

**SAMRAT VIKRAMADITYA VISHWAVIDYALAYA, UJJAIN MP****(Session -2025-2026 onwards)****BCA (Hon's) FOUR YEARS (EIGHT SEMESTERS), CBCS SCHEME (NEP)**

S.No.	Paper code	Course Component and Name of Course	Credits			Marks		Total
			T	P	Total	Max Marks CCE Internals	Max Marks Theory Externals	
1.	BCAH 201 Major-1	Object Oriented programming using C++	4	0	4	20	50	100
	BCAH P	Object Oriented programming using C++	0	2	2	10	20	
2.	BCAH 202 Major-2	Data Base Management System	6	0	6	30	70	100
3.	BCAH 203 Minor-1	Digital Electronics	4	0	4	30	70	100
4.	BCAH-204 Ability Enhancement Course	English	2	0	2	-	100	100
6.	BCAH-205 Value Added Course	Understanding India	2	0	2	-	100	100
Total Credits and marks			18	02	20	90	410	500

<b>PART A: Introduction</b>			
Program: Certificate	Class: II SEM	Year: I Year	Session: 2025-26
<b>Subject:</b> Computer Application			
1.	Course Code	<b>BCAH-201</b>	
2.	Course Title	<b>Object Oriented Programming using C++</b>	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational)	<b>Major I</b>	
4.	Pre-Requisite (if any)	Basic knowledge of computer and C language	
5.	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>• Creating simple programs using classes and objects in C++.</li> <li>• Implement Object Oriented Programming Concepts in C++.</li> <li>• Develop applications using stream I/O and file I/O.</li> <li>• Implement simple graphical user interfaces.</li> <li>• Implement Object Oriented Programs using templates and exceptional handling concepts</li> </ul>	
6.	Credit Value	4 Credit	
7.	Total Marks	Max. Marks : 70	Min. Passing Marks: 25

<b>PART B: Content of the Course</b>		
Total No. of Lectures (in hours per week): 01 Hours per day		
Total Lectures: 60 Hours		
Unit	Topics	No. of Lectures
I	<b>Object Oriented Systems Development</b> : Introduction to traditional programming with C. Objectives of OOP, Object Oriented Analysis, Object Oriented Programming in C++: Concepts of Objects, Classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding and Message passing. Tokens, Expressions and Control Structures.	12
II	<b>Classes &amp; Objects:</b> Classes, Structure & classes, Union & Classes, Friend function, Friend classes, Inline function, Scope resolution operator, Static class members: Static data member, Static member function, passing objects to function, Returning objects, Array of objects.	12
III	<b>Constructor &amp; Destructor:</b> Introduction, Constructor, Parameterized constructor, Multiple constructor in a class, Constructor with default argument, Copy constructor, Default Argument, Destructor. <b>Function &amp; operator overloading:</b> Overloading and information hiding, Function overloading, Operator overloading	12
IV	<b>Inheritance:</b> Inheritance, Derived and base classes, Single, Multilevel, Hierarchical, Hybrid Inheritance, Protected member, overriding member function, class hierarchies, multiple inheritance, Containership, Virtual base class	12

V	<p><b>Polymorphism</b> : virtual functions, late binding, pure virtual functions, abstract classes, this pointer, templates, function templates, Class templates.</p> <p><b>The C++ I/O system basics:</b> C++ streams, The basic stream classes: C++ predefined streams.</p>	12
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<b>PART C: Learning Resources</b>	
Textbooks, Reference Books, Other Resources	
<b>Suggested Reading:</b>	
<ol style="list-style-type: none"> <li>1. Object-Oriented Programming with C++: E. Balagurusamy, TMH, 2005</li> <li>2. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.</li> <li>3. Object Oriented Programming, Tomothy Budd, Pearson education.</li> </ol>	
<b>Suggestive digital platform web links:</b>	
<a href="https://www.youtube.com/watch?v=BCIS40yzssA">https://www.youtube.com/watch?v=BCIS40yzssA</a> <a href="https://www.youtube.com/watch?v=vLnPwxZdW4Y&amp;vl=en">https://www.youtube.com/watch?v=vLnPwxZdW4Y&amp;vl=en</a> <a href="https://www.youtube.com/watch?v=Umm1ZQ5ltZw">https://www.youtube.com/watch?v=Umm1ZQ5ltZw</a> <a href="https://nptel.ac.in/courses/106/105/106105151/">https://nptel.ac.in/courses/106/105/106105151/</a> <a href="https://www.udemy.com/course/beginning-c-plus-plus-programming/">https://www.udemy.com/course/beginning-c-plus-plus-programming/</a>	

