

Pre-Revision

Study & Evaluation Scheme

of

Bachelor of Science (Honours)-Computer Science

[Applicable for the Batch 2017-18]



**COLLEGE OF COMPUTING SCIENCES &
INFORMATION TECHNOLOGY**

TEERTHANKER MAHAVEER UNIVERSITY

Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in



Study & Evaluation Scheme
B.Sc. (Honours) Computer Science
Semester-I

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC101	Computer Fundamentals, Internet, & MS-Office	4	1	0	5	40	60	100
2	CSC 103	Digital System Design	4	1	0	5	40	60	100
3	CSC149	English Communication & Soft Skills-I	3	0	2	4	40	60	100
4	CSC 106	Environmental Studies	4	0	0	4	40	60	100
Elective (Select any one)									
5	CSC 107	Managerial Economics	4	0	0	4	40	60	100
	CSC 108 /BCA 111	Mind Management & Human Values							
6	CSC154	Computer Fundamentals, Internet, & MS-Office Lab	0	0	6	3	50	50	100
7	CSC 155	Digital System Design Lab	0	0	4	2	50	50	100
		Total	19	2	12	27	300	400	700

Semester-II

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	Elective (Select any one)								
	CSC 201	Computer Organization	4	1	0	5	40	60	100
	CSC 206	Circuit Theory & Basic Electronics							
2	CSC202	Programming in C	4	1	0	5	40	60	100
3	Elective (Select any one)								
	CSC 207	Discrete Mathematics	4	1	0	5	40	60	100
	CSC 208	Graph Theory							
4	CSC 209	Operating System Concepts using Linux	4	1	0	5	40	60	100
5	CSC249	English Communication & Soft Skills-II	3	0	2	4	40	60	100
6	CSC251	Software Lab : C-Programming Lab	0	0	6	3	50	50	100
7	CSC 252	Hardware Lab : Digital	0	0	4	2	50	50	100
	Total		19	4	12	29	300	400	700



Semester-III

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC301	Software Engineering and UML	4	1	0	5	40	60	100
2	CSC307	Data Structures Using C	4	1	0	5	40	60	100
3	CSC 349	English Communication & Soft Skills-III	3	0	2	4	40	60	100
4	CSC308	Theory of Data Base Management System	4	1	0	5	40	60	100
5	CSC309	Computer Network	4	1	0	5	40	60	100
6	CSC351	Data Structure Lab	0	0	6	3	50	50	100
7	CSC353	Data Base Management System Lab	0	0	4	2	50	50	100
Total			19	4	12	29	300	400	700

Semester-IV

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC402	Object-Oriented Programming Concepts – C++	4	1	0	5	40	60	100
2	CSC403	Algorithm Design	4	1	0	5	40	60	100
3	CSC406	Formal language and Automata Theory	4	1	0	5	40	60	100
Elective (Select any one)									
4	CSC407	Concepts of IOT(Internet of Things)	4	1	0	5	40	60	100
	CSC408	Scientific Computing							
	CSC409	Ethical Hacking Fundamentals							
	CSC410	Mobile Device and Network Architecture							
5	CSC 449	English Communication & Soft Skills-IV	3	0	2	4	40	60	100
6	CSC452	Object Oriented Programming Lab through C++	0	0	6	3	50	50	100
7	CSC454	Algorithm Design Lab	0	0	4	2	50	50	100
Total			19	4	12	29	300	400	700



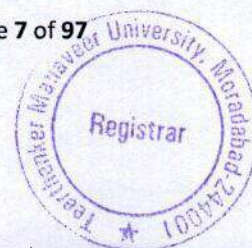
Semester-V

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC501	Numerical and Optimizing Techniques	4	1	0	5	40	60	100
2	CSC502	Computer Graphics	4	1	0	5	40	60	100
3	*Elective (Select any one)								
	CSC503	Microprocessor	4	1	0	5	40	60	100
	CSC504	Compiler Design							
4	CSC506	Core Java	4	1	0	5	40	60	100
5	CSC507	C#.Net	4	1	0	5	40	60	100
6	CSC553	Core Java Lab	0	0	6	3	50	50	100
7	CSC554	C#.Net Lab	0	0	6	3	50	50	100
Total			20	5	12	31	300	400	700



Semester-VI

S. No.	Category (Core & Non-core)	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CORE	CSC603	Mobile Computing	3	1	0	4	40	60	100
2	NON CORE	CSC605	Digital Image Processing	3	1	0	4	40	60	100
3	NON CORE	Elective (Select any one)								
		CSC617	Artificial Intelligence							
		CSC607	Embedded System							
		CSC608	Distributed Computing							
			3	1	0	4	40	60	100	
4	CORE	*Elective (Select any one)								
		CSC609	Advance Java	4	1	0	5	40	60	100
		CSC610	ASP.Net with Ajax							
5	CORE	CSC616	Cloud Computing	4	1	0	5	40	60	100
6	NON CORE	Elective (Select any one)								
		CSC611	Concept of Green Technology							
		CSC612	Social Implications of Information technology							
		CSC613	Information Security and Cyber Law							
		CSC614	Enterprise Resource Planning system							
		CSC615	Big Data Analytics							
		3	1	0	4	40	60	100		
7	CORE	CSC653	Project Lab-Under the Super vision of Project Guide(In house Development)	0	0	4	2	50	50	100
8	CORE	*Elective (Select any one)								
		CSC655	Advance Java Lab	0	0	4	2	50	50	100
		CSC656	ASP.Net with Ajax Lab							
		Total		20	6	8	30	340	460	800





Post Revision

Study & Evaluation Scheme

of

Bachelor of Science (Honours)-Computer Science

[Applicable w. e. f. Academic Session – 2019-20]

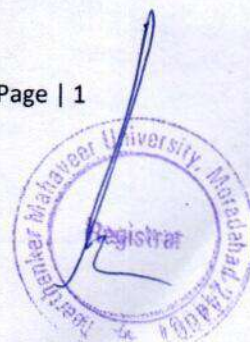
[As per CBCS guidelines given by UGC]



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Bachelor of Science (Honours) Computer Science Curriculum

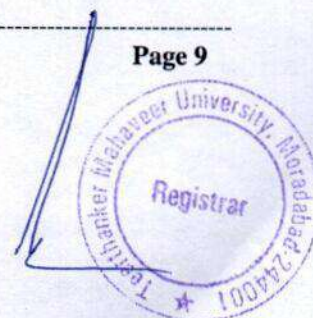
B.Sc. (Honours) CS : Semester I

S. No.	Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	AEC I	TMU 101	Environmental Studies	2	1	0	3	40	60	100
2	CC I	CSC111	Computer Fundamentals & C Programming	3	1	0	4	40	60	100
3	AEC II	CSC 112	Human Values & Professional Ethics	3	1	0	4	40	60	100
4	CC II	CSC 113	Digital Logic & Basics of Computer Organization	3	1	0	4	40	60	100
5	AEC III	TMUGE101	English Communication I	2	0	2	3	40	60	100
6	CC III	CSC156	Programming In C: Lab	0	0	4	2	50	50	100
7	CC IV	CSC157	Computer Fundamentals & Digital Electronics Lab	0	0	4	2	50	50	100
Total				13	4	10	22	300	400	700

Value Added Course / Semester- I

Value added course is an audit course which will be compulsory to pass with 45% marks. However, it will not be added towards overall result.

S. No.	Category name	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-1	TMUGA-101	Foundation in Quantitative Aptitude	2	1	0	0	40	60	100



**B.Sc. (Honours) CS : Semester II**

S. No.	Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC V	CSC213	Operating System Concepts	3	1	0	4	40	60	100
2	CC VI	CSC 214	Introduction to Web Design	3	1	0	4	40	60	100
3	CC VII	CSC 215	Data Structures Using C++	3	1	0	4	40	60	100
4	CC VIII	CSC216	Discrete Mathematics	3	1	0	4	40	60	100
5	AEC IV	TMUGE201	English Communication II	2	0	2	3	40	60	100
6	CC IX	CSC 255	Introduction to Web Design Lab	0	0	4	2	50	50	100
7	CC X	CSC 256	Data Structures Using C++ Lab	0	0	4	2	50	50	100
Total				14	4	10	23	300	400	700

Value Added Course / Semester - II

Value added course is an audit course which will be compulsory to pass with 45% marks. However, it will not be added towards overall result.

S. No.	Category name	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-2	TMUGA-201	Analytical Reasoning	2	1	0	0	40	60	100



**B.Sc. (Honours) CS : Semester III**

S. No.	Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC XI	CSC301	Software Engineering and UML	3	1	0	4	40	60	100
2	GEC I	Select one out of the list Generic Elective I		3	1	0	4	40	60	100
3	CC XII	CSC315	Object-Oriented Programming Concepts Using Java	3	1	0	4	40	60	100
4	CC XIII	CSC316	Computer Network	3	1	0	4	40	60	100
5	AEC V	TMUGE301	English Communication III	2	0	2	3	40	60	100
6	CC XIV	CSC357	Object-Oriented Programming Concepts Using Java LAB	0	0	4	2	50	50	100
7	GEC II	Select one out of the list Generic Elective II		0	0	4	2	50	50	100
		Total		14	4	10	23	300	400	700

Value Added Course / Semester - III

Value added course is an audit course which will be compulsory to pass with 45% marks. However, it will not be added towards overall result.

