

**VIKRAM UNIVERSITY, UJJAIN**  
**INSTITUTE OF COMPUTER SCIENCE**

**PROGRAMME TITLE: BACHELOR OF SCIENCE (HONORS) COMPUTER SCIENCE**

**PROGRAMME OBJECTIVES:**

The objective of the B.Sc.(H) CS programme is to prepare graduate students for productive careers in the software industry and academia by providing an outstanding environment for teaching and research in the core and emerging areas of the discipline.

This Bachelor Degree Program has been designed with a semester approach in mind. The first year courses are aimed at skills development in computers using various technologies, the second year, provides the specialization and the project work.

The main objectives of the B.Sc.(H) CS programme includes:

- Learn various programming languages to solve real world problems from diversified python and Machine learning domain.
- To develop in depth understanding of the key concepts of computer science and to impart knowledge of problem solving techniques, database management, software engineering and Web Technology.
- Develop problem solving skills in interdisciplinary domains.
- Focus on development of advanced knowledge and specific skills required for IT industry working in the domain of AI.
- To make sustained efforts for holistic development of the students and empower them to analyze, develop, configure IT solutions keeping in view the challenges posed by changing industrial requirements.
- To develop competent computer professionals with strong ethical values.

**PROGRAMME OUTCOMES (POs)**

At the end of this programme, B.Sc.(H) CS student will be able to:

- Explore software, hardware, application systems and their interplay in Machine learning systems.
- Employ tools and technologies to implement Machine learning applications.
- Acquire experimental learning of algorithms and tools required for capturing, storing, managing and analyzing new language.
- Gain understanding of the key technologies Machine learning, Computer Organization, Computer Architecture, Data Communication, Web Technology, Cloud Computing, Soft computing, Artificial Intelligence and Advance Data Structures.
- Understanding the key concepts of Information Technology to improvise organizational performance.

After Completion of the programme students are able to work as-

- Language Programmer
- -Software Developer
- -Web Application Developer

# **Vikram University, Ujjain**

**Board of Studies in Computer Science**

**SYLLABUS of B.Sc. (Honours) Computer Science Programme**

**[Choice Based Credit System & Grading System (CBCS& GS)]**

**Exclusively for University Teaching Department (ICS, VUU)**

**THREE YEAR B.Sc. (Honours) COMPUTER SCIENCE**

**(FULL TIME) PROGRAMME of UTD (ICS, VUU)**

**(Effective from Academic Session 2020-2021)**

**Modified as according to the provision of “Ordinance No. 69 for Programme and**

**Ordinance No.14 for Choice Based Credit System Pattern”**

**VIKRAM UNIVERSITY, UJJAIN**

**COURSE STRUCTURE**

**B.Sc. (Hons.) CS- FIRST SEMESTER**

S N	Course Type	Course code	Title	End term semester Exam	Internal	Max Marks	Credits*	Distribution of Credits		
								L	T	P
1	Core Course	BSCH-101	Programming in C	60	40	100	6	4		2
		BSCH-102	Mathematics-I	60	40	100	6	4		
2	Course for Ability Enhancement & skill Development (AE & SD)	BSCH-103	Physics	60	40	100	6	4	2	
Choose any one From BSCH-104E1 and BSCH-104E2										
3	Elective Discipline Centric	BSCH- 104E1	Introduction to Information Technology	60	40	100	6	4	2	
		BSCH-104E2	Internet and its Applications	60	40	100	6	4	2	
Choose any one From BSCH- 105E1, BSCH-105E2 and BSCH-105E3										
4	Elective Generic Categories	BSCH-105E1	Digital Electronics	60	40	100	6	4		
		BSCH-105E2	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		BSCH-106	Practical (Based on BSCH-101)	50	-	50	04 <u>Virtual (VR)</u>			
			Total			550	30+4	20	06	04

(C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Practical Work per week)

\*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial) and two hours (120 minutes) for practical

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions “Ordinance 14 : Choice Based Credit System” shall be applicable and the conditions mentioned therein will need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

## B.Sc. (Hons.) CS-

### SECOND SEMESTER

S N	Course Type	Course code	Title	End term semester Exam	Inter nal	Max Marks	Credits*	Distribution of Credits		
								C	L	T
			<b>Core Courses</b>							
1	Core Course	BSCH-201	Object Oriented Programming Using C++	60	40	100	6	4		2
		BSCH-202	Mathematics-II	60	40	100	6	4	2	
2	Course for Ability Enhancement & skill Development (AE & SD)	BSCH-203	Office Automation and PC Software	60	40	100	6	4		
<b>Choose any one From BSCH-204E1 and BSCH-204E2</b>										
3	Elective Discipline Centric	BSCH-204E1	Database Management System	60	40	100	6	4	2	
		BSCH- 204E2	Internet Programming	60	40	100	6	4	2	
<b>Choose any one From BSCH-205E1, BSCH-205E2 and BSCH-205E3</b>										
4	Elective Generic Categories	BSCH-205E1	Operating Systems	60	40	100	6	4		2
		BSCH-205E2	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		BSCH-206	Practical (Based on BSCH-201)	50	-	50	04 Virtual (VR)	20	06	04
			<b>Total</b>			550	<b>30+04</b>			

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\*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

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## B.Sc. (Hons.) CS-

### THIRD SEMESTER

S N	Course Type	Course code	Title	End term semester Exam	Internal	Max Marks	Credits*	Distribution of Credits		
								C	L	T
1	Core Course	BSCH-301	Data Structure using C++	60	40	100	6	4	2	2
		BSCH-302	Programming with VB.NET	60	40	100	6	4	2	
2	Course for Ability Enhancement & skill Development (AE & SD)	BSCH-303	Communication Skills	60	40	100	6	4		
Choose any one From BSCH-304E1 and BSCH-304E2										
3	Elective Discipline Centric	BSCH-304E1	System Analysis and Design	60	40	100	6	4		2
		BSCH-304E2	Distributed Computing	60	40	100	6	4	2	
Choose any one From BSCH-305E1, BSCH-305E2 and BSCH-305E3										
4	Elective Generic Categories	BSCH-305E1	Data Communication and Computer Network	60	40	100	6	4	2	
		BSCH-305E2	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		BSCH-306	Practical based on BSCH-301	50	-	50	04 Virtual (VR)			
			Total			550	30+04	20	06	04

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\*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions “Ordinance 14 : Choice Based Credit System” shall be applicable and the conditions mentioned therein will need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

**B.Sc. (Hons.) CS-**

**FOURTH SEMESTER**

S N	Course Type	Course code	Title	End term sem Exam	Inter nal	Max Mar ks	Credits*	Distribution of Credits		
								C	L	T
1	Core Course	BSCH-401	Programing with JAVA	60	40	100	6	4		2
		BSCH-402	Computer Graphics	60	40	100	6	4		2
2	Course for Ability Enhancemen t & skill Development (AE & SD)	BSCH-403	Presentation and Personality Development skills	60	40	100	6	4		
Choose any one From BSCH-404E1 and BSCH-404E2										
3	Elective Discipline Centric	BSCH- 404E1	Internet and E- Commerce	60	40	100	6	4	2	
		BSCH- 404E2	Design and Analysis of Algorithm	60	40	100	6	4	2	
Choose any one From BSCH-405E1, BSCH-405E2 and BSCH-405E3										
4	Elective Generic Categories	BSCH- 405E1	Software Engineering	60	40	100	6	4	2	
		BSCH- 405E2	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		BSCH-406	Practical based on BSCH-402	50	-	50	04 Virtual (VR)			
			Total			550	30+04	20	06	04

C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Practical Work per week)

\*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions “Ordinance 14 : Choice Based Credit System” shall be applicable and the conditions mentioned therein will need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

## B.Sc. (Hons.) CS-

### FIFTH SEMESTER

S N	Course Type	Course code	Title	End term sem Exam	Inter nal	Max Mark s	Credits*	Distribution of Credits		
								C	L	T
1	Core Course	BSCH-501	Advanced JAVA	60	40	100	6	4		2
		BSCH-502	Artificial Intelligence	60	40	100	6	4	2	
2	Course for Ability Enhancement & skill Development (AE & SD)	BSCH-503	Minor Project	60	40	100	6	4		2
Choose any one From BSCH-504E1 and BSCH-504E2										
3	Elective Discipline Centric	BSCH-504E1	Data Mining	60	40	100	6	4	2	
		BSCH-504E2	Internetwork Application	60	40	100	6	4	2	
Choose any one From BSCH-505E1 and BSCH-505E2										
4	Elective Generic Categories	BSCH-505E1	Network Security	60	40	100	6	4	2	
		BSCH-505E2	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		BSCH-506	Practical based on BSCH-501	50	-	50	04 Virtual (VR)			
			Total			550	30+04	20	06	04

