DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO. SU/Sci./19/2016

It is hereby inform to all concerned that, on the recommendation of the Committees, the Hon'ble Vice-Chancellor has **accepted the syllabi in Honors Pattern of 1) B.Sc.Bio-Chemistry III & IV Semester, 2) B.Sc.Computer Science III & IV Semester, 3) B.Sc. Biotechnology III & IV Semester under Credit Based System** in his emergency powers under Section-14[7] of the Maharashtra Universities Act, 1994 on behalf of the Academic Council.

This is effective from the Academic Year 2016-17 & onwards as appended herewith under the Faculty of Science.

These syllabi are also available on the university website www.bamu.ac.in.

All concerned are requested to note the contents of the circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. SU/2016/4462-68

Date:- 20-07-2016.

★ ★ ★ ★ ★ ★ ★

******

22/7/16
Director,
Board of College and
University Development.

Copy forwarded with compliments to :-

1] **The Principal, Model College, Ghansawangi,**
Dr. Babasaheb Ambedkar Marathwada University.

Copy to :-

1] The Controller of Examinations,
2] The Section Officer, [B.Sc. Unit],
3] The Programmer [Computer Unit-1] Examinations,
4] The Programmer [Computer Unit-2] Examinations,
5] The In-Charge, E-Suvidha Kendra, [Professional Unit], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University,
6] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

N.B. : All are informed that to download a copy of syllabus from the above website.

-=**=-

JS/-200716/-*

NAAC 'A' Accreditation

Dr.Babasaheb Ambedkar Marathwada University

Aurangabad-431004.

Model College , Ghansawangi

SYLLABUS

B.Sc. Computer Science (Honours)

Second Year (III and IV Semester)

Model College, Ghansawangi.

Tel.No. : 02483-278607, Fax: 02483-278607

Syllabus for B.Sc.Computer Science(Honors), with effective from 2015-16

PATTERN OF EXAMINATION

A) Internal Class Test :

- A class tests is to be conducted after completion of 15-20 Lecturers for 20 Marks.

B) THEORY :-

- Each final theory paper will carry Maximum 30 marks; duration of examination of theory paper will be 2 hours.

C) PRACTICALS: - Total marks 50 marks

- Each Practical paper will carry Maximum 50 marks, duration of examination of each practical paper will be 1.5 hours.
- Internal Distribution of marks for each practical paper will be as follows.
  - Journal/ Record book (certified) 10 marks.
  - Oral/ viva 10 marks.
  - Practical Test 30 marks.

D) PROJECT:-

- Students of semester VI will have to perform ONE project of 150 marks. (

  A group of maximum 3 candidates will allow working on one project work)

- Internal Distribution of project marks will as follows.

  • Review 1 Report : 25

  • Review 2 Report : 25

  • Project work (certified) 25 marks.

  • Project work Presentation. 50marks.

  • Viva/ Oral. 25 marks.

Model College, Ghansawangi, Dr.Babasaheb Ambedkar Marathwada University, Aurangabad.

Curriculum Structure and Scheme of Evaluation: B.Sc(Computer Science.)

Sr. NO	Course Code	Name of the Subject	Scheme of Teaching				Scheme of Evaluation(Marks)				
			T hrs/week	P hrs/ week	Total hrs/ week	Total Credit	Class Tests + Tutorial	Univ. Th. Exam.	Uni. Pract. Exam.	Uni.Exam Duration (in hrs.)	Total Marks
III Semester											
1	CSC-E301	English-I	4	-	4	4	40	60	-	3	100
2	CSC-IL302	Second Language	4	-	4	4	40	60	-	3	100
3	Core-A CSC303T(A)	8086 Microprocessor	4	-	4	3	10+10 (20)	30	-	2	50
4	Core-B CSC303T(B)	Windows Operating System	4	-	4	3	10+10 (20)	30	-	2	50
5	Supportive CSC304T	Database Management System	4	-	3	3	10+10 (20)	30	-	2	50
6	Applied CSC305T	Basic of Object Oriented Programming using C++	3	-	3	3	10+10 (20)	30	-	2	50
7	Supportive CSC304P	Lab: Database Management	-	2	2	3	-		50	2	50

		System and Windows Operating System									
8	Applied CSC305P	Lab: OOPS using C++	-	2	2	3	-		50	2	50
9	CSC306	Life Skill Curriculum (Job Oriented Soft Skill)	2	-	2	2	10+10 (20)	30	-	2	50
10	CSC307	Life Skill Curriculum (Value Oriented Courses)	2	-	2	2	10+10 (20)	30	-	2	50

Model College, Ghansawangi, Dr.Babasaheb Ambedkar Marathwada University, Aurangabad.

