DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the **revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under** :-

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

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

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/SU/SCI./
2015/3761-4160
Date:- 16-06-2015.

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Director,
Board of College and
University Development.

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Copy forwarded with compliments to:-

1] The Principals, affiliated concerned colleges,
Dr. Babasaheb Ambedkar Marathwada University

Copy to :-

1] The Controller of Examinations,
2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,
3] The Superintendent, [B.Sc. Unit],
4] The Superintendent, [M.Sc. Unit],
5] The Programmer [Computer Unit-1] Examinations,
6] The Programmer [Computer Unit-2] Examinations,
7] The Record Keeper.

-=**=-

S*/-160615/-

NAAC Re-accredited with Grade 'A'

Dr. Babasaheb Ambedkar Marathwada University

Aurangabad-431004

SYLLABUS

B.Sc. (Computer Science) (Optional)

Second Year

(effective from 2015-16)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

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

Semester III									
1	CSO7	Advance C Programming	3		3	50	-	2	50
2	CSO8	Data Structure	3		3	50	-	2	50
3	CSO9	Advance C Programming	-	3	3	-	50	3	50
4	CSO10	Data Structure	-	3	3	-	50	3	50
Total of Semester – III			6	3	9	100	100		200
Semester IV									
1	CSO11	Programming in CPP	3		3	50	-	2	50
2	CSO12	DBMS Using SQL	3		3	50	-	2	50
3	CSO13	Programming in CPP	-	3	3	-	50	3	50
4	CSO14	DBMS Using SQL							
Total of Semester – IV			6	3	9	100	100		200

B.Sc. (Computer Science) (Optional)
Semester III

Paper No.: CSO7 **B.Sc.(C.S.) (Opt.) Semester : III**

Paper title: Advance C Programming

Unit –I		
	Functions Introduction, types of functions. Defining functions, Arguments, Function prototype, actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion. **Structure & Union** Structure: Introduction, Declaration and initializing structure, Accessing structure members, Nested structures, Arrays of structure, typedef statement. Unions: Declaration, Difference between structure and union	
Unit –II		
	Pointers: Introduction, Memory organization. Declaration and initialization of pointers. The pointer operator * and &, De-referencing, Pointer expression and pointer arithmetic, Pointer to pointer. **Storage Class & Library Functions:** Storage classes, Scope, visibility and lifetime of variable, block and file scope, auto, extern, static and register storage classes. String handling functions: strcpy(), strcmp(), strcat(), strlen(), strupr(), strlwr(), gets(), puts() **Data conversion functions from stdlib.h:** atoi(), atol(), atof(), itoa(), ltoa(), random(), calloc(),malloc(),exit(), abs(), toupper(), tolower() **Preprocessor Directives:** File inclusion and conditional compiler directives, Macro substitution, #define, #if, #ifdef, #else, #elif, #endif	
Unit –III		
	File handling: Introduction, Opening & closing a file, Input/Output operations on files, text and binary files, getc(), putc() function. File copy program, fprintf() and fscanf(). fread() and fwrite() function. Writing and reading records from binary file, Appending, modifying and deleting a record from file, Random access functions fseek(), rewind(), flushall(), remove(), rename(). **Command line arguments**: use of argc and argv. **Graphics in C:** Introduction: initgraph() and detectgraph() function, Drawing object in C, Line, Circle, Rectangle, Ellipse, Changing foreground & background colors, Filling object by color, outtextx() function.	

Books:

1) Let us C Solutions : Y.P. Kanetkar [bpb publication]
2) Programming in C : E. Balagurusamy. [Tata macgraw hill]
3) Programming in C : Goterfried [Shaums Series]
4) Graphics Under C : Y. Kanetkar
5) Spirit of "C" : Moolish Kooper.
1) Test your Skills in C : Y.Kanetkar

Paper No.: CSO8 **B.Sc.(C.S.) (Opt.) Semester : III**
Paper title: Data Structure

Unit –I		
	Introduction to Data Structure: Introduction, Basic Terminology : Data item, Fields, Records, Files, Entity, Attributes Data Organization and Data Structure **Arrays** Representation of Linear Arrays, Traversing, Insertion and Deletions, Sorting & Searching Algorithms, Multidimensional Arrays : 2D & M-D Concept, Record: Record Structures, Representation in Memory	
Unit –II		
	Linked List Concept of Linked List, Representation of linked List in memory, Traversing a linked list, Searching a linked list : sorted and unsorted, Insertion & Deletion in Linked List Header Linked List & Two way List.	
Unit –III		
	Stacks, Queues , Recursion Stack: Operation , Array Representation of Stack, linked representation of stack, Arithmetic Expression, POLISH & POSTFIX, Application of stacks: Quicksort, Recursion. Queue: Representation of queues & link, Types of Queues : Deques & Priority Queues	

Books:

1) Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.
2) Fundamentals of Data structures, by Horowitz and Sahani (Galgotia Publicaztions).
3) An introduction to data structures and application, by Jean Paul Tremblay & P al G. Sorenson (McGraw Hill).
4) Data Structures, by Tannenbaum, (PHI).