C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Practical Work per week)

\*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

**Note:** (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions “Ordinance 14 : Choice Based Credit System” shall be applicable and the conditions mentioned therein will need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

**B.Sc. (Hons.) CS-**

**SIXTH SEMESTER**

S N	Course Type	Course code	Title	End term sem Exam	Inter nal	Max Mark s	Credits*	Distribution of Credits		
								C	L	T
1	Core Course	BSCH-601	ASP.NET Technology using C#	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	
		BSCH-602	Programming in Python	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	
2	Major Project	BSCH-603	Valuation of Dissertation	60	40	100	<u>6</u>	<u>4</u>		<u>2</u>
3		BSCH-604	Final presentation/ Seminar	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	
		BSCH-605	Final Viva-voce examination	60	40	100	<u>6</u>			
4		BSCH-606	Practical (Based on BSCH-601 and BSCH-602)		<u>50</u>	50	<u>04</u> <u>Virtual</u> <u>(VR)</u>	<u>4</u>		<u>2</u>
			Total			550	<u>30</u>	<u>20</u>	<u>06</u>	<u>04</u>



**B.Sc. (Hons.) CS**

**FIRST**

**SEMESTER**

Course code	Title	End semester Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-101</b>	<b>Programming in C</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b>6</b>	<b>4</b>		<b>2</b>

### UNIT-1

Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance, algorithms & flowcharts, Characteristics of a good program – accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

### UNIT-2

History of C, Structure of a C program, Data types, Constant & Variable, Operators & expressions, Control Constructs – if-else, for, while, do-while, Case statement, Arrays, Formatted & unformatted I/O, Type modifiers & Storage classes, Ternary operator, Type conversion & type casting, Priority & associativity of operators.

### UNIT-3

Functions, Arguments, return value, Parameter passing – call by value, call by reference, return statement, Scope, visibility and life time rules for various types of variable, static variable, calling a function, Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion examples.

### UNIT-4

Special constructs – break, continue, exit(), goto& labels; Pointers - &and \* operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(), String, Pointer to function, Function to parameter, Structure – basic, declaration, membership operator, pointer to structure, referential operator, self-referential structures, structure within structure, array in structure, array of structures, Union – basic, declaration; Enumerated data type, Typedef, Command line arguments.

### UNIT-5

File handling and related functions: printf&scanf family, C preprocessor – basics, # Include, # define, # undef, conditional compilation directive like #if, #else, #endif, #ifdef and #ifndef, Variable argument list functions.

### Reference Books:

1. Kerninghan& Richie: The C Programming language, PHI
2. Cooper Mullish: The Spirit of C, Jaico Publishing House, Delhi
3. Kanetkar Y: Let us C
4. Kanetkar Y: Pointers in C.

**List of experimental program based on (BSCH-101) Programming in C**

1. Area and Circumference of a Circle
2. Print ASCII Value of the Character
3. Area of Triangle
4. Convert a Person's Name in Abbreviated
5. Simple Interest
6. Gross Salary of an Employee
7. Percentage of 5 Subjects
8. Converting Temperature Celsius into Fahrenheit
9. The Greatest Number Among the Given Three Number
10. The Number Is Positive or Negative
11. Character Is Vowel or Consonant
12. A Character Is an Alphabet or Not
13. The Greatest Number Among the Given Three Number
14. The Number Is Positive or Negative
15. Character Is Vowel or Consonant
16. A Character Is an Alphabet or Not
17. Uppercase, Lowercase, Special Character, or Digit
18. The Number Is Positive or Negative
19. The Number Is Even or Odd
20. Greatest of Two Numbers
21. Greatest Among Three Numbers
22. Leap Year
23. Reverse A given Number
24. Find Number Is Armstrong Or Not
25. Calculate Sum of Natural Numbers
26. Display Fibonacci Series
27. Find LCM of two Numbers
28. Reverse a Number
29. Check Whether a Number is A Palindrome or Not
30. Count Number of Digits of an Integer
31. Find A Generic Root Of Number
32. Insert An Element Desired or Specific Position In An Array
33. Remove Duplicates Items In An Array
34. Delete Element From Array At Desired Or Specific Position
35. Create a file and write contents, save and close the file.
36. Read file contents and display on the console.
37. Read numbers from a file and write even, odd and prime numbers to separate file.
38. Append content to a file.
39. Compare two files.
40. How to Copy contents from one file to another file.
41. Merge two files to the third file.

Course code	Title	End term semester Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						L	T	P
BSCH-102	Mathematics-I	60	40	100	6	4		

### UNIT-1

Set Theory: Introduction, Sets and Elements, Universal Set and Empty Set, Subsets, Venn Diagrams. Relations: Introduction, Product Sets, Relations, Pictorial Representation of Relations, Composition of Relations, Types of Relations, Partial Ordering Relations.

### UNIT-2

Functions: Introduction, One-to-One, Onto, and Invertible Functions, Cardinality. Logic and Propositional Calculus: Introduction, Propositions and Compound Propositions, Basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions.

### UNIT-3

Counting: Introduction, Basic Counting Principles, Factorial Notation, Binomial Coefficients, Permutations and Combinations. Pigeon hole Principle.

### UNIT-4

Graph Theory: Introduction, Graphs and Multigraphs, Subgraphs, Paths, Connectivity, Weighted Graphs, Complete, Regular and Bipartite Graphs. Directed Graphs: Introduction, Rooted Trees, Graph Algorithms: Depth first and Breadth-First Searches.

### UNIT-5

TREES AND CUT - SETS : Paths and Circuits, Shortest Paths, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits. Rooted Trees, Path Lengths in Rooted Trees, Binary Search Trees. Spanning Trees, Minimum Spanning Trees.

### Reference Books:

1. Elements of Discrete Mathematics, C.L.Liu, Second Edition, TMH
2. Discrete Mathematics and its applications, Kenneth H. Rosen, (Fifth Edition), Tata McGraw Hill Publishing Company.
3. Theory and Problems of Discrete Mathematics, Semmour Lipschutz, Marc Lipson, Second Edition, Schaum's Outline, T.M.H.

Course code	Title	End term semester Exam	Internal	Max Marks	Credits *	Distribution of Credits		
						C	L	T
<b>BSCH-103</b>	<b>Physics</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

#### UNIT-1

**Analog signal and digital signal:** Data converters, basic D/A converters, Binary weighted type DAC, R-2R ladder type DAC. A/D converters, counter type ADC, successive approximation Type ADC, Dual Slope type ADC, Flash Type A/D Converter.

#### UNIT-2

**TTL Circuits:** Introduction to TTL circuits, TTL specifications, Propagation Delay, Power Dissipation Fan-in, Fan-Out, Noise immunity, Noise Margin, voltage Level. Types of TTL , Standard TTL, Standard TTL NAND gate, Multiple Emitter Transistor, inverter transistor.

#### UNIT-3

**CMOS Circuits:** MOSFET As a Switch, N-channel enhancement MOSFET, P- channel Enhancement type MOSFET, Complementary MOSFETs, CMOS Gate, complementary connection of one P-channel and N-channel Enhancement MOSFET, CMOS NOT Gate, CMOS NAND Gate, CMOS NOR Gate.

**CMOS Logic Devices:** 74C00 Series , 54C00 Series, 74H00 Series, CD 4000 Series, Properties of CMOS Devices, Comparison of TTL and CMOS.

#### UNIT-4

**Register:** Buffer Register, Uncontrolled Buffer Register, Controlled Buffer Register, 4-bit Controlled Buffer Register, Shift Registers, controlled and uncontrolled Left Shift Register, Right Shift Register, controlled and uncontrolled Right Shift Register.

**Classification of shift register:** SISO,SIPO, PISO,PIPO, One –Bit SISO Register, 4-bit SISO Register, Tristate Buffer, Different Types of Tristate Buffers, Bidirectional Transceiver Buffer.