Curriculum Structure and Scheme of Evaluation: B.Sc.(Computer Science)

Sr. NO	Course Code	Name of the Subject	Scheme of Teaching				Scheme of Evaluation(Marks)				
			T hrs/week	P hrs/ week	Total hrs/ week	Total Credit	Class Tests + Tutorial	Univ. Th. Exam.	Uni. Pract. Exam.	Uni.Exam Duration (in hrs.)	Total Marks
IV Semester											
1	CSC-E401	English-II	4	-	4	4	40	60	-	3	100
2	CSC-IL402	Second Language	4	-	4	4	40	60	-	3	100

3	Core-A CSC403T(A)	8086 Peripherals and Its Interfacing	3	-	3	3	10+10 (20)	30	-	2	50
4	Core-B CSC403T(B)	Software Engineering	3	-	3	3	10+10 (20)	30	-	2	50
5	Supportive CSC404T	Relational Database Management System	3	-	3	3	10+10 (20)	30	-	2	50
6	Applied CSC405T	Advances in OOPs using C++	3	-	3	3	10+10 (20)	30	-	2	50
7	Supportive CSC404P	Lab: RBDMS and Software Engineering.	-	3	3	3	-		50	2	50
8	Applied CSC405P	Lab: Advance OOPS using C++	-	3	3	3	-		50	2	50
9	CSC406	Life Skill Curriculum (Job Oriented Soft Skill)	2	-	2	2	10+10 (20)	30	-	2	50
10	CSC407	Life Skill Curriculum (Value Oriented Courses)	2	-	2	2	10+10 (20)	30	-	2	50

B.Sc. (Computer Science)

Semester III

Course: B.Sc.(C.S.) – III Sem. (Core –A) Paper Code: CSC303A			
8086 Microprocessor			
Objective: Students successfully completing this course should be able to: 1. Student will understand the 8086 assembly language. 2. Using this course student will familiarize with the architecture of microprocessors. 3. Make the student aware about the functional organization of physical components and architecture of a 8086 Microprocessor Kit.			
Sr. No	**Topic**	**Ref**	**No. of Lect.**
Unit-I			
	Introduction to Microprocessor and Microcomputer Introduction of Microprocessors, History, Microprocessor Instruction set and computer languages, From large Computers to Single chip microcontrollers. Microprocessor based personal computer system, Computer data formats.	*1*	**10**
Unit-II			

	8086 Hardware specification Microcomputer structure and operation,8086 internal architecture, Introduction to programming 8086 : Prog.lang. **Addressing Modes** Data addressing modes, Program memory addressing modes, Stack memory addressing modes	*2*	**10**
Unit-III			
	Data Movement Instructions MOV revisited: Machine language, the op-code, MOD field, resister assignment/M memory addressing, special addr.mode, PUSH/POP, initializing stack, Miscellaneous data transfer instructions: XCHG, LAHF & SAHF	*2*	**10**
Unit-IV			
	Arithmetic and Logical instructions Addition, subtraction and comparison, Multiplication and division,BCD and ASCII arithmetic, Basic logic Instructions, Shift and rotate.	*1*	**10**
Unit-V			
	Program control Instructions The JUMP group instruction: conditional and unconditional instruction. Flag Control Instruction, Call/RET, Procedures String Instruction: Compare string, scanning, etc.	*1*	**05**

Reference:

1. Microprocessors and Interfacing : Douglas Hall
2. The Intel Microprocessors: Architecture, programming and interfacing – By Barry B. Brey

Course: B.Sc.(C.S.) – III Sem.	**(Core –B)**		**Paper Code: CSC303T**
Windows Operating System			
Objective: Students successfully completing this course should be able to: 1. Course presents theoretical and hands-on instruction using the Microsoft Windows operating system environment. 2. Content includes customizing the environment, running multiple applications simultaneously, optimizing performance, managing file systems, optimizing disks, and transferring data between applications, performing file and folder operations. 3. This lectures will exploring the students for Windows registry, using troubleshooting tools, evaluating system performance, and evaluating installation issues.			
Sr. No	**Topic**	**Ref**	**No. of Lect.**
Unit-I			
	Introduction of Windows Operating System Introduction of windows operating system, Graphical user interface, benefits of graphical user interface, Screen attributes: icons and bars, Features and accessories of the Windows program, Objects and their properties	*1*	**10**
Unit-II			
	Structure and Input process	*2*	**10**

