Course Title

Course Name:	B.Sc in Information Technology (BSCIT)
Formal Abbreviation:	BSCIT
Proposed Date of Introduction:	NOVEMBER 2020

Organizational Arrangements

Managing Faculty:	Faculty from Computer Science, Information Technology
Collaborating Faculties: consultant	Professionals from MCA, Computer Science Background
External Partners:	To be decided

Nature of Development

The proposal involves:

⊗ A new course

☐ Redevelopment or diversification of an existing course

Objective

BSCIT - is one of the most sought after career oriented professional programs offered at the bachelor's level. This degree course opens up innumerable career options and opportunities to the aspiring IT professionals both in India and abroad.

Course

▪ Three – Year full-time B.Sc in Information Technology (**BSCIT**) (Six – Semester).

▪ Minimum number of class room contact teaching for BSCIT (**B.Sc in Information Technology**) programme should be 140 credits (one credit equals 10 hours) and Internship / Project should be 12 credits i.e., Total 128 + 12 = 140 credits.

▪ Specialization: Students can opt for anyone Specialization; Data Warehousing and Mining/ Data,Visualization Using Business Intelligence/Information and Cyber Security, Cyber Laws and Ethics/ E-commerce/Internet of Things

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▪ As per UGC guidelines, a student can opt for Hons. in a specific stream for which he/she needs to acquire 140 credit points along with additional 16 credit points that can be acquired by undertaking online courses as prescribed by the university under MOOCS basket.

Reasons for Introduction of Course

B.Sc in Information Technology is a 3 years professional course in Computer Programming, Database Management System, Computer Networking, Artificial Intelligence & Machine Learning, Computer Architecture. This proposed course is divided in six semesters and each semester will have five different papers. One can join the course after passing common entrance test (CET) conducted by MAKAUT, WB.

Eligibility Criteria

Interested aspirants for the course are required to fulfill the below-mentioned eligibility criteria.

☐A candidate should have cleared class 12 (10+2 or equivalent) / higher secondary examination
with English & Mathematics/Computer Application/ Computer Science

Notification for admission to the BSc.IT programme will be published and classes will start around the commencement of the academic session.

Admission Process: Through CET Exam

Course Structure

Subject Type	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI
CC	C1, C2	C3, C4	C5, C6,C7	C8,C9,C10	C11,C12	C13,C14
DSE					DSE1, DSE2	DSE3, DSE4
GE	GE1	GE2	GE3	GE4		
AECC	AECC 1	AECC 2				
SEC			SEC 1	SEC 2		
	4 (20)	4 (20)	5(26)	5(26)	4 (24)	4 (24)

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Curriculum Structure

1st Semester

Subject Type		Course Code	Course Name	Credit Points	Credit Distribution			Mode of Delivery			Proposed MOOCs
					Th	Pr	Tu	Offline	Online	Blended	
CC	CC1	BSCIT101 BSCIT191	Data Structure and algorithm using C	6	4	2				YES	
	CC2	BSCIT102 BSCIT192	Fundamental of Programming with Python	6	4	2				YES	
*GE	GE1		Any one from GE Basket	6						YES	
AECC	AECC 1	BSCIT (HU) 101	TechnicalEnglish for engineers	2	2					YES	
Semester Credits				**20**							

2ND Semester

Subject Type		Course Code	Course Name	Credit Points	Credit Distribution			Mode of Delivery			Proposed MOOCs
					Th	Pr	Tu	Offline	Onlin	Blende	
CC	CC3	BSCIT201 BSCIT291	OOPs and Programming with JAVA	6	4	2				YES	
	CC4	BSCIT202	Computer Organization and Architecture	6	5		1			YES	
*GE	GE2		Any one from GE Basket	6						YES	
AECC	AECC 2	BSCIT(HU)201	Environment and Ecology	2	2					YES	
Semester Credits				**20**							

3rd Semester

Subject Type		Course Code	Course Name	Credit Points	Credit			Mode of Delivery			Proposed MOO
					Th	Pr	Tu	Offline	Online	Blended	
CC	CC5	BSCIT 301	Design Analysis and Algorithm	6	5		1			YES	
	CC6	BSCIT 302 BSCIT 392	Database Management System	6	4	2				YES	
	CC7	BSCIT 303	Information System Analysis and Design	6	5		1				
*GE	GE3		Any one from GE Basket	6						YES	
SEC	SEC 1	BSCIT 305	GUI PROGRAMMING WITH .NET	2		2				YES	
Semester				**26**							

4th Semester

Subject Type		Course Code	Course Name	Credit Points	Credit Distribution			Mode of Delivery			Proposed MOOCs
					Th	Pr	Tu	Offline	Onlin	Blende	
CC	CC8	BSCIT 401& BSCIT 491	Operating System with UNIX Programming	6	4	2				YES	
	CC9	BSCIT 402	Artificial Intelligence & Machine Learning	6	5		1			YES	
	CC10	BSCIT 403	Computer Networking	6	5		1	YES			
*GE	GE4		Any one from GE Basket	6						YES	
SEC	SEC2	BSCIT 405	Data Science Using Python Tools	2	2					YES	
Semester Credits				**26**							

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5th Semester

Subject Type		Course Code	Course Name	Credit Points	Credit Distribution			Mode of Delivery			Proposed MOOCs
					Th	Pr	Tu	Offline	Onlin	Blende	
CC	CC11	BSCIT 501& BSCIT 591	Management Information System	6	4	2				YES	
	CC12	BSCIT 502	Cloud Computing	6	5		1			YES	
DSE	DSE1	BSCIT 503 A/B/C	Data Warehousing and Mining/ Data Visualization Using Business Intelligence/ Information and Cyber Security	6	5		1			YES	
	DSE2	BSCIT 504	Minor Project and Industrial Training	6	4	2				YES	
Semester Credits				24							

6th Semester

Subject Type		Course Code	Course Name	Credit Points	Credit Distribution			Mode of Delivery			Proposed MOOCs
					Th	Pr	Tu	Offline	Onlin	Blended	
CC	CC13	BSCIT 601& BSCIT 691	Web Technology	6	4	2				YES	
	CC14	BSCIT 602	Multimedia	6	5		1			YES	
DSE	DSE 3	BSCIT 603 A/B/C	Cyber Laws and Ethics/ E-commerce/Internet of Things	6	5		1			YES	
	DSE4	BSCIT 681	Major Project and Grand Viva	6							
Semester Credits				24							

List of Discipline Specific Elective Course:

DSE 1	DATA WAREHOUSING AND MINING/ DATA VISUALIZATION USING BUSINESS INTELLIGENCE/INFORMATION AND CYBER SECURITY
DSE 2	MINOR PROJECT AND INDUSTRIAL TRAINING
DSE 3	CYBER LAWS AND ETHICS/ E-COMMERCE/INTERNET OF THINGS
DSE 4*	MAJOR PROJECT AND GRAND VIVA

Any one from the list of Skill Enhancement Course:

SEC 1	GUI PROGRAMMING WITH .NET
SEC 2	DATA SCIENCE USING PYTHON TOOLS

Core Papers BSC in INFORMATION TECHNOLOGY		
Semester : I		
CC1 DATA STRUCTURE AND ALGORITHM USING C	**CC2** FUNDAMENTALS OF PROGRAMMING WITH PYTHON	
Semester : II		
CC3 OOPs AND PROGRAMMING WITH JAVA	**CC4** COMPUTER ORGANIZATION AND ARCHITECTURE	
Semester : III		
CC5 DESIGN ANALYSIS AND ALGORITHM	**CC6** DATABASE MANAGEMENT SYSTEM	**CC7** INFORMATION SYSTEM ANALYSIS AND DESIGN
Semester : IV		
CC8 OPERATING SYSTEM WITH UNIX PROGRAMMING	**CC9** ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	**CC10** COMPUTER NETWORKING
Semester : V		
CC11 MANAGEMENT INFORMATION SYSTEM	**CC12** CLOUD COMPUTING	
Semester : VI		
CC13 WEB TECHNOLOGY	**CC14** MULTIMEDIA	

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PROGRAM OUTCOMES:

Serial No	Program Outcome	Mapped Courses
1	Understanding of Data structures using C Language	CC1(BSCIT101)
2	Understanding of Programmimg with Python and Python Tools,JAVA, DOT NET, UNIX	CC2(BSCIT102),CC3(BSCIT201),SEC1(BSCIT305),SEC2(BSCIT405),CC8(BSCI T401)
3	Learning Techinal English	AECC1(BSCIT(HU)101)
4	Learning Computer Organization and Architecture	CC4 (BSCIT202)
5	Learning Environment and its Ecology	AECC2 (BSCIT(HU)201),
6	Learning the Design Analysis and algorithm , Information System and its analysis	CC5(BSCIT301), CC7(BSCIT303)
7	Learning the basics of Database management, Computer Networking,Artificial Intelligence along with Machine Learning	CC6(BSCIT302), CC10(BSCIT403),CC9(BSCIT402)
8	Learning the basics and different types of MIS	CC11(BSCIT501)
9	Learning Web technology,Multimedia,Cloud Computing	CC13(BSCIT601),CC14(BSCIT602),C C12(BSCIT502)
10	Learning the basics of Operating System	CC8(BSCIT401)
11	Learning Sets, Relation, algebraic structures and many more related mathematics for computer science	GE1(BSCIT103),GE2(BSCIT203)

SEMESTER 1

Paper Name: Data Structure and Algorithm using C
Code : BSCIT101 & BSCIT191
Contact: 4L+2P
Credits: 4+2
Allotted Hrs: 60

Course Objectives:
CO1. To understand and identify the different types of data.
CO2. To understand the pointers, structures and self referential structure.
CO3. To learn the implementation of different types of memory allocation.
CO4. To learn File Management and the application.
CO5. To understand the implementation of Data Structure using Array.
CO6. To gain the proper knowledge of sorting, searching of data and their complexity analysis.CO7.
To understand the implementation of Linked list.
CO8. To understand the concept of tree and their different implementations.
CO9. To understand the graphs and their operations.
CO10.To learn the hash functions and their different functionalities.