Course: B.Sc.(C.S.) **Semester : III**
Paper title: Practical Based on Adv. C Programming **Paper No.: CSO9**

1. Swapping of numbers by using call by reference.
2. Program to pass array to function.
3. Program for passing structure pointer to function.
4. String manipulation function e.g. string copy, concatenation, compare, string length, reverse.
5. Program for reading/writing text file.
6. Program for reading/writing binary file.
7. File copy program.
8. Program to modify a record from binary file.
9. Program to delete a record from binary file.
10. Program on conditional compiling.
11. Program on macro substitution.
12. Program for data conversion.
13. Program to draw simple pictures (human face, clock, hut, etc.) using graphics functions.
14. Program using command line arguments.
15. Program to demonstrate the storage class.
16. Program to sort names.

Course: B.Sc.(C.S.) **Semester : III**
Paper title: Practical Based on Data Structure **Paper No.: CSO10**

Assignments: Write the Program using C (if applicable) :

1. Write a program using DIV(J,K) which reads a positive integer N>10 and determines whether or not N is a prime number.
2. Write a program which counts the number of particular character/word in the String.
3. Write a program which reads words WORD1 and WORD2 and then replaces each occurrence of word1 in text by word2.
4. Write the programs for traversing of n item using the array.
5. Write the programs for insertion and deletion of n item using the array.
6. Implement Linear and binary search algorithm using C.
7. Implement Bubble sort using C.
8. Write the programs for traversing of n item from the linked list.
9. Write the programs for push and pop operation using the stacks.
10. Write the programs for insertion and deletion of n item from the queues.

B.Sc. (Computer Science) (Optional)
Semester IV

Paper No.: CSO11 **B.Sc.(C.S.) (Opt.) Semester : IV**
Paper title: Programming in C++

Unit –I

Introduction of OOPs

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, History and overview of C++, C++ program structure. Reference variables, Scope resolution operator, Member de-referencing operators, new and delete, cin and cout, The endl and setw manipulator.

Functions in C++:

Function prototype, Call by reference (using reference variable), Return by reference, Inline function, Default arguments, Const arguments.

Unit –II

Function overloading:

Different numbers and different kinds of arguments

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.

Unit –III

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.

Books:

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++ YeshwantKanetkar; bpb publication

Paper No.: CSO12 **B.Sc.(C.S.) (Opt.) Semester : IV**
Paper title: DBMS Using SQL

Unit –I

Basic Concept

Data Definition, Types of Data, Record and File, File based System & Processing Database System Application, Purpose of Database System Abstraction & Data Integration Three level Architecture proposal for a DBMS. Component of a DBMS: Users, Facilities &Structure. Advantageous & Disadvantageous of DBMS.

Data Modeling & Design

Data Association – Entities , Attributes & Association, Relationship among Entities, Representation of Association & Relationships

Data Model: Importance of Data Model, Types of Data Model: Relational, E-R, Semi-structured, Object-Oriented, Network & Hierarchical Data Model. Advantageous & Disadvantageous of above model.

Unit –II

Entity-Relationship Data Model

Entity , Entity Set, Types of Entities, Strong & Weak Entity, Representation Attribute, Types of Attributes , Representation Relationship : Binary & Ternary , Representation Mapping Cardinality, Entity-Relationship Design Issues

Relational Data Model

Basic Structure of Relational Data Model, Database Schema Constraints : Integrity Rule 1 & 2

Normal Form: Anomalies, Functional Dependency, Dependency Diagram, First Normal Form, Second Normal Form, Third Normal Form, Conversion from Universal to 1 NF, 1NF to 2 NF and 2NF to 3NF.

Unit –III

Relational Algebra

Basic Operation – Union , Intersection, Difference and Cartesian Product Advance Operation- Projection, Selection, Join (Inner and Outer) & Division Examples based on above Operation. Relation Algebraic Queries.

Introduction to Oracle

Oracle Software : Versions of Oracles, Products of Oracle, Tools of Oracle

SQL: Logging to SQL/ iSQL, SQL plus worksheet.

Books:

1) Database System Concepts (Sixth Edition) AviSilberschatz, Henry F. Korth,S. Sudarshan
2) An Introduction to Database Systems byBipin C. Desai
3) Easy Oracle SQL: Get Started Fast Writing SQL Reports with SQL*Plus By John Garmany.
4) Mastering Oracle SQL By Sanjay Mishra, Alan Beaulieu

Course: B.Sc.(C.S.) **Semester : IV**
Paper title: Practical Based on Programming in C++ **Paper No.: CSO13**

Minimum 12 Practicals to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Course: B.Sc.(C.S.) (Opt.) **Semester : IV**
Paper title: Practical Based on Database Management System **Paper No.: CS O14**

1) Design five schemas for any organization like: College, school, hospital, travel agency, company, bank etc.
2) Normalize the above five selected schemas as per 1NF,2NF and 3NF
3) Draw E-R Diagram for the same.
4) Solve at least ten Relational Algebraic Queries

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./विज्ञान/अभ्यासक्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधीतांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वितीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

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[31]	B.Sc. Geology	Semester-III & IV,
[32]	B.A. Statistics with minor changes	Semester-I & II,
[33]	B.A. Statistics	Semester-III & IV,
[34]	B.Sc. Statistics with minor changes	Semester-I & II,
[35]	B.Sc. Statistics	Semester-III & IV,
[36]	B.Sc. Industrial Chemistry	Semester-III & IV,
[37]	B.Sc. Horticultural	Semester-I & II,
[38]	B.Sc. Dry land Agriculture	Semester-I & II,
[39]	B.Sc. Microbiology	Semester-III & IV,
[40]	M.Sc. Computer Science	Semester-I to IV,
[41]	M.Sc. Information Technology	Semester-I to IV.

