LEARNING OUTCOMES–BASED CURRICULUM FRAMEWORK (LOCF)
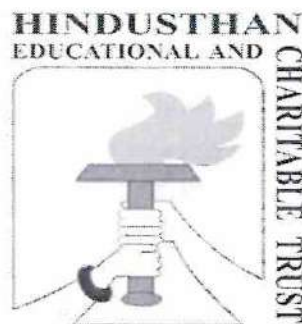
in the

UNDERGRADUATE PROGRAMME

Bachelor of Science in Computer technology

FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2021 - 2022 AND ONWARDS

HINDUSTHAN
EDUCATIONAL AND CHARITABLE TRUST

HICAS

HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
(Affiliated to Bharathiar University and Accredited by NAAC)
COIMBATORE-641028
TAMILNADU, INDIA.
Phone: 0422-4440555
Website: www.hicas.ac.in

PREAMBLE

Learning Outcome Based Curriculum Framework for Undergraduate education in Bachelor of Science in ComputerTechnology.

Bachelor of Science in Computer Technology is a 3 – Year under Graduate Programme with six semesters. The Programme is designed to accomplish high degree of technical skills in Problem solving and application development. This course develops requisite professional skills and problem solving abilities for pursuing a successful career in software industry and forms the required basics for pursuing higher studies in Computer Technology

VISION

To create professionally competent and socially responsible graduates capable to face challenges in global environment.

MISSION

- To provide a strong theoretical and practical background in the field of Computer Technology.

- To impart the skills necessary to continue education to grow professional.

- To inculcate professional behavior, strong ethical values, innovative research capabilities and leadership abilities.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1: Provide solutions to challenging problems in their profession by applying Computer Technology Theory and Principles.

PEO2: Engage in life-long learning and professional development to adapt to rapidly changing work environment.

PEO3: Provide Technical growth in fundamental and modern computing practices, passion for the profession and its growth.

PEO4: Proficient in successfully designing innovative solutions to real life problems.

PEO5: Encourage professional attitude and citizenship to make them productive members of the society with high ethical and professional standards.

PROGRAMME OUTCOME (PO)

PO1 : DISCIPLINARY KNOWLEDGE: Able to apply the knowledge of algorithmic principles in the modeling and designing of computer based systems of varying complexity levels.

PO2 : PROBLEM SOLVING AND ANALYZING : Ability to analyze, categorize, formulate and solve the problems that emerges in the field of Computer Technology.

PO3 : ENVIRONMENT SUSTAINABILITY AND ETHICS: Select and apply current techniques, skills, and tools necessary for providing solutions suitable to the user environment and apply ethical principles and responsibilities during professional practice.

PO4 : MODERN TOOL USAGE: Create, select, and apply appropriate techniques, resources, and modern technology tools .

PO5 : CO-OERATIVE TEAM WORK &COMMