes environmental awareness

**References:**

1. Maruthesha Reddy, "Textbook of Environmental Studies (PB)", Published by, Medtec (July 2016).
2. Ravi P Agrahari, "Environmental Ecology, Biodiversity, Climate Change & Disaster Management (English)", Published by, McGraw Hill (17 October 2023).
3. Nawneet Vibhaw, "Environment, Energy and Climate Change", Published by Lexis Nexis (2017-01-01).

# Semester-IV

## BCAT-241: Relational Database Management System

**Course Objectives:** Student will be able to...

1. Understand the concept Database
2. Analyze the operators and command in RDBMS
3. Imbibe Advanced SQL Concepts
4. Study Dynamic SQL Query

No of Credits: 2	SEMESTER-IV BCAT-241: Relational Database Management System	No of Hours (60)
<b>Unit I</b>	<b>Introduction to RDBMS</b>	<b>8</b>
	Concept of RDBMS, Difference between DBMS and RDBMS, Features of RDBMS, Terminologies: Relation, attribute, domain, Tuple, Entities, Degree, Codd's Rules, Relational Model: Structure of Relational Database, Concept of Relational Algebra, Role and Responsibilities of DBA.	
<b>Unit II</b>	<b>Basics of SQL</b>	<b>8</b>
	Features of SQL, Data types, Difference between various platforms for SQL, Integrity Constraints-(Primary key, Foreign key, unique key, not null, default, check), DDL, DML, DCL, TCL Commands, Select Statement with Clauses-Where, Having, Order by, Group by, SQL Operators-Arithmetic, Relational, Logical, Like, Between, Functions in SQL (Aggregate functions, String Functions)	
<b>Unit III</b>	<b>Joins And Sub queries in SQL</b>	<b>6</b>
	Join types - Inner Join, Outer Join, Cross Join and self-Join, Sub-queries, Multiple sub queries, nesting of sub queries, sub queries in DML commands, correlated sub queries, Create Indexes, Sequences, Views	
<b>Unit IV</b>	<b>PL/SQL control statements and stored procedures</b>	<b>8</b>
	Introduction to PL/SQL Block Structure, Control Structures-Branching statements, Iterative Control statements, Stored procedures-Creating and executing procedures with and without parameters, Cursors -Concept, Types- Implicit, Explicit, Procedure to create explicit cursors, TRIGGERS: Concept and types.	

**Course outcomes:** After completion of this course student will be able to...

1. Synthesize complex SQL queries.
2. Deploy SQL Functions in PL/SQL.
3. Design classes and objects.
4. Use constructor and destructor.

### References:

1. *Introduction to Database Systems* C.J. Date Pearsons Education
2. *Database System Concept* Korth, Silberschatz and Sudarshan MGH
3. *Database Principles: Fundamentals of Design, Implementation and Management* by Rob Edition- 10 Cengage Publication
4. *SQL/PLSQL For Oracle 11G Black Book* Dr. Deshpande Wiley Dreamtech

**BCAP 243: RDBMS Lab****Lab: Based on BCAT-241****Course Objectives:** Student will be able to...

1. Learn Basic Programming Concepts
2. Study different basic concepts arrays in C
3. Understand the different concepts of operations on Pointers.

<b>Credits (Total Credits 4)</b>	<b>LAB COURSE – I: BCAP 243 Relational Database Management System</b>	<b>No. of hours 60 Hrs.</b>
<b>Sr. No</b>	<b>Title of Experiment</b>	<b>No. of hours</b>
<b>1</b>	Create the tables with appropriate constraints.	<b>3</b>
<b>2</b>	<b>Perform the following:</b> <ul style="list-style-type: none"> <li>• Creating a Database Viewing all Tables in a Database</li> <li>• Creating Tables (With and Without Constraints)</li> </ul>	<b>3</b>
<b>3</b>	Perform the following: <ul style="list-style-type: none"> <li>• Inserting/Updating/Deleting Records in a Table</li> <li>• Saving (Commit) and Undoing(rollback)</li> </ul>	<b>3</b>
<b>4</b>	Perform the following: <ul style="list-style-type: none"> <li>• Altering a Table</li> <li>• Dropping/Truncating/RenamingTables</li> </ul>	<b>3</b>
<b>5</b>	Perform the following: <ul style="list-style-type: none"> <li>• Simple Queries with Aggregate functions</li> <li>• Queries with Aggregate functions (groupby and having clause)</li> </ul>	<b>3</b>
<b>6</b>	Queries in volving <ul style="list-style-type: none"> <li>• Date Functions</li> <li>• String Functions</li> <li>• Math Functions</li> </ul>	<b>3</b>
<b>7</b>	Write sql query to display all the employees whose name ends with 'a'	<b>3</b>
<b>8</b>	Write sql query to display all the employee names in upper case.	<b>3</b>
<b>9</b>	Write sql query to increase the salaries of employees by 5000 whose designation is DBA.	<b>3</b>
<b>10</b>	Writes an sql query to display all the Student names prefixed with Mr./Ms. Based on Gender column.	<b>3</b>
<b>11</b>	Write an sql query to display all the Student names where the length of the name is 5 characters	<b>3</b>
<b>12</b>	Write sql query to display the students who are not from Telangana or AndhraPradesh.	<b>3</b>
<b>13</b>	Write sql query to create an index on column Sname.	<b>3</b>
<b>14</b>	Write sql query to display all the employees whose salary is between 30000 and 45000.	<b>3</b>
<b>15</b>	Write sql query to sort the employee table in the descending order of salaries.	<b>3</b>
<b>16</b>	Creating queries on Joins	<b>3</b>
<b>17</b>	Creating Views and index.	<b>3</b>
<b>18</b>	PL-SQL block on branching statement.	<b>3</b>
<b>19</b>	PL-SQL block on looping statement.	<b>3</b>
<b>20</b>	Stored Procedures, cursors and triggers.	<b>3</b>

**Course Outcomes:** After completion of this course student will be able to...

1. Understand the basic concepts of database management system.
2. Develop skills to create database.
3. Use knowledge of SQL and Oracle Query.
4. Apply working of SQL and Oracle.

**References:**

1. *Murach's Oracle SQL and PLSQL* by Joel Murach, Murach and Associates. (Unit I-Unit II) 2002
2. *Oracle Database 11g PL/SQL Programming Workbook* By: Michael Mc Laughlin, John Harper (Unit II-Unit III) 2008
3. *Oracle PL/SQL Programming Fifth Edition* By Steven Feuerstein, Bill 2010

## BCAT 242: Web Development (PHP)

**Course Objectives:** Student will be able to...

1. Learn basic concepts of PHP.
2. Understand application using PHP, MySQL
3. Impart necessary ability to choose the appropriate web tools/languages for creating state-of-the-art web sites
4. Expose students to current trends and styles in web design and applications.

No of Credits: 2	SEMESTER-IV BCAT-242: Web Development (PHP)	No of Hours (60)
<b>Unit I</b>	<b>Introduction to PHP</b>	<b>10</b>
	Setting up a PHP development environment, Basics of web development <b>PHP Syntax and Variables:</b> PHP tags and delimiters, PHP data types and variables, Variable scope, Constants and Magic constants <b>Operators and Expressions:</b> Arithmetic, assignment, comparison and logical operators, String and array operators, Precedence and associativity of operators, Type juggling and type casting	
<b>Unit II</b>	<b>Control Structures and Functions and Arrays</b>	<b>8</b>
	<b>Control Structures:</b> Conditional statements: if, else, elseif, switch, Looping statements: for, while, do-while, foreach Break and continue statements. Error handling and exceptions <b>Functions and Arrays:</b> Defining and calling functions Passing arguments to functions, returning values from functions, Working with arrays: indexed, associative, and multidimensional arrays, Array functions and sorting	
<b>Unit III</b>	<b>Working with Forms and Database-MySQL</b>	<b>6</b>
	<b>Working with Forms and User Input:</b> HTML forms and form elements, retrieving user input with \$_GET, \$_POST, Form validation and sanitization, Handling file uploads <b>Working with Database-MySQL:</b> Introduction to databases and MySQL, connecting to a MySQL database, SQL queries: SELECT, INSERT, UPDATE, DELETE, Prepared statements and preventing SQL injection, Retrieving and displaying data from a database	
<b>Unit IV</b>	<b>Session Management and Cookies</b>	<b>6</b>
	<b>Session Management and Cookies:</b> Understanding sessions and cookies, Creating & destroying sessions, storing session data, Managing user authentication & authorization <b>File Handling and Directory Operations:</b> Working with files and directories, reading from and writing to files, File uploads and file permissions, File and directory manipulation functions	

**Course Outcomes:** After completion of this course student will be able to...

1. Understand the basics of PHP programming language and its role in web development.
2. Implement functions and arrays in PHP to solve programming problems.
3. Design web forms using HTML and process user input using PHP.
4. Execute file uploads and perform file handling operations in PHP applications.