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,
औरंगाबाद-४३१ ००४.
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/
६५९९-७०२
दिनांक :- २७-०५-२०१४.

संचालक,
महाविद्यालये व विद्यापीठ
विकास मंडळ.

****

या परिपत्रकाची एक प्रत :-

१) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
२) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थंळावर उपलब्ध करुण देण्यात यावेत.
४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Revised Syllabus of

B.Sc. First Year

Computer Science (Optional)

Semester-I & II

[Effective for June 2014-15]

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Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

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

Sr. No.	Course Code	Name of the Subject	Scheme of Teaching			Scheme of Evaluation(Marks)			
			T Hrs/ Week	P Hrs/ Week	Total Hrs/ Week	University Theory Exam.	University Practical Exam.	Duration	Total Marks
Semester I									
1	CSO1	Computer Fundamentals	3	-	3	50	-	2	50
2	CSO2	Digital Electronics	3	-	3	50	-	2	50
3	CSO3	Office Suite & Digital Electronics	-	3	3	-	50	3	50
Total of Semester – I			6	3	9	100	50		150
Semester II									
4	CSO4	Operating System I	3		3	50	-	2	50
5	CSO5	Programming in C	3		3	50	-	2	50
6	CSO6	Operating System & Programming in C	-	3	3	-	50	3	50

Total of Semester – II	6	3	9	100	50		150

SUBJECT: Comp. Sci. (opt.) Semester: I Hours/week: 3

Code : CSO1

Computer Fundamentals

Objective: *To impart basic introduction to computer hardware components, computer numbering, how the CPU works, fundamental about algorithms and flowchart as well as different type of software.*

Sr. No	Topic	Ref.	No. of Lect.
1.	**Fundamentals of Computer System**		3
	• Introduction.	1/1	
	• Characteristics & features of Computers.		
	• Components of Computers.		
	• Organization of Computer.		
2.	**Algorithm and Flowcharts**		6
	• Algorithm	2/1	3
	o Definition		
	o Characteristics		
	o Advantages and disadvantages		
	o Examples		
	• Flowchart	3/3	3
	o Definition		
	o Define symbols of flowchart	3/ 4	
	o Advantages and disadvantages		
	o Examples		
3.	**Computer Generation & Classification**		3
	• Generation of Computers : First to Fifth	2/12	
	• Classification of Computers		
	• Distributed & Parallel computers		
4.	**Computer Languages**		3
	• Types of Programming Languages	2/9	
	o Machine Languages		
	o Assembly Languages		
	o High Level Languages		

- Assembler, Linker, Loader, Interpreter & Compiler. 2/9

5. Computer Memory **3**

- Memory Cell & Organization 2/4
- Types of Memory (Primary And Secondary) 2/4
  - RAM
  - ROM
  - PROM
  - EPROM
  - Secondary Storage Devices (FD, CD, HD, Pen drive, DVD, Tape Drive, DAT)

6. I/O Devices **3**

- Input Devices : 1/4
  - Touch screen , OMR, OBR , OCR, Light pen
- Output Devices : 1/4
  - Scanners, Digitizers, Plotters, LCD
  - Plasma Display, Printers

7. Processor **6**

- Structure of Instruction 2/5
- Description of Processor
- Processor Features
- RISC & CISC

8. Operating system Concepts **6**

- Why Operating System 2/10 2
- Functions of Operating System
- Types of Operating System 2/10 4
  - Batch O.S.
  - Multiprogramming O.S.
  - Time Sharing O.S
  - Personal Computers O.S.
  - Network O.S.

Core Reference:

1. Fundamentals of Information Technology
   By Chetan Srivastava, Kalyani Publishers

2. Fundamentals of Computers

   By V. Rajaraman, PHI Publication, IVth Edition.

3. Fundamentals of Programming

   By Raj K. Jain, S. Chand Publication

Additional Reference:

1. Computer Today

   By Suresh K. Basandra, Galgotia Publication, Updated Edition

2. Computer Fundamental

   By B. Ram, BPB Publication.

SUBJECT: Comp. Sci. (opt.) Semester: I Hours/week: 3

Code : CSO2

Digital Electronics.