S. No.	Category name	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-3	TMUGA-302	Modern Algebra and Data Management	2	1	0	0	40	60	100
2	VAC-4	TMUGS-301	Managing Self	2	1	0	0	50	50	100



**B.Sc. (Honours) CS : Semester IV**

S. No.	Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC XV	CSC403	Algorithm Design	3	1	0	4	40	60	100
2	CC XVI	CSC411	Data Base Management System	3	1	0	4	40	60	100
3	CC XVII	CSC 413	Introduction to R Programming	3	0	0	3	40	60	100
4	DSC I	Select one out of the list Discipline Specific Elective Course I		3	1	0	4	40	60	100
5	AEC VI	TMUGE401	English Communication IV	2	0	2	3	40	60	100
6	CC XVIII	CSC456	Data Base Management System LAB	0	0	4	2	50	50	100
7	DSC II	Select one out of the list Discipline Specific Elective Course II		0	0	4	2	50	50	100
8	CC XIX	CSC461	R Programming Lab	0	0	4	2	50	50	100
Total				14	3	14	24	350	450	800

Industrial Training

S. No.	Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	Project I	CSC557	Industrial Training*	0	0	0	2	50	50	100

*Industrial Training to be undertaken at the end of IV semester and to be evaluated at the start of V semester





Value Added Course / Semester - IV

Value added course is an audit course which will be compulsory to pass with 45% marks. However, it will not be added towards overall result.

S. No.	Category name	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-5	TMUGA-402	Advance Algebra and Geometry	2	1	0	0	40	60	100
2	VAC-6	TMUGS-401	Managing Work and Others	2	1	0	0	50	50	100



**B.Sc. (Honours) CS : Semester V**

S. No.	Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CC XX	CSC515	Dot Net Framework with C#	3	1	0	4	40	60	100
2	CC XXI	CSC516	Theory of Computation	3	1	0	4	40	60	100
3	CC XXII	CSC517	Python Programming & Introduction to Data Science	3	1	0	4	40	60	100
4	SEC I	Select one out of the list Skill Enhancement Course I		3	1	0	4	40	60	100
5	GEC III	Select one out of the list Generic Elective III		3	1	0	4	40	60	100
6	SEC II	Select one out of the list Skill Enhancement Course II		0	0	4	2	50	50	100
7	CC XXIII	CSC560	Python Programming & Introduction to Data Science Lab	0	0	4	2	50	50	100
8	CC XXIV	CSC 561	Dot Net Framework with C# Lab	0	0	4	2	50	50	100
9	OEC I	Open Elective I		3	0	0	3	40	60	100
		Total		18	5	12	31*	440*	560*	1000*

* including Industrial Training (to be undertaken at the end of IV semester, listed in IV semester evaluation scheme)





B.Sc. (Honours) CS : Semester VI

S. No.	Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	SEC III	Select one out of the list Skill Enhancement Course III		3	1	0	4	40	60	100
2	CC XXV	CSC 618	Machine Learning using Python	3	1	0	4	40	60	100
3	GEC IV	Select one out of the list Generic Elective IV		3	1	0	4	40	60	100
4	DSC III	Select one out of the list Discipline Specific Elective Course III		3	1	0	4	40	60	100
5	Project II	CSC662	Project LAB	0	0	6*	3	50	50	100
6	SEC IV	Select one out of the list Skill Enhancement Course IV		0	0	4	2	50	50	100
7	DSC IV	Select one out of the following list Discipline Specific Elective Course IV		0	0	4	2	50	50	100
8	CC XXVI	CSC661	Machine Learning using Python LAB	0	0	4	2	50	50	100
9	OEC II	Open Elective II		3	0	0	3	40	60	100
		Total		15	4	18	28	400	500	900

* 2 hours will be supervisor interaction and 4 hours will be lab hours



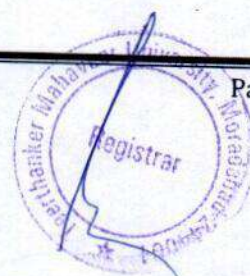


Course Code: CSC111	Core Course - I	
	B.Sc. (Honours) Computer Science – Semester I	L-3 T-1 P-0 C-4
	Computer Fundamentals & C Programming	
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basic structure of a computer along with hardware, software and memory associated with it.	
CO2.	Understanding various terminologies and functions used in C programming language.	
CO3.	Applying programming concepts to write compile and debug programs in C language.	
CO4.	Analyzing programming concepts by using loops, arrays, pointers, structures etc.	
CO5.	Design programs for general purposes	
Course Content:		
Unit-1:	Introduction to computers, characteristics and limitations of computer, Block diagram of computer, types of computers, uses of computers, computer generations. Input and output devices: Keyboard and mouse, inputting data in other ways, Types of Software: system software, Application software, commercial, open source, domain and free ware software, Memories: primary, secondary and cache memory.	8 Hours
Unit-2:	Introduction to C: Introduction – Structure of C Program – Writing the first C Program – File used in C Program – Compiling and Executing C Programs – Using Comments – Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Statements in C- Operators in C- Programming Examples – Type Conversion and Type Casting.	8 Hours
Unit-3:	Decision Control and Looping Statements: Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – Goto Statement Functions: Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive function	8 Hours
Unit-4:	Arrays: Introduction – Declaration of Arrays – Accessing elements of the	8 Hours





	Array – Storing Values in Array – Calculating the length of the Array – Operations on Array – one dimensional array for inter-function communication – Two dimensional Arrays –Operations on Two Dimensional Arrays Strings: Introduction String and Character functions	
Unit-5:	Pointers: Understanding Computer Memory – Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Generic Pointers - Passing Arguments to Functions using Pointer – Pointer and Arrays – Passing Array to Function – Structure, Union, and Enumerated Data Types: Introduction – Nested Structures – Arrays of Structures – Structures and Functions - Unions – Enumerated Data Types, Command line arguments	8 Hours
<u>Text Books:</u>	1. Sinha P.K., Computer Fundamentals, BPB Publishing.	
<u>Reference Books:</u>	<ol style="list-style-type: none"> 1. O’Leary Timothy, O’Leary Linda , Microsoft Office ,TMH Publication 2. BalaguruswamyE., <i>Programming in ANSI C</i>, TMU 3. KanitkarYashwant, <i>Let Us C</i>, BPB 4. Leon A. & Leon M., <i>Introductions to Computers</i>, Vikas Publication. 5. Norton Peter, <i>Introductions to Computers</i>, TMH Publication. Price Michael, <i>Office in Easy Steps</i> ,TMH Publication. 6. Behrouz A. Forouzan and Richard F. Gilberg, “Computer Science A Structured Programming Approach Using C”, PHI, 3rd Ed., 7. Jeri R. Hanly and Elliot B. Koffman, “Problem Solving and Programming in C”, Pearson, 8. Rama N. Reddy and Carol A. Ziegler, “C Programming for Scientist and Engineers with Applications”, Jones and Bartlet 	
<u>Additional Electronic Reference Material:</u>	1. https://www.javatpoint.com/computer-fundamentals-tutorial	





Course Code: CSC112	Ability Enhancement Course - II B.Sc. (Honours) Computer Science – Semester I Human Values & Professional Ethics	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts of Morals, Values, Ethics and Value education.	
CO2.	Understanding the concept of work ethics and find out the difference between profession, ethics and happiness.	
CO3.	Analyzing the concept of trust, spiritualism, and focus on problems related to stress.	
CO4.	Understanding the concept and meaning of Intellectual Property Rights, Cybercrime, Plagiarism and misconduct	
CO5.	Understanding about e-waste and creating a balance between computer ethics and corporate social responsibility.	
Course Content:		
Unit-1:	Introduction to Value Education: Understanding of Morals, Values and Ethics; Need, Content and Process for Value Education. Attributes of A Good Character- Integrity, Work Ethic, Respect For Others, Living Peacefully, Cooperation, Commitment, Empathy etc. Spirituality: Introduction to Yoga and Meditation for Professional Excellence and Stress Management. Understanding Harmony in the Family and Society.	8 Hours
Unit-2:	Ethics & Technology: Impact of Technological Growth on Society and Value System; Reports of Club of Rome, Appropriate Technology Movement of Schumacher, Problems of Technology Transfer, Technology Assessment Impact Analysis, Human Operator in Engineering Projects & Industries, Problems of Man-Machine Interaction, Human Centered Technology, Safety and Risk Analysis.	8 Hours
Unit-3:	Ethics of Profession: Ethical Issues in Engineering Practice, Conflicts of Interest: Conflicts between Business Demands and Professional Ethics. Social and Ethical Responsibilities of Technologists. Ethical Issues at Workplace: Discrimination, Cybercrime, Plagiarism, Sexual Misconduct, Fraudulent Use of Institutional Resources. Intellectual Property Rights and its uses. Whistle blowing and beyond, Case studies.	8 Hours