	Structure of windows operating system, Mouse vs. keyboard input, Touchpad Input, Virtual Keyboard, Different types of advance input in windows operating system and its advantages.		
Unit-III			
	Program management Creating, saving and editing documents Concurrent execution of programs , Sharing data between programs.	*2*	**10**
Unit-IV			
	Folder and file management Working with files , Naming files ,Copying and moving files,. Deleting files, Managing folders, Creating and Viewing folder, Expanding and collapsing. **Management Tools** DOS sessions, Explorer , Memory configuration , Safe mode, Install and uninstall applications Setup/troubleshooting issues.	*1*	**10**
Unit-V			
	Control panel Customizing screens:. Screen colors , Patterns , Spacing icons, Selecting time/date Customizing printing: Changing the print queue,. Configuring the printer(s), Adding printers, Working with fonts: changing, removing, adding Customizing mouse and keyboard use , System properties and the device manager	*1*	**05**

Core References:

1. Microsoft Windows Operating System Essentials by Tom Carpenter, Sybex (9 February 2012).
2. Windows Internals: The Design and Implementation of the Windows Operating System by Matt Pietrek, Addison Wesley; 01 edition (31 May 1993)

Course: B.Sc.(C.S.) – III Sem.	**Supportive**	**Paper Code: CSC304T**

Database Management System

Objective: Students successfully completing this course should be able to:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational,

hierarchical, and network models.

3. To understand and use data manipulation language to query, update, and manage a database.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
	Introduction General introduction to database systems; Database - DBMS distinction, approaches for building a database, data models, database management system, three-schema architecture of a database, challenges in building a DBMS, various components of a DBMS	*1*	**10**
Unit-II			
	Data Models E/R Model - Conceptual data modeling - motivation, entities, entity types, various types of attributes, relationships, relationship types, E/R diagram notation, examples.	*1*	**10**
Unit-III			
	Structured Query Language (SQL) Introduction, data definition in SQL, table, key and foreign key definitions, update behaviors. Querying in SQL - basic select-from-where block and its semantics, nested queries - correlated and uncorrelated, notion of aggregation, aggregation functions group by and having clauses, embedded SQL.	*2*	**10**
Unit-IV			

	Data Normalization Dependencies and Normal forms - Importance of a good schema design, problems encountered with bad schema designs, motivation for normal forms, definitions of 1NF, 2NF.	*2*	**10**
Unit-V			
	Data Storage, Indexes and Transactions File organizations, primary, secondary index structures and various index structures.Transaction processing - concepts of transaction processing, ACID properties, and concurrency control, locking based protocols.	*1*	**05**

Core References:

1. An Introduction to Database System By Bipin C Desai
2. H Garcia-Molina, JD Ullman and Widom, Database Systems: The Complete Book,2nd Ed., Prentice-Hall, 2008.
3. A Silberschatz, H Korth and S Sudarshan, Database System Concepts, 6th Ed., McGraw-Hill, 2010.
4. R Elmasri, S Navathe, Fundamentals of Database Systems, 6th edition, Addison-Wesley, 2010.
5. R Ramakrishnan, J Gehrke, Database Management Systems, 3rd Ed., McGraw-Hill, 2002.

Web Reference

1. http://people.inf.elte.hu/nikovits/DB2/Ullman_The_Complete_Book.pdf
2. http://www.cs.umb.edu/cs630/hd1.pdf

Course: B.Sc.(C.S.) – III Sem. Supportive CSC405P			Paper Code:
Lab: Database Management System & Windows Operating System			
Objective: student understands the practical application of database management system and windows operating system.			
Sr. No	**Topic**	**Ref**	**No. of Practical**
Database management system			
1	**Experiment**		**25**
	• Basic Introduction to SQL • Commands of SQL(DML,DCL and DDL)		
2 Windows Operating System			
	Experiment		**20**
	• Study the file structure of windows operating system • Windows operating system installation • Study and use of system file available in windows operating system.		