#### UNIT-5

**Counters:** Asynchronous Counter, Timing Diagram, Mode-8 Asynchronous Up-Counter, Mode-8 Asynchronous Down-Counter, Synchronous Counter, Mode-8 synchronous Up-Counter, Mode-4 synchronous Down-Counter, Mode-4 synchronous Down-Counter, Mode-3 synchronous Ripple Up-Counter, Controlled Asynchronous Counter and Controlled synchronous Counter. Up/Down Counter, Ring counter using Left shift Register and Right shift Register.

#### Reference Books:

1. Integrated Electronics, J. Milman and C. C. Halkias, McGraw Hill (1972)
2. Electronic Devices, L. Floyd, Pearson Education New York (2004)
3. BARTEE, "Digital Computer Fundamentals " TMH Publication
4. MALVINO, " Digital Computer Electronics " TMH Publication
5. MORRIS MANO, "Computer System Architecture PHI Publication

Course code	Title	End term semester Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH-104E1	Introduction to Information Technology	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	

### UNIT-1

**Computer Fundamental:** Characteristics of Computers, History of Computer, Evolution of Computers, Computer Generations, Types of Computer, Components of a Computer: Registers, Instruction Set, Bus Architecture, Computer Hardware: Input Devices, Output Devices, Storage Devices: Primary Storage capacity, Memory Types, Memory Measuring Units, Secondary Storage Device

### UNIT-2

**Software and Computer Applications:** Software & Software Types, Computer Languages, Compiler, Interpreter, Editor, Computer Ethics, Computer applications, Introduction of Programming: Procedure Oriented Programming, Object oriented programming, Concepts used in OOP, Benefits of OOP, Main advantages and disadvantage of OOP, Applications of OOP, OOP vs. POP.

### UNIT-3

**Operating System Overview:** Computer System Startup, Computer System Structure, Computer System Components, Operating System Classifications, Operating System Services, Major Functions of Operating system, Process Management, CPU Scheduling, Scheduling Criteria. Memory and File Management: Memory Management Requirements, Swapping, Memory Management Techniques, Virtual Memory, File Management, File Access Methods, Protection.

### UNIT-4

**Introduction to DBMS:** File System, Traditional File Oriented Approach, DBMS- Advantages and Disadvantages, Role of DBMS, Three views of data, DBMS Architecture, Data Models, Data Independence, Major components of DBMS, Data Dictionary, Types of Users, DBMS applications, Keys in Databases, Database Languages.

### UNIT-5

**Introduction to Computer Networks:** Computer Network Definition, Importance of Networking, Types of Networks, Network Topology, Advantages and Disadvantage of Computer Networks, Applications of computer networks, Reference Model, Internet, Introduction to Internet Technology, Electronic Mail, World Wide Web.

### Reference Books:

1. Operating Systems Concepts, A. Silberschatz, P.Galvin, G.Gagne, John Wiley & Sons
2. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.
3. Data base management systems vol. 1., Date C.J.
4. Fundamental of Computer Science & IT, Singh Umesh Kumar, Jain S., Maheshwari A., SSDN Publications New Delhi,
5. Data Communications and Networks, Godbole A, Tata McGraw-Hill Publications.

Course code	Title	End term sem Exam	Inter nal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH- 104E2</b>	<b>Internet and its Applications</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

#### **UNIT-1**

Introduction to Computers Programming Language, types, History of Internet, Personal Computers, History of World Wide Web- Micro software .NET Java-Web resources.

#### **UNIT-2**

Web Browsers- Internet Explorer- connecting to Internet, Features of Internet explorer, Searching the Internet- online help and tutorials, File Transmission Protocol (FTP), Browser settings.

#### **UNIT-3**

Attaching a file, Electronic mail, Creating an E-mail id, Sending and Receiving mails, attaching a file, Instance messaging, other web browsers.

#### **UNIT-4**

Introduction to HTML headers, Linking- Images, special characters and line breaks, unordered lists, simple HTML programs.

#### **UNIT-5**

E-marketing, consumer tracking, Electronic advertising, search engine, CRM, credit card payments, Digital cash and e-wallets micro payments- smart card

#### **Reference Books:**

1. Internet and World Wide Web Third edition H.M.Deitel, P.J. Deitel and A.B.Goldberg- PHI
2. The Internet- Complete Reference Harley hahn, Tata McGraw Hill

Course code	Title	End term semester Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-105E1</b>	<b>Digital Electronics</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>		

#### UNIT-1

Data types and Number systems, Binary number system, Octal & Hexa-decimal number system, 1's & 2's complement, Binary Fixed-Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes.

#### UNIT-2

Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND& XOR gates, Boolean Algebra, Basic Boolean Law's, DeMorgan's theorem, MAP Simplification. Minimization techniques, K-Map, Sum of Product & Product of Sum.

#### UNIT-3

Combinational & Sequential circuits, Half Adder & Full Adder, Full subtractor, Flip -flops- RS, D, JK & T Flip-flops, Shift Registers, RAM and ROM, Multiplexer, Demultiplexer, Encoder, Decoder, Idea about Arithmetic Circuits, Program Control, Instruction Sequencing.

#### UNIT-4

I/O Interface, Properties of simple I/O devices and their controller, isolated versus memory-mapped I/O, Modes of Data transfer, Synchronous & Asynchronous Data transfer, Handshaking, Asynchronous serial transfer, I/O Processor

#### UNIT-5

Auxiliary memory, Magnetic Drum, Disk & Tape, Semi-conductor memories, Memory Hierarchy, Associative Memory, Virtual Memory, Address space & Memory Space, Address Mapping, Page table, Page Replacement, Cache Memory, Hit Ratio, Mapping Techniques, Writing into Cache.

#### Reference Books:

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



Course code	Title	End term semester Exam	Internal	Max Marks	Credits*	Distribution of Credits		
					C	L	T	P
BSCS-106	Practical based on BSCS-101	50	-	50	04 Virtual (VR)			

**B.Sc. (Hons.) CS**

**SECOND**

**SEMESTER**

Course code	Title	End term sem. Exam	Internal	Max Marks	Credits *	Distribution of Credits		
						C	L	T
BSCH-201	Object Oriented Programming Using C++	60	40	100	6	<u>4</u>		<u>2</u>

#### UNIT-1

**Object Oriented Systems Development :** Introduction to traditional programming with C. Objectives of OOP, Object Oriented Analysis, Object Oriented Programming in C++: Concepts of Objects, Classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding and Message passing. Tokens, Expressions and Control Structures.

#### UNIT-2

**Classes & Objects:** Classes, Structure & classes, Union & Classes, Friend function, Friend classes, Inline function, Scope resolution operator, Static class members: Static data member, Static member function, passing objects to function, Returning objects, Array of objects.

#### UNIT-3

**Constructor & Destructor:** Introduction, Constructor, Parameterized constructor, Multiple constructor in a class, Constructor with default argument, Copy constructor, Default Argument, Destructor.

**Function & operator overloading:** Overloading and information hiding, Function overloading, Operator overloading

#### UNIT-4

**Inheritance:** Inheritance, Derived and base classes, Single, Multilevel, Hierarchical, Hybrid Inheritance, Protected member, overriding member function, class hierarchies, multiple inheritance, Containership, Virtual base class

#### UNIT-5

**Polymorphism :** virtual functions, late binding, pure virtual functions, abstract classes, this pointer, templates, function templates, Class templates.

**The C++ I/O system basics:** C++ streams, The basic stream classes: C++ predefined streams.

#### Reference Books:

1. Object-Oriented Programming with C++: E. Balagurusamy, TMH, 2005
2. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.
3. Object Oriented Programming, Tomothy Budd, Pearson education.

Course code	Title	End term Sem. Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-202</b>	<b>Mathematics-II</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

#### UNIT-I

Types of errors, Error approximation, truncation error, rounding error. Solution of transcendental equation by: Bisection, false position, Newton-Raphson Methods

#### UNIT-2

Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and N DFA, Two-way finite automata.

#### UNIT-3

Regular Expressions, Finite Automata with Output, Applications of Finite Automata, Closure Properties of Regular Sets.