Unit-4:	Profession and Human Values: Values Crisis in Contemporary Society; Value Spectrum of Good Life; Integrated Personality. Modern Search for a Good Society: Justice, Democracy, Secularism, Rule of Law. Values in Indian Constitution. Canons of ethics: Ethics of Virtue; Ethics of Duty; Ethics of Responsibility.	8 Hours
Unit-5:	Global Issues & Professional Ethics: MNCs & Morality; Case Study: Bhopal Gas Tragedy. Environmental Ethics: Disposal of Plastic Waste, e-Waste, Industrial. Computer Ethics: Problems in Computer Ethics. Weapons Development: Impact on Society & Humanity. Moral Leadership; Corporate Social Responsibility. Engineering Council of India.	8 Hours
<u>Text Books:</u>	1. RS Naagarazan, A Text Book on Professional Ethics & Human Values, New Age International Publishers	
<u>Reference Books:</u>	<ol style="list-style-type: none"> 1. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 2. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 4. Sathya Sai Education in Human Values, UK Newsletter, 2/2003 www.sathyaiaiehv.org.uk 	
<u>Additional Electronic Reference Material:</u>		





Course Code: CSC113	Core Course - II B.Sc. (Honours) Computer Science – Semester I Digital Logic & Basics of Computer Organization	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the operations of logic gates, boolean algebra and karnaugh map.	
CO2.	Understanding the working of combinational and sequential circuits.	
CO3.	Understanding the working of register organization and stack organization.	
CO4.	Understanding the concept of Input-Output Organization and memory organization.	
CO5.	Applying the concepts of combinational and sequential circuits to design the desired circuit.	
Course Content:		
Unit-1:	Introduction to Number Systems -Types-Decimal, Binary, Octal, Hexadecimal; Conversion from one number system to other; Binary arithmetic operations; Representation of Negative Numbers; 1's complement and 2's complement, Complement arithmetic, weighted and Non Weighted Codes Logic Gates: Basic Gates, Universal Gates and realization of other gates using universal gates	8 Hours
Unit-2:	Boolean Algebra: Rules and laws of Boolean algebra, Demorgan's Theorems, Boolean Expressions and Truth Tables, Standard SOP and POS forms; Minterm and Maxterms, Canonical representation of Boolean expressions, Minimization Techniques for Boolean Expressions using Karnaugh Map (three, four and five variable) Combinational Circuits- Introduction to combinational Circuits, Adders- Half-Adder and Full-Adder, Subtractors- Half and Full Subtractor, BCD adder, BCD Subtractor.	8 Hours
Unit-3:	Combinational Circuits: Multiplexer, Demultiplexer, Encoder, Priority Encoder, Decoder, BCD to Seven segment Display Decoder, Comparators.	8 Hours





	Sequential Circuits: Introduction to Sequential Circuits, Flip-Flops, Types of Flip Flops: R-S, T, D, J-K, Race around condition, Master-Slave JK flip flop, Realization of flip flops. Shift Registers: Introduction to shift registers, 4 bit shift register	
Unit-4:	Processor Organization: General register organization, Stack organization, Reverse Polish Notation, Instruction Format, Addressing mode, Instruction type.	8 Hours
Unit-5:	Input-Output Organization: Peripheral Devices, Strobe control, Hand Shaking, DMA, Interrupts & Interrupt handling, Direct Memory access: DMA Controller and DMA Transfer. Memory Organization: Memory Hierarchy, Main Memory: RAM & ROM chips.	8 Hours
<u>Text Books:</u>	1. Mano M., Computer System Architecture, Prentice Hall of India. 2. Mano Morris, Digital Logic, Prentice Hall of India.	
<u>Reference Books:</u>	1. Stallings, Computer Organization, Prentice Hall of India. 2. Vravice, Zaky&Hamacher, Computer Organization, Tata Mc Graw Hill 3. Tannenbaum, Structured Computer Organization, Prentice Hall of India. 4. Hayes John P., Computer Organization, McGraw Hill	
<u>Additional Electronic Reference Material:</u>	1. https://www.electronics-tutorials.ws/logic/logic_1.html	



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Course Code: CSC156	Core Course - III B.Sc. (Honours) Computer Science – Semester I Programming in C: Lab	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding problem-solving techniques.	
CO2.	Applying sorting algorithms	
CO3.	Applying function on programs for reusability	
CO4.	Applying concepts such as arrays, structures etc to write different programs in C language.	
CO5.	Design general purpose programs using C	
Course Content:		
	<ol style="list-style-type: none"> 1. Programs based on data Types 2. Programs to calculate factorial, Fibonacci series. 3. Programs on Arrays – Maximum, Minimum, Sum of the elements, etc 4. Basic Sorting Algorithms 5. Function based programs 6. Returning from Functions 7. Static data handling examples 8. Pointers based address manipulations programs 9. Programs to handle data through the use of structures. 10. Filing based programs – create, read, append etc 	20 Hours





Course Code: CSC157	Core Course - IV B.Sc. (Honours) Computer Science – Semester I Computer Fundamentals & Digital Electronics Lab	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basics of MS office.	
CO2.	Understanding the working of basic of sequential circuits.	
CO3.	Understanding the working of basic gates.	
CO4.	Applying concepts of MS-WORD, MS-EXCEL, POWERPOINT and MS-ACCESS	
CO5.	Applying concepts of logic gate and boolean algebra to design combinational circuits.	
CO6.	Designing sequential circuits with flipflops and registers.	
Course Content:		
	<p>MS Office:</p> <p>MS-WORD</p> <p>Creating, Editing, Formatting: Font name, size, color, alignment, changing, paragraph settings, change case, spell checker, Mail Merge, Creating Tables, editing tables, alignment settings in tables</p> <p>MS-EXCEL</p> <p>Creating, Editing, Formatting: font name, size, color, alignment, changing, entering data, Sorting Data, Inserting, renaming and deleting Sheet, Inserting row, column, cell ,picture, background, graph, symbol, hyperlink ,object, diagram.</p> <p>MS-POWERPOINT</p> <p>Creating, Editing, Formatting: font name, size, color, alignment, changing, Inserting table, picture, background, graph, symbol, hyperlink, object, diagram.</p> <p>MS-ACCESS</p> <p>Creating database and editing data base</p> <p>1. Design proper logic circuits to verify the truth table of basic gates</p>	20 Hours





	<ol style="list-style-type: none"> 2. Implement the following Boolean expression using basic 3. Design proper logic circuits to prove that NAND gate is a universal gate. 4. Design proper logic circuits to prove that NOR is gate a universal gate. 5. Design an X-OR gate using NAND gate only. 6. Design half subtractor using NOR gate 7. Design Half Adder using NAND gate 8. Design Full Adder using Basic logic gates 9. Design Full Subtractor using Basic logic gates 10. Design a 4*1 multiplexer using basic logic gates and create IC. 11. Design a 8*1 multiplexer using basic logic gates and cerate IC. 12. Realize the following Boolean function using suitable MUX:- $f(A,B,C)=\Pi(0,1,3, 5)$ 13. Design a half adder using suitable MUX 14. Design a full adder using suitable MUX. 15. Design a half subtractor using suitable MUX. 16. Design a full subtractor using suitable MUX. 	
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Course Code: CSC214	Core Course - VI B.Sc. (Honours) Computer Science – Semester II Introduction to Web Design	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basics of web technologies, HTML, Linking of HTML files.	
CO2.	Understanding the concept of Image alignment text alignment in HTML.	
CO3.	Understanding the concept of web page working, creating forms using of buttons.	
CO4.	Understanding various operations on cascading style sheet (CSS).	
CO5.	Understanding the bootstrap framework with its features and layout.	
Course Content:		
Unit-1:	HTML – URI, LIST, Hyperlinks: History of HTML, Introduction to URI: Fragment Identifier & Relative Uniform Resource indicator, Standard Generalized Markup Language, Structure of HTML document, Switching between your Editor and Browser, Structuring Web Page, Paragraph and Line Break Tags, Adding Comments, Formatting your Text; Creating Lists: Ordered List Tags, Unordered List Tag & Nesting Lists: Controlling How Ordered Lists are displayed, Creating a Multilevel Outline, Using Start and Value Attributes in an Ordered List, Controlling the Display of Unordered List, Creating Definition List; Creating Hyper Text Links, Linking to a File or Data Object, Linking to NON-WWW Files, Linking to a Place in the Same HTML File, Linking to a Place in Another HTML File, Creating Link Lists, Creating a Simple Link List	8 Hours
Unit-2:	HTML – Images, Links, Rules, Address Tag and Text: Inserting Images: Using the Align Attribute in Inline Graphics, Setting the Height and Width of an Inline Image; Creating Image Links; Horizontal Rules: Changing the Height of a Horizontal Rule, Changing between Shaded and Un-shaded Horizontal Rule, Changing the Width of a Horizontal Rule, Setting the Alignment of a Horizontal Rule; Address Tag; Working with Text: Text Alignment, Changing Font Sizes and Colors: Setting Font Sizes, Setting the Base Font, Using the Small and Big tags, Changing the Font Color; Using a Background Image; Marquee Tag	8 Hours
Unit-3:	Web Page Authoring using HTML: Tables: Creating Columns and Rows, Adding a Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the Table Width and Height, Aligning Cell	8 Hours