Course Outcomes:

Sl. No.	Course Outcome	Mapped Module
1	Ability to understand the basic structures of data	Module 1
2	Ability to understand and use of the pointer, Self referential structure	Module 2
3	Ability to understand static and dynamic memory allocation in memory using malloc(),calloc(),realloc(), free().	Module 3
4	Ability to understand File Management and the application using different functions.	Module 4
5	Ability to use and implement Data Structure using Array	Module 5
6	Ability to do different types of Searching and Sorting	Module 6
7.	Ability to implement different types of Linked List	Module 7
8.	Ability to grasp the concept of different types of tree and their implementations.	Module 8
9.	Ability to understand of different types of graphs and their operations.	Module 9
10.	Ability to understand of Hashing and their different functionalities.	Module 10

Module I: Concepts of Abstract data type(4L)

 Concept of abstract data types, Structure, union, enum, pointer to structure, Self referential structure, Pointer to pointer 2.

Module II: Dynamic Memory Allocation (4L)

Difference between static and dynamic memory allocation, Using functions such as malloc(), calloc(), realloc(), free().

Module III: File Management (4L) Application of functions such as fopen(), fclose(), getc(), putc(), fprintf(), fscanf(), getw(), putw(), command line argument

Module IV: Data Structure using Array(4L)

Stack, queue, circular queue, priority queue, dequeue and their operations and applications.

Module V: Searching and Sorting(6L)

Searching: linear search, Binary search, their comparison, Sorting: insertion sort, Selection sort. Quick sort, Bubble sort Heap sort, Comparison of sorting methods , Analysis of algorithm, complexity using big 'O' notation

Module VI: Linked List(4L)

Linear link lists, doubly linked lists, stack using linked list, queue using linked list, circular linked list and their operations and applications.

Module VII: Trees (5L)

Binary trees, binary search trees, representations and operations, thread representations, sequential representations, B tree , B+ tree,

Module VIII: Graphs (5L)

Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal: Depth first search and Breadth first search. Spanning Trees, minimum spanning Tree, Shortest path algorithm

Module IX: Hashing (4L)
Definition, Hashing functions, Load factor and collision, open addressing (linear probing) and chaining method to avoid collision

Reference Books:
1. Data Structures, R.S. Salaria, Khanna PublishingHouse
2. Data Structures in C, Ajay Agarwal, CyberTech
3. Data Structures Using C, Radhakrishnan&Shrinivasan, ISTE/EXCELBOOKS
4. C and Data Structure,Radhaganesan,Scitech
5. Data Structure Using C & C++, Tannenbaum,PHI
6. Mastering Algorithms with C,Loudon,SPD/O'REILLY
7. Expert Data Structures with C, R.B. Patel, Khanna Publishing House

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
Module 1	Understanding the basics of data Structures	2	5	1	1		
Module 2	Understanding the pointer	2	5	1	1		
Module 3	Static and dynamic memory	4	10	1	1		
Module 4	File Management	4	10	3	1		
Module 5	Data Structure using Array	4	10	4	1		
Module 6	Searching and Sorting	6	15	5	1		
Module 7	Linked List	4	10	6	1		
Module 8	Trees	5	12.5	7	1		
Module 9	Graphs	5	12.5	8	1		
Module 10	Hashing	4	10	9	1		

Paper: Fundamental of Programming with Python
Code : BSCIT102 & BSCIT192
Contacts Hours/ Week : 4L + 2P
Credits : 4+2

Course Objectives:

CO1. To understand and identify the different types of data.
CO2. To learn the use of Python variables, expressions, statements.
CO3. To learn how to use Python function.
CO4. To understand different types of conditional operators.
CO5. To understand different types of Iteration loops.
CO6. To understand different types of Python recursion.
CO7. To understand different uses of string.
CO8. To learn the concept of List in python.
CO9. To learn the concept of dictionaries & lists in python.
CO10.To learn the concept of tuple in python.
CO11.To learn the concept of Classes and Objects in python.

Course Outcomes:

Sl. No.	Course Outcome	Mapped Module
1	Ability to understand the basics of Python	Module 1
2	Ability to understand and use of Python variables, expressions, statements.	Module 1
3	Ability to understand Python Functions.	Module 1
4	Ability to understand different types of conditional operators	Module 2
5	Ability to understand different types of Iteration loops	Module 2
6	Ability to understand different types of Python recursion	Module 3
7.	Ability to use Accessing values in string, Updating strings, Slicing strings using string methods	Module 3
8.	Ability to grasp the concept of List in python	Module 3
9.	Ability to understand brief idea of dictionaries & lists	Module 3
10.	Ability to understand Tuples	Module 3
11.	Ability to understand Classes and Objects	Module 4

Module I: Introduction to Python(12L)

1. Introduction to Python
2. Python variables, expressions, statements : Variables,Keywords, Operators& operands, Expressions, Statements, Order of operations, String operations, Comments, Keyboard input, Example programs
3. Functions : Type conversion function, Math functions, Composition of functions, Defining own function, parameters, arguments, Importing functions, Example programs

Module II: Conditions&Iterations(8L)

1. Conditions: Modulus operator, Boolean expression, Logical operators, if, ifelse, if-elseif-else, Nested conditions, Example programs
2. Iteration :while, for, break, continue, Nested loop, Example programs

Module III: Recursion,Strings,List,Dictionaries,Tuples(10L)

1. Recursion :Python recursion, Examples of recursive functions, Recursion error, Advantages & disadvantages of recursion
2. Strings : Accessing values in string, Updating strings, Slicing strings, String methods – upper(), find(), lower(), capitalize(), count(), join(), len(), isalnum(), isalpha(), isdigit(), islower(), isnumeric(), isspace(), isupper() max(), min(), replace(), split(), Example programs
 3. List:Introduction, Traversal, Operations, Slice, Methods, Delete element, Difference between lists and strings, Example program
4. Dictionaries :Introduction, Brief idea of dictionaries & lists
5.Tuples : Introduction, Brief idea of lists & tuples, Brief idea of dictionaries & tuples

Module IV: Classes&Objects(10L)

Classes &Objects : Creating class, Instance objects, Accessing attributes, Built in class attributes, destroying objects, Inheritance, Method overriding, Overloading methods, Overloading operators, Data hiding, Example program

Reference Books:
1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Introduction to Computing and Problem Solving with Python, J. Jose, KhannaPublications
3. Python Programming, SeemaThareja, Pearson
4. Learn Python The Hard Way, Zed A. Shaw, ADDISON-WESLEY
5. Learning Python, Mark Lutz, O'REILY
6. Programming In Python, Dr. Pooja Sharma, BPB
7. Python Programming - Using Problem Solving Approach, ReemaThareja, OXFORD UNIVERSITY PRESS

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
Module 1	Basics of Python	2	5	1	2		
Module 2	Python variables, expressions, statements	5	12.5	2	2		
Module 3	Python Functions	5	12.5	3	2		
Module 4	Conditional operators	4	10	4	2		
Module 5	Iteration	4	10	5	2		
Module 6	**Recursion**	2	5	6	2		
Module 7	**Strings**	2	5	7	2		
Module 8	**List**	2	5	8	2		
Module 9	**Dictionaries**	2	5	9	2		
Module 10	**Tuples**	2	5	10	2		
Module 11	**Classes & Objects**	10	25	11	2		

Paper Name: Technical English for Engineers
Code: BSCIT(HU)101
Contact: 2L
Credits:2

Course Objectives:
1. To understand English Grammar and Correction of sentences.
2. To write good Essay.
3. To understand and Read Comprehension.
4. To understand how to write Business Correspondence things.
5. To learn Report Writing.
6. To develop good Communication skills.
7. To gain the confidence and take part in Group discussion.