**References:**

1. *Herbert Schildt ,PHP: The Complete Reference ,9th Edition, McGraw Hill ,2017*
2. *Richard Blum, PHP, MySQL & JavaScript All-in-One For Dummies, January 2018,Wiley publication*

## BCAP 244: Web Development (PHP)

### Lab: Based on BCAT 242

**Course Objectives:** Student will be able to ...

1. Learn Basic Programming Concepts in php
2. Study different basic concepts arrays in php
3. Understand the different concepts of operations.
4. Familiarize the DDL and DML Query

<b>Credits (Total Credits 4)</b>	<b>SEMESTER - IV LAB COURSE – I : BCAP 344 Web Development</b>	<b>No. of hours 60 Hrs.</b>
<b>Sr. No</b>	<b>Title of Experiment</b>	<b>No. of hours</b>
<b>1</b>	Write a PHP program to swap two numbers with and without using third variable.	<b>3</b>
<b>2</b>	Write a PHP program to find the factorial of a number.	<b>3</b>
<b>3</b>	Write a PHP program to count the total number of words in a string.	<b>3</b>
<b>4</b>	Write a program in PHP to find the occurrence of a word in a string.	<b>3</b>
<b>5</b>	Write a PHP program to replace a word in a string.	<b>3</b>
<b>6</b>	Write a PHP program to demonstrate various functions of regular expression.	<b>3</b>
<b>7</b>	Write a PHP program to find area of triangle and rectangle using functions.	<b>3</b>
<b>8</b>	Write a PHP Program to display count, from 5 to 15 using PHP loop as given below.	<b>3</b>
<b>9</b>	Write a PHP program to print 2 php variables using single echo statement.	<b>3</b>
<b>10</b>	Write a PHP program to check student grade based on the marks using if-else statement.	<b>3</b>
<b>11</b>	Write a PHP program to find the GCD of two numbers using user-defined functions.	<b>3</b>
<b>12</b>	Write a Program for finding the biggest number in an array without using any array Functions.	<b>3</b>
<b>13</b>	Write a Program for finding the smallest number in an array.	<b>3</b>
<b>14</b>	Write a PHP program to design a simple calculator.	<b>3</b>
<b>15</b>	Design a simple web page to generate multiplication table for a given number using PHP.	<b>3</b>
<b>16</b>	Design a web page that should compute one's age on a given date using PHP.	<b>3</b>
<b>17</b>	Write a PHP program read Student information (Roll_No, Name, Class, Contact_No, email_id) using HTML form and display this information using GET/POST method.	<b>3</b>
<b>18</b>	Write a PHP program to read student marks for semester subjects with other required details (prn, name, rollno, class, etc.) and display semester mark list.	<b>3</b>
<b>19</b>	Write a PHP program to find factorial of a number using recursive function.	<b>3</b>
<b>20</b>	Write a program to calculate factorial of a number using for loop in php.	<b>3</b>

**Course Outcomes:** After completion of this course student will be able to...

1. Develop skills for writing programs using 'php'.
2. Define a Programming logic.
3. Acquire the ability to analyze problems, design algorithms and implement solutions using PHP.
4. Design and implement PHP programs that interact with user inputs, perform calculations and generate dynamic web contents.

**References:**

1. *Carlos Coronel and Steven Morris (2014) - Database Systems: Design, Implementation, and Management*
2. *Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom (2008) - Database Systems: The Complete Book*
3. *Rajiv Chopra, C Programming An Introduction, (April 2018).*



## BCAT 245: Embedded System Design

**Course Objectives:** Student will be able to...

1. Learn the instructions of 8085 microprocessor.
2. Understand memory organization.
3. Study architecture and instruction set of 8051 microcontrollers.
4. Gain Knowledge of interfacing of microcontroller.

Credits (Total Credits 2)	SEMESTER-III BCSET 245: Embedded System Design	No. of hours per unit/credits 30
Unit I	<b>Programming of 8085</b>	7
	Timing and control circuitry: Machine cycle, instruction cycle, Timming states, Hardware and software interrupts, subroutine, delay loops program for: Addition, subtraction, multiplication.	
Unit II	<b>Microprocessor Memory Organization</b>	9
	Memory management, Data and code memory, Interfacing memory with microprocessor, Peripheral mapping, Memory mapping, I/O mapped, Ports-parallel and series.	
Unit III	<b>Introduction to Microcontroller 8051</b>	7
	Introduction, Architecture-Block diagram, Reset and clock, Registers, Flags and internal memory, Special function, register, I/O ports.	
Unit IV	<b>Interfacing of Microcontroller</b>	7
	Introduction, Study of 8051 instruction sets, addressing modes, Timer and counter, Time delay generation, Serial ports, Interfacing LED, Interfacing 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 microprocessors.
2. Elaborate microprocessor memory organization.
3. Develop programs based on 8051 microcontrollers.
4. Interface with LED, LCD, Stepper motor using 8051.