	Contents, Setting Column Width, Centering a Table, Inserting an Image, Spanning Columns & Spanning Rows, Setting Font Size and Colors, Assigning Background Colors; Frames: Percentage dimensions, Relative dimensions, Creating two rows Frames, Creating two columns frames, Creating two rows and the second row containing two columns; Forms: What is Form?, Form Tag, Method, Action, Input Tag, Type Attribute: Check box, Hidden, Image, Radio, Reset, Submit, Text Cascading Style Sheets (CSS): Properties Table: Using the style Attribute, Creating Classes and IDs, Generating External Style Sheets, Typography, Consistency, Types of styles, Specifying class within HTML document, Style placement: Inline style, Span & div tags, header styles, Text and font attributes: Font Vs CSS, changing fonts, text attributes, Advance CSS properties: Backgrounds, Box properties and Positioning	
Unit-4:	Bootstrap Framework , History of Bootstrap , Advantages of Bootstrap Framework, What is Responsive web page, Major Features of Bootstrap, What is Mobile-First Strategy, How to apply Bootstrap to Applications, Bootstrap Grid , Advantages of Bootstrap Grid, Display responsive Images, use readymade themes. Bootstrap Tables, Bootstrap Form Layout.	8 Hours
<u>Text Books:</u>	1. Burdman, Collaborative Web Development , Addison Wesley.	8 Hours
<u>Reference Books:</u>	<ol style="list-style-type: none"> 1. Bayross Ivan, Web Technologies Part II , BPB Publications. 2. HTML and CSS: Design and Build Websites By Jon Duckett 3. Bootstrap Quick Start by Jake Spurlock. Publisher: O'Reilly Media, Inc 4. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education. 5. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education. 6. Marty Hall and Larry Brown, "Core Web Programming" Second Edition, Volume I and II, Pearson Education. 7. Bates, "Developing Web Applications", Wiley. 	
<u>Additional Electronic Reference Material:</u>	1. https://www.creativebloq.com/web-design/10-design-concepts-web-developers-need-know-11135255	





Course Code: CSC215	Core Course - VII B.Sc. (Honours) Computer Science – Semester II Data Structures Using C++	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basic concepts of C++ Programming to solve computing problems.	
CO2.	Understanding the basic concepts of object and classes in C++ and different function statements for transforming a problem solution into programs.	
CO3.	Understanding the basic concepts of data structure, arrays and recursion.	
CO4.	Understanding the stack, linked list and queue data structure using C++ class concepts.	
CO5.	Understanding the basic concepts of sorting and searching with different algorithms.	
CO6.	Understanding the basic concepts of tree and file structure.	
Course Content:		
Unit-1:	C++ Programming Basics: Variables, data type, features of object oriented programming, Functions, Call by Reference, Call by Address, Call by Value, Function Overloading, Inline Function, Enumerations. Object & Classes: Access Specifiers, Constructors. Default, Copy Constructor, destructor, Object as Function Arguments, Returning Object from Function. Static Data Members, Static Member Functions, Abstract class, Const Data and Classes. Friend Functions, memory allocation in C++.	8 Hours
Unit-2:	Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time Space trade off. Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, string and its operations, Array as Parameters, Array & pointers.	8 Hours
Unit-3:	Stack: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Applications of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Queues: Array representation and implementation of queues, Operations on Queue, Circular queue, Priority Queue.	8 Hours





	Linked List: Representation and Implementation: Singly Linked List, Doubly Linked List, Circular Linked List, Circular Doubly Linked List, Header Linked List. Operations on Linked List: Insert, Delete, Searching, Traversal. Array and Queue Implementation using Linked List, Polynomial representation and addition.	
Unit-4:	Sort, Practical consideration for Internal Sorting. Searching and Hashing: Sequential search, binary search, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.	8 Hours
Unit-5:	Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees. Graphs: Definitions and concepts, representation using Adjacency matrix, Adjacency lists.	8 Hours
<u>Text Books:</u>	1. S. Lipschutz, Data Structures , TMH.	
<u>Reference Books:</u>	1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia 2. T. H .Cormen "Introduction to Algorithms " PHI 3. K Loudon, "Mastering Algorithms With C", Shroff Publisher & Distributors 4. A M Tenenbaum, "Data Structure using C", Pearson 5. YashwantKanitkar "Data Structure using C" 6. R. S. Salaria, "Data Structures & Algorithms Using C"	
<u>Additional Electronic Reference Material:</u>	1. https://towardsdatascience.com/data-structures-in-c-part-1-b64613b0138d 2. http://www.cplusplus.com/doc/tutorial/structures/	





Course Code: CSC255	<p align="center">Core Course - IX</p> <p align="center">B.Sc. (Honours) Computer Science – Semester II</p> <p align="center">Introduction to Web Design Lab</p>	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying concepts to create simple web pages using various HTML tags and attributes.	
CO2.	Applying concepts of CSS to design the layout of web pages.	
CO3.	Applying concepts of Java script to design dynamic web pages.	
CO4.	Applying concepts of dynamic and auto responsive web pages using Java Script and Bootstrap Framework.	
CO5.	Designing dynamic and auto responsive web pages using Java Script and Bootstrap Framework.	
Course Content:		
	<ol style="list-style-type: none"> 1. Create a simple HTML document about yourself or a topic of your choice using the basic tags learned in the first lesson. 2. Add bold and italic words to your document, save and view. 3. Add a header to your document, save and view. 4. Add paragraph and break tags to your document, save and view. 5. Add a horizontal rule where appropriate, save and view. 6. Add an unordered list to your document, save and view. 7. Add an ordered list to your document, save and view. 8. Add a definition list to your document, save and view. 9. Create a new file called <i>yournamefile2.htm</i> (it can be very basic). 10. Create a link to Yahoo (http://www.yahoo.com). 11. Create a link from <i>yournamefile2.htm</i> to <i>yournamefile1.htm</i>. 12. Create a page that shows the different types of heading available and show each in the same page. 13. Open one of your HTML files in your editor. 	<p align="center">20 Hours</p>





14. Add an image to your document using the tag, (Note: **image.gif** is a generic name. Your image may be **horse.gif** or **scenery.gif**. Also, the image must be placed in the same directory or folder as your HTML file. Although the image *can* be in another directory, the way to reference that image in your image tag isn't a part of this exercise). Save and view.
15. Align a short description to the bottom of your image, save and view.
16. Align the description to the top of the image, save and view.
17. Add a simple table to *yournamefile1.htm* without borders. Make the table with 2 rows and columns, save and view.
18. Add border value of 1, save and view.
19. Add a border value of 5, save and view.
20. Make the top row a table header, save and view.
21. Align all data elements to the middle of their cells, save and view.
22. Center one of your headers in *yournamefile1.htm*, save and view.
23. Center your image, save and view.
24. Align the image to the right, save and view.
25. Put a border around the image with a value of 1; save and view each.
26. Add a horizontal rule that is aligned to the left, is 50% of the width of the page and has a size value of 5, save and view.
27. Give some text (non-header) a font size value of +3, save and view.
28. Put a background color and text color on your page. In order to do this you must obtain the hexadecimal value for the color you want to use. The hex values are at the top of each color swatch (a 6 digit alpha-numeric number). Just plug the value in at the appropriate place in your **Body** tag.
29. Add title and footer to each page you have created till now.
30. Draw a home page of the 'TeerthankarMahaveer University' (with tables).





31. Design a website that displays the information about the total courses offered by the university. The website should show the information about each Course in a well formatted manner. Use proper images and colors in the website.
32. Create the gallery page of the “TeerthankarMahaveer University”. In this page the different thumbnails of the pictures should be there and on the click the big picture should be seen in a new window.
33. Create a contact page of the university. The different types of controls should be seen there.

Program related to CSS

1. Create a page that will show the inline style of css.
2. Create a page that will show the embedding style of css.
3. Create a page that will show the different types of selectors
4. Create a page that will be done by the file style of CSS.
5. Create a page that will show the different types of property in CSS.
6. Create a page that will display the user information. The formatting will be done by the inline cascading style sheet.
7. Create a web page that will display the different style on a single page using the single style sheet with the help of DIV Tag.
8. Create a web page that will display the different ten properties of style sheet like margin, align, float etc.