Course Outcomes:

Sl. No.	Course Outcome	Mapped Module
1	Ability to understand Grammar,Correction of sentences.	Module 1
2	Ability to write Essay	Module 2
3	Ability to get Reading Comprehension	Module 3
4	Ability to write Business Correspondence things	Module 4
5	Ability of Report Writing	Module 5
6	Ability of smart Communication / Public Speaking skills	Module 6
7.	Ability to take part in Group discussion	Module 7

Module I:
Grammar,Correction of sentence, Vocabulary / word formation, Single word for a group of words,
Fill intheblank,transformationofsentences,Structureofsentences–Active/Passive Voice–
Direct / IndirectNarration
Module II:
Essay – Descriptive – Comparative – Argumentative – Thesis statement- Structure of opening / concluding
paragraphs – Body of the essay
Module III:
Reading Comprehension – Global – Contextual – Inferential – Select passages from recommended text
Module IV:
Business Correspondence – Letter Writing – Formal. Drafting. Biodata- Resume- Curriculum Vitae
Module V:
Report Writing – Structure , Types of report – Practice Writing
Module VI:
Communication / Public Speaking skills , Features of effective speech, verbal-nonverbal
Module VII:
Group discussion – principle – practice

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Reference Books:

1. Mark MaCormack : "Communication"
2. John Metchell" How towritereports"
3. SRInthira& VSaraswathi" EnrichyourEnglish– a) Communicationskillsb) Academicskills" Publisher CIEFL & OUP
4. R.C. Sharma and K.Mohan , "Business Correspondence and Report Writing " , Tata McGraw Hill , New Delhi , 1994
5. L.Gartside , "Model Business Letters" , Pitman , London , 1992
6. Longman , "Longman Dictionary of Contemporary English" (or 'Oxford Advanced Learner's Dictionary of Current English' ,
OUP , 1998.
7. Maxwell Nurnberg and RosenblumMorris , "All About Words" , General Book Depot, New Delhi , 1995
8. A Text Book for English foe Engineers & Technologists

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
Module 1	Grammar, Correction of Sentences	5	10	1	3		
Module 2	Essay	3	15	2	3		
Module 3	Reading Comprehension	3	20	3	3		
Module 4	Business Correspondence	2	20	4	3		
Module 5	Report Writing	2	10	5	3		
Module 6	Communication / Public Speaking skills	2	10	6	3		
Module 7	Group discussion	3	15	7	3		

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SEMESTER 2

Paper Name: OOPS and Programming With JAVA
Code :BSCIT201 & BSCIT291
Contact: 4L+2P
Credits: 4+2

Course Objectives:

1. To understand the concept of Class,Data,Polymorphism,Inheritence,Dynamic Binding
2. To understand the concept of Overview of JAVA
3. To understand the different types of natural Data type, Variable and Constants token in JAVA
4. To understand the concept of Control Statement of JAVA
5. To understand the **Iteration Statement, Arrays and Vector, Classes and Objects, Inheritance.**
6. To understand **Packages, Interfaces, Exception Handling, Multithreaded Programming, : Applets, Abstract Window Toolkit**

Course Outcomes:

Sl. No.	Course Outcome	Mapped Modules
1	Students will able to understand **Oops Concept**	Module 1
2	Studentswillabletounderstand Javafeatures, JVM, Comparison between Java and C++, Idea of any Java	Module 2
3	Studentswillabletounderstand Data Types, variablesand constants Tokens in Java (Identifiers, Literals, Keywords, Operator	Module 3
4	Students will able to understand control statement - Simple if statement, if…else statement, Nesting of if-else statement, switchstatement	Module 4
5	Students will able to understand For loop, While loop, Do-While loop	Module 5
6	Students will able to understand 1D and 2D array, vector concepts	Module 6
7	Students will able to understand Creating main() in a separate class, Methods with parameters, Methods with a return type, Method overloading, Passing	Module 7
8	Students willable tounderstand Basicconcepts, typesof inheritance, use of super keyword, overriding methods. 9. Module IX: StringandStringBuffer(2L) Use of different	Module 8
9	Students will able to understand User defined package, import package, Class path, How to create	Module 9

10	Students will able to understand User defined package, import package, Class path, How to create interface, use and extend interface	Module 10
11	Students will able to undertand Byte Streams, Input Stream, Output Stream Character Streams (Reader, Writer), How Files and Streams Work, Working with Reader classes (InputStreamReader, BufferedReader)	Module 11
12	Students will able to understand Overview, Thread Life cycle, Advantages of multithreading over multi-tasking Thread Creation and simple programs, Synchronized threads, Synchronized Methods	Module 12
13	Students will able to understand Applet vs. Application, Applet class, Advantages of Applet, Applet Lifecycle My First Applet, Applet tag, How to run applet	Module 13
14	Students will able to understand GUI Components, Interface and Classes of AWT Package, Labels, Buttons, Check Boxes, Radio button, Text Area, Text Field, Scrollbar, Panels, Layout managers, Simple event driven programming with Text Field and Button	Module 14

Module I: Oops Concept (4L)

Object, Class, Data abstraction, Data encapsulation, Inheritance, Polymorphism, Dynamic binding

Module II: An overview of Java (2L).

Java features, JVM, Comparison between Java and C++, Idea of any Java Development Kit (JDK), learn to run java program through command line and with any JDK

Module III: Data Concept (2L)

Data Types, variables and constants Tokens in Java (Identifiers, Literals, Keywords, Operator)

Module IV: Control Statements (2L)

Simple if statement, if…else statement, Nesting of if-else statement, switch statement

   Module V: Iteration Statement (2L) For loop, While loop, Do-While loop **Module VI: Arrays and Vector(2L)** 1D and 2D array, vector concepts

Module VII: Classes and Objects (3L)

Creating main() in a separate class, Methods with parameters, Methods with a return type, Method overloading, Passing
Objects as Parameters, Passing Values to methods and Constructor, Abstract classes

Module VIII: Inheritance (2L)

 Basic concepts, types of inheritance, use of super keyword, overriding methods. 9. Module IX: StringandStringBuffer(2L) Use of different functions

Module X: Packages, Interfaces (3L)

User defined package, import package, Class path, How to create interface, use and extend interface

Module XI: Exception Handling (2L)

Overview, What is Exceptions and handling exception?, Compile time errors Run time errors, try…catch, Using Multiple catch Blocks, finally Block, Throwing an Exception, Using the throw and throws Statement.

Module XII: Stream (3L)

Byte Streams, Input Stream, Output Stream Character Streams (Reader, Writer), How Files and Streams Work, Working with
Reader classes (InputStreamReader, BufferedReader)

Module XIII: Multithreaded Programming (3L)

Overview, Thread Life cycle, Advantages of multithreading over multi-tasking Thread Creation and simple programs, Synchronized threads, Synchronized Methods

Module XIV: Applets (4L)

Applet vs. Application, Applet class, Advantages of Applet, Applet Lifecycle My First Applet, Applet tag, How to run applet

Module XV: Abstract Window Toolkit (4L)

 GUI Components, Interface and Classes of AWT Package, Labels, Buttons, Check Boxes, Radio button, Text Area, Text Field, Scrollbar, Panels, Layout managers, Simple event driven programming with Text Field and Button

 Reference Books:

 1. Let Us JAVA 2 Edition, YashavantKanetkar BPB Publications
 2. Programming with JAVA 5th Edition, E Balagurusamy, TMH
 3. Core JAVA, TanweerAlam, Khanna Publishing House

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applica	Remarks (if any)
Module 1	**Oops Concept**	4	10	1	2		
Module 2	**An overview of Java**	2	5	2	2		
Module 3	**Data Concept**	2	5	3	2		
Module 4	**Control Statements**	2	10	4	2		
Module 5	**Iteration Statement**	2	10	5	2		

Module 6	**Arrays and Vector**	2	10	6	2		
Module 7	**Classes and Objects**	3	5	7	2		
Module II Unit 8	**Inheritance**	3	10	8	2		
Module 9	**Packages, Interfaces**	3	10	9	2		
Module 10	**Exceptional Handling**	2	10	10	2		
Module 11	**Stream**	3	3	11	2		
Module 12	**Multithreaded Programming**	3	5	12	2 2		
Module 13	**Applets**	4	5	13	2		
Module14	**Abstract Window Toolkit**	4	2	14	2		

Computer Organization and Architecture
Code :BSCIT202
Contact: 5L+1T
Credits: 6
Allotted Hrs: 60

Course Objectives:

1. To understand the concept of **Data Representation, Computer arithmetic,**
2. To understand the concept of **Register transfer and micro-operations**
3. To understand the different types of **Basic Computer organization and design, Micro programmed control**
4. To understand the concept of **Central processing unit**
5. To understand the **Pipeline and vector processing**
6. To understand **output organization, Memory organization**

Course Outcomes:

Sl. No.	Course Outcome	Mapped Modules
1	Students will able to understand Number Systems –Complement, Fixed point representation, Floating point representation	Module 1
2	Students will able to understand different algorithm of sign magnitude numbers	Module 2
3	Students will able to understand Register, Bus Memory transfers, Micro operations ,One stage logic circuit	Module 3

4	Students will able to understand Instruction codes, basic computer registers, computer instructions, Instruction cycle	Module 4
5	Students will able to understand Control memory, Address sequencing	Module 5
6	Students will able to understand register organization, Stack organization, Evaluation of arithmetic expression using stack, Instruction format, Types of CPU organization (single accumulator, general register & stack organization)	Module 6/7
7	Students will able to understand Peripheral devices, Input – output interface, Isolated I/O, Memory mapped I/O, 4. Asynchronous data transfer: strobe & handshaking, Basic idea of DMA & DMAC, Input – output processor	Module 8
8	Students will able to understand Memory hierarchy, Main memory definition, types of main memory, types of RAM, ROM, difference between SRAM & DRAM, Cache memory, Cache memory mapping, CAM, hardware organization of CAM, Virtual memory, mapping using pages, page fault, mapping using segments, TLB, Auxiliary memory, diagrammatic representation of magnetic disk & hard disk drive, Definitions of seek time, rotational delay, access time, transfer time, latency	Module 9

Module I: Data Representation (4L)
Number Systems – decimal, binary, octal, hexadecimal, alphanumeric representation, 2. Complements – 1's complement, 2' complement, 9's complement, 10' complement, (r-1)'s complement, r's complement, 3. Fixed point representation – Integer representation, arithmetic addition, arithmetic subtraction, overflow, decimal fixed point representation, 4. Floating point representation, 5. IEEE 754 floating point representation

Module II: Computer arithmetic (5L)
 1. Addition algorithm of sign magnitude numbers, 2. Subtraction algorithm of sign magnitude numbers, 3. Addition algorithm
of signed 2's complement data, 4. Subtraction algorithm of signed 2's complement data, 5. Multiplication algorithm, Booth's
algorithm, 6. Division algorithm