### References:

- 1) *Microprocessor architecture programming and application with the 8085* by R Gaonkar. 8086 *Microprocessor* by John Uffenbeck.
- 2) *Fundamentals of Microprocessors and Microcontrollers* by B Ram
- 3) *8085 Microprocessor Assembly Language Programming* by Samir G. Pandya
- 4) *The 8051 Micro controller 3rd Edition* by Kenneth Ayala.

## **BCAP 246: (Embedded System Design)**

### **Lab: Based on BCAT 245**

**Course Objectives:** Student will be able to ...

1. Understand Fundamentals of Electronics – hardware & software
2. Learn How to Design hardware.
3. Impart the Interfacing of hardware and software
4. Familiarize different Instruction sets.

<b>Credits (Total Credits 2)</b>	<b>SEMESTER - II LAB COURSE – I : BCAP 246 Embedded System Design</b>	<b>No. of hours 60 Hrs.</b>
<b>Sr. No</b>	<b>Title of Experiment</b>	<b>No. of hours</b>
1	Interface 8085 with input/output devices like LED, Switches and displays.	<b>3</b>
2	Write and execute simple programs using 8085 assembly language to perform task like addition, subtraction.	<b>3</b>
3	Logical operations using 8081 microprocessor.	<b>3</b>
4	Study of different addressing modes of 8051 microcontroller.	<b>3</b>
5	Study of interfacing of 7 segment display with 8051 microcontroller	<b>3</b>
6	Arithmetic operation using 8051 microcontroller.	<b>3</b>
7	Study the architecture of 8051 microcontroller.	<b>3</b>
8	Interfacing of LED using 8051 microcontroller.	<b>3</b>
9	Interfacing of LCD using 8051 microcontroller.	<b>3</b>
10	Study the time delay generation using timers 8051.	<b>3</b>
11	Time delay generation using timers 8051.	<b>3</b>
12	Write and execute simple programming 8085 assembly language to perform task like Multiplication, Division.	<b>3</b>
13	Learn how to interface 8085 with memory devices like RAM and ROM.	<b>3</b>
14	Interface 8085 with serial communication devices.	<b>3</b>
15	Study the timer and counter features of 8085 for various application.	<b>3</b>
16	Interfacing 8085 with external devices such as ADC, DAC.	<b>3</b>
17	Interfacing 8085 with external devices such as sensors for data acquisition and control purposes.	<b>3</b>
18	Learn how to troubleshoot common issues that may arise during practical experiments with 8085 microprocessor.	<b>3</b>
19	Learn how to troubleshoot common issues that may arise during practical experiments with 8051 microcontroller.	<b>3</b>
20	Understand architecture ,instruction set of 8085 microprocessor.	<b>3</b>

**Course Outcomes:** After completion of this course student will be able to...

1. Implement different applications using microprocessor and microcontroller.
2. Elaborate microprocessor memory organization.
3. Design and develop programs based on 8051 microcontrollers.
4. Interface with LED, LCD, Stepper motor using 8051.

**References:**

1. *Microprocessor architecture programming and application with the 8085 by R Gaonkar.*  
*8086 Microprocessor by John Uffenbeck.*
2. *Fundamentals of Microprocessors and Microcontrollers by B Ram*
3. *8085 Microprocessor Assembly Language Programming by Samir G. Pandya*
4. *The 8051 Micro controller 3rd Edition by Kenneth Ayala.*

## BCAT-VSC - II: Laravel Framework

**Course Objectives:** Student will be able to ...

1. Familiar with Advance technology.
2. Understand concepts of Laravel.
3. Gain knowledge of Logic concepts.
4. Learn tools of framework.

Credits (Total Credits 4)	SEMESTER - IV BCAT-VSC - II: Laravel Framework	No. of hours 60 Hrs.
Sr. No	Title of Experiment	No. of hours
1	Introduction to Laravel.	3
2	Installation of Laravel.	3
3	Preparing the database.	3
4	Database Migrations.	3
5	Eloquent Models.	3
6	Routing.	3
7	Stubbing the routes.	3
8	Displaying a view.	3
9	Building layouts & views	3
10	Defining the layout.	3
11	Defining the child view	3
12	Adding tasks.	3
13	Validation	3
14	Creating the task.	3
15	Displaying existing tasks.	3
16	Deleting.	3
17	Adding the Delete button.	3
18	Error variable.	3
19	Method Spoofing.	3
20	Deleting specific task.	3

**Course Outcomes:** Students who complete this course should be able to:

1. Demonstrate ability to use Laravel.
2. Explain use of database migration.
3. Formulate different tasks.

**References:**

1. *Matt Stauffer, "Laravel: Up & Running: A Framework for Building Modern PHP Apps", Published by O'Reilly Media (April 20, 2019)*
2. *Daniel Correa (Author), Paola Vallejo, "Practical Laravel: Develop clean MVC web applications", Published by Independently published (February 13, 2022)*
3. *Alfred Nutile, "Laravel 5.x Cookbook", published by Packt Publishing (31 August 2016)*

## BCAT-SEC-II: Information Security

**Course Objectives:** Students should be able to ...

1. Learn the concepts of Operating System
2. Understand Linux commands.
3. Study VI editor Concepts

Credits (Total Credits 4)	SEMESTER - IV BCAT-SEC-II: Information Security	No. of hours 60 Hrs.
Sr. No	Title of Experiment	No. of hours
1	Introduction to Information Security.	3
2	Install & Configure Antivirus System (Any).	3
3	Set up operating system updates.	3
4	Perform Backup and restore of the system.	3
5	Set up passwords to operating system and applications.	3
6	Apply security to file folder or application using access permissions and verify.	3
7	Write a program to implement Caesar Cipher.	3
8	Write a program to implement Vernam Cipher.	3
9	Create and verify Hash Code for given message	3
10	Write a program to implement Rail fence technique	3
11	Write a program to implement Simple Columnar Transposition technique.	3
12	Create and verify digital signature using tool (e.g. Cryptool).	3
13	Use Steganography to encode and decode the message using any.	3
14	Install firewall on any operating system.	3
15	Configure firewall settings on any operating system.	3
16	Create and verify Digital Certificate using tool (e.g. Cryptool).	3
17	Trace the origin of email using any tool (e.g. email Tracker Pro).	3
18	Trace the path of web site using Tracert Utility.	3
19	PGP Email Security.	3
20	Generate Public and Private Key Pair	3

**Course Outcomes:** After completion of this course student will be able to...

1. Demonstrate ability to use System Hacking Concepts.
2. Explain use of Security Services.
3. Formulate different threat concepts.
4. Define use of cryptography and explain their characteristics

### Reference Books:

1. Pfleeger, "Security in Computing, Fourth Edition", Published by Pearson Education (1 January 2007)
2. Wenbo Mao, "Modern Cryptography: Theory and Practice", Published by Prentice Hall (25 July 2003).
3. William Stallings, "Network Security Essentials: Applications and Standards", Published by Pearson Education (27 February 2018)

## BCAT-CC-II: Sports and Exercise

### Course Objectives: Student will be able to ...

1. Identify the diverse career paths available in computer science for sports.
2. Understand the specific technical skills and knowledge required for different sports technology roles.
3. Develop a personalized career development plan for entering the sports technology industry.
4. Network with professionals working in computer science for sports.

Credits (Total Credits 2)	BCAT-CC-II Sports and Exercise	No. of hours per unit/credits
<b>Unit I:</b>	<b>Sports Activities</b>	<b>(8)</b>
	Definition, Types, recreational activities, aerobic activities, benefits of sports activities	
<b>Unit II</b>	<b>Exercises</b>	<b>(8)</b>
	Definition, Types, Free hand and equipment-based exercises, Warming up exercises, relaxation exercises, benefits of exercises	
<b>Unit III</b>	<b>Computer Application in Exercise</b>	<b>(7)</b>
	Overview of objectives and expectations, Importance of computer technology in exercise, software tools and applications, Future trends in computer applications in exercise science	
<b>Unit IV</b>	<b>Exercise of computer Application in sports</b>	<b>(7)</b>
	Types of data collected in sports science, Sensors and wearable technology, Wearable devices for athlete monitoring, Injury prediction and prevention using technology, Role of computer applications in training program design, Periodization and programming software	

### Course outcomes:

#### The student should be able to...

1. Use diverse career paths available in computer science for sports.
2. Analyze specific technical skills and knowledge required for different sports technology roles.
3. Implement personalized career development plan for entering the sports technology industry.
4. Understand professionals working in computer science for sports.

### References:

1. Coakley, Jay J. *Sports in Society: Issues and Controversies*. McGraw-Hill Education, 2018.
2. Maguire, Joseph, and Mark Falcos. *Sport and Society: A Student Introduction*. SAGE Publications Ltd, 2007.
3. Eitzen, D. Stanley, and George H. Sage. *Sociology of North American Sport*. Oxford University Press, 2017.
4. Shogan, Deborah L., and David Karen. *Sports in Society: Issues and Controversies*. McGraw-Hill Education, 2017.