#### UNIT-4

Context Free Grammars: Motivation and Introduction, Context-free Grammars, Derivation trees and Ambiguity, Normal Forms (Chomsky Normal Form ,Unit Production Chomsky Normal Forms, Closure properties of Context Free Languages, Construction of Reduced Grammars, Elimination of null production.

#### UNIT-5

Turing Machines: Introduction, TM model, representation and languages acceptability of TM Universal Turing Machine.

#### Reference Books:

1. Introduction to Automata Theory, Languages & Computation, J E Hopcraft & JD Ullman, Narosa Publications.
2. Theory of Computer Science, KLP Mishra & N Chandra Sekhar, PHI
3. Mathematical Foundations of Computer Science, Beckman
4. John C Martin, "Introduction to languages and theory of computation", McGraw Hill
5. Anami & Aribasappa , " Formal Languages and Automata Theory",Wiley India

Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-203</b>	<b>Office Automation and PC Software</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b>6</b>	<b>4</b>		

#### UNIT-1

MS Windows: Introduction to MS Windows; Features of windows; Various versions of Windows & its uses; Working with Windows; My computer & Recycle bin; Desktop, Icons and Windows Explorer; Screen description & working styles of Windows; Dialog Boxes & Toolbar; Working with files & Folders; Simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts & Autostarts; Accessories and Windows Settings using Control Panel-setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists ;Installing and Uninstalling new Hardware & Software program on your computer.

#### UNIT-2

Office Packages – Office activates and their software requirements, Word-processing, Spreadsheet, Presentation graphics, Database, introduction and comparison of various office suites like MS Office, Lotus Office, Star Office, Open Office etc.

MS Word Basics – Introduction to MS Office; Introduction to MS- Word; Features & area of use, working with MS- word; Menus & Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates, creating a New Document; Different Page Views and Layouts; Applying various Text Enhancements; Working with – Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features; Bullets, Numbering, Auto formatting, Printing & various print options.

#### UNIT-3

Advanced Features of MS- word- Spell check, Thesaurus, Find & Replace; Headers & Footers: Inserting- Page Number, Pictures, Files, Autotexts, Symbols etc.; working with columns, Tab& Indents; Creation and working with Tables including conversion to and from text; Margins and Space management in Documents; Adding references and Graphics; Mail Merge, Envelops & mailing Labels. Importing and Exporting to and from various formats.

#### UNIT-4

MS Excel: Introduction and area of use; working with MS Excel: concept of workbook and worksheet; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different views of Worksheet; Column Freezing, Labels, Hiding, Splitting etc.; Using different features of Data and Text; Use of Formulas, Calculation & Functions; Cell formatting including Borders and Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with Various options.

#### UNIT-5

MS PowerPoint: Introduction and area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its Different Views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts; Columns and Lists; Adding Graphics, Sounds and Movies to a slide; Working with PowerPoint Objects; Designing and Presentation of a Slide Show; Printing Presentations; Notes, Handouts with print options.

Reference Books:

1. Windows XP Complete Reference. BPB Publications
2. MS Office XP complete BPB Publication
3. MS Windows XP Home edition complete, BPB Publications

Course code	Title	End term sem. Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-204E1</b>	<b>Database Management System</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

### UNIT-1

DBMS Concepts and architecture Introduction, Review of file organization techniques, Database approach v/s Traditional file accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, Functions of DBA and designer. Entities and attributes, Entity types, Value, Sets, Key attributes, Relationships, Defining the E-R diagram of database, **Various data models:** Basic concepts of Hierarchical data model. Network data model, and Relational data model, Comparison between the three types of models.

### UNIT-2

**Relational Data models:** Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints, Intension and Extension, **Relational Query languages:** Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union etc.

### UNIT-3

Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations. SQL: Data definition in SQL, update statements and views in SQL QUEL & QBE: Data storage and definitions. Data retrieval queries and update statements etc.

### UNIT-4

**Data Base Design:** Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and losslessjoin, problems with null valued and dangling tuples, multivalued dependencies. Distributed databases, protection, security and integrity constraints, concurrent operation on databases, recovery, transaction processing, basic concepts of object oriented data base system and design.

### UNIT-5

Case study of relational database management systems: Oracle and Microsoft access, Oracle tools.

### Reference Books:

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

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-204E2</b>	<b>Internet Programming</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

#### UNIT-1

Introduction to Internet Programming- Client-Server model, Browsers-Graphical and Hypertext Access to the Internet, HTTP–Hyper Text Transfer Protocol (how it actually works), The Phases of Web Site Development

#### UNIT-2

Creating Internet World Wide Web pages- HTML - Hypertext Markup Language , Basic HTML Concepts, HTML: Structured Language ,headers, body, html tags, tables , Text, graphics, sounds, video clips, multi- media ,Client side image mapping

#### UNIT-3

HTML forms programming: Building a form, Text fields and value, size, max length html buttons, radio, checkboxes, Selection lists.

CSS: Introduction To Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning Use of classes in CSS, color properties, use of <div>&<span>

#### UNIT-4

Intro to script, types, intro of JavaScript, JavaScript identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Date Objects with methods User defined & Predefined functions, DOM objects, Window Navigator, History, Location, Event handling, Validations On Forms

#### UNIT-5

Intro & features of XML, XML writing elements, attributes etc. XML with CSS, DSO, XML Namespaces XML, DTD, XML Schemas, Writing Simple sheets using XSLT, SAX & DOM Parsers, SOAP Introduction.

#### Reference Books:

1. Joe Fawcett,Danny Ayers,Liam R.E. Quin, “Beginning XML” Wrox Press, 5th Ed., 2012
2. Deitel & Deitel, “XML how to program”, Pearson, 2000
3. Hofstetter fred , “Internet Technology at work”, Osborne pub. , ISBN : 9780072229998, 2004
4. Ivan Bayross , “HTML, DHTML, JavaScript, Perl & CGI” ,BPB pub. 3rd Ed.,2004
5. Ivan Bayross, “Web enabled commercial application development using HTML, DHTML, JavaScript, PERL-CGI”, BPB pub., 2nd Ed., 2000

Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH-205E1	Operating Systems	60	40	100	<u>6</u>	<u>4</u>		<u>2</u>

#### UNIT-1

**Introduction to Operating Systems:** Operating system services, multiprogramming, time-sharing system, storage structures, system calls, multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling, I/O devices organization, I/O devices organization, I/O devices organization, I/O buffering.

#### UNIT-2

**Process concept:** process scheduling, operations on processes, threads, inter-process communication, precedence graphs, critical section problem, semaphores, problems of synchronization, Deadlock problem: deadlock characterization, deadlock prevention. deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

#### UNIT-3

**Concepts of memory management:** logical and physical address space, swapping, contiguous and Non- contiguous allocation, paging, segmentation, and paging combined with segmentation.

#### UNIT-4

Concepts of virtual memory, demand paging, page replacement algorithms. allocation of frames, thrashing, demand segmentation, Security threads protection, Intruders- Viruses-trusted system,

#### UNIT-5

Disk scheduling, file concepts, file access methods, allocation methods, directory systems, file protection, introduction to distributed systems and parallel processing case study.

#### Reference Books:

1. Operating System by Silberschatz
2. Operating System by Deitel
3. Modern operating system by Tanneubacem.



Course code	Title	End term semester Exam	Internals	Max Marks	Credits*	Distribution of Credits		
						L	T	P
BSCS-206	Practical based on BSCS-201	<u>50</u>	-	50	<u>04 Virtual (VR)</u>	<u>20</u>	<u>06</u>	<u>04</u>

**B.Sc. (Hons.) CS**

**THIRD**

**SEMESTER**

Course code	Title	End term sem. Exam	Internal	Max Marks	Credits *	Distribution of Credits		
						C	L	T
BSCH-301	<b>Data Structures using C++</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b>6</b>	<b><u>4</u></b>	<b><u>2</u></b>	<b><u>2</u></b>

### UNIT-1

**Stacks and Queues:** The concept of data structure, Abstract data type, Concept of list & array Introduction to stack, Stack as an abstract data type, primitive operation on stack, Stacks application: Infix, Post fix, Prefix and Recursion. Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular queue, Dequeue, Priority queue, Applications of queue.

### UNIT-2

**Linked Lists:** Introduction to the Linked List, Defining & implementing linked lists with creation, insertion and deletion operations in C++, Types of Linked List, Application of Linked List.