Module III: Register transfer and micro-operations(5L)
Register transfer language, 2. Register transfer, 3. Bus system for registers, 4. Memory transfers – memory read, memory write, 5. Micro operations – register transfer micro operations, arithmetic micro operations, logic micro operations, shift micro operations, 6. Binary adder, binary adder subtractor, binary incrementer, arithmetic circuit for arithmetic micro operations, 7. One stage logic circuit, 8. Selective set, Selective complement, Selective clear, Mask, Insert, Clear

Module IV: Basic Computer organization and design (4L)
 1. Instruction codes, 2. Direct address, Indirect address & Effective address, 3. List of basic computer registers, 4. Computer instructions: memory reference, register reference & input – output instructions, 5. Block diagram & brief idea of control unit of basic computer, 6. Instruction cycle

Module V: Micro programmed control (2L)
Control memory, 2. Address sequencing, 3. Micro program examples

 Module VI: Central processing unit (5L)
1. General register organization, 2. Stack organization, Register stack, Memory stack, Stack operations – push & pop, 3. Evaluation of arithmetic expression using stack, 4. Instruction format, 5. Types of CPU organization (single accumulator, general register & stack organization) & example of their instructions, 6. Three, two, one & zero address instruction, 7. Definition and example of data transfer, data manipulation & program control instructions

Module VII: Pipeline and vector processing (3L)
Parallel processing, 2. Flynn's classification, 3. Pipelining, Example of pipeline, space time diagram, speedup,
4. Basic idea of arithmetic pipeline, example of floating point addition/ subtraction using pipeline

Module VIII: Input – output organization(6L)
1. Peripheral devices, 2. Input – output interface, 3. Isolated I/O, Memory mapped I/O, 4. Asynchronous data transfer: strobe
& handshaking, 5. Programmed I/O, 6. Interrupt initiated I/O, 7. Basic idea of DMA & DMAC 8. Input – output processor

Module IX: Memory organization (6L)
1. Memory hierarchy, 2. Main memory definition, types of main memory, types of RAM, ROM, difference between SRAM & DRAM, 3. Cache memory, Cache memory mapping – Direct, Associative, Set Associative, 4. CAM, hardware organization of CAM, 5. Virtual memory, mapping using pages, page fault, mapping using segments, TLB, 6. Auxiliary memory, diagrammatic representation of magnetic disk & hard disk drive, 7. Definitions of seek time, rotational delay, access time, transfer time, latency

Reference Books:
1. Computer System Architecture, M. Morris Mano, PEARSON
2. Computer Organization & Architecture – Designing For Performance, William Stallings, PEARSON
3. Computer Architecture &Organisation, J.P. Hayes, TATA MCGRAW HILL
4. Computer Organization and Architecture, T. K. Ghosh, TATA MCGRAW-HILL
5. Computer Architecture, BehroozParhami, OXFORD UNIVERSITY PRESS

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module1	**Data Representation**	4	10	1	4		
Module2	**Computer arithmetic**	5	10	1.2	4		
Module3	**Register transfer and micro-operations**	5	15	3	4		
Module4	**Basic Computer organization and design**	4	10	8	4		
Module 5	**Micro programmed control**	2	10	7	4		
Module 6	**Central processing unit**	5	10	6	4		
Module 7	**Pipeline and vector processing**	3	10	7	4		
Module 8	**output organization**	6	10	4	4		
Module 9	**Memory organization**	6	15	5	4		

Paper Name: Environment and Ecology
Code :BSCIT(HU)201
Contact: 2L
Credits:2

Course Objectives:

1. To understand the concept of General Basic ideas of environment, Sustainable Development
2. To understand the concept of Anthropogenic degradation
3. To understand the different types of Ecology Elements of ecology,
4. To understand the concept of Air pollution and control Atmospheric Composition
5. To understand the Water Pollution and Control Hydrosphere, Land Pollution Lithosphere
6. To understand **the** Noise Pollution Definition of noise, Environmental Management

Course Outcomes:

Sl. No.	Course Outcome	Mapped Modules
1	Students will able to understand basic ideas of environment, basic concepts, man, society & environment, their interrelationship Sustainable Development.,Materials balance, Natural environmental Hazards,Anthropogenic degradation.	Module 1
2	Students will able to understand systems,ecology, species, population, community, ecosystem,Biodiversity	Module 2
3	Students will be able to understand different types of pollution	Module 3/4/6
4	Students will be able to understand Internal structure of earth, rock and soil,. Solid waste management and control (hazardous and biomedical waste).	Module 5
5	Students will be able to understand Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.	Module 7

Module I:
General Basic ideas of environment, basic concepts, man, society & environment, their interrelationship. Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non- renewable, potentially renewable, effect of excessive use vis-à-vis population growth, Sustainable Development.
Materials balance: Steady state conservation system, steady state system with non conservative pollutants, step function. Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management;
Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and
Engineering.

Module II:
Ecology Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function. 1L Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web. 2L Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. 1L Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity.

Module III:

Air pollution and control Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere,Tropopause
and Mesopause. Energy balance:Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems.Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food.Global warming and its consequence, Control of Global warming. Earth's heat budget. Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). Atmospheric dispersion: Maximum mixing depth, ventilation coefficient,
effective stack height, smokestack plumes and Gaussian plume model. Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur,particulate, PAN. Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green house gases, effect of ozone modification. Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP. cyclone separator,bag house, catalytic converter, scrubber (ventury), Statement with brief reference).

Module IV:
Water Pollution and Control Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects:
Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds. River/Lake/ground water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH. Lake: Eutrophication [Definition, source and effect]. Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only) Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening] Wastewater treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition. Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic

Module V:
Land Pollution Lithosphere; Internal structure of earth, rock and soil 1L Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste).

Module VI:
Noise Pollution Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise] Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, Noise pollution control.

Module VII:
Environmental Management: Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WB
Syllabus of B. Sc. In Information Technology
(Effective for 2020-2021 Admission Session)
Choice Based Credit System
140 Credit (3-Year UG)

Reference Books:
1. Masters, G. M., "Introduction to Environmental Engineering and Science", PrenticeHall of India Pvt. Ltd., 1991.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	General Basic ideas of environment	5	15	1	5		
Module 2	Ecology Elements of ecology	3	15	2	5		
Module 3	Air pollution and control Atmospheric Composition:	5	15	3	5		
Module 4	Water Pollution and Control Hydrosphere	3	15	4	5		
Module 5	Land Pollution Lithosphere	1	15	5	5		
Module 6	Noise Pollution Definition of noise	1	10	6	5		
Module 7	Environmental Management	2	15	7	5		

[NOTE: FOR **BSc IT 203**, ANY ONE FROM THE LIST OF GENERIC ELECTIVES / INTERDISCIPLINARY COURSES.]

Semester-III

Paper Name: Design Analysis and Algorithm
Code :BSCIT301
Contact: 5L+1T
Credits:6

Course Objectives:

1. To understand the concept of General Basic ideas of Algorithms and Flowcharts
2. To understand the concept of Analysis of Algorithms, Asymptotic Notations, Apriori Analysis, Complexities
3. To understand the various design approaches such as Divide & Conquer, Max-Min, Greedy Method
4. To understand the concept of Graph Theory, Spanning Tree, Minimum Spanning Tree, Heap Algorithms, Backtracking, Recursion
5. To understand the Sorting Algorithms: Bubble, Insertion, Selection, Quick, Radix. Searching Algorithms: Linear and Binary

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to understand basic ideas of Algorithms and Flowcharts	Module 1
2	Students will able to understand Analysis of Algorithms, Asymptotic Notations, Apriori Analysis, Complexities	Module 2
3	Students will be able to understand the various design approaches such as Divide & Conquer, Max-Min, Greedy	Module 3
4	Students will be able to understand the Sorting Algorithms: Bubble, Insertion, Selection, Quick, Radix, Searching Algorithms: Linear and Binary	Module 4

Module 1:

Introduction on Algorithms and Flowcharts, Analysis of Algorithms, Asymptotic Notations, Apriori Analysis, Complexities

Module 2:

Various Design Approaches such as Divide & Conquer, Max-Min, Greedy Method

Module 3:

Graph Theory, Spanning Tree, Minimum Spanning Tree, Heap Algorithms, Backtracking, Recursion

Module 4:
Sorting Algorithms: Bubble, Insertion, Selection, Quick, Radix,Searching Algorithms: Linear and Binary

Reference Books:

1. Skiena – Algorithm Design Manual - Springer

2. Sara Basse & A.V. Gelder - Computer Algorithm – Introduction to Design and Analysis, Pearson.

3. Sedgewick & Wayne – Algorithms – MIT Press. Pvt. Ltd., 1991.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Algorithms and Flowcharts	8	20	1	1		
Module 2	Various Design Approaches	10	25	2	2		
Module 3	Graph Theory, Spanning Tree, Minimum Spanning Tree, Heap Algorithms,	10	25	3	3		
Module 4	Sorting Algorithms: Bubble, Insertion, Selection, Quick, Radix,Searching Algorithms: Linear and Binary	12	30	4	4		

Paper Name: Database Management System
Code : BSCIT302 & BSCIT392
Contact: 4L+2P
Credits: 4+2

Course Objectives:

1. To introduce the students to the database system.
2. To learn how to design a database by using different models.
3. To enable the students to understand the database handling during execution of the transactions.
4. To understand the handling of database by concurrent users.
5. To gain complete knowledge of SQL and PL/SQL.