Course: B.Sc.(C.S.) – III Sem. (Applied) CSC306T	Paper Code:
Basics of Object Oriented Programming Using C++	
Objective: Students successfully completing this course should be able to:	

1. To expose students to concept of object oriented programming using C++.
2. Student will elaborate the algorithmic thinking and problem solving and impart moderate skills in programming using C++ Language in an industry-standard.
3. Introduce students to learn basic features of C++ language, design and execute the C++ program dynamically.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
	Introduction of OOP Procedural Vs Object Oriented Programming, Basic concepts of Object Oriented Programming, Class, Object, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing. Benefits and applications of OOP.	*1*	**15**
Unit-II			
	Introduction to C++ History and overview of C++, C++ program structure. Reference variables, Scope resolution operator, Member de-referencing operators, new and delete, cin and cout,	*2*	
Unit-III			
	Functions in C++: Function prototype, Call by reference (using reference variable), Return by reference, Inline function, Default arguments, Const arguments.		**10**

	Function overloading Different numbers and different kinds of arguments,		
Unit-IV			
	Objects and Classes Specifying a class, private and public, Defining member functions, Nesting of member function, Object as data types, Memory allocation for objects, static data members and member functions. Array of objects, Objects as function argument, returning objects, Friend function and its characteristics.	*3*	**10**
Unit-V			
	Constructors and Destructors Introduction, default and parameterized constructors, Multiple constructors in a class, Copy Constructor, Destructors **Operator Overloading** Overloading unary operators, Rules for operator overloading, Overloading without friend function and using friend function, Overloading binary operators such as arithmetic and relational operators, Concatenating Strings, Comparison operators	*1*	**10**

Core Reference:

1. Object Oriented Programming with C++ E. Balagurusamy, Tata McGraw-Hill Publishing
2. Object Oriented Programming In C + + Robert Lafore, Galgotia
3. Let us C++ Yeshwant Kanetkar; bpb publication

.Course: B.Sc.(C.S.) – III Sem. Applied			Paper Code: CSC306P
Lab: Basic Object Oriented Programming Using C++			
Objective: student understands the practical and logical application of programming language. The use of C++ logical statement in real time example solving.			
Sr. No	**Topic**	**Ref**	**No. of Practical**
Unit-I			
1	**Installation of C Program**		**10**
	Download and installation of C++ programming software. Discussion on available c software and use of each individually.		
2	**Input Output program**		**10**
	Minimum 10 program on input and output statement, data type and constant.		
3	**List of Program**		**25**
	• Find Area, Perimeter of Triangle & Rectangle. • Find maximum amongst 3 numbers. • Program for nested loops. • Program to Calculate x^y		

	• Program to check Prime Number, Program reverse of digit. • Program to find Armstrong Number. • Program to print the Fibonacci Series • Searching and element from array. • Transpose of matrices • Multiplication of matrices • Sorting array using the bubble sort technique • Program for factorial of number.		

Note: minimum five programs covering the each unit of the syllabus.

B.Sc. (Computer Science)

Semester IV

Course: B.Sc.(C.S.) – IV Sem. (Core –A) Paper Code:CSC403T			
8086 Peripheral and Its Interfacing			
Objective: Students successfully completing this course should be able to: 1. Upon successful completion of this course, student will understand the basic concept of 8086 microprocessor peripheral and its interfacing. 2. Student will understand the physical structure of computer on the view of microprocessor.			
Sr. No	**Topic**	**Ref**	**No. of Lect.**
Unit-I			
	8086 Hardware Specification Power supply requirements, DC characteristics, 8086 Pin-out: minimum mode pins and maximum mode pins.,8284A Clock generator: pin-out, Internal Block diagram and it's operation. (includes Ready and wait state operation), Bus buffering and latching: Demultiplexing of buses, 8086 demultiplexing, fully buffered 8086. Bus Timing: basic bus operation, Read bus cycle, write bus cycle.	*1*	**10**
Unit-II			
	Memory Interfacing Memory Pin Connections: Address Connections, Data connections, selection connections and Control connections, 8086 Memory Interface(16-bit) : 16-Bit Bus Control, separate bank Decoder, 80386 and 80486 Memory Interface: Memory Banks, 32-Bit Memory Interface.	*1*	**10**
Unit-III			