**Searching algorithms:** Sequential search & Binary search algorithms, Implementation in C++.

### UNIT-3

**Sorting:** Analysis of algorithm, complexity using big 'O' notation, insertion sort, Selection sort. Quick sort, Bubble sort, Heap sort.

**Hashing and Indexing:** Hash Table, Collision resolution Techniques, index techniques, cylinder-surface indexing, tree indexing-B-trees, trie indexing

### UNIT-4

**TREES:** Basic Terminology, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary Trees Traversal of binary trees: - In order, Preorder & Post order, Application of Binary tree, threaded binary tree, B-tree & Height balanced tree, Binary tree representation of trees.

### UNIT-5

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

### Reference Books:

1. Fundamentals of Data Structure, By S, Sawhney & E, Horowitz
2. Data Structure: By Trembley & Sorenson
3. Data Structure: By lipschuists (Schaum's Outline Series Mcgraw Hill Publication)
4. Fundamentals of Computer Algorithm: By Ellis Horowitz and Sartaj Sawhney

Course code	Title	End term Sem. Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH-302	<b>Programming with VB.NET</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

## **Programming with VB.NET**

### **UNIT-1**

Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser.

### **UNIT-2**

The VB.NET Language- Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions, Passing variable, Number of Argument, Optional Argument, Returning value from function. Control flow statements: conditional statement, loop statement. MsgBox & Inputbox.

### **UNIT-3**

Working with Forms : Loading, showing and hiding forms, controlling One form within another. Using MDI form. Windows Form Control (with Properties, Methods and events): Textbox, Rich Text Boxes, Label, Link Label, Button, Checkbox, Radio Button, Panel, Group Box, Picture Box, Listbox, Combobox, Check Listbox, scroll bar, Timer. Advance Controls: Menus, Context Menus , Built-in Dialog Box: OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog, Printing. ListView, TreeView, toolbar, StatusBar.

### **UNIT-4**

Object oriented Programming: Classes & objects, constructor, destructor, inheritance. Access Specifiers, Interfaces, Polymorphism. Exception Handling: using Try, Catch, Finally, Throw Keywords. Graphics Handling: Using Graphics & Pen classes for drawing colors and figures. File Handling: Opening or Creating a File, Writing & Reading Text.

### **UNIT-5**

Database programming with ADO.NET – Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid.

Generate Reports Using CrystalReportViwer.

### **Reference Books:**

1. VB.NET Programming Black Book by steven holzner –dreamtech publications
2. Mastering VB.NET by Evangelos petroustos- BPB publications
3. Introduction to .NET framework-Worx publication

Course code	Title	End term sem. Exam	Internal	Max Marks	Credits *	Distribution of Credits		
					<b>C</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>BSCH-303</b>	<b>Communication Skills</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>		

## Communication Skills

### UNIT-1

Meaning and process of communication, importance of effective communication, communication situation and communication skills, barriers to communication.

### UNIT-2

Objectives of communication, types of communication, principles of communication, essentials of effective communication.

### UNIT-3

Media of communication: written, oral, face-to-face, visual, audio-visual, merits and demerits of written and oral communication, preparing for oral presentation, conducting presentations.

### UNIT-4

Developing communication skills, interview- how to face and how to conduct. Preparing of biodata, seminar, paper, bibliography, group discussion, official correspondence.

### UNIT-5

Mechanics of writing, paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports.

### Reference Books:

1. Essentials of Business Communication by Rajendra Pal and J.S.Korilahalli, Sultan Chand & Sons Publishers, New Delhi.
2. Business Communications by U.S. Rai &S.M.Rai, Himalaya Publishing House.
3. Writing a Technical Paper by Menzal and D.H.Jones, McGraw Hill, 1960.
4. Business Communication: Strategy and Skill, Prentice Hall New Jersey, 1987.

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH-304E1	Systems Analysis and Design	60	40	100	<u>6</u>	<u>4</u>		<u>2</u>

#### UNIT-1

**System Concept:** Definition, Characteristics, Elements of system, Physical and abstract system open and closed system, man-made information systems,

**System Development Life Cycle:** Various phases of system development, Considerations for system planning and control for system success. **System Planning:** Base tor planning a system, Dimensions of Planning.

#### UNIT-2

**Initial Investigation:** Determining users requiriments and analysis, fact finding process and techniques.**Feasibility study:** Determination of feasibility study, Technical, Operational & Economic Feasibilities, System performance constraints, and identification of system objectives, feasibility report. **Cost/Benefit Analysis:** Data analysis cost and benefit analysis of a new system. Categories determination and system proposal.

#### UNIT-3

**Tools of structured Analysis:** Logical and Physical models context, diagram, data dictionary, data diagram, form driven methodology, IPO and HIPO charts, Gantt charts, system model, pseudo codes, Flow charts, system flow chart, run flow charts etc., decision tree, decision tables, data validation. **Input/ Output and Form Design:** Input and output form design methodologies, menu, screen design, layout consideration.

#### UNIT-4

Management standards Systems analysis standards, Programming standards, Operating standards. Documentation standards User Manual, system development manual, programming manual, programming specifications, operator manual. **System testing & quality:** System testing and quality assurance, steps in system implementation and software maintenance. System security: Data Security, Disaster/ recovery and ethics in system development, threat and risk analysis, System audit.

#### UNIT-5

**Organisation of EDP:**Introduction, Job Responsibilities & duties of EDP, Personnel- EDP manager, System Analyst, Programmers, Operators etc. Essential features in EDP Organization.**Selection of Data Processing Resources:** purchase, lease,rent-advantages and disadvantages. Hardware and software procurement – In-house purchase v/s hiring and lease.

#### Reference Books:

1. System Analysis & Design by V K Jain, Dreamtech Press
2. Modern System Analysis &Design by A Hoffer. F George- S Valaciahlow Priced Edn. Pearson Education.
3. Information Technology & Computer Applications. by V.K.Kapoor, Sultan Chand & Sons, New Delhi.

Course code	Title	End term sem. Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-304E2</b>	<b>Distributed Computing</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

#### UNIT-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System : Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport’s & vectors logical clocks. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms.

#### UNIT-II

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem.

#### UNIT-III

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Security: Overview of security techniques, Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System.

#### UNIT-IV

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault-tolerant services, Transactions with replicated data.

#### UNIT-V

Distributed Algorithms: Destination based routing, APP (assignment problem in parallel), Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. CORBA Case Study: CORBA, CORBA services.

#### References:-

1. P K Sinha, “Distributed operating systems; Concepts and design”, PHI Learning.
2. Sunita Mahajan & Shah, Distributed Computing, Oxford Press
3. Tanenbaum and steen, “Distributed systems: Principles and paradigms”, 2nd edition, PHI Learning.
4. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
5. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.

Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH-305E1	<b>Data Communication and Computer Networks</b>	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	

## Data Communication and Computer Networks

### UNIT-1

**Introduction:** Theoretical Model for Communication, analog and digital signals Bandwidth, Noise, Channel Capacity, Data-rate, Concepts of Circuit Switching, Message switching and Packet switching with their timing diagrams, comparison of switching techniques, ISDN.

### UNIT-2

**Evolution of Computer Networks Layered:** Network architecture, OSI Layers Model, transmission media topology, error detection & Correction techniques, Parity checks, CRC, Asynchronous and synchronous transmission, TDM, FDM.

### UNIT-3

**Data Link Layer:** Different Types of line discipline, simplex, half duplex and full duplex.**Flow control:** stop and wait protocol, sliding Window Protocol with their efficiency, ARQ techniques & their performances HDLC.

### UNIT-4

**LAN:** Static & Dynamic channel allocation, Media access control for LAN & WAN; **ALOHA:** pure, slotted ALOHA, CSMA, CSMA/CD, **IEEE 802 standards for LAN & MAN:** 802.3, 802.4, 802.5, 802.6 and 802.2 & their **comparison Fast LANs:** fast Ethernet, FDDI.

### UNIT-5

**Routing:** Definition, Elements of routing techniques, Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Routing Strategies, Congestion Control encryption & description techniques, Internet working, Internet and Intranet.