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to understand basic ideas of database system	Module 1
2	Students will able to design a database by using different models	Module 2/3/4

3	Students will be able to gain complete knowledge of SQL and PL/SQL	Module 5

Module 1: Introduction
Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Data Abstraction, Three Schema architecture of DBMS.

Module 2: E-R Model

Need for E-R Model, Various steps of database design, Mapping Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity

Module 3: SQL

Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Stored procedures,cursors and triggers.

Module 4: Relational Model and Relational Database Design

Concept of Relational Model, Design Issues, Keys, Closure set, Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multivalued dependencies, 4NF,5NF, Centralized and distributed database.

Module 5: File Organization and Query Optimization

Concepts of File and Records, Fixed Length-Variable length Record, Query optimization.

Module 6: Indexing
Primary, secondary, clustering, Multilevel Indexes.

Module 7: Transaction Management
Transaction definition, properties, transaction state diagram, commit and rollback, Concurrency control,lock based protocols,two phase locking, Recovery management.

Reference Books:
1. Database System Concepts – Henry F. Korth and Silberschatz Abraham - Mc.Graw Hill
2. Fundamentals of Database Systems - Ramez Elmasri, Shamkant B.Navathe – Addison Wesley

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction	4	10	1			
Module 2	E-R Model	6	15	2			

Modul e 3	SQL	10	15	2			
Module 4	Relational Model and Relational Database Design	8	30	2			
Module 5	File Organization and Query Optimization	4	10	3			
Module 6	Indexing	4	10	2/3			
Module 7	Transaction Management	4	10	3			

Paper Name: Information System Analysis and Design
Code :BSCIT303
Contact: 5L+1T
Credits:6

Course Objectives:

1. To introduce the students to the Computer Based Information System.
2. To learn how to do feasibility analysis.
3. To learn how to do use CASE TOOLS.
4. To understand the testing process.
5. To gain complete knowledge of ERP,CRM,SCM,

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to understand basic ideas of Computer Based Information Systems.	Module 1
2	Students will able to do feasibility analysis and testing.	Module 2/3
3	Students will be able to gain complete knowledge of ERP, SCM, MRP, CRM	Module 4

Module 1: (12L)
Overview of Computer Based Information System- TPS, OAS, MIS, DSS, KBS Development Life Cycles- SDLC and its phases Models- Waterfall, Prototype, Spiral, Evolutionary Requirement Analysis and Specification, SRS System analysis- DFD, Data Modeling with ERD

Module 2: (9L)
Feasibility Analysis System design tools- data dictionary, structure chart, decision table, decision tree. Concept of User Interface, Essence of UML. CASE tool.

Module 3: (9L)
Testing- Test case, Test suit, Types of testing- unit testing, system testing, integration testing, acceptance testing Design methodologies: top down and bottom up approach, stub, driver, black box and white box testing

Module 4: (10L)
ERP, MRP, CRM, Software maintenance SCM, concept of standards (ISO and CMM)

Reference Books:
1. System analysis and design, Igor Hawryszkiewycz, Pearson
2. Analysis and design of Information System, V Rajaraman, PHI
3. Software Engineering, Ian Sommerville, Addison-Wesley
4. Software Engineering, N.S. Gill, Khanna Publishing House
5. A concise introduction to software Engineering, Pankaj Jalote, Springer
6. Software Engineering, K.K. Aggarwal & Yogesh Singh, New Age International

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module1	Overview of Computer Based Information	12	25	1			
Module 2	Feasibility Analysis	12	25	2			
Module 3	TESTING	12	25	2			
Module 4	Different modules	14	25	2			

Paper Name: GUI PROGRAMMING WITH .NET
Code :BSCIT305
Contact: 2PR
Credits:2

Course Objectives:

1. To introduce the students to the Framework technologyog .NET.
2. To learn what are the basics of .NET.
3. To learn how to use Window controls.
4. To understand MDI with OOPS..
5. To gain complete knowledge of classes/functions VB .NET library functions,

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to understand the Framework technology og .NET	Module 1
2	Students will able to learn the basics of .NET	Module 2
3	Students will able to use Window controls	Module 3
4	. Students will be able to understand MDI with OOPS	Module 4
5	Students will gain complete knowledge of classes/functions VB .NET library functions	Module 5/6

MODULE 1

Introduction to Framework technology,Overview of Frame work & Architecture Versioning and deployment CLR, CTS ,CLS : three base of framework Metadata IDE for windows programming (toolbox, solution explorer , property window , output window , command window , task list window)

MODULE 2

Basics of .NET -Variable , constants & object declaration in vb.net Operators , flow control statements Modular (subroutines, functions) Introduction about property , events and methods Your first windows application & some console application with some input box and message box, Multiple Documents Interface

MODULE 3:

Windows Control - Textbox , rich text box, listbox , combo box, checked list box, scrollbar , trackbar, timer , picture box, image box , label, link label, radio button , check box, group box,

MODULE 4:

Advanced Windows Control -Listview , treeview , common dialog controls (open ,save, font , color , print , page setup… etc) ,tab control , date time picker

MODULE 5:

MDI with OOPS Introduction about menu & context menu Menu editor & context menu as tool Menus properties , event & methods Overview of OOPS (object, class, inheritance , encapsulation, abstraction) Module & Class module and their uses

MODULE 6:

Basic of classes / functions (Libraries) -Overview of VB.NET library & it's utility Important of 'import' keyword & it's usage Various classes / functions (char, string, string builder , numeric , date time , time span class….

4ᵀᴴ SEMESTER

Paper Name: OPERATING SYSTEM WITH UNIX PROGRAMMING
Code :BSCIT401 & BSCIT491
Contact: 4L+2P
Credits:4+2

Course Objectives:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication.
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
5. To know the components and management aspects of concurrency management
6. To learn programmatically to implement simple OS mechanisms

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to *to learn the fundamentals of Operating Systems*	Module 1
2	Students will able to learn the *mechanisms of OS to handle processes and threads and their communication*	Module 2
3	Students will able to *gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement*	Module 3
4	. Students will be able to *know the components and management aspects of concurrency management*	Module 4/5/6/7
5	Students will be able to *learn programmatically to implement simple OS mechanisms*	Module 1/2/3/4/5/6/7

MODULE 1
Introduction Conceptof Operating Systems, Generationsof Operatingsystems, Typesof Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

MODULE 2
Processes Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Schedulingcriteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Preemptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

MODULE 3

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

MODULE 4

Deadlocks Definition, Necessaryandsufficientconditionsfor Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

MODULE 5

MemoryManagementBasicconcept,LogicalandPhysicaladdressmap,Memoryallocation:Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in FirstOut(FIFO), SecondChance (SC), Notrecently used (NRU) andLeastRecentlyused(LRU).

MODULE 6

I/OHardware I/Odevices, Devicecontrollers, Directmemoryaccess Principlesof I/OSoftware: Goalsof Interrupthandlers, Devicedrivers, Deviceindependent I/Osoftware, Secondary-Storage Structure: Disk structure,Diskschedulingalgorithms File Management:Conceptof File, Accessmethods, Filetypes, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

MODULE 7

Disk Management Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

List of Practical: 1. Basics of UNIX commands. 2. Shell programming 3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority 4. Implement all file allocation strategies 5. Implement Semaphores 6. Implement Bankers algorithm for Dead Lock Avoidance 7. Implement an Algorithm for Dead Lock Detection 9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU 10. Implement Shared memory and IPC

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Concept of Operating Systems Concept of Operating Systems ion System	3	7	1			

Module 2	Processes	8	29	2			
Module 3	Inter-process Communication	4	7	3			
Module 4	Deadlocks Definition	4	14	4			
Module 5	Memory Management	8	14	4			
Module 6	I/O Hardware I/O devices	6	14	4			
Module 7	Disk Management	3	14	4			

Paper Name: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Code :BSCIT402
Contact: 5L+1T
Credits:6

Course Objectives:

1. Gain a historical perspective of AI and its foundations
2. Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
5. Experiment with a machine learning model for simulation and analysis.
6. Explore the current scope, potential, limitations, and implications of intelligent systems

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to *g*ain a historical perspective of AI and its foundations	Module 1
2	Students will able to become familiar with basic principles of AI toward problem solving, inference, perception, knowledge	Module 2
3	Studentswillabletoinvestigateapplicationsof AItechniquesin intelligent agents, expert systems, artificial neural networks and other machine learning models *protocols*	Module 3
4	.Studentswillbeabletoexperience AIdevelopmenttoolssuchas an'AI language', expert system shell, and/ordataminingtool	Module 4
5	Students will be able *to* experiment with a machine learning model for simulation and analysis and explore the current scope, potential, limitations, and implications of intelligent systems	Module 5

Module 1 Artificial intelligence fundamentals

A.I. systems integrating approaches and methods.- Advanced search- Constraint satisfaction problems – Knowledge representation and reasoning – Non-standard logics – Uncertain and probabilistic reasoning (Bayesian networks, fuzzy sets).- Foundations of semantic web: semantic networks and description logics. – Rules systems: use and efficient implementation.- Planning systems

Module 2 Machine learning

Computational learning tasks for predictions, learning as function approximation, generalization concept. – Linear models and Nearest-Neighbors (learning algorithms and properties, regularization). – Neural Networks (MLP and deep models, SOM). – Probabilistic graphical models. – Principles of learning processes: elements of statistical learning theory, model validation. – Support Vector Machines and kernel-based models. – Introductiontoapplicationsandadvancedmodels.Applicativeproject:implementationanduseof ML/NN models with emphasis to the rigorous application of validation techniques

Module 3 Human language technologies

Formal and statistical approaches to NLP. Statistical methods: Language Model, Hidden Markov Model, Viterbi Algorithm, Generative vs Discriminative Models Linguistic essentials (tokenization, morphology, PoS, collocations, etc.). Parsing (constituency and dependency parsing).Processing Pipelines. Lexicalsemantics: corpora, thesauri, gazetteers. Distributional Semantics: Word embeddings, Character embeddings. Deep Learning for natural language. Applications: Entity recognition, Entity linking, classification, summarization. Opinion mining, Sentiment Analysis. Question answering, Language inference, Dialogic interfaces. Statistical MachineTranslation. NLP libraries: NLTK, Theano, Tensorflow

Module 4 Intelligent Systems for Pattern Recognition

Particular focus will begiventopatternrecognitionproblemsandmodelsdealingwithsequentialandtime-series data-Signal processing and time-series analysis-Image processing, filters and visual feature detectors-Bayesianlearninganddeeplearningformachinevisionandsignalprocessing-Neuralnetworkmodelsfor pattern recognition on non-vectorial data (physiological data, sensor streams, etc)-Kernel and adaptive methods for relational data-Pattern recognition applications: machine vision, bio informatics, robotics, medical imaging, etc.-ML and deep learning libraries overview: e.g. scikit-learn, Keras, Theano

Module 5 Smart applications and Robotics

Commondesignsforsmartapplicationsexamples: fuzzylogicincontrolsystemsorcloudanalysisoffield sensorsdatastreamsMakeorbuy: selectingappropriateprocurementstrategiesexample: writing your own RRN architecture vs. Using cloud services Development platforms for smart objects examples: Brillo (IoT devices) or Android TV (Smart TVs) Development platforms for smart architectures examples: TensorFlow (server-side RNNs), or the Face Recognition API (mobile) Cloud services for smart applications examples: Google Cloud Machine Learning API, Google Cloud Vision API, Google Cloud Speech API, or Deploying Deep Neural Networks on Microsoft Azure GPUVMs Deploymentandoperationsexamples: cloud hosting vs. Device hosting, or harnessing user feedback to drive improvement Measuring success: methods and metrics examples: defining userengagementandsatisfactionmetrics,orassessingthenaturalnessofsmartinteractionsIntroductionto robotics: main definitions, illustration of application domains-Mechanics and kinematics of the robot Sensors for robotics-Robot Control-Architectures for controlling behaviour in robots-Robotic Navigation-Tactile Perception in humans and robots-Vision in humans and robots-Analysis of case studies of robotic systems-Project

laboratory: student work in the lab with robotic systems.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	**Artificial intelligence fundamentals** System	7	20	1			
Module 2	**Machine learning**	7	20	2			
Module 3	**Human language technologies**	7	20	3			
Module 4	**Intelligent Systems for Pattern Recognition**	7	20	4			
Module 5	**Smart applications and Robotics**	8	20	5			

Paper Name: COMPUTER NETWORKING
Code :BSCIT403
Contact: 5L+1T
Credits:6

Course Objectives:
1. To gain knowledge of computer networks.
2. To gain knowledge of several layers and network architectures
3. To gain knowledge of communication through networks, protocols and algorithms.
4. To understand the division of network functionalities into layers.
5. Be familiar with the components required to build different types of networks
6. Be exposed to the required functionality at each layer
7. Learn the flow control and congestion control algorithms

Course Outcomes:

Sl.No	Course Outcome	Mapped Modules
1	Students will able to gain knowledge of computer networks	Module 1/2/3/4/5
2	Students will able to gain knowledge of several layers and network architectures	Module 1/2/3/4/5
3	Students will able to understand the division of network functionalities into layers *protocols*	Module 3/4/5
4	Students will be able to gain knowledge of communication through networks, protocols and algorithms	Module 4
5	Students will be able *to learn* the components required to build different types of networks	Module 5

MODULE 1 FUNDAMENTALS & LINK LAYER

Building a network – Requirements – Layering and protocols – Internet Architecture – Network software – Performance ; Link layer Services – Framing – Error Detection – Flow control

MODULE 2 MEDIA ACCESS & INTERNETWORKING

Media access control – Ethernet (802.3) – Wireless LANs – 802.11 – Bluetooth – Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP,ICMP)

MODULE 3 ROUTING

Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast –addresses – multicast routing (DVMRP, PIM)

MODULE 4 TRANSPORT LAYER

Overview of Transport layer – UDP – Reliable byte stream (TCP) – Connection management – Flow control – Retransmission – TCP Congestion control – Congestion avoidance (DECbit, RED) – QoS – Application requirements

MODULE 5 APPLICATION LAYER

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	FUNDAMENTALS & LINK LAYER System	7	20	1/2			
Module 2	MEDIA ACCESS & INTERNETWORKING	7	20	1/2			
Module 3	ROUTING	7	20	3			
Module 4	TRANSPORT LAYER	8	20	4			
Module 5	APPLICATION LAYER	7	20	5			

Paper Name: DATA SCIENCE USING PYTHON TOOLS
Code :BSCIT405
Contact: 2L
Credits:2

Course Objectives:

1. To gain knowledge of Data Science.
2. To gain knowledge of several decision trees, SVM, logistic regression
3. To gain knowledge of engineering and selection.
4. To understand the text mining and information retreival.

Course Outcomes:

Sl. No.	Course Outcome	Mapped Modules
1	Students will able to gain knowledge of Data Science	Module 1
2	Students will able to gain knowledge of several decision trees,SVM, logistic regression	Module 2
3	Students will able to understand the concept of engineering and selection	Module 3
4	Students will be able to gain knowledge of text mining andinformation retreival	Module 4

Module-1:

Introduction to data science, Exploratory data analysis, Linear regression and regularization, Model selection and evaluation

Module-2:

Classification: kNN, decision trees, SVM; Ensemble methods: random forests, Naïve Bayes and logistic regression

Module-3:

Feature engineering and selection, Clustering: k-means, hierarchical clustering, Dimensionality reduction: PCA and SVD

Module-4:

Text mining and information retrieval, Network Analysis, Recommender systems

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction to data science	10	25	1/2			
Module 2	Classification	6	25	1/2			
Module 3	Feature engineering and selection	10	25	3			
Module 4	Text mining and information retrieval	10	25	4			

Paper Name: MANAGEMENT INFORMATION SYSTEM
Code : BSCIT501 & BSCIT591
Contact: 4L+2P
Credits: 4+2

Course Objectives:

1. To gain knowledge on the basics of Information System.
2. To gain knowledge of basics of Management Information Systems
3. To gain knowledge of Information and Managerial Effectiveness.
4. To understand the different types of Information systems.
5. Be familiar with the different software life cycle models
6. Be exposed Development and Management of Data Base

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to gain knowledge on the basics of Information System	Module 1
2	Students will able to gain knowledge of basics of Management Information Systems	Module 2
3	Students will able to understand the knowledge of Information and Managerial Effectiveness	Module 3
4	Students will be able to gain knowledge of different types of Information systems	Module 4
5	Students will be able to *learn* the different software life cycle models, exposed to DBMS	Module 5

Module I:

(a) Introduction, Data, Information, and Knowledge, Information Technology - Concept, Features and Components, Information Systems - Concept and types of Information Systems, Role of IT in

business and society.

(b) MIS Concept, evolution and meaning of MIS; Information system for competitive advantage, MIS

function in an organization. Limitations of MIS (8L)

Module II:

(a) Information and Managerial Effectiveness: Information as a corporate resource, types of information – operational, tactical and strategic; Levels of management and information needs of management; Quality of information;

Information systems for finance, marketing, manufacturing, human resource areas. (6L)

Module III:

Understanding information system; concepts; sub-systems and super-systems; Types of information systems, Transaction processing systems, MIS decision support systems, Executive support system; Enterprise

Resource Planning (ERP)(Features, merits, issues and challenges in implementation) (6L)

Module IV:

System Development Life Cycle: Sequential Process of software development; Waterfall model. (3L)

Module V:

Development and Management of Data Bases: Relation databases, DDL, DCL, DML, Data Base

Management Systems (DBMS) and their components, Concept of entity and relationships, ER Diagram,

Data Model, Data dictionary, Introduction to SQL Queries. (9L)

Suggested Readings:
1. C. S. V. Murti : Management Information System, Himalaya Publishing House.
2. A.K. Gupta: Management Information System, S Chand.
3. Oka Miland M & Murty: Management Information System.
4. Jaiswal and Mittal: Management Information Systems, Oxford University Press
5. Management Information Systems by Laudon, Laudon, Dass, Pearson

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Concept and types of Information Systems	8	15	1			
Module 2	Information and Managerial Effectiveness	6	20	2			
Module 3	Understanding information system	6	25	3			
Module 4	System Development Life Cycle	6	20	4			
Module 5	Development and Management of Data Bases	10	20	5			

Paper Name: CLOUD COMPUTING
Code :BSCIT502
Contact: 5L+1T
Credits:6

Course Objectives:

1. To gain knowledge of Cloud Computing and its Basics.
2. To gain knowledge on use of Platforms in Cloud Computing
3. To gain knowledge of cloud Infrastructure.

To understand the concepts of Services and Applications.