Program related to JavaScript

1. Write a JavaScript program which contain a Textbox and a submit button. To perform the operation of calculate the sum of its digits as per click on the submit button.
2. If a five digit number input through the keyboard in the textbox, to perform logic of reverse the number as per click on submit button.
3. If a five digit number is input through the keyboard, write a JavaScript program to print a new number by adding one of each of its digit which will be input in the Textbox. For example if the number that is input 12391 then the output should be displayed as 23402 as per click on submit button.
4. According to the Gregorian calendar, it was Monday on the date 01/01/1990. If any year is input through the keyboard write a





JavaScript program to find out what is the day on 1st January of this year.

5. A library charges a fine for every book returned late. For first 5 day the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a JavaScript program to accept the number of days the member is late to return the book and display the fine or the appropriate message as per click on the submit button.
6. If the three sides of a triangle are entered through the keyboard in three textbox, write a program to check whether the triangle is isosceles, equilateral, scalene or right—angled triangle as per click on the submit button.
7. Write a JavaScript program that performs the logic of prime number finding between 1 to 300. But condition is that it will print all the number in reversing order.
8. Write a JavaScript program that performs the logic of Fibonacci series as per given range. But condition is that it will reverse order.
9. Write a menu driven program which has following option:
 - a. Factorial of a number
 - b. Armstrong or not
 - c. Odd or even
 - d. Magic number or not
 - e. Perfect number or not
10. Write a javascript general—purpose function to convert any given year into the textbox. The following table shows the roman equivalents of decimal numbers:

Decimal	Roman	Decimal	Roman
1	i	100	c
5	v	500	d
10	x	1000	m





	50	L		
<p>Example:</p> <p>Roman equivalent of 1988 is mdcccclxxxviii</p> <p>Roman equivalent of 1525 is mdxxv</p> <ol style="list-style-type: none"> 11. A positive number entered through the keyboard. Write a JavaScript function to obtain the prime factors of this number. For example, prime factors of 24 are 2,2,2 and 3, whereas prime factor of 35 are 5 and 7. 12. Write a JavaScript program in which 25 numbers are entered from the keyboard into an array. Write a program to find out how many of them are positive, how many are negative, how many are even and how many are odd. 13. Implement the selection sort, bubble sort and insertion sort algorithm on a set of 25 number using JavaScript. 14. Write a JavaScript program to interchange the odd and even components of an array. 15. Create a JavaScript Program which count how many character are placed in the text area. This application contain two Button one for Total Count and another for showing the content and counting character. 16. Write a JavaScript program in which contain 3 Textbox which contain day, month, year from user and a button, onclick on that button you will find the days of week. 17. Write a JavaScript program in which browser contains a textbox and a button. Perform sum the digit from 1 to range of digit which u have enter in the textbox and show the sum of the digit as per given range in the alert message with word conversion. 18. Write a JavaScript Stopwatch program in which browser contains two Textbox and a button: one Textbox contain predetermine time and another Textbox contain Times as per decreasing order according to First Textbox when clicking on button when the time is 00:00:00 then you will get a alert message. 				





	<p>19. Write a JavaScript program in which browser contains a textbox and a button. Perform the following validation when hit on the Button</p> <ol style="list-style-type: none"> The textbox field would not be Blank Check the length of the input string in to the Textbox it would not be less than 3 and greater than 10. If the range is less than 3 and greater than 10, than perform a alert message with the range of string. <p>20. Write a JavaScript Stopwatch program in which browser contains two Textbox and a button: one Textbox contain predetermine time and another Textbox contain Times as per increasing order start from 00:00 the clock will raise an alert message when the time will same as the time on first Textbox.</p> <p>21. Write a JavaScript Program that will find out how many days left in this month.</p> <p>22. Write a JavaScript Program that will contain a input box that will show the visitor how long they have been on your page. Time is running in increment operation.</p> <p>23. When someone visits your web page, JavaScript will start the clock. When the leave that page, they will be alerted with the time they have been viewing the page.</p> <p>24. Perform the Checkbox Validation using JavaScript.</p> <p>25. Perform Phone Number Validation using JavaScript.</p> <p>26. Perform Date Validation sing JavaScript.</p> <p>27. Perform Email address Validation using JavaScript.</p> <p>28. Write a JavaScript Program that will validate credit card entry.</p> <p>29. Write a JavaScript program in which browser contains three textbox and a button. Perform the following operation and validation as per First textbox contain FirstName and Second Textbox contain Lastname in Proper Case. The Third Textbox contains UserId as per this rule when u hit on the Submit Button. The rule is userId contain 6 Character from the starting of Last Name and 1 character of the firstname from starting after concatenate show this string as a userId in the third Textbox. If the Last Name has not 6 Character than collect all the character from</p>	
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	<p>the Last name and swap remaining blank from – and concatenate first character of First Name.</p> <p>Example:-</p> <table><tr><td>First Name</td><td>Ram</td></tr><tr><td>Last Name</td><td>Laxman</td></tr><tr><td>UserID</td><td>LaxmanR</td></tr></table> <p>But If</p> <table><tr><td>First Name</td><td>Ram</td></tr><tr><td>Last Name</td><td>Laxm</td></tr><tr><td>UserID</td><td>Laxm—R</td></tr></table> <ul style="list-style-type: none">• Only Characters are Allowed in text Box• Blank Text Box Not Allowed• Locked UserID Text Box Mean no one can Change the Content.	First Name	Ram	Last Name	Laxman	UserID	LaxmanR	First Name	Ram	Last Name	Laxm	UserID	Laxm—R	
First Name	Ram													
Last Name	Laxman													
UserID	LaxmanR													
First Name	Ram													
Last Name	Laxm													
UserID	Laxm—R													





Course Code: CSC256	Core Course - X B.Sc. (Honours) Computer Science – Semester II Data Structures Using C++ Lab	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying concepts of data types, class and object by writing C++ program.	
CO2.	Applying concepts of stack, linked list and queue by writing C++ Program.	
CO3.	Applying concepts of different searching and sorting algorithms by writing C++ Program.	
CO4.	Applying basic concepts of tree by writing C++ Program.	
CO5.	Developing various programs for utility in C++	
Course Content:		
	Implement the concepts of C++ classes, objects and various instances. 1. Implement the features of array arguments and friend function. 2. To write programs implementing Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort. 3. To write programs implementing Searching programs: Linear Search, Binary Search. 4. To write programs Array implementation of Stack, Queue, Circular Queue, Linked List. 5. To write programs implementing Stack, Queue, Circular Queue, Linked List using dynamic memory allocation. 6. To write program implementing Binary tree. 7. To write programs implementing Tree Traversals (pre-order, in-order, post-order). 8. To write program to represent graph.	20 Hours





Course Code: CSC411	Core Course - XVI B.Sc. (Honours) Computer Science – Semester IV Data Base Management System	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basics of database concepts including Characteristics, design of data models, database architecture and database languages.	
CO2.	Understanding the performance of data models using entity relationship model and relational model with the help of E-R diagram, extended E-R diagram, key concepts and integrity constraints.	
CO3.	Understanding and analyzing the relational tables and evaluate the results with DDL, DML and DCL queries and operations like sub queries, join, union and intersection using SQL.	
CO4.	Understanding and remembering the concept of functional dependency and normalization upto 3NF and BCNF on relational tables with transaction processing, serializability and recovery.	
CO5.	Applying the concept of concurrency control protocols and locking on database transactions with recovery techniques and database security	
Course Content:		
Unit-1:	Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.	8 Hours
Unit-2:	Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model. Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra.	8 Hours
Unit-3:	SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Insert, update and delete operations ,sub queries, Aggregate functions, Joins, Unions, Intersection, Minus operations. Roles and	8 Hours





	Privileges.	
Unit-4:	Data Normalization: Functional dependencies, Normal form up to 3rd normal form & BCNF Transaction Processing Concepts: Transaction system, testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures.	8 Hours
Unit-5:	Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity. Overview of recovery techniques and Database Security.	8 Hours
<u>Text Books:</u>	1. Silberschatz Abraham, Korth Henry & Sudarshan S., Database Systems Concepts, McGraw Hill, 1997.	
<u>Reference Books:</u>	1. Elmars R. & Navathe S.B., Fundamentals of Database Systems, Addison Wesley, 2004 2. Date C.J., An Introduction to Database Systems, Addition Wiley. 3. Melton Jim & Simon Alan, Understanding the New SQL: A Complete Guide, Morgan Kaufmann Publishers, 1993. 4. Majumdar A. K. & Battacharya P., Data Base Management Systems, Tata McGraw Hill, 1996. 5. Bipin Desai, An Introduction to Database Systems, Galgotia Publications, 1991	
<u>Additional Electronic Reference Material:</u>	1. https://www.guru99.com/what-is-dbms.html	