### Reference Books:

1. Computer Networks Tanenbaum A. S. PHI.
2. LANs- Keizer
3. Computer Networks - Stalling w., PHI.

### References:-

1. Ullman "Analysis and Design of Algorithm" TMH
2. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002.
3. Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
4. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm," PHI
5. E. Horowitz, S. Sahni, and S. Rajsekar, "Fundamentals of Computer Algorithms," Galgotia Publication



Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
					C	L	T	P
BSCH-306	Practical based on BSCS-301	<u>50</u>	-	50	<u>04 Virtual (VR)</u>			

**B.Sc. (Hons.) CS**

**FOURTH**

**SEMESTER**

Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCS-401	<b>Programming with JAVA</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>		

#### UNIT-1

C++ Vs JAVA, JAVA and Internet and WWW, JAVA support systems, JAVA environment, JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant & Variables, Data Types, Declaration of Variables, Scope of Variables, Symbolic Constants, Type Casting. Operators: Arithmetic, Relational, Logical Assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions & its evaluation. If statement, If...Else... statement, Nesting of If. . .else. . . statements, else...if Ladder, Switch, ? operators, Loops- While, Do, For, Jumps in Loops, Labelled Loops.

#### UNIT-2

Defining a Class, Adding Variables and Methods, creatingObjects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting ofMethods. Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Visibility Control.

#### UNIT-3

Arrays: One Dimensional & two Dimensional strings, Vectors, wrapperClasses,Defining Interface Extending Implementing Interface, Accessing Interface Variable, System Packages, Using System Package, adding a Class to aPackage, Hiding Classes.

#### UNIT-4

Creating Threads, Extending the Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the Runnable Interface.

#### UNIT-5

Local and Remote Applets Vs Applications, Writing Applets, Applets Life Cycles,creating an Executable Applet, designing a Web Page, Applet Tag, Adding Applet to HTML File. Running the Applet, Passing Parameters to Applets, Aligning the Display, HTML Tags & Applets Getting Input from the User.

#### Reference Books:

1. Balaguruswamy, "Programming in Java", 2nd Edition, TMH Publications
- 2."Peter Norton. Guide To Java Programming,Techmedia Publications

Course code	Title	End term sem. Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH 402	Computer Graphics	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	

## Computer Graphics

### UNIT-1

Introduction to Raster scan displays, Storage tube displays, refreshing, flickering, interlacing, color monitors, display processors resolution, working principle of dot matrix, inkjet laser printers, working principles of keyboard, mouse scanner, digitizing camera, track ball, tablets and joysticks.

### UNIT-2

Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham's Algorithm, Circle drawing, general method, Bresenham's Algorithm, Mid Point Algorithm, curves, parametric function, Beizier Method, B-spline Method.

### UNIT-3

2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse transformation, Composite transformation, world coordinate system, screen coordinate system, parallel and perspective projection, Representation of 3D object on 2D screen.

### UNIT-4

Point Clipping. Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.

### UNIT-5

Multimedia components, Multimedia Hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia Tools, Presentation tools, Authoring tools, presentation.

### Reference Books:

1. James E. Shuman, "Multimedia in Action" Thomson / Vikas Publishing House.
1. Tay Vaughan " Multimedia: making it work" Tata McGraw Hill 1999« 4<sup>th</sup> Edition
2. Prabhat kAandleigh, Kiran Thakral "Multimedia System Design", PHI
3. Donald Hearn and M.P. Becker "Computer Graphics" PIR Pub.
4. FolayVandam,Feiner, Hughes "Computer Graphics Principle & Practice" Adison Wesley,2/e. 1997
5. Principles of Computer Graphics "Rogers" TMH.

Course code	Title	End term sem. Exam	Internal	Max Marks	Credits*	Distribution of Credits		
					<b>C</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>BSCH 403</b>	<b>Presentation and Personality Development skills</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

### **BSCH 403 Presentation and Personality Development skills**

#### **UNIT-1**

**Introduction:** Personality Development- concept, types, role and impact, developing self awareness, projecting a winning personality.

#### **UNIT-2**

**Personality Assessment:** Personality assessment and testing- resume writing- types, contents, formats, interviewing skill, group discussion, JAM sessions, persuasive communication.

#### **UNIT-3**

**Communication Skill:** Practice on oral/spoken communication skill and testing- voice and accent, feedback and questioning techniques, objectives in an argument.

#### **UNIT-4**

**Presentation Skills:** skills and techniques, etiquette, project/assignment presentation, role play and body language, impression management.

#### **UNIT-5**

**Personality Development Activities:** Leadership activities, motivation activities, team building activities, stress and time management techniques, creativity and ideation.

#### **Reference Books:**

1. Business Communication- Royan and V.lesikar, John D. Pettit, JR.Richard D.Irwin, INC.
2. Personality Development and Soft Skills- Barun K. Mitra, Oxford Publisher.
3. Personality Development- Rajiv K.Mishra, Rupa Publisher.

Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH 404-E1</b>	Internet and E-Commerce	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

## 404 E1 Internet and E-Commerce

### Unit-I

Internet: Evolution, Concepts, Internet Vs Intranet, Growth of Internet, ISP, ISP in India, Types of connectivity - Dial-up, Leased line, DSL, Broadband, RF, VSAT etc., Methods of sharing of Internet connection, Use of Proxy server. Internet Services USENET, GOPHER, WAIS, ARCHIE and VERONICA, IRC. WORLD WIDE WEB (WWW) - History, Working, Web Browsers, Its functions, URLs, web sites, Domain names, Portals. Concept of Search Engines, Search engines types, searching the Web, Web Servers, TCP/IP and others main protocols used on the Web. E-Mail: Concepts, POP and WEB Based E-mail, merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free E- mail services, e-mail servers and e-mail clients programs.

### Unit-II

Concepts of Hypertext, HTML introduction, features, uses & versions Using various HTML tags, Elements of HTML syntax, Head & Body Sections, inserting texts, Text alignment, using images in pages, Hyperlinks text and images, bookmarks, Backgrounds and Color controls, creating and using Tables in HTML, and presentation, use of font size & Attributes, List types and its tags. Cascading Style sheets defining and using simple CSS.

### Unit-III

Introduction to WYSIWYG Design tools for HTML, Overview of MS FrontPage, Macromedia Dream weaver, and other popular HTML editors, designing Web sites using MS FrontPage (using at least FrontPage 2000).Use of Frames and Forms in web pages, Image editors, Issues in Web site creations & Maintenance, Web Hosting and publishing Concepts, Hosting considerations, Choosing Web servers Linux Vs Windows Web servers, Choosing Domain names, Domain name Registration, Obtaining space on Server for Web site, FTP software for upload web site. Add your website on search engines.

### Unit-IV

JavaScript Overview, JavaScript and the WWW, JavaScript vs. VB Script, JavaScript vs.Java, JavaScript versions, Script element,. Functions: Functions introduction, Calling functions. JavaScript Comments, Variables: Variables overview, declaring variables, Types of variables, Casting variables, Alert box, Prompt & confirm. Expressions: Arithmetic operators, Assignment operators, Logical operators, Expressions and precedence, Statements: If statement, for statement, while statement, Break/Continue Creating arrays/event handlers, JavaScript Object model, Object and Events in JavaScript – OnClick, On Mouse Over, On Focus, OnChange, On Load etc. Getting data with forms.

### Unit—V

E - Commerce an introduction, Concepts, Advantages and disadvantages, Technology in E-Commerce, Internet & E-business, Applications, Feasibility & various constraints.E-transition challenges for Indian corporate, the Information Technology Act 2000 and its highlights related to e-commerce.

Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit Card-Based Electronic Payment Systems, Risk and Electronic Payment Systems.

E-security — Security on the internet, network and web site risks for e-business, use of firewalls, secure physical infrastructure

**Reference Books:**

1. Frontiers of Electronic Commerce, By- Kalakota, Ravi; Stone, Tom; Whinston, Andrew B, Addison Wesley Publishing Co.
2. E-Commerce an Indian Perspective (Second Edition) — by P. T, Joseph, S.J. PrenticeHall of India
3. Learn HTML in a weekend by Steven E. Callihan, PHI
4. Using HTML By Lee Anne Phillips, PHI
5. SAMS Teach Yourself JavaScript in 24 Hrs., By Michael Moncur. TechMedia

Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH 404-E2	Design and Analysis of Algorithms	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	

### BSCH404 E2: Design and Analysis of Algorithms

#### UNIT 1

Introduction and Review: What is an Algorithm, Algorithm's Performance, order architecture:  **$\Theta$ -Notation,  $O$ -Notation,  $\Omega$ -Notation**, Algorithm Analysis: time space complexities, **Worst-case Complexity, Average-case Complexity.**

#### UNIT2

**Divide and conquer:** Structure of divide-and –conquer algorithms: examples, Binary search, quick sort, Analysis of divide and conquer, run time recurrence relations.