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to gain knowledge of of Cloud Computing and its Basics	Module 1
2	Students will able to gain knowledge on use of Platforms in Cloud Computing	Module 2
3	Students will able to understand the cloud Infrastructure	Module 3
4	Students will be able to gain knowledge of concepts of Services and Applications.	Module 4

Module 1 Definition of Cloud Computing and its Basics

1. Definition of Cloud Computing: Defining a Cloud, Cloud Types – NIST model, Cloud Cube model, Deployment models (Public , Private, Hybrid and Community Clouds), Service models – Infrastructure as a Service, Platform asaService, SoftwareasaServicewithexamplesofservices/serviceproviders,CloudReferencemodel Characteristicsof Cloud Computing– ashiftinparadigm Benefitsandadvantagesof Cloud Computing

2. CloudArchitecture:AbriefintroductiononComposability, Infrastructure,Platforms,VirtualAppliances, Communication Protocols, Applications, Connectingto the Cloud by Clients 3. Services and Applications by Type IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos PaaS – Basic concept, tools and development environment with examples SaaS - Basic concept and characteristics, Open SaaS and SOA, examplesof SaaS platform Identityasa Service(IDaaS) Complianceasa Service(CaaS)

Module 2 Use of Platforms in Cloud Computing

1. Conceptsof Abstractionand Virtualization Virtualizationtechnologies: Typesofvirtualization(access, application, CPU, storage), Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D) Load Balancingand Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network), Mention of The Google Cloud as an example of use of load balancing Hypervisors: Virtual machine technology and types, VMware vSphere Machine Imaging (including mention of Open Virtualization Format – OVF) Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance

2. Conceptsof Platform asa Service Definition ofservices, Distinctionbetween SaaS and PaaS (knowledge of Salesforce.comand Force.com), Application development Use of PaaS Application frameworks

3. UseofGoogleWebServices Discussionof GoogleApplications Portfolio–Indexedsearch,DarkWeb, Aggregation and disintermediation, Productivity applications and service, Adwords, Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engineservice.

4. Use of Amazon Web Services Amazon Web Service components and services: Amazon Elastic Cloud, AmazonSimple Storage system, Amazon Elastic Block Store, Amazon SimpleDB and Relational Database Service

5. Use of Microsoft Cloud Services Windows Azure platform: Microsoft's approach, architecture, and main elements, overview of Windows Azure AppFabric, Content Delivery Network, SQL Azure, and Windows Live services

Module 3 Cloud Infrastructure

1. Types of services required in implementation – Consulting, Configuration, Customization and Support 2. Cloud ManagementAnoverviewofthefeaturesofnetworkmanagementsystemsandabriefintroductionofrelated productsfromlargecloudvendors, Monitoringofanentirecloudcomputingdeploymentstack– anoverview with mention of some products, Lifecycle management of cloud services (six stages of lifecycle)

3. Concepts of Cloud Security Cloud security concerns, Security boundary, Security service boundary Overview of security mapping Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance Identity management (awareness of Identity protocol standards)

Module 04 Concepts of Services and Applications

1. Service Oriented Architecture: Basicconceptsofmessage-basedtransactions,Protocolstackforan SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs

2. Applications in the Cloud: Concepts of cloud transactions, functionality mapping, Application attributes, Cloud service attributes, System abstraction and Cloud Bursting, Applications and Cloud APIs 3. Cloud-based Storage: Cloud storage definition – Manned and Unmanned

4. Web mail Services: Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo mail, concepts of Syndication services

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module1	**Definition of Cloud Computing and its**	8	29	1			
Module 2	**Use of Platforms in Cloud Computing**	6	36	2			
Module 3	**Use of Platforms in Cloud Computing**	6	14	3			

Module 4	**Concepts of Services and Applications**	6	21	4			

Paper Name: DATA WAREHOUSING AND MINING
Code :BSCIT503A
Contact: 5L+1T
Credits:6

Course Objectives:

1. Be familiar with mathematical foundations of data mining tools..
2. Understand and implement classical models and algorithms in data warehouses and data mining
3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. Master data mining techniques in various applications like social, scientific and environmental context.
5. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to Be familiar with mathematical foundations of data mining tools	Module 1/2/3/4/5
2	Students will able to gain knowledge of classical models and algorithms in data warehouses and data	Module 2/3
3	Students will able to Characterize the kinds of patterns that can bediscovered by association rule mining, classification and clustering	Module 3/4
4	Students will be able to master data mining techniques in various applications like social, scientific and environmental context	Module 4
5	Students will be able to develop skill in selecting the appropriate data mining algorithm for solving practical	Module 5

MODULE 1

Introduction to Data Warehousing; Data Mining: Mining frequent patterns, association and correlations; Sequential Pattern Mining concepts, primitives,scalable methods;

MODULE 2

Classification and prediction; Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods; Transactional Patterns and other temporal based frequent patterns,

MODULE 3

Mining Time series Data, Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis;

MODULE 4

Mining Data Streams, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem; Graph Mining; Social Network Analysis; modulation for communication, filtering, feedback control systems.

MODULE 5

 Web Mining, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining; Distributed Data Mining.

MODULE 6
   Recent trends in Distributed Warehousing and Data Mining, Class Imbalance Problem; Graph Mining; Social Network Analysis.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction to Data Warehousing	6	14	1			
Module 2	Classification and prediction	8	14	2			
Module 3	Mining Time series Data,	6	14	3			
Module 4	Mining Data Streams	6	28	4			
Module 5	Web Mining	6	14	5			
Module 5	Recent trends in Distributed Warehousing and Data Mining	4	14	6			

Paper Name: DATA VISUALIZATION USING BUSINESS INTELLIGENCE
Code :BSCIT503B
Contact: 5L+1T
Credits:6

Course Objectives:

1. The main objective of data visualization is to understand the significance of data and to communicate this information clearly and efficiently. Analyzing and reasoning about data through visualizations makes complex data more accessible, understandable and usable.

Course Outcomes:

Sl.No	Course Outcome	Mapped Modules
1	Students will able to understand the overview of visualization	Module 1
2	Students will able to know Data, mapping, charts, glyphs, parallel coordinates, stacked graphs.	Module 2
3	Students will able to understand the Graphs, networks, tree maps, Principle Component Analysis, multidimensional scaling, packing, Visualization systems and Overview and intro to web programming	Module 3/4/5
4	Students will be able to do interactive computing using MVC	Module 6/7
5	Students will be able to *declarative programming*	Module 8

MODULE 1

Orientation, overview of visualization, graphics, drawing, photorealism, human perception.

MODULE 2

Data, mapping, charts, glyphs, parallel coordinates, stacked graphs, Tufte's design rules, using color

MODULE 3

Graphs, networks, tree maps, Principle Component Analysis, multidimensional scaling, packing

MODULE 4

Visualization systems, Information Visualization Mantra, database visualization, visualization system design.

MODULE 5

Overview and intro to web programming, intro to D3 and selections, D3 chart help.

MODULE 6

Interactive computing, MVC, browsers, event callbacks, interaction design, D3 events, Tooltips, D3 Graphs, D3 transitions, interactive dynamics .

MODULE 7

Narrative structure, narrative layouts, narrative spectrum, Ellipsis.

MODULE 8

Declarative programming, reactive programming, course conclusion .

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module1	Orientation, overview of visualization	6	17	1			
Module 2	Data, mapping	7	29	2			
Module 3	Graphs	6	10	3			
Module 4	Visualization systems	6	14	3			
Module 5	Overview and intro to web programming	3	10	3			
Module 6	Interactive computing	3	10	4			
Module 7	Narrative structure	3	10	4			
Module 8	Declarative programming	2	3	5			

Paper Name: INFORMATION AND CYBER SECURITY
Code :BSCIT503C
Contact: 5L+1T
Credits:6

Course Objectives:

1. To gain knowledge on the basics of Information and Cyber Security.
2. To gain knowledge on Data explosion
3. To gain knowledge of Survey of techniques.
4. To understand the computation systems for protecting delimited data and the various technologies used.

Course Outcomes:

Sl.No	Course Outcome	Mapped Modules
1	Students will able to gain knowledge on basics of Information and Cyber Security.	Module 1
2	Students will able to gain knowledge on Data explosion	Module 2
3	Students will able to of Survey of techniques	Module 3
4	Students will be able to gain knowledge of the computation systems for protecting delimited data and the various technologies used	Module 4/5

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140 Credit (3-Year UG)

Module I
Introduction- Fundamental Concepts, Definitions, Statistics, Data Privacy Attacks, Data linking and profiling, access control models, role based access control, Hierarchical Access control, privacy policies, languages and implementation, privacy policy languages, privacy in different domains- medical, financial, etc.

Module II
Data explosion- Statistics and Lack of barriers in Collection and Distribution of Persons specific information, Mathematical model for characterizing and comparing real-world data sharing practices and policies and for computing privacy and risk measurements, Demographics and Uniqueness. Protection Models- Null-map, k-map, Wrong map

Module III
Survey of techniques- Protection models (null-map, k-map, wrong map), Disclosure control, Inferring entity identities, Strength and weaknesses of techniques, entry specific databases.

Module IV
Computation systems for protecting delimited data- MinGen, Datafly, Mu-Argus, k-Similar, Protecting textual documents: Scrub.

Module V:
Technology, Policy, Privacy and Freedom- Medical privacy legislation, policies and best practices, Examination of privacy matters specific to the World Wide Web, Protections provided by the Freedom of Information Act or the requirement for search warrants.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction	10	25	1			
Module 2	Data explosion	8	25	2			
Module 3	Survey of techniques	8	25	3			
Module 4	Computation systems for protecting delimited data	6	25	4			
Module 5	Techniques	4	25	4			

Paper Name: WEB TECHNOLOGY
Code : BSCIT601 & BSCIT691
Contact: 4L+2P
Credits:4+2

Course Objectives:

1 To introduce the students to the network of networks -Internet.
2 To enable the students to use various services offered by internet.
3 To gain knowledge about the protocols used in various services of internet.
4 To understand the working and applications of Intranet and Extranet.