	8254 Peripheral Interface 8-Bit and 16-Bit 8254 PPI , architecture of 8254, Basic Description of the 8254a, Programming the 8255, instruction set of 8254.	*1*	**10**
Unit-IV			
	8255 Peripheral Interface 8-Bit and 16-Bit 8255 PPI, architecture of 8255, Basic Description of the 8255a, Programming the 8255, instruction set of 8255.	*1*	**10**
Unit-V			
	8275 Peripheral Interface 8-Bit and 16-Bit 8275 PPI , architecture of 8275, Basic Description of the 8275a, Programming the 8275, instruction set of 8275.	*1*	**05**

Core Reference:

1. Microprocessors and Interfacing: Douglas Hall.
2. The Intel Microprocessors By Barry B. Brey, PHI Publishers

Course: B.Sc.(C.S.) – IV Sem. (Core –B) Paper Code:CSC403B
Basics of Statistical Methods
Objective: Students successfully completing this course should be able to: 1. To acquaint students with various statistical methods and their applications in different Fields. 2. To cultivate statistical thinking among students. 3. To develop skills in handling complex problems in data analysis and research

design.

4. To prepare students for future courses having quantitative components.

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
	Introduction and basic concepts of Statistics Definition of Statistics, Scope and importance of Statistics. Primary and Secondary data, Types of data : qualitative, quantitative, discrete, continuous, cross-section, time series, failure, industrial, directional data	*1*	**10**
Unit-II			
	Graphical Representation of Data Graphical presentation: Histogram, frequency polygon, frequency Curves Diagrammatic presentation: Bar diagrams, Pi diagram, scatter diagram.	*2*	**10**
Unit-III			
	Statistical Measure for Data Computation of mode, Merits and demerits of mode. Median: Computation for frequency and non-frequency data, computation. Merits & demerits of median. Geometric mean (G.M.) computation for G M ,Merits demerits and applications of G.M.Harmonic Mean (H M) computation for frequency, non-frequency data, merits, demerits		
Unit-IV			
	Descriptive statistics: the histogram, the density		

	scale, cross----tabulation, the average And the SD and their relationship to the histogram, the median, the normal approximation for data, percentiles, percentiles and the normal curve, measurement error. **Correlation**: the scatter diagram, the correlation coefficient, properties of the correlation coefficient , Basics of Regression. **Probability**: basics of probability, conditional probabilities, the multiplication rule, Independence.		
Unit-V			
	Classification of Data Classification of data: frequency distributions, inclusive and exclusive methods of classification. **Normal distribution** Tests of significance: null and alternative hypotheses, test statistics and significance levels, the standard error for a difference, comparing two sample averages, comparing two proportions.	*2*	**10**

Core References:

1. "Numerical Computational Methods" - Dr. P.B.Patil, Narosa Publication Hous.
2. Statistical Methods By S.C.Gupta and V.K. Kapoor.

Course: B.Sc.(C.S.) – IV Sem. Supportive Paper Code: CSC404T			
Relational Database Management Systems			
Objective: Students successfully completing this course should be able to: 1. To understand the different issues involved in the design and implementation of a Relational database management system. 2. To study the physical and logical database designs, relational data modeling. 3. To understand the concept of query optimization and advance data normalization. 4. To understand mechanism for Transaction Processing and database recovery methods.			
Sr. No	**Topic**	**Ref**	**No. of Lect.**
Unit-I			
	Introduction General introduction to database systems; RDBMS distinction, approaches to building a Relational database, Relational data models, database management system, RDBMS schema and architecture.	1	**10**
Unit-II			
	Relational Data Model: Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys, relational algebra operators: selection, projection, cross product, various types of joins, division, example queries, tuple relation calculus, domain relational calculus, converting the database specification in E/R notation to the relational schema.	*1*	**10**

Unit-III			
	Query Optimization Introduction Data Definition Language, Data Manipulation Language, Data Control Language SQL and their purpose, transformation of relational expressions, estimating cost and statistics of expression, choosing evaluation plans, linear and bushy plans, and dynamic programming algorithms.	*1*	**10**
Unit-IV			
	Advanced Data Normalization and Handling Dependencies Motivation for normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, algorithms for 3NF and BCNF normalization, multi-valued dependencies and 4NF, join dependencies and definition of 5NF.	*1*	**10**
Unit-V			
	Advanced Indexing and Transactions Processing Hash-based, dynamic hashing techniques, multi-level indexes, B+ trees. Transaction Processing fundamentals, locking based protocols for CC, error recovery and logging, undo, redo, undo-redo logging and recovery methods..	*2*	**05**