<b>Part D: Assessment and Evaluation</b>		
<b>Suggested Continuous Evaluation Methods:</b>		
Maximum Marks:		<b>70</b>
Continuous Comprehensive Evaluation (CCE):		<b>20 Marks</b>
University Exam (UE):		<b>50 Marks</b>
<b>Internal Assessment:</b>	Class Test	10
Continuous Comprehensive Evaluation (CCE)	Assignment/Presentation	10
		<b>Total Marks: 20</b>
<b>External Assessment:</b>	Section (A): Short Answer type questions	04 × 05 = 20
University Exam (UE)	Section (B): Long Answer Type Questions	06 × 05 = 30
Time: 03.00 Hours		<b>Total Marks: 50</b>

<b>PART A: Introduction</b>			
Program: Certificate		Class: <b>II Sem</b>	Year: <b>I Year</b>
Session: <b>2025-26</b>			
Subject: <b>Computer Applications</b>			
1.	Course Code	BCAHP	
2.	Course Title	<b>Object Oriented Programming Using C++ Lab</b>	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational)	<b>Core Course</b>	
4.	Pre-Requisite (if any)	To study this course, a student must have basic logical and analytical skills.	
5.	Course Learning Outcomes(CLO)	<p><b>After the completion of this course, a successful student will be able to do the following:</b></p> <ol style="list-style-type: none"> <li>1. Develop simple algorithms and flow charts to solve a problem with programming using top down design principles.</li> <li>2. Writing efficient and well-structured computer algorithms/programs.</li> <li>3. Learn to formulate iterative solutions and array processing algorithms for problems.</li> <li>4. Use recursive techniques, pointers and searching methods in programming.</li> <li>5. Possess ability to choose a data structure to suitably model any data used in computer applications.</li> <li>6. Implement and know the applications of algorithms for searching and sorting etc.</li> </ol>	
6.	Credit Value	<b>Practical – 2 Credits</b>	
7.	Total Marks	Max. Marks : <b>20+10</b>	Min. Passing Marks: 10
<b>PART B: Content of the Course</b>			
No. of Lab Practicals (in hours per week): <b>2 hours per week</b>			
Total No. of Lab.: <b>60 Hrs.</b>			
	<b>Suggestive list of Practicals</b>		<b>No. of Labs.</b>
	<p><b>Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code in C++, execute and test it. Students should be given assignments on following :</b></p> <ol style="list-style-type: none"> <li>1. Write a C++ program to perform addition, subtraction, multiplication, and division of two numbers.</li> <li>2. Write a C++ program to check whether a number is even or odd.</li> <li>3. Write a C++ program to find largest of three numbers.</li> <li>4. Write a C++ program to calculate factorial of a number.</li> <li>5. Write a C++ program to generate Fibonacci series.</li> <li>6. Write a C++ program to reverse a number.</li> <li>7. Write a C++ program to calculate sum of digits of a number.</li> <li>8. Write a C++ program to print multiplication table of a given number.</li> <li>9. Write a C++ program to display patterns using nested loops.</li> <li>10. Write a C++ program for matrix addition.</li> <li>11. Write a C++ program to demonstrate function overloading</li> <li>12. Write a C++ program to define a class Student with data members: roll number, name, and marks. Create objects of the class and display the</li> </ol>		60

	<p>student details.</p> <ol style="list-style-type: none"> <li>13. Write a C++ program to demonstrate array of object.</li> <li>14. Write a C++ program to demonstrate parameterized constructor.</li> <li>15. Write a C++ program to demonstrate copy constructor.</li> <li>16. Write a C++ program to demonstrate constructor overloading.</li> <li>17. Write a C++ program to demonstrate destructor.</li> <li>18. Write a C++ program to demonstrate friend function.</li> <li>19. Write a C++ program to demonstrate friend function to access private data of two classes.</li> <li>20. Write a C++ program to demonstrate the use of a static data member.</li> <li>21. Write a C++ program to demonstrate unary operator overloading.</li> <li>22. Write a C++ program to demonstrate binary operator overloading.</li> <li>23. Write a C++ program to demonstrate single inheritance.</li> <li>24. Write a C++ program to demonstrate multilevel inheritance.</li> <li>25. Write a C++ program to demonstrate multiple inheritance.</li> <li>26. Write a C++ program to demonstrate hierarchical inheritance.</li> <li>27. Write a C++ program to demonstrate hybrid inheritance.</li> <li>28. Write a C++ program to demonstrate virtual function.</li> <li>29. Write a C++ program to demonstrate class template.</li> <li>30. Write a C++ program to demonstrate function template.</li> </ol>	
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### PART C: Learning Resources

#### Textbooks, Reference Books, Other Resources

#### Suggested Readings

- J. R. Hanly and E. B. Koffman, "Problem Solving and Program Design in C", Pearson, 2015
- E. Balguruswamy, "C++ ", TMH Publication ISBN O-07-462038-X
- Herbert Schildt, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7

#### Reference Books:

- R. Lafore, 'Object Oriented Programming C++'
- N. Dale and C. Weems, "Programming and problem solving with C++: brief edition", Jones & Bartlett Learning.
- Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
- SartajSahani, "Data Structures, Algorithms and Applications with C++", McGraw Hill.
- Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
- D.S. Malik, "Data Structure using C++", Second edition, Cengage Learning.
- M. A. Weiss, "Data structures and Algorithm Analysis in C", 2nd edition, Pearson.
- Lipschutz, "Schaum's outline series Data structures", Tata McGraw-Hill

#### Suggestive digital platform web links

- <https://www.youtube.com/watch?v=BCIS40yzssA>  
<https://www.youtube.com/watch?v=vLnPwxZdW4Y&vl=en>  
<https://www.youtube.com/watch?v=Umm1ZQ5ltZw>

#### Suggested equivalent online courses

S.No.	Online Course	Duration	Platform
1	Programming in C++ <a href="https://nptel.ac.in/courses/106/105/106105151/">https://nptel.ac.in/courses/106/105/106105151/</a>	8 weeks	NPTEL
2	Beginning C++ Programming - From Beginner to Beyond <a href="https://www.udemy.com/course/beginning-c-plus-plus-programming/">https://www.udemy.com/course/beginning-c-plus-plus-programming/</a>	Self paced	Udemy

### PART D: Assessment and Evaluation

**Internal Assessment :** Continuous

**External Assessment:** University Exam (UE) : **20**

Comprehensive Evaluation (CCE) : <b>10 Marks</b>		<b>Marks</b> Time : <b>02.00 Hours</b>	
<b>Internal Assessment</b>	<b>Marks</b>	<b>External Assessment</b>	<b>Marks</b>
Hands-on Lab Practice	2 Marks	Practical record file	5 Marks
Viva	3 Marks	Viva voce practical	5 Marks
Lab Test from practical list	2 Marks	Table works/ Exercise Assigned (02) in practical exam	5 Marks
Assignments (Charts/ Model)/ Technology Dissemination/ Excursion/ Lab visit/ Industrial Training	3 Marks	Reports of excursion/ Lab visits/ Industrial training/ Survey/ Collection/ Models	5 Marks
<b>Total</b> <i>Excursion/ Lab visits/ Industrial Training is compulsory</i>	<b>10 Marks</b>	<b>Total</b>	<b>20 Marks</b>

<b>PART A: Introduction</b>			
Program: Certificate	Class: II SEM	Year: I Year	Session: 2025-26
<b>Subject: Computer Application</b>			
1.	Course Code	BCAH-202	
2.	Course Title	<b>Data Base Management System</b>	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational)	<b>Major II</b>	
4.	Pre-Requisite (if any)	Students must have the basic Knowledge of computer systems and database.	
5.	Course Learning Outcomes(CLO)	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand and describe the basic concepts and terminology of Database Management System.</li> <li>2. Analyze and Design the database of applications using ER modelling and Normalization.</li> <li>3. Evaluate business information problem and find out the data requirements of organization.</li> <li>4. Demonstrate the database schema, data modelling and normalization process with the help of example.</li> <li>5. Implement the database design using appropriate database tools.</li> </ol>	
6.	Credit Value	6 Credit	
7.	Total Marks	Max. Marks : 100	Min. Passing Marks: 35

<b>PART B: Content of the Course</b>		
Total No. of Lectures (in hours per week): 01 Hours per day		
Total Lectures: 60 Hours		
Unit	Topics	No. of Lectures
I	DBMS Concepts and architecture Introduction, Review of file organization techniques, Database approach v/s Traditional file accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, Functions of DBA and designer. Entities and attributes, Entity types, Value, Sets, Key attributes, Relationships, Defining the E-R diagram of database, <b>Various data models:</b> Basic concepts of Hierarchical data model. Network data model, and Relational data model, Comparison between the three types of models.	12
II	<b>Relational Data models:</b> Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints, Intension and Extension, <b>Relational Query languages:</b> Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union	12

	etc.	
III	Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations. SQL: Data definition in SQL, update statements and views in SQL QUEL & QBE: Data storage and definitions. Data retrieval queries and update statements etc.	12
IV	<b>Data Base Design:</b> Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and losslessjoin, problems with null valued and dangling tuples, multivalued dependencies. Distributed databases, protection, security and integrity constraints, concurrent operation on databases, recovery, transaction processing, basic concepts of object oriented data base system and design.	12
V	Case study of relational database management systems: Oracle and Microsoft access, Oracle tools.	12

### PART C: Learning Resources

Textbooks, Reference Books, Other Resources

#### Suggested Reading:

1. Data Base Management System by C.J. Date
2. Data Base Management System by Ullman
3. Fundamental of database system by Elmasri/Navathe the Benjamin / Cunnings Publishing company inc..
4. Data base design by Gio Wiederhold, McGraw Hill
5. Fundamental of Data Base Management System by Leon & Leon, Vikas Publishing House Pvt. Ltd.

#### Suggestive digital platform web links:

<https://nptel.ac.in/courses/106105175>  
<https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/pages/lecture-notes/>  
<https://nptel.ac.in/courses/106104135>

### Part D: Assessment and Evaluation

#### Suggested Continuous Evaluation Methods:

**Maximum Marks :** **100 Marks**

**Continuous Comprehensive Evaluation (CCE): 30 Marks**

**University Exam (UE): 70 Marks**

<b>Internal Assessment:</b> Continuous Comprehensive Evaluation (CCE)	Class Test	15
	Assignment/Presentation	15
		<b>Total Marks: 30</b>
<b>External Assessment:</b> University Exam (UE) Time: 03.00 Hours	Section (A): Short Answer type questions	05 × 05 = 25
	Section (B): Long Answer Type Questions	09 × 05 = 45
		<b>Total Marks: 70</b>

<b>PART A: Introduction</b>			
Program: Certificate	Class: II SEM	Year: I Year	Session: 2025-26
<b>Subject: Computer Application</b>			
1.	Course Code	BCAH 203	
2.	Course Title	<b>Digital Electronics</b>	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational)	<b>Minor-1</b>	
4.	Pre-Requisite (if any)	Basic knowledge of computer.	
5.	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> <li>• Understand and Represent Data in Different Binary Formats</li> <li>• Design, Simplify and evaluate Boolean Equations and Circuits</li> <li>• Explain and Analyze Basic Building Blocks of Digital Electronics and Computer</li> <li>• Design and Analyze Simple Combination &amp; Sequential Circuits</li> <li>• Analyze the Basic Computer Organization and Programming</li> <li>• Understand the Organization of I/O Devices and Computer Memory Mapping:</li> </ul>	
6.	Credit Value	4 Credit	
7.	Total Marks	Max. Marks : 100	Min. Passing Marks: 35

<b>PART B: Content of the Course</b>		
Total No. of Lectures (in hours per week): 01 Hours per day		
Total Lectures: 60 Hours		
Unit	Topics	No. of Lectures
I	Data types and Number systems, Binary number system, Octal & Hexadecimal number system, 1's & 2's complement, Binary Fixed-Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes.	12
II	Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra, Basic Boolean Law's, DeMorgan's theorem, MAP Simplification. Minimization techniques, K-Map, Sum of Product & Product of Sum.	12
III	Combinational & Sequential circuits, Half Adder & Full Adder, Full subtractor, Flip -flops- RS, D, JK & T Flip-flops, Multiplexer, Demultiplexer, Encoder, Decoder.	12

IV	I/O Interface, Properties of simple I/O devices and their controller, isolated versus memory-mapped I/O, Modes of Data transfer, Synchronous & Asynchronous Data transfer, Handshaking, Asynchronous serial transfer, I/O Processor	12
V	Auxiliary memory, Magnetic Drum, Disk & Tape, Semi-conductor memories, Memory Hierarchy, Associative Memory, Virtual Memory, Address space & Memory Space, Address Mapping, Page table, Page Replacement, Cache Memory.	12

**PART C: Learning Resources**

Textbooks, Reference Books, Other Resources

**Suggested Reading:**

1. BARTEE, "Digital Computer Fundamentals " TMH Publication
2. MALVINO, " Digital Computer Electronics " TMH Publication
3. MORRIS MANO, "Computer System Architecture PHI Publication

**Suggestive digital platform web links:**

<https://archive.nptel.ac.in/courses/106105163/>  
<https://archive.nptel.ac.in/courses/106106166/>  
<https://archive.nptel.ac.in/courses/106103180/>  
<https://archive.nptel.ac.in/courses/106102157/>  
<https://archive.nptel.ac.in/courses/106106134/>

**Part D: Assessment and Evaluation**

**Suggested Continuous Evaluation Methods:**

Maximum Marks : 70 Marks  
Continuous Comprehensive Evaluation (CCE): **30** Marks  
University Exam (UE): 70 Marks

<b>Internal Assessment:</b>	Class Test	15
Continuous Comprehensive Evaluation (CCE)	Assignment/Presentation	15
		<b>Total Marks: 30</b>
<b>External Assessment:</b>	Section (A): Short Answer type questions	05 × 05 = 25
University Exam (UE)	Section (B): Long Answer Type Questions	09 × 05 = 45
Time: 03.00 Hours		<b>Total Marks: 70</b>