Course Outcomes:

Sl.No	Course Outcome	Mapped Modules
1	Students will able to gain knowledge of computer networks	Module 1
2	Students will able to use HTML for coding	Module 2
3	Students will be able to do server side programming and Scripting	Module 3
4	Students will be able to learn Security in networking	Module 4
5	Students will be able to gain knowledge of the working and applications of Advanced networking	Module 5

MODULE 1

Introduction to Networking Overview of Networking, Intranet, Extranet and Internet, Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP, Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6, Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IPtables, Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast, Electronic Mail

MODULE 2

Web Programming Introduction to HTML, Editors, Elements, Attributes, Heading, Paragraph Formatting, Link,Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Color name, Color value, Image Maps, area, attributes of image area, Extensible Markup Language (XML), CGI Scripts, GET and POST Methods.

MODULE 3

Server Side Programming and Scripting Basic PHP Programming, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling, JavaScript basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation, Definition of cookies, Create and Store cookie.

MODULE 4

Security Issues Network security techniques, Password and Authentication, VPN, IP Security, security in electronic transaction, Secure Socket Layer(SSL), Secure Shell (SSH), Introduction to Firewall, Packet filtering, Stateful, Application layer, Proxy.

MODULE 5

Advance Internet Technology Internet Telephony (VoIP), Multimedia Applications, Multimedia over IP: RSVP, RTP, RTCP and RTSP. Streamingmedia, Codec and Plugins, IPTV, Search Engine Optimization, Metadata.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction to Networking	8	17	1			
Module 2	Web Programming	8	21	2			
Module 3	Server Side Programming	8	21	3			
Module 4	Security Issues	6	13	4			
Module 5	Advance Internet Technology	6	19	5			

Paper Name: MULTIMEDIA
Code :BSCIT602
Contact: 5L+1T
Credits:6

Course Objectives:

1. To provide the basics of multimedia systems and processing of multimedia signals.
2. To gain knowledge on multimedia tools and processes.
3. To design multimedia systems in systematic approach.
4. To produce information on user interface design.
5. To identify the major applications of multimedia systems.
6. To insight the research areas of multimedia systems.

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able togain knowledgeof thebasics of Multimedia	Module 1
2	Students will able to gain knowledge on multimedia tools and processes	Module 2

3	Students will able to understand Image and Video Database Image representation	Module 3
4	Studentswillbeableto gain knowledge of Document Architecture and Content Management	Module 4
5	Students will be able to *learn* the Multimedia Applications	Module 5

MODULE 1

Introduction Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications Text and Audio Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption;

MODULE 2

Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate,Sampling Size, Quantization), Audio Formats, Audio tools, MIDI Storage models and Access Techniques Magnetic media, optical media, file systems (traditional, multimedia) Multimedia devices – Output devices, CD-ROM, DVD, Scanner, CCD

MODULE 3

Image and Video Database Image representation, segmentation, similarity based retrieval, image retrieval by color, shape and texture; indexing- k-d trees, Rtrees, quad trees; Case studies- QBIC, Virage. Video Content, querying, video segmentation, indexing

MODULE 4

Document Architecture and Content Management Content Design and Development, General Design Principles Hypertext: Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG),Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing. Case study of Applications.

MODULE 5

Multimedia Applications Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

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Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction Multimedia	6	14	1			
Module 2	Multimedia tools and processes	8	21	2			
Module 3	Image and Video Database Image representation	8	21	3			
Module 4	Document Architecture and Content Management	9	29	4			
Module 5	Multimedia Applications	5	14	5			

Paper Name: CYBER LAWS AND ETHICS
Code :BSCIT603A
Contact: 5L+1T
Credits:6

Course Objectives:

1. This course will look at the emerging legal, policy and regulatory issues pertaining to cyberspace and cybercrimes
2. Tocoverallthetopicsfromfundamentalknowledgeof Information Technologyand Computer Architecture so that the participant can use to understand various aspects of working of acomputer.
3. To enable the participants appreciate, evaluate and interpret the case laws with reference to the IT Act and other Laws associated with the cyberspace.
4. To identify the emerging Cyberlaws, Cybercrime & Cyber security trends and jurisprudence impacting cyberspace in today's scenario.

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to gain knowledge of Introduction to Cyberspace, Cybercrime and Cyber Law	Module 1
2	Students will able to gain knowledge of Regulatory Framework of Information and Technology Act 2000	Module 2
3	Students will able to understand Offences and Penalties Information Technology (Amendment) Act 2008	Module 3
4	Studentswillbe ableto gain knowledge of Indian Evidence Act Classification	Module 4
5	Students will be able to *learn* the components required to build different types ofnetworks	Module 5

MODULE 1

Introduction to Cyberspace, Cybercrime and Cyber Law The World Wide Web, Web Centric Business, e-Business Architecture, Models of e-Business, e-Commerce, Threats to virtual world. IT Act 2000 - Objectives, Applicability, Non-applicability, Definitions, Amendments and Limitations. Cyber Crimes- Cyber Squatting, Cyber Espionage, Cyber Warfare, Cyber Terrorism, Cyber Defamation. Social Media-Online Safety for women and children, Misuse of Private information.

MODULE 2

Regulatory Framework of Information and Technology Act 2000 Information Technology Act 2000, Digital Signature, E-Signature, Electronic Records, Electronic Evidence and Electronic Governance. Controller, Certifying Authority and Cyber Appellate Tribunal. (Rules announced under the Act), Network and Network Security, Access and Unauthorized Access, Data Security, E Contracts and E Forms.

MODULE 3

Offences and Penalties Information Technology (Amendment) Act 2008 – Objective, Applicability and Jurisdiction; Various cyber-crimes under Sections 43 (a) to (j), 43A, 65, 66, 66A to 66F, 67, 67A, 67B, 70, 70A, 70B, 80 etc. along with respective penalties, punishment and fines, Penal Provisions for Phishing, Spam, Virus, Worms, Malware, Hacking, Trespass and Stalking; Human rights in cyberspace, International Cooperation in investigating cybercrimes.

MODULE 4

Indian Evidence Act Classification – civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts. Criminal Procedure Code. Cognizable and non-cognizable offences. Bailable and non-bailable offences. Sentences which the court of Chief Judicial Magistrate may pass. Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. Section 293 in the code of criminal procedure. Secondary EvidenceSection 65-B.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction to Cyberspace, Cybercrime and Cyber Law	9	24	1			
Module 2	Regulatory Framework of Information and Technology Act 2000	9	24	2			
Module 3	Offences and Penalties Information Technology (Amendment) Act 2008	9	26	3			
Module 4	Indian Evidence Act Classification	9	26	4			

Paper Name: E COMMERCE
Code :BSCIT603B
Contact: 5L+1T
Credits:6

Course Objectives:

1. Understand fundamentals ofE-commerce.
2. Understand different Knowledge base systems.
3. Understand designing of knowledge base Systems to improve the efficiency of organizations based on their need.

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to gain knowledge of Introduction to E-Commerce	Module 1
2	Students will able to gain knowledge about different types of E-commerce.	Module 2
3	Students will able to understand Legal issues Risks	Module 3/5
4	Studentswillbe ableto gain knowledge of Security Issues Security Solutions	Module 4
5	Students will be able to *learn* the E-business Internet	Module 6

MODULE 1

Introduction to E-Commerce Definition, Scope of E-Commerce, Hardware requirements, ECommerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.

MODULE 2

Business to Business E-Commerce Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, InterOrganizational E-commerce.

MODULE 3

Legal issues Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.

MODULE 4

Security Issues Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security.

MODULE 5

Business to Consumer E-Commerce Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.

MODULE 6

E-business Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Introduction to E-Commerce	6	15	1			
Module 2	Business to Business E-Commerce	5	17	2			
Module 3	Legal issues Risks	5	17	3			
Module 4	Security Issues Security Solutions	6	17	4			
Module 5	Business to Consumer E-Commerce	8	17	3			
Module 6	E-business Internet	6	17	5			

Paper Name: INTERNET OF THINGS
Code :BSCIT603C
Contact: 5L+1T
Credits:6

Course Objectives:

1. Understand the concepts of Internet of Things
2. Design IoT applications in different domain and be able to analyze their performance
3. Implement basic IoT applications on embedded platform

Course Outcomes:

Sl. No	Course Outcome	Mapped Modules
1	Students will able to gain Overview of IoT	Module 1
2	Students will able to gain knowledge of IoT Architecture	Module 2
3	Students will able to understand the division of network functionalities into layers *in IOT*	Module 3/4

MODULE 1

OverviewIoT-AnArchitecturalOverview–Buildinganarchitecture,Maindesignprinciplesandneeded capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals-Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

MODULE 2

Reference Architecture IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design ConstraintsIntroduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control

MODULE 3

IOT Data Link Layer & Network Layer Protocols PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP Unit IV – TRANSPORT & SESSION LAYER PROTOCOLS (12 hours) Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

MODULE 4

Service Layer Protocols& Security Service Layer-oneM2M, ETSIM2M, OMA, BBF– Securityin IoTProtocols–

MAC 802.15.4, 6LoWPAN, RPL, Application Layer

Module No.	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (if applicable)	Remarks (if any)
Module 1	Overview IoT	9	25	1			
Module 2	IoT Architecture	9	25	2			
Module 3	IOT Layers	9	25	3			
Module 4	Service Layer Protocols & Security Service Layer	9	25	3			