Objective: *To impart basic knowledge in digital logic and circuits and to introduce basic concepts of data communications. Student will be able to learn basic concepts of digital logic and the design of basic logic circuits using commonly used combinational and sequential circuits*

Sr. No	Topic	Ref.	No. of Lect.
1	**Number Systems and Arithmetic**	1/1	**10**
	Decimal Number System & Binary Number System		1
	Decimal to Binary conversion(Double-dabble method only)		1
	Binary to Decimal Conversion		1
	Binary Arithmetic : Binary addition, subtraction, multiplication & division		2
	Hexadecimal number system , Hexadecimal to binary, binary to Hexadecimal, Hexadecimal to decimal conversion		2
	Hexadecimal arithmetic: Addition, subtraction, multiplication & division		2
	Binary subtraction using 1' complement, 2's complement method		1
2	**Boolean Algebra and Logic Gates**	1/3	**7**
	Postulates of Boolean Algebra		1
	Theorems of Boolean Algebra: Complementation , commutative, AND, OR, Associative, Distributive, Absorption laws , De morgan's theorems		2
	Reducing Boolean expressions		1
	Logic Gates : AND, OR, NOT, Ex-OR, Ex-NOR		1

	NAND as Universal building block		1
	Logic diagrams of Boolean expressions Boolean expressions for logic diagrams		1
3	**Minimization Techniques**	1/5	**5**
	Introduction , Minterms and Maxterms		1
	K-Map, K-map for 2 variables		1
	K-map for 3 variables		1
	K-map for 4 variables		2
4	**Combinational and Arithmetic Logic Circuits**	1/6	**7**
	Half Adder & Full Adder		1
	Binary parallel Adder		1
	Half Subtractor, Full Subtractor		1
	Adder/Subtractor in 2's complement system		1
	BCD to Decimal decoder		1
	2 : 4 demultiplexer		1
	4 line to 1 line multiplexer		1
5	**Flip Flops**	1/7	**6**
	Introduction : RS FF		1
	Clocked RS FF, D FF		1
	Triggering, preset and clear		1
	JK FF , T FF , Race around condition		2
	Master slave FF		1
6	**Counters**	1/8	**7**
	Introduction : Asynchronous/ ripple counter		1
	Modulus Counter , MOD-12 counter		1
	Synchronous counter : Synchronous serial & synch parallel counter		2
	BCD counter		1
	Ring counter		1
	Johnson counter		1
7	**Shift Registers**	1/9	**3**

Introduction, Buffer register	1
Serial- in serial –out, Serial-in parallel-out	1
Parallel-in serial-out, parallel-in parallel-out	1

Core Reference:

1. Digital Electronics and Micro-Computers – R. K. Gaur, Dhanpat Rai Publication

Additional Reference:

1. Digital Electronics and Logic Design – N. G. Palan, Technova Publication

SUBJECT: Comp. Sci. (opt.) Semester: I Hours/week: 3

Code : CSO3

Office Lab

Objective: To impart the student hands on practice so that students should be able to: *Create, Save, Copy, Delete, Organize various types of files and manage the desk top in general, use a standard word and spread-sheet processing package exploiting popular features.*

- **GUI Operating System:** Mouse Practice, Starting, Login, Shutdown, Exploring Directories, Resizing, Moving, Minimizing, closing of software windows, familiarization with file icons, Launching Applications, Deleting, Renaming files, Managing Directories, Searching for files, Using Accessories.

- **Web Browser:** Basic Browsing, Buttons: forward, backward, home, adding to favorites, stop, save, save as, Saving an Image from the Web, printing, Specifying a Home Page, **Browsing**: Using Web URLs, Anatomy of a URL, Membership Websites: Signing up for email service, **Searching:** Academic Search on the web.

- **Word Processing Tool**: Menus, Shortcut menus, Toolbars, Customizing toolbars, Creating and opening documents, Saving documents, Renaming documents, Working on multiple documents, Close a document ; **Working With Text** :Typing and inserting text, Selecting text, Deleting text, Undo, Formatting toolbar, Format Painter, Formatting Paragraphs: Paragraph attributes, Moving, copying, and pasting text, The clipboard, Columns, Drop caps; **Styles** : Apply a style, Apply a style from the style dialog box, Create a new styles from a model, Create a simple style from the style dialog box, Modify or rename a style, Delete a style; **Lists** : Bulleted and numbered lists, Nested lists, Formatting lists **Tables** :Insert Table button, Draw a table, Inserting rows and columns, Moving and resizing a table, Tables and Borders toolbar, Table properties **Graphics** :Adding clip art, Add an image from a file, Editing a graphic, AutoShapes; **Spelling and Grammar**: AutoCorrect, Spelling and grammar check, Synonyms, Thesaurus; **Page**

Formatting: Page margins, Page size and orientation, Headers and footers, Page numbers, Print preview and printing.

- **Spreadsheet Basics**: Screen elements, Adding and renaming worksheets, The standard toolbar - opening, closing, saving, and more; **Modifying A Worksheet**, Moving through cells, Adding worksheets, rows, and columns, Resizing rows and columns, Selecting cells, Moving and copying cells,, Freeze panes; **Formatting Cells:** Formatting toolbar, Format Cells dialog box, Dates and times; **Formulas and Functions:** Formulas, Linking worksheets, Relative, absolute, and mixed referencing, Basic functions, Function Wizard, Autosum, **Sorting and Filling:** Basic ascending and descending sorts, Complex sorts, Autofill; Alternating text and numbers with Autofill, Autofilling functions; Graphics; Adding clip art; Add an image from a file; Editing a graphics; AutoShapes; **Charts:** Chart Wizard; Resizing a chart; Moving a chart, Chart formatting toolbar; **Page Properties and Printing:** Page breaks, Page orientation, Margins, Headers, footers, and page numbers, Print Preview, Print; Keyboard Shortcuts.