#### UNIT 3

Graph Searching and Traversal: Overview, Traversal methods: depth first and breadth first search.

**Greedy Method:** Overview of the greedy method, Minimum spanning trees, Single source shortest paths.

#### UNIT 4

**Dynamic programming:** The general method, principle of optimality, difference between dynamic programming and greedy method, Applications: optimal binary search trees, **Back tracking:** The general method, 8-queens problem.

#### UNIT 5

**Branch and Bound Algorithm:** The **Branch and bound** method, FIFO and LIFO branch and bound, LC (Least Cost) search, Traveling Salesman Problem, LCBB on Traveling Salesman Problem.

#### Reference Books:

1. Fundamentals of Computer Algorithms By Ellis Horowitz and Sartaj Sahni, Galgotia Publications.
2. Ullman “Analysis and Design of Algorithm” TMH
3. Goodman “ Introduction to the Design & Analysis of Algorithms, TMH-2002
4. Sara Basse, A.V. Gelder, “ Computer Algorithms, “ Addison Wesley
5. T.H. Cormen, Leiserson, Rivert and stein, “ Introduction of Computer algorithm, “ PHI
6. E. Horowitz, S. Sahni, and S. Rajsekar, “Fundamentals of Computer Algorithms, “ Galgotia Publication.



Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH 405-E1	Software Engineering	60	40	100	6	4	2	

## BCA-405 E1 Software Engineering

### Unit-I

**The Software Product and Software Process:** Software Engineering - A Layered Technology, **Software Process Models:** Linear Sequential Model. Prototyping Model, RAD Model Evolutionary Software Process Models: Incremental Model, Spiral Model Component Assembly Model, Formal Methods, Fourth-Generation Techniques.

### Unit -II

**Systems Engineering:** The Systems Engineering Hierarchy, Information Engineering, Information Strategy Planning, Business Area Analysis, **Product Engineering Requirement Analysis Modeling:** Analysis Concepts and Principles, The Elements of the Analysis Model . Data Modifying, Functional Modeling and Information Flow and Behavior Modeling, Mechanics of Structured Analysis, Data Dictionary.

### Unit-III

**Principles, and Methods:** TheSoftwareDesignProcess:Design Principles, Design Concepts, Effective Modular Design, Design Heuristics, Design Documentation, Design Methods: Data Design, Architectural Design, Interface Design, Human Computer Interface Design, Procedural Design.

### Unit-IV

**Software Testing Methods:** Software Testing Fundamentals,Test Case Design, Black-BoxTesting, White-Box Testing, Software Testing Strategies: Verification and Validation, Strategic Issues, Unit Testing, Integration Testing, Validation Testing, System Testing.

### Unit V

**Software Process and Project Metrics:** Measures, Metrics and indicators, Metrics in the Process and Project Domains, Software Measurement, Metrics of Software Quality.

### Reference Books:

1. Software Engineering: A Practitioner's Approach by P, S. Pressman Fourth edition 1997,McGraw- HW pub.
2. An integrated Approach to Software Engineering Pankaj Jalote, 1991,Narosa Pub.
3. Software Engineering University Press — by Sonunervilie Oxford university press 1996
4. Fundamentals of Software Engineering Leon and Leon Vikas Publishing House Pvt. Ltd.

Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
					C	L	T	P
BSCS-406	Practical based on BSCS-402	<u>50</u>	-	50	<u>04 Virtual (VR)</u>			

**B.Sc. (Hons.) CS**

**FIFTH**

**SEMESTER**

## BCA- V Semester

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH- 501	Advanced JAVA	60	40	100	6	4	2	

### BCA-501 Advanced JAVA

#### UNIT-I

**The Java Environment:** History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; A simple program, its compilation and execution; the concept of CLASSPATH; Basic idea of application and applet; **Basics:** Data types; Operators- precedence and associativity; Type conversion; The decision making – if, if..else, switch; loops – for, while, do...while; special statements–return, break, continue, labeled break, labeled continue; Modular programming methods; arrays; memory allocation and garbage collection in java keywords. **Object Oriented Programming in Java:** Class; Packages; scope and lifetime; Access specifies; Constructors; Copy constructor; this pointer; finalize () method; arrays; Memory allocation and garbage collection in java keywords **Inheritance** : Inheritance basics, method overriding, dynamics method dispatch, abstract classes.

#### UNIT-II

**Interfaces** : defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces. **Multithreading and Exception Handling:** Basic idea of multithreaded programming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer-consumer relationship; Daemon thread, Selfish threads; Basic idea of exception handling; The try, catch and throw; throws Constructor and finalizers in exception handling; Exception Handling.

#### UNIT-III

**Applets:** Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet.**The AWT:** The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scroll bar; Frame; Layout managers flow layout, Grid layout, Border layout, Card layout. **The Java Event Handling Model:** Java's event delegation model – Ignoring the event, Self contained events, Delegating. **Events:** The event class hierarchy; The relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Key Event, Mouse Event, Text Event, Window Event.

#### UNIT-IV

**Input/Output** : Exploring Java i.o., Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization. **JDBC:** JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the result set object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

#### UNIT-V

**Networking & RMI:** Java Networking : Networking Basics : Socket, Client server, reserved sockets, proxy servers, Inet address, TCP sockets, UDP sockets. ; RMI for distributed computing; RMI registry services; Steps of creating RMI Application and an example. **Collections:** The collections framework, collection interfaces, collection classes.

#### Reference Books:

1. Naughton & Schildt “The Complete Reference Java 2”, Tata McGraw Hill
2. Deitel “Java- How to Program:” Pearson Education, Asia

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH- 502	Artificial Intelligence	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	

## BSCH-502 Artificial Intelligence

### Unit-I

**Basic Problem solving methods:** Production systems-state space search, control strategies. Heuristic search, forward and backward reasoning, Hill climbing techniques Breadth first search, Depth first search, Best search.

### Unit-II

**Knowledge Representation:** Predicate logic, Resolution question Answering, Nonmonotonic Reasoning, statistical and probabilistic reasoning, Semantic Nets. Conceptual Dependency, frames and scripts.

### Unit-III

**AI languages:** Important characteristics of AI languages PROLOG, LISP.

### Unit-IV

**Introduction to Expert Systems:** Structure of an Expert system interaction with an expert, Design of an Expert system.

### Unit V

**Neural Network:** Basic Structure of a neuron, Perception Feed forward, Back propagation, Hopfield Network.

### Reference Books:

1. Rich E and Knight K Artificial Intelligence, "TMH New Delhi,
2. Nilsson N.J. Principles of Artificial Intelligence, Springer Verlag, Berlin.
3. Barr A, Fergenbaub EA. and Cohen PR, Artificial Intelligence. Addisonwesley Reading (Mars) 1989.
4. Waterman D.A. A guide to Expertsystem, Adision - Wesley, Reading (Mars) 1986,
5. Artificial Intelligence Hand book, Vol. 1-2, ISA. Research Triangle Park 1989,
6. Kos Ko B Neural Networks and Fuzzy system -pH-
7. Neural Network Design, Martin Hagar, Vikas-Thomson Learning. Vikas Pub. House PVI, Ltd., Delhi.
8. Expert Systems: Principals & Programming, Joseph Giarrantons&Rilay. Vikas- Thomson Learning Vikas Pub. House Pvt. Ltd., Delhi.

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-504 E1</b>	<b>Data Mining</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

### **BSCH-504 E1 Data Mining**

#### **UNIT-1**

Introduction : Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas. Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search.

#### **UNIT -2**

Clustering paradigms; Partitioning algorithms like K-means, K-Mediod, CLARA,CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS.

#### **UNIT -3**

DM techniques & Web Mining: artificial neural networks , application of Neural Network, AI, Fuzzy logic and Genetic algorithm, Decision tree in DM. Web Mining, Web content mining, Web structure Mining, Web Usage Mining.