Core References:

1. An Introduction to Database System By Bipin C Desai, Galgotia Publications Pvt Ltd, New Delhi (2012)

2. H Garcia-Molina, JD Ullman and Widom, Database Systems: The Complete Book,2nd Ed., Prentice-Hall, 2008.
3. A Silberschatz, H Korth and S Sudarshan, Database System Concepts, 6th Ed., McGraw-Hill, 2010.
4. R Elmasri, S Navathe, Fundamentals of Database Systems, 6th edition, Addison-Wesley, 2010.
5. R Ramakrishnan, J Gehrke, Database Management Systems, 3rd Ed., McGraw-Hill, 2002.

Web Reference

4. http://people.inf.elte.hu/nikovits/DB2/Ullman_The_Complete_Book.pdf
5. http://www.cs.umb.edu/cs630/hd1.pdf

Course: B.Sc.(C.S.) – II Sem. Supportive			**Paper Code: CSC404P**
Lab: Relational Database Management Systems & Basic Statistical Method			
Objective: student understands the practical application of Relational Database Management system and Basic Statistical Method.			
Sr. No	**Topic**	**Ref**	**No. of Practical**
Relational Database Management Systems			
1	**Experiment**		**25**
	• Introduction of PLSQL • Basic programming of plsql • Minimum 20 program of plsql.		

2 Basic Statistical Method			
	Experiment		**20**
	• Introduction and study of SPSS and Matlab Tool • Practical on each technique in SPSS or Matlab .		

Course: B.Sc.(C.S.) – IV Sem.	**Applied**	**Paper Code: CSC405T**
Advances in Object Oriented Programming Using C++		
Objective: Students successfully completing this course should be able to: 1. An understanding of all the components of advance C++. 2. An understanding of advanced practical issues, including memory management, 3. The course will helps to student for complex declarations and expression evaluation.		

Sr. No	Topic	Ref	No. of Lect.
Unit-I			
	Inheritance Derived and base class, Specifying the derived class, Accessing base class members, public and private Inheritance, Single Inheritance, The protected access specifier, Derived class constructors, Multilevel and Hierarchical Inheritance, Multiple Inheritance, Ambiguity in multiple Inheritance, virtual base classes, Abstract base classes.	*1*	**15**
Unit-II			
	Virtual function & Polymorphism Introduction, Pointer to object, Pointer to derived class, Overriding member functions, Virtual function, Rules for virtual functions, Pure virtual function.	*2*	
Unit-III			
	Working with Files Introduction, Classes for file Stream Operation, Opening & closing files, Detection of end of file, file modes, File pointer & manipulator, Sequential input & output operations, Updating a file: Random access, Writing an object to disk, Reading an object from disk, Binary Vs. Character files, The Fstream class, File pointers, Specifying the position, Specifying the offset The tellg() function, Disk I/O	*2*	**10**

	with member functions		
Unit-IV			
	Templates Introduction, Class templates, class templates with multiple parameters, function templates, function templates with multiple parameters, Overloading of template functions, member function templates. Introduction to Standard Template Library- STL Components of STL, Containers, Algorithms, Iterators, Applications of Container Classes.	*3*	**10**
Unit-V			
	Exception handling Exception Handling Mechanism, The try block, the catch exception handler The throw statement The try/throw/catch sequence Exception Specifying exceptions.	*1*	**10**

Core Reference:

1. Object Oriented Programming with C++ E. Balagurusamy, Tata McGraw-Hill Publishing
2. Object Oriented Programming In C + + Robert Lafore, Galgotia
3. .Let us C++ Yeshwant Kanetkar; bpb publication

.

Course: B.Sc.(C.S.) – IV Sem. Applied			Paper Code: CSC405P
Lab: Advances in Object Oriented Programming Using C++			
Objective: student understands the practical and logical application of programming language. The use of advance C++ concepts such has file handling, pointer and graphics for real time programming.			
Sr. No	**Topic**	**Ref**	**No. of Practical**
Unit-I			
1	**Inheritance**		**15**
	Any 10 program on inheritance concept		
2	**Virtual Function and polymorphism**		**15**
	Minimum 10 program on Virtual Function and polymorphism		
3	**File Handling and Exception Handling**		**15**
	10 programs on file handling and exception handling.		

Note: minimum five programs covering the each unit of the syllabus.