- **Presentation Tool**: AutoContent Wizard, Create a presentation from a template, Create a blank presentation, Open an existing presentation, AutoLayout, Presentation Screen: Screen layout, Views, Working with Slides: Insert a new slide, Applying a design template, Changing slide layouts, Reordering slides, Hide slides, Create a custom slide show, Edit a custom slide show Adding Content: Resizing a text box, Text box properties, Delete a text box, Bulleted lists, Numbered lists, Adding notes, Video and Audio Working with Text: Adding text, Editing options, Formatting text, Replace fonts, Line spacing, Change case Spelling check Color & Background: Color schemes, Backgrounds, Graphics, Adding clip art, Adding an image from a file, Editing a graphic, AutoShapes, WordArt Slide Effects: Action buttons, Slide animation, Animation preview, Slide transitions, Slide show options, Master Slides, Slide master, Header and footer, Slide numbers, Date and time Saving and Printing, Save as a web page, Page setup, Print

- **Integrating Programs** Word, spreadsheet and Presentation.

Note:

The above practical is to be conducted using the either Microsoft-Office or OpenOffice.

Digital Electronics Lab

Objective: *To provide hands-on practice of the basic knowledge in digital logic and circuits and to provide hands-on practice in some commonly used combinational and sequential circuits*

Instruction: The Laboratory work will have to be performed during the semester consisting of any of the 8 experiments from the given list below*:*

List of Experiments:

1. Study and Testing of measuring instruments: Digital and Analog multimeters, CROs and Signal Generators – measurement of AC & DC voltages, measurement of frequency.
2. Study of Components: Identification and testing of resistors, capacitors, inductors, diodes, LEDs & transistors
3. Study of Logic Gates: Study of truth table of basic gates, realization of Boolean functions
4. Study of Half adder and Full Adder
5. Study of Half Subtractor and Full Subtractor
6. Study of Implementation of a 3:8 decoder,
7. Study of 4-line to 16 bit decoder
8. Study of BCD to 7-segment decoder
9. Study of Generating a Boolean expression with a multiplexer
10. Study of Clocked JK Flip Flop
11. Study of 4-bit ripple counter
12. Study of Parallel-in, serial-out, 4-bit shift register

SUBJECT: Comp. Sci. (opt.) Semester: II Hours/week: 3

Code : CSO4

Operating Systems

Objectives: To introduce students the basic functioning *of operating systems as resource manager and its Salient features. Also to study about process states, scheduling, Memory and I/O Management techniques.*

Sr. No	Topic	Ref	No. of Lect.
I	**Introduction to Software:**		**2**
	• **Software:** Definition, classification and components of software, operating system as the main component of system software;		2
II	**Operating System Fundamental**	2/1	**7**
	• **Operating Systems**: OS as a resource manager, Structure of OS, OS functions, Characteristics of modern OS.		2
	• **Types of O.S.:** Early systems, simple batch systems, multi-programmed batch systems, Time sharing system, Personal Computer systems, Parallel systems, Distributed systems, Real time systems		3
	• **OS Structures:** Components of OS: Process management, Memory management, Storage management, File management, I/O management.		2
III	**Process Management**	1/2	**18**
	• **Concept of Process**: Process State, Operation on Processes, thread.		3
	• **CPU Scheduling**: Types of Schedulers, Criteria for scheduling, Scheduling Algorithms.		5
	• **Process Synchronization:** Need for synchronization, Critical Section, Hardware Synchronization, Semaphores, Monitors, Problem of synchronization.		5
	• **Deadlocks:** Concept of Deadlock, Deadlock Modeling, Methods		5

for Handling Deadlock

IV	**Storage Management**	1/3	**12**
	• **Memory Management**: Address Binding, Logical vs. Physical Address space, Memory Allocation, Paging, Segmentation, Segmentation and paging of Intel Pentium.		4
	• **Virtual Memory:** Demand Paging, Page replacement Algorithms (FIFO, Optimal, LRU), Virtual Memory in windows Xp.		4
	• **File System Interface**: Files, File Access, Directory Structure, Protection		2
	• Implementation of File System: Allocation Methods, Free space Management		2
V	**I/O System**	1/4	**6**
	• I/O System Components : I/O Devices , I/O Hardware , Application I/O interface		3
	• Secondary Storage Structure : Disk fundamental, Disk Scheduling , Disk Management		3

Core References:

1. “Operating System”, By S. R. Sathe & Anil S. Mokhade , MacMillan Publication.

2. “Operating System”, By Stuart E. Madnick, John J. Donovan.

Additional References:

1. Operating System Concepts- A. Silberzchaz & P.B. Galvin, Addison – Wesley Publishing Company.

SUBJECT: Comp. Sci. (opt.) Semester: II Hours/week: 3

Code : CSO5

Programming in C

Objective: *To expose students to algorithmic thinking and problem solving and impart moderate skills in programming using C Language in a industry-standard. Introduce students to learn basic features, Create, execute simple C programs using conditional statements, loops and arrays.*

Sr. No	Topic	Ref.	No. of Lect.
1.	**Introduction** • An Overview of C , History of C language, • C as a Structured Language, Features of C.	2/1, 1/1,	3
2.	**Basic Elements & Operators** • Character set, C Token, Identifier & Keywords, Variables • Constant and its types. Integer constant, floating point constant, character constant, string constants. • Operators: Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator. • Precedence & Associatively of Operators	2/2,3, 1/1	6
3.	**Data Types** • Data Types: *int, char, float, double*. Declaration & Initialization. • Type modifiers: long, short, signed and unsigned	2/2, 1/1, 1/6	3
4.	**C Program & I/O statements** • Structure of C Program, Compilation & Execution of C program I/O: Introduction, Formatted Input/Output	2/4, 2/3, 1/1	3

function: *scanf & printf*, Escape sequence characters.