#### **UNIT-4**

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis. Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends.

#### **UNIT -5**

The vicious cycle of Data mining, data mining methodology, feature extraction, motion analysis, Market baskets analysis, link analysis, generic algorithms, data mining and corporate data warehouse, OLA

#### **Reference Books :**

1. Data Mining Techniques ; Arun K.Pujari ; University Press.
2. Data Mining; Adriaans & Zantinge; Pearson education.
3. Mastering Data Mining; Berry Linoff; Wiley.
4. Data Mining; Dunham; Pearson education.

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH-504E2	Internetwork Application	60	40	100	6	4	2	

## BSCH-504E2 Internetwork Application

### UNIT - 1

TCP/IP Model: Comparison with ISO -OSI reference model. TCP/IP Protocol Family: Transport : Transmission Control Protocol, TCP Header Format, UDP Routing : IP Addressing , limitations , Brief overview of IPV6 i.e. the next generation IP, IP header format. Network Addresses: ARP, Domain Name System (DNS), RARP.

### UNIT-2

User Services /Applications : File Transfer Protocol (FTP) : Channel Connection, Command : internal & Users, Connections, debugging option with FTP, third party transfer, anonymous FTP, FTP Servers, TFTP, Telnet, BOOTP, Gateway Protocols : brief overview of EGP, CGP & IGP, Other protocols : NFS, NIS, RPC, SMTP, SNMP.

### UNIT - 3

Internet : Uses, Goals/advantages, WWW, Intranet : Goals, benefits, how TCP/IP, bridges, routers, E-mail works in an intranet, Intranet and WWW : IP Networks, HTTP, Commands, Intranet applications : Overview of Web-Servers : essential & desirable features of a web server : authentication , authorization and encryption ; proxy services ; Subnetting an intranet.

### UNIT-4

Overview of an intranet security system: Security and access policies, Server Security, Firewalls, General Security. WAN : overview of DDS, T-1, T-3 , Frame Relay, Sonet, SMDS, ATM Services, WAN implementation, Connecting the LANs : Bridges, routers, Accessing WAN, Message handling system : X.400 & X.500 , Message Transfer Agents (MTA), Mailbox.

### UNIT-5

Development of the Socket Programming Interface: Socket Services, Creating a Socket , Binding the Socket , Connecting to the Destination , open Command , Sending Data , Receiving Data , Server Listening , Closing a Connection , Aborting a Connection , UNIX Forks.

Network services- file servers, message servers, Directory servers, print servers, application servers.

### Reference Books:

Douglas J. Comer : Internetworking with TCP/IP (Vol I)

Richard Stevens : Unix Networking

Course code	Title	End term sem. Exam	Internal	Max Mark s	Credits*	Distribution of Credits		
						C	L	T
<b>BSCH-505 E1</b>	<b>NETWORK SECURITY</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

### **BSCH-505 E1 NETWORK SECURITY**

#### **UNIT-1**

A Definition of Computer Security, The Challenges of Computer Security, The OSI Security Architecture. Security Attacks (Passive Attacks, Active Attacks). Security Services (Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service). Vulnerability and Threats, Malware: Viruses, Worms, Trojan horses.

#### **UNIT-2**

Symmetric Encryption Principle (Cryptography, Cryptanalysis) Classical Encryption Techniques, Algorithm Types (Stream Cipher, Block Cipher) Cipher Block Modes of Operation (Electronic Codebook Mode, Cipher Block Chaining Mode, Cipher Feedback Mode, Counter Mode).Symmetric Block Encryption Algorithms (Data Encryption Standard, Triple DES, Advanced Encryption Standard).

#### **UNIT-3**

Public-Key Cryptography Principles (Public-Key Encryption Structure, Applications for Public-Key Cryptosystems, Requirements for Public-Key Cryptography). Public-Key Cryptography Algorithms (The RSA Public-Key Encryption Algorithm, Diffie-Hellman Key Exchange).

#### **UNIT-4**

Approaches to Message Authentication: MD5 Message Digest Algorithm, The Secure Hash Algorithm (SHA-1), Security of Hash Functions,. Message Authentication Codes (HMAC, MACs Based on Block Ciphers).

#### **UNIT-5**

Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, IP Security, Web Security, Firewalls, Firewall Design Principles, Intrusion Detection Systems, Virtual Private Network.

#### **Reference Books :**

1. William Stallings, "Cryptography and Network Security", Second edition, Prentice Hall, 1999.
2. Atul Kahate, "Cryptography and Network Security," TMH
3. William Stallings, "Cryptography and Network Security",Third Edition, Pearson Ed
4. Introduction to network security, Krawetz, Cengage



## B.Sc. (H) Computer Science VI SEMESTER

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH-601	ASP.NET Technology using C#	60	40	100	<u>6</u>	<u>4</u>	<u>2</u>	

### BSCH-601 ASP.NET Technology using C#

#### Unit-I

Overview of ASP.NET framework, Understanding ASP. NET Controls, Applications, Web servers, installation of IIS. Web forms, web form controls server controls, client controls, web forms & HTML, Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box, etc. Running a web Applications, creating a multiform web project.

#### Unit-II

Form Validation: Client side validation, server Side validation, Validation Controls: Required Field, Comparison, Range, Calendar control, Ad rotator Control, Internet Explorer Control. State management- View state, Session state, Application state.

#### Unit-III

Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, Data Adapter Class, Dataset Class.

Display data on data bound Controls and Data Grid. Database Accessing on web applications: Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound control.

#### Unit-IV

Writing datasets to XML, Reading datasets with XML. Web services: Introduction, Remote method call using SOAP, web service description language, building & consuming web service, Web Application deployment.

#### Unit-V

Overview of C#, C# and .NET, similarities & differences from JAVA, Structure of C# program Language features: Type system, boxing and unboxing, flow controls, classes, interfaces, Serialization, Delegates, Reflection.

#### Reference Books:

1. VB.NET Black Book by stevenholzner - dreamtech
2. ASP.NET Unleashed
3. C# programming— wrox publication
4. C# programming Black Book by Matt telles

Course code	Title	End term sem. Exam	Intern al	Max Marks	Credits*	Distribution of Credits		
						C	L	T
BSCH- 602	<b>Programmin g in Python</b>	<b>60</b>	<b>40</b>	<b>100</b>	<b><u>6</u></b>	<b><u>4</u></b>	<b><u>2</u></b>	

## BSCH-602 Programming in Python

### UNIT-I

**Introduction:** check icon History, Features, Setting up path, Variable and Data Types, Operator.  
**Conditional Statements:** if, if-else, if-elif, nested if-else and Looping: for, while, nested loops with break, continue and pass keyword. **String Manipulation:** Accessing Strings, Basic Operations, String slices, Function and Methods. **Functions:** Defining and Calling of a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

### UNIT-II

**Collection:** list, tuple , Dictionaries. Introduction, Accessing values, Working, Properties, Functions and Methods. **Modules:** Importing module, Math module, Random module, os module, date-time module, calendar module, Packages, user defined module, introduction of pip. **IO:** Printing on screen and Reading data from keyboard, Opening and closing file, Reading and writing files, Functions.

### UNIT-III

**Exception Handling:** Except, Try, else, finally clause, User Defined Exceptions, raise user-defined exception, nested try-except. **OOPs concept:** Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, final and abstract class. Database: Introduction, Connections with MYSQL, Executing queries, Transactions) web-designing: HTML, CSS, JAVASCRIPT.

### UNIT-IV

**CGI:** Introduction, Architecture, CGI environment variable, GET and POST methods. application using CGI: signup, login and session tracking with server side programming.

### UNIT-V

**DJANGO:** working of MVT, Environment setting and installation, creating a Project, Apps Life Cycle, Admin Interface, Views, URL Mapping. **Template System:** DTL and JINJA. Models, Page Redirection, Form Processing, project with signup and login.

### References:

1. Programming and Problem Solving with Python (Ashok Namdev Kamthane and Amit Ashok Kamthane) McGraw Hill publication
2. Let Us Python (Kanetkar Yashavant) BPB Publication
3. Python Complete Reference (Brown Martin C.) McGraw Hill publication
4. Python Programming A Modular Approach (Naveen and Kumar and Taneja Sheetal) PEARSON
5. Beginning Django (Rubio Daniel) Apress