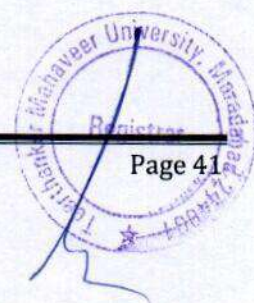


Course Code: CSC315	Core Course - XII B.Sc. (Honours) Computer Science – Semester III Object-Oriented Programming Concepts Using Java	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the detail concept of java in real life.	
CO2.	Understanding java with some modules.	
CO3.	Understanding how the java is different and easy from other programming Languages.	
CO4.	Applying the relationship between java and Data Analysis.	
CO5.	Analyzing how the data is predicted in java.	
Course Content:		
Unit-1:	Core Java: Overview, Data types, Variables, Operators, Arrays, Control Statements, Class and object, Methods, Inheritance, Package and Interface, Exception Handling, Multithreaded programming, I/O, Java Applet, String handling, Networking, Event handling. Abstract Window Toolkit (AWT): Controls, Layout managers, Menus, Images, Graphics.	8 Hours
Unit-2:	Java Swing- Swing Overview, Swing Components: JApplet, Icons, Labels, Text Fields, Buttons, Check Boxes, Radio Buttons, Toggle buttons, Lists, Combo Boxes, Toolbars, Tabbed Panes, Layered Panes, Scroll Panes, Split Panes, Trees, menus, Swing and the Model- View- Controller Design Pattern, Dialog Boxes, Pluggable Look and feel,. Layouts, Windows, Dialog Boxes, Inner frame.	8 Hours
Unit-3:	Java Database Connectivity- JDBC vs ODBC, Two – Tier and Three – Tier Model, JDBC Package and Drivers, Driver Interface and Driver Manager Class, Connection Interface-Statement Interface, Prepared Statement,ResultSet , Meta Data Interface, Database URL, Making the Connection, Executing sql Commands, Managing Connections Statement, Populating a Database, Scrollable and Updateable ResultSet, RowSets,JDBC/ODBC Bridge, java.sql package, Connectivity to remote database, navigating through multiple rows retrieved from a database.	8 Hours
Unit-4:	Java Beans: Application Builder tools, Bean developer kit (BDK), Introspection, Developing a simple bean, Using Bound properties, Java	8 Hours





	<p>Beans API.</p> <p>Generic Programming-Basic Concepts of Generic class, Generic methods.</p> <p>Utilities- JAR Files, Java's Documentation Comments.</p>	
Unit-5:	<p>Java Servlet- Servlet Overview, Servlet API, Life cycle, Running, Debugging, Servlet Interface, Generic Servlet, HTTP Servlet, Servlet Life Cycle, Working with Apache Tomcat Server, Step to create Servlet in Tomcat, Handling Client HTTP Request & Server HTTP Response, Introduction to Thread-safe Servlet and Cookies.</p>	8 Hours
<u>Text Books:</u>	<p>1. Patrick Naughton & Herbert Schildt, <i>The Complete Reference JAVA2</i>, Tata McGraw Hill</p>	
<u>Reference Books:</u>	<p>1. Balagurusamy E., <i>Programming in JAVA</i>, Tata McGraw Hill</p> <p>2. Steven Holzner, <i>Java2 Black Book</i>, Dreamtech.</p>	
<u>Additional Electronic Reference Material:</u>	<p>1. https://www.javatpoint.com/java-tutorial</p>	





Course Code: CSC357	Core Course - XIV B.Sc. (Honours) Computer Science – Semester III Object-Oriented Programming Concepts Using Java LAB	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the execution of java In real life.	
CO2.	Applying the different modules to predict data.	
CO3.	Applying different functions to search pattern in the files.	
CO4.	Analyzing the data from different datasets with different modules.	
CO5.	Develop applets in Java	
Course Content:		
	<ol style="list-style-type: none"> 1. Developing simple console application in Java. 2. Programs based on loops, arrays, operators and big numbers. 3. Programs based on Classes and Objects. 4. Programs based on Method Overloading, Constructors 5. Simple application based on static keyword. 6. Programs based on Inheritance. 7. Programs based on Method Overriding, Dynamic Method Dispatch, Abstract Classes. 8. Programs based on Object Wrappers and Autoboxing. 9. Programs based on String Handling. 10. Programs based on Networking. 11. Simple application to demonstrate the working of Packages. 12. Developing a Simple Applet. 13. An applet to demonstrate the working of Mouse Events. 14. Programs based on the usage of all AWT controls. 15. A simple application to demonstrate the working of Frames. 	20 Hours





	<ul style="list-style-type: none">16. A simple swing application.17. Programs to demonstrate event handling on various swing components.18. Programs based on applets and multithreading.19. A simple application to retrieve and insert records in MS-Access database.20. A simple application to retrieve and insert records in My-SQL database.	
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Course Code: CSC413	Core Course - XVII B.Sc. (Honours) Computer Science – Semester IV Introduction to R Programming	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basic of R programming, data types, operators, R vectors, R matrix, Categorical and continuous variables, understanding about Data frames, lists, sorting and merger of data frames.	
CO2.	Understanding basic programming structure in R, conditions, loops, understanding import data from CSV, Excel, SPSS, STATA, SAS files, export data to various file format. Understanding aggregate function.	
CO3.	Understanding data visualization, elementary statistics, Sampling distributions, Hypothesis testing, Linear Regression, Multiple Linear Regression, Linear Model selection.	
CO4.	Understanding grammar of graphics, graph plotting, understanding debugging tools traceback(), debug().	
CO5.	Understanding Clustering in R, K-Means and k-medoids clustering, Analyzing Time Series, understanding reading, plotting and decomposing time series data, understanding ARIMA models, Text mining using R.	
Course Content:		
Unit-1:	Introduction: R programming language, R data types, Arithmetic and logical operators. R Vectors, R Matrix: Create, print, add column, slice. Factor in R: Categorical and continuous variables. Data Preparation: R data frames: create, append, select, subset. List in R, R sort a data frame, merge data frames in R.	8 Hours
Unit-2:	Programming: Control structure: if, else, else if, for loop, nested for loop, repeat loop, while loop, next, break. Functions, Loop Functions: apply(), lapply(), sapply(), tapply(), split(), mapply(), vectorizing a functions. Import data in R: read CSV, Excel, SPSS, STATA, SAS file. Replacing missing value in R. R exporting data to excel : CSV, SAS, STATA, Text File . R aggregate function.	8 Hours
Unit-3:	Statistics and Probability: Elementary statistics; Basic Data Visualization; Probability; Common Probability distribution. Statistical Testing and Modeling: Sampling distributions; Hypothesis	8 Hours





	testing; Analysis of Variance; Simple Linear Regression; Multiple Linear Regression; Linear Model selection.	
Unit-4:	Advanced Graphs: Advanced Plot Customization; Grammar of Graphics; Defining color and Plotting in Higher dimension; Interactive 3D plots. Debugging: Tools in R, using traceback(), using debug(), using recover()	8 Hours
Unit-5:	Clustering using R: K-Means and k-medoids clustering; Case study; Hierarchical clustering procedures. Time Series Analysis: Reading, plotting and decomposing time series data; Forecasting using exponential smoothing; ARIMA models; Text mining using R.	8 Hours
<u>Text Books:</u>	1. Sandeep Rakshit, R Programming for Beginners.	
<u>Reference Books:</u>	1. Norman Matloff, "The Art of R Programming". 2. R Programming for Data Science, 3. Hadley Wickham, R for Data Science.	
<u>Additional Electronic Reference Material:</u>	1. https://www.r-project.org/about.html	





Course Code: CSC456	Core Course - XVIII B.Sc. (Honours) Computer Science – Semester IV Database Management System LAB	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the Oracle installation to perform DDL queries like Create, Alter, Drop, Truncate and Rename on relational database tables.	
CO2.	Understanding and applying DML queries like Select, Insert, Update and Delete on relational database tables.	
CO3.	Understanding and applying DCL queries like Grant and Revoke on relational database tables with the mechanism to take the backup of our database	
CO4.	Applying and evaluating aggregate functions with Group By and Having Clauses.	
CO5.	Analyzing queries for different types of joins and set operations with the creation of nested sub queries and views. Also learn to design a database with at least 2-NF conformity.	
Course Content:		
	<ol style="list-style-type: none"> 1. Introduction various DBMS – Oracle 9i, MySQL Server, MS-SQL Server. 2. Implementing the following on any one of the above servers. Description of Data Types. 3. Using Select queries , where clause, order by clause, distinct keywords etc on a sample database. 4. Create a sample Relational Database. 5. Using DDL to create Tables, Alter Tables, Drop Tables. 6. Using DML to update tables and insert data. 7. Use constraints to define Primary Keys, Foreign Keys, Cascade Operations and check Constraints. 8. Using DCL to grant & revoke permissions to users. 9. Taking backup on Hard Drive. 10. Design a Complete Database for a Bank with at least 2-NF conformity. 	20 Hours





Course Code: CSC461	Core Course - XIX B.Sc. (Honours) Computer Science – Semester IV R Programming Lab	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying real world problems using R, adding vectors, finding mean, min, max of vectors.	
CO2.	Applying searching and sorting based programs, recursion and basic mathematics based applications.	
CO3.	Analyzing application which taking input from user, creating programs to generate random number.	
CO4.	Analyzing data science tools and their implementations.	
CO5.	Creating list based application, plotting graph using R.	
Course Content:		
	Basic Questions in R <ol style="list-style-type: none"> 1. R “Hello Word “ program. 2. R program to add two vectors. 3. Find sum, mean and product of vector in R programming. 4. Program to take input from user. 5. Program to generate random numbers from standard distributions. 6. Program to sample from a population. 7. R program to find min and max. 8. R program to sort a vector. 9. R program to find the factorial of a number. 10. R program for multiplication table. 11. R program to check prime number. 12. R program to check Armstrong number. 13. R program to print the Fibonacci series. 14. R program for leap year. 15. R program to find odd or even number. 16. R program to check number +ve , -ve or zero. 	20 Hours





	<p>17. R program to find sum of natural numbers.</p> <p>18. R program to convert decimal to binary using recursion.</p> <p>19. R program to find factorial of a number using recursion.</p> <p>20. R program to find factor of a number.</p> <p>21. Fibonacci series using recursion in R.</p> <p>22. R program to find HCF or GCD.</p> <p>23. R program to find LCM.</p> <p>24. R program to make a simple calculator.</p> <p>25. R program for list implementation.</p> <p>26. R program for data frames.</p> <p>27. R programming Bar plot.</p> <p>28. R programming histogram.</p> <p>29. R programming pie chart.</p> <p>30. R box plot.</p> <p>31. R strip chart.</p> <p>R programming for data science</p> <p>1. Identifying types of variables in R.</p> <p>2. Univariate statistics implementation in R.</p> <p>3. Implementation of probability in R.</p>	
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Course Code: CSC515	Core Course - XX B.Sc. (Honours) Computer Science – Semester V Dot Net Framework with C#	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basics of Dot Net Framework with C#.	
CO2.	Classifying hands-on use of Dot Net Framework with C# applications in Web, Window and Console Application. Completion of the assignments will result Dot Net Framework with C# applications knowledge and skills.	
CO3.	Identifying categories of programs, Web, Window and Console Application. Organize and work with many projects.	
CO4.	Recognizing when to use each of the Dot Net Framework with C# programs to create professional, academic, business and many software projects.	
CO5.	Applying skills and concepts for basic use of computer hardware, software, networks and the Internet in the workplace and in future coursework as identified by the internationally accepted Internet and Microsoft Core .Net standards	
Course Content:		
Unit-1:	Review of OOP Concepts - Overview of .NET Framework - Basic Elements of C# - Program Structure and simple Input and Output Operations – Operators and Expressions – Statements – Arrays and Structures.	8 Hours
Unit-2:	Inheritance - Namespace – Polymorphism – Interface and Overloading – Multiple Inheritance – Property – Indexes – Delegates – Publish/Subscribe Design Patterns- Operator overloading-Method Overloading.	8 Hours
Unit-3:	C# Concepts for creating Data Structures - File Operation – File Management systems – Stream Oriented Operations- Multitasking – Multithreading – Thread Operation – Synchronization.	8 Hours
Unit-4:	Working with XML – Techniques for Reading and Writing XML Data - Using XPath and Search XML - ADO.NET Architecture – ADO.NET Connected and Disconnected Models – XML and ADO.NET – Simple and Complex Data Binding– Data Grid View Class.	8 Hours





Unit-5:	Application Domains – Remoting – Leasing and Sponsorship - . NET Coding Design Guidelines –Assemblies – Security – Application Development – Web Services - Building an XML Web Service - Web Service Client – WSDL and SOAP – Web Service with Complex Data Types – Web Service Performance.	8 Hours
<u>Text Books:</u>	1. S. ThamaraiSelvi and R. Murugesan “A Textbook on C# “, Pearson Education.	
<u>Reference Books:</u>	1. Stephen C. Perry “ Core C# and .NET”, Pearson Education. 2. Jesse Liberty, “Programming C#”, Second Edition, O’Reilly Press. 3. Robinson et al, “Professional C#”, Fifth Edition, Wrox Press. 4. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw Hill. 5. Andrew Troelsen, “C# and the .NET Platform”, A! Press, 200UNIT III 6. Thaana Thai and Hoang Q. Lam, “. NET Framework Essentials”, Second Edition, O’Reilly.	
<u>Additional Electronic Reference Material:</u>	1. https://docs.microsoft.com/en-us/dotnet/csharp/tutorials/	





Course Code: CSC516	Core Course - XXI	L-3 T-1 P-0 C-4
	B.Sc. (Honours) Computer Science – Semester V Theory of Computation	
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the basic concept of computer automation, finite state system, DFA, NFA, comparison of DFA and NFA, limitations and applications of finite automata.	
CO2.	Understanding concept of finite automata with epsilon transitions, Kleene's theorem, minimization of DFA, Moore and Mealy machine, closure properties of regular sets.	
CO3.	Understanding concept of regular language in finite machine, converting DFA's to regular expression, applications of regular expressions, pumping lemma of regular language, Chomsky classification of grammars, right linear and left linear grammar, construction of CFG, derivation trees, sentential forms .	
CO4.	Understanding concept of context free grammar, ambiguity in CFG and removing this, reduced grammar, CNF and GNF, closure properties of CFL, pumping lemma for CFL.	
CO5.	Understanding concept of PDA, acceptance of CFL, CFL and PDA equivalence, DCFL and DPDA.	
Course Content:		
Unit-1:	Fundamentals: Basic Mathematical Notation and techniques, Strings, Alphabet, Language, Operations, Introduction to Finite State System, Finite automaton model, Deterministic Finite Automata (DFA) -Formal definition, Nondeterministic Finite Automata (NFA)- Definition of NFA, language recognizer, Designing of DFA and NDFA : state transition diagram, transition table, language of a DFA, Extended Transition Function, NFA to DFA conversion, Equivalence of DFA and NFA, Limitations and Applications of Finite Automata.	8 Hours
Unit-2:	Finite Automata: Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Kleene's Theorem, Properties and Limitations of FSM, Minimization of Deterministic Finite Automata, Equivalence between two FSM's, Myhill-Nerode Theorem, Finite automata with output : Moore and	8 Hours





	Mealy machines and Inter conversion, Closure Properties of Regular Sets.	
Unit-3:	<p>Regular Languages: Regular sets and expressions, Identity rules, Converting DFA's to Regular Expressions: Arden's Theorem and vice versa, applications of Regular Expressions. Proving languages to be non-regular -Pumping lemma.</p> <p>Grammar: Definition, Chomsky Classification of Grammars, right linear and left linear grammars, Equivalence between regular linear grammar and FA, Construction of Context Free Grammar, Derivation Trees, Sentential forms.</p>	8 Hours
Unit-4:	Context Free Grammars : Ambiguity and its removal, Reduced Grammar-Elimination of Useless symbols - Unit productions - Null productions.CNF and GNF, Closure properties of CFL, Pumping Lemma for CFL.	8 Hours
Unit-5:	PDA: Push down automata, Definition, Model, Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence, CFL and PDA equivalence, Introduction to DCFL and DPDA.	8 Hours
<u>Text Books:</u>	1. John C. Martin, "Introduction to Languages and Theory of Computation", McGraw Hill.	
<u>Reference Books:</u>	<ol style="list-style-type: none"> 1. Peter Linz, An introduction to formal language & automata, Jones & Bartlete publications 2. Hopcroft, J.E. & Ullman, J.D. Formal languages and their relation to Automata, Pearson Education. 3. Lewis, H.R. & Papadimitriou, C.H. Elements of the theory of computation. PHI 4. Krithivasan K. & Rama R., "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education, 2009. 5. Michael Sipser, "Introduction to the Theory of Computation", Cengage Learning. 	
<u>Additional Electronic Reference Material:</u>	1. https://www.geeksforgeeks.org/introduction-of-theory-of-computation/	





Syllabus of B. Sc. (H)-Computer Science – College of Computing Sciences &IT, TMU Moradabad.

Course Code: CSC517	Core Course - XXII	
	B.Sc. (Honours) Computer Science – Semester V	L-3 T-1 P-0 C-4
	Python Programming & Introduction to Data Science	
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understand programming skills in core Python.	
CO2.	Understand Object Oriented Skills in Python	
CO3.	Understand important aspects related with string, lists and dictionary in python.	
CO4.	Apply the skill of designing user defined functions in python.	
CO5.	Develop the ability to work on database applications.	
Course Content:		
Unit-1:	Introduction History, Features, Setting up path, Working with Python, Basic Syntax , Variable and Data Types , Operator Conditional Statements If ,If- else ,Nested if-else Looping For, While ,Nested loops Control Statements Break, Continue ,Pass	8 Hours
Unit-2:	String Manipulation Accessing Strings ,Basic Operations ,String slices ,Function and Methods Lists Introduction ,Accessing list ,Operations ,Working with lists ,Function and Methods Tuple Introduction ,Accessing tuples ,Operations ,Working ,Functions and Methods	8 Hours
Unit-3:	Dictionaries Introduction, Accessing values in dictionaries ,Working with dictionaries ,Properties ,Functions Functions Defining a function , Calling a function, Types of functions ,Function Arguments ,Anonymous functions ,Global and local variables	8 Hours
Unit-4:	Modules Importing module ,Math module ,Random module ,Packages ,Composition Input-Output Printing on screen ,Reading data from keyboard ,Opening and closing file ,Reading and writing files ,Functions. Database- connectivity, Transactions using MYSQL.	8 Hours
Unit-5:	Exception Handling Exception ,Exception Handling ,Except clause ,Try ? finally clause ,User Defined Exceptions, OOPs concept Class and object, Attributes ,Inheritance ,Overloading fuction and operator ,Overriding ,Data hiding , Scientific libraries in Python – NumPy,	8 Hours





	SciPy, Matplotlib and Pandas	
<u>Text Book:</u>	1. Learning Python by Mark Lutz, David Ascher Shop O'Reilly - O'Reilly Media	
<u>Reference Books:</u>	1. "Learn Python the Hard Way" by Zed A. Shaw 2. "Python Essential Reference" by David M. Beazley, Addison Wesley 3. "Python in a Nutshell" by Alex Martelli, Oreilly Publication. 4. "Think Python" by Allen Downey, Green Tea Press 5. "Core Python Programming" by Wesley J. Chun, Pearson Education 6. "An Introduction to Python by Guido Van Russom, Fred L.Drake, Network Theory Limited. 7. "Beginning Python: From Novice To Professional By Magnus Lie Hetland, Second Edition Apress 8. "Programming in Python" by Mark Summerfield, Pearson Education	
<u>Additional Electronic Reference Material:</u>	1. https://www.python.org/about/gettingstarted/ 2. https://www.programiz.com/python-programming	





Syllabus of B. Sc. (H)-Computer Science – College of Computing Sciences &IT, TMU Moradabad.

Course Code: CSC560	Core Course - XXIII B.Sc. (Honours) Computer Science – Semester V Python Programming & Introduction to Data Science Lab	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Apply core python programming like loop, if statement and other concept.	
CO2.	Apply different collections - list, tuple, dictionaries.	
CO3.	Apply functions.	
CO4.	Apply class, inheritance and operator overloading.	
CO5.	Develop Database application in python.	
Course Content:		
	<ol style="list-style-type: none"> 1. Implement some calculative programs in Python. 2. Implement control structures. 3. Implement the concept of list, Built-in List Functions & Methods. 4. Implement tuples, Dictionaries, and data type conversion function. 5. Implements different loops. 6. Implement user defined functions, Pass by reference vs value, variable length argument. 7. Implement of module import, The from...import Statement. 8. Implement exception handling in program. 9. Implementation of classes and objects. 10. Implementation of inheritance in programs. 11. Implementation of File and Text I/O Operations. 12. Implementation of Strings and Regular Expression. 13. Implementation of Overloading and Overriding. 14. Implementation of Built—in functions. 	20 Hours





Syllabus of B. Sc. (H)-Computer Science – College of Computing Sciences &IT, TMU Moradabad.

Course Code: CSC561	Core Course - XXIV B.Sc. (Honours) Computer Science – Semester V Dot Net Framework with C# Lab	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understand how to design, code, compile, and execute business-oriented programs using the C# programming language commands.	
CO2.	Apply programming logic for business-oriented programs using appropriate tools such as TOE (Task, Object and Event) charts, hierarchy charts, flowcharts, and pseudo code	
CO3.	Analyze the characteristics unique to object-oriented programming vs. structured programming.	
CO4.	Analyze program-generated output for correctness.	
CO5.	Develop code that validates input data.	
Course Content:		
	<ol style="list-style-type: none"> 1. Installing Visual Studio 2013 2. Creating a C# project within Visual Studio 3. Basic Programs to demonstrate the working of basic data types. 4. Programs to implement the use of Objects. 5. Programs to implement multithreading 6. Programs to implements String handling 7. Programs to implement file handling 8. Using ADO.Net to handle data, connecting to a database, firing queries to display data 9. Using XML Libraries to export data from a database to an XML file 10. Developing windows forms 11. Using various controls on Windows forms. 	20 Hours





Course Code: CSC618	<p align="center">Core Course - XXV</p> <p align="center">B.Sc. (Honours) Computer Science – Semester VI</p> <p align="center">Machine Learning using Python</p>	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understand how the human intelligence works and takes decision by using experience.	
CO2.	Understand how to make a machine intelligent to take decisions like human and how to give experience to machine.	
CO3.	Understand the importance of ecosystem and conserving it for maintaining ecological balance using machines that takes their own decisions.	
CO4.	Apply various techniques and algorithms for regression, classification and clustering with python, the widely used language having most sophisticated machine learning libraries.	
CO5.	Analyze the efficiency of algorithms using confusion matrix for classification algorithms and R^2 Adjusted for regression algorithms.	
Course Content:		
Unit-1:	Introduction to Machine Learning: Introduction; History, Advantages, Scope and Applications; Learning Algorithms: Supervised Learning; Unsupervised Learning; Semi-Supervised Learning; Reinforcement Learning. Decision Trees: Introduction, Scope, Advantages; Hunt's algorithm for learning a decision tree; Details of tree induction;	8 Hours
Unit-2:	KNNs, SVMs and Naïve Bayes: Examples of few text classification problems; Naïve Bayes for text classification; Introduction to KNN algorithm; Decision boundary KNN Vs Decision tree; What is the best K; KNN Problems; Feature selection using KNNs; Linear Classifiers; Learning non-linear patterns.	8 Hours
Unit-3:	ANN and Regression: Motivation for Artificial Neural Network; Perceptron Algorithm; Decision Boundary for a single Neuron; Introduction to Linear Regression; R^2 : Coefficient of Determination; Logistic regression vs Linear Regression; Can we use Regression Mechanism for Classification?; Logistic Regression – Deriving the Formula; Logistic Regression for Multi-class Classification; Logistic Regression Decision Boundary.	8 Hours





Unit-4:	Feature Selection: Introduction to feature selection: what, why, how and where?; Feature selection vs feature extraction; Feature subset selection using Filter based methods; Wrapper Methods; Wrapper Methods vs Filter Methods; Model based machine learning with regularization; Regularization using L2 and L1.	8 Hours
Unit-5:	Sequence Labeling, Clustering: Introduction to Sequence Learning; Sequence Labeling as Classification; Probabilistic Sequence Models; Hidden Markov Model; Three Problems of an HMM. Basics of Clustering; Applications of Clustering; Understanding Distance based Clustering; K-means Algorithm; Hierarchical (Agglomerative) clustering; Evaluation of cluster quality.	8 Hours
<u>Text Books:</u>	1. Brian, O, <i>Management Information System</i> , Tata McGraw Hill.	
<u>Reference Books:</u>	1. Gordon, B. D. and Margrethe H. O., <i>Management Information System</i> , Tata McGraw Hill. 2. Brian, O., <i>Introduction to Information System</i> , McGraw Hill. 3. Jawadekar, W., <i>Management Information System</i> , Tata McGraw Hill. 4. Jain, S., <i>Management Information System</i> , Tata McGraw Hill.	
<u>Additional Electronic Reference Material:</u>	1. https://www.greatlearning.in/great-lakes-artificial-intelligence-and-machine-learning	





Course Code: CSC661	Core Course - XXVI B.Sc. (Honours) Computer Science – Semester VI Machine Learning using Python LAB	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understand how to import data, clean data and prepare training, testing and validation data in python.	
CO2.	Apply python to train an algorithm to make a machine intelligent to take decisions like human	
CO3.	Apply various techniques and algorithms for regression, classification and clustering with python, the widely used language having most sophisticated machine learning libraries.	
CO4.	Analyze the efficiency of model after implementation in python.	
CO5.	Develop ecosystem by preparing a model that uses other models and used by other models in machine learning ecosystem	
Course Content:		
	<ol style="list-style-type: none"> 1. Apply EM algorithm to cluster a set of data stored in a .CSV file. 2. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. 3. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. 4. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. 5. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. 	20 Hours



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[Circular stamp: Registrar, Teerthanker Mahaveer University, Moradabad]