- Library functions: General used & Mathematical.

5.	**Control and Iterative Statements :**	2/5, /6, 1/3, 1/4	12

- Simple if, nested if, if-else, else if ladder
- Switch-case statement
- The conditional expression (? : operator)
- *while* and *do-while* loop, and *for* loop
- *break* & *continue* statement, *goto* statement

6.	**Arrays:**	2/7, 2/8, 1/8, 3	9

- Introduction, Declaration and initialization Accessing array elements, Memory representation of array.
- One dimension and multidimensional arrays, character array, Introduction to string

7.	**Functions**	2/9, 1/5, 3	6

- Introduction, types of functions. Defining functions, Arguments, Function prototype, actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion.

Core Reference:

1. Let us C : Y. P. Kanetkar [BPB publication]
2. Programming in C : E. Balaburuswamy [Tata McGraw hill]
3. Programming in C : Goterfried [Shaums' Series]

Additional References:

1. Spirit of “C” : Moolish Kooper.

SUBJECT: Comp. Sci.(opt.) Semester: II Hours/week: 3

Code : CSO6

Operating System

Assignments: Write the Program using C (if applicable):

Operating System:

1. **Study of DOS Commands.**
2. **Study of Unix/Linux Commands.**
3. Write a program to implement the FCFS Scheduling Algorithm.
4. Write a program to implement the SJF Scheduling Algorithm.
5. Write a program to implement the Priority Scheduling Algorithm.
6. Write a program to implement the Round Robin Scheduling Algorithm.

Lab for Programming in 'C'

List of Experiments:

1. Find Area, Perimeter of Triangle & Rectangle.
2. Find maximum amongst 3 numbers.
3. Program for nested loops.
4. Program to Calculate x^y
5. Program to check Prime Number.
6. Program to find Armstrong Number.
7. Program to print the Fibonacci Series
8. Searching and element from array.
9. Transpose of matrices
10. Multiplication of matrices
11. Sorting array using bubble sort technique
12. Program for recursion e.g. factorial, reverse of digit
13. Program for structure initialization
14. Array of Structure e.g. student result, Employee pay slip , Phone bill
15. Function with parameter & return values

PATTERN OF QUESTION PAPERS

Note : 1) All questions carry equal marks.

2) All questions are compulsory.

Q. No.	Format	Marks
1.	Multiple Choice/Fill in the blank/Match the pair/ one line answer. 1) 2) . . 10)	1 x 10 = 10
2.	a) b) OR a)	5 * 2 =10 10
3.	a) b) OR a)	5 * 2 =10 10
4.	a) b) OR a)	5 * 2 =10 10
5.	Write Short Notes On: (Any Two) a) b) c)	5 * 2 =10
	Total	50

* Not More than 3 bits should be asked in each question of 10 Marks.

(Only for Paper Setter)

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO. SU/Sci./B.Sc. Syllabi/100/2016

It is hereby notified for information to all concerned that, on the recommendation of the Ad-hoc Board in Computer Science and I.T. the **Academic Council at its meeting held on 01 & 02 June, 2016** has accepted the following revised syllabi as mentioned against their names under the Faculty of Science :-

Sr. No.	B.Sc. III Year Revised Syllabus		Semester
[1]	B.Sc. Computer Science	Degree Course	V & VI
[2]	B.Sc. Information Technology	Degree Course	V & VI
[3]	B.C.A. Science	Degree Course	V & VI
[4]	B.Sc. Animation	Degree Course	V & VI
[5]	B.Sc. Computer Science	Optional	V & VI
[6]	B.Sc. Information Technology	Optional	V & VI
[7]	B.C.A. Science	Optional	V & VI
[8]	B.Sc. Computer Maintenance	Optional	V & VI

This is effective from the **Academic Year 2016-2017** and onwards.

These **syllabi are also available on the University Website www.bamu.ac.in**

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

University Campus,
Aurangabad-431 004.
REF.NO.SU/B.Sc./2016/2389-639
A.C.M.A.I.No.10

Date:- 07-06-2016.

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Director,
Board of College and
University Development.

..2..

Copy forwarded with compliments to :-

1] The Principals, affiliated concerned Colleges,
Dr. Babasaheb Ambedkar Marathwada University.

Copy to :-

1] The Controller of Examinations,

2] The Section Officer, [B.Sc. Unit],

3] The Section Officer, [B.C.S. Unit],

4] The Programmer [Computer Unit-1] Examinations,

5] The Programmer [Computer Unit-2] Examinations,

6] The In-Charge, E-Suvidha Kendra, [Professional Unit], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University,

7] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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S/-0070616/-*

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Revised Syllabus of

B.Sc. Computer Science

(Optional)

Semester – V and VI

Effective from 2016-17

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

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

Sr. No.	Course Code	Name of the Subject	Scheme of Teaching			Scheme of Evaluation(Marks)			
			T Hrs/ Week	P Hrs/ Week	Total Hrs/ Week	University Theory Exam.	University Practical Exam.	Duration	Total Marks
Semester V									
1	CSO15	Software Engineering	3		3	50	-	2	50
2	CSO16*	Web Designing	3		3	50	-	2	50
3	CSO16*	VB.Net	3		3	50	-	2	50
4	CSO17	Case Study	-	3	3	-	50	3	50
5	CSO18	Pr. Based on CSO16	-	3	3	-	50	3	50
Total of Semester – V			6	3	9	100	100		200

Semester VI									
1	**CSO19**	**Data Communication and Networking**	**3**		**3**	**50**	**-**	**2**	**50**
2	**CSO20***	**Ethics and Cyber Low**	**3**		**3**	**50**	**-**	**2**	**50**
3	**CSO20***	**E-Commerce**	**3**		**3**	**50**	**-**	**2**	**50**
4	**CSO21**	**Seminar**	**-**	**3**	**3**	**-**	**20**	**3**	**50**
5	**CSO22**	**Project**		**3**	**3**		**80**		
Total of Semester – VI			**6**	**3**	**9**	**100**	**100**		**200**

*** Indicate optional paper (any one from 2 and 3)**

Semester V

Paper No.: CSO15 **Comp. Sci. (Gen.) Semester : V**
Paper title: Software Engineering

Unit –I	
	Software and Software Engineering What is Software, Characteristics of software, categories of Software, attributes of WebApps, software Engineering, Software Process, Essence Software Engineering Practice, General Principles, Software Myths
Unit –II	
	Software Process and Process Models Software process Model Process Flow, Process Models, Waterfall model, Incremental Process Model, Evolutionary Process Models, Concurrent Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Product and Process **Agile** Introduction to Agility, Agility and the Cost of Change, Agile Process, Agility Principles, Human Factors, Extreme Programming (XP), XP Values, XP Process, Industrial, Critics of XP
Unit –III	
	Principles That Guide Practice Principles That Guide Process, Principles That Guide Practice, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles

Books:

1) Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill.
1) An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa

Paper No.: CSO16* **Comp. Sci. (Gen.) Semester : V**
Paper title: Web Designing

Unit –I

Introducing HTML5
Understanding HTML, XHTML, and HTML5, Introducing semantic markup, Syntax, Attributes, Working with elements, Creating an HTML document
Embedding content, Embedding HTML by using inline frames, Working with hyperlinks, Adding images to your HTML document, Embedding plug-in content
Advances of HTML5
HTML5 Layout container
Format using element
Working with Tables: creating regular and irregular tables, heading, columns and rows, captions, header, footer.

Unit –II

Introducing JavaScript
Basic of JavaScript
JavaScript Variables, Operators & Its Precedence, Special Values,
Predefined Built-Infunctions, Functions Declaration & Call
String Functions
Conditions and looping structure,
Inline JavaScript & External JavaScript
Advances in JavaScript
Object in JavaScript, Concept of array, how to use it in JavaScript, types of an array, array methods
DOM Concept in JavaScript, DOM Objects, DOM Search Methods
Event handling in JavaScript: Capturing & Bubbling, Subscribing, Unsubscribing and Cancelling Event, Windows Event, Keyboard and Mouse Events.

Unit –III

Cascading Style Sheet
Introduction to CSS3
Defining and Applying a Style, Inline, Embedded and External Style Sheet.
Selectors: element, id and class selector, grouping selector, attribute,
Specificity and cascading
CSS properties: Color, box Model, border, padding, margin, float, clear

Books and References:

1) Programming in HTML5 with Javascript and CSS3 , Glenn Johnson (http://www.daoudisamir.com/references/vs_ebooks/html5_css3.pdf)
2) Beginning HTML5 andCSS3 By Richard Clark, OliStudholme,Christopher Murphy and DivyaManian.(http://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning_html5_and_css3.pdf)
3) A Definitive Guide to HTML5 , By Adam Freemans

Paper No.: CSO16* **Comp. Sci. (Gen.) Semester : V**
Paper title: VB.NET

Unit –I	
	Introduction: Introduction to .NET and .NET Framework, Difference between CUI & GUI, Event Driven Programming, the VB IDE, Operators, Conditional statements and looping statements. Sub Procedure, functions and exception handling
Unit –II	
	Windows Forms : General Properties, Events handling events like mouse, keyboard, Types of forms MDI, adding removing controls at run time. **Controls** : The control class, Text Box, Rich Text Box, Label, Buttons, Checkbox, Radio Button, Panels, Group Boxes, List Box, Combo Box, Picture Box, Scroll Bars, Splitters, Track Bars, Pickers, Timer.
Unit –III	
	Object-Oriented Programming : Class and Object, Class Vs. Object Members, Creating Classes, Objects, Structures, Modules, Constructors, Data Members, Methods, Properties, Event

Books and References:

1) Visual Basic .NET Programming Black Book" by Steven Holzner, Dreamtech Press
2) "Mastering in Visual Basic .NET" by Evangelos Petroutsos, Sybex Publication.

Paper No.: CSO17 Comp. Sci. (Gen.) Semester : V
Paper title: Software Engineering Case Study

Using any Software engineering model case study on development of a software.

Paper No.: CSO18 Comp. Sci. (Gen.) Semester : V

Paper title: Web Designing if Selected

1. Create a simple website by using Visual Studio Express
2. Create additional pages
3. Embedding Content
4. Create a webpage using <table> and elements
5. Create a webpages using conditional and looping statements.
6. Create a calculator webpage
7. Create a Webpage to introduce National Bird/Animal/Emblem/Flower
8. Learn more about positioning by adding more elements to the webpage to define a header and footer for the page. Use CSS style rules to set the position.
9. Learn more about CSS selectors by adding more elements to the page and try setting the format by selecting the elements without using an id.
10. Learn more about colors by changing the color scheme, using RGB values.

Paper No.: CSO18 **Comp. Sci. (Gen.) Semester : V**
Paper title: VB.NET if Selected

Minimum 12 Practical to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

Semester VI

Paper No.: CSO19 **Comp. Sci. (Gen.) Semester : VI**
Paper title: Data Communication and Networking

Unit –I	
	Introduction Communication System, Components of communication system, Computer network Advantage and applications of computer n/w. point-to-point and multipoint line configuration, LAN, MAN and WAN. Analog and Digital signals, Data Transmission: Parallel and Serial, Synchronous and Asynchronous transmission, Transmission Mode: Simplex, half-duplex and full-duplex. **Network Topologies** Mesh, Star, Tree, Bus and Ring and Hybrid Topology (Advantages and disadvantages of each)
Unit –II	
	Transmission media Guided and unguided media, Twisted-pair, UTP and STP cable, coaxial cable, Optical Fiber cable, Radio waves, Microwaves, Satellite Communication (*Transmission characteristics and advantages of each type*) **Modulation & Multiplexing** Concept of modulation and demodulation, Digital-to-analog conversion, Amplitude Shift Keying (ASK)/AM, Frequency Shift Keying (FSK)/FM, Phase Shift keying (PSK)/PM.
Unit –III	
	The Mobile Telephone System: First Generation(1G), Second Generation(2G), Third Generation(3G), Internet over cable, Spectrum Allocation, cable Modem, ADSL Versus Cable.

Books:

1) Introduction to Digital and Data Communications, Michal A Miller, JAICO, publishing.
2) Data Communication and Networking: C.S.V. Murthy, Himalaya Publishing House
3) Data Communication and Networking :: Behrouz A. Forouzan; Mc-Graw Hill Pub.
4) Computer Networks by A. S. TANENBAUM, DAVID J. WETHERALL PRENTICE HALL PublicationSoftware

Paper No.: CSO20* **Comp. Sci. (Gen.) Semester : VI**
Paper title: Ethics and Cyber Law

Unit –I

	Basic Concepts of Technology and Law, Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence. Law of Digital Contracts The Essence of Digital Contracts.
Unit –II	
	The System of Digital Signatures. The Role and Function of Certifying Authorities. The Science of Cryptography, E-Governance, Cyber Crimes and Cyber Laws. Introduction to Intellectual Property.
Unit –III	
	Information Technology Act 2000 Cyber Law Issues in E-Business Management. Major issues in Cyber Evidence Management, Cyber Law Compliancy Audit, The Ethics of Computer Security. Relevant Rules Notifications, Information Technology (Amendment) Act, 2008.

Books and References:

1) Godbole,"Information Systems Security", Willey
2) Merkov, Breithaupt,"Information Security", Pearson Education
3) Yadav, "Foundations of Information Technology", New Age, Delhi
4) Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
5) Sood,"Cyber Laws Simplified", Mc Graw Hill
6) Furnell, "Computer Insecurity", SpringerA Definitive Guide to HTML5 , By Adam Freemans

Paper No.: CSO20* **Comp. Sci. (Gen.) Semester : VI**
Paper title: E-Commerce

Unit –I	
	Introduction, IT and business, E-commerce: Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI to E-commerce, EDI, UN/EDIFACT
Unit –II	
	Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues. India E-commerce Readiness, Legal issues, Getting started. Security Technologies: Encryption, Symmetric key Encryption, Public key encryption, Public key encryption using digital Signatures. Hashing techniques, Certification and key Distribution, Cryptographic.
Unit –III	
	The elements of E-commerce. SSL-Secure Socket Layer, SET-Secure Electronic Transaction Protocol for Credit card payment, E-Cash, E-check, Smart cards. Electronic Payment System: Digital Cash, Digital Wallets, Digital checking payment systems, Electronic Billing, Wireless payment systems. Software Package: PGP e-mail encryption software

Books and References:

1) E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill.
2) E- Commerce Strategy , Technologies and Applications, David Whiteley, McGraw Hill Edition
3) E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi, TMG
4) E-Commerce Concepts, Models , Strategies by - G.S.V Murthy
5) E-Commerce- Kenneth C.Laudon and Carol Guercio Traver
6) Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam

Paper No.: CSO21 **Comp. Sci. (Gen.) Semester : VI**
Paper title: Seminar

Student should prepare and present a seminar on any latest topic should be related to Computer Science.

Paper No.: CSO22 **Comp. Sci. (Gen.) Semester : VI**
Paper title: Major Project

Students group (maximum 3 students) should design and develop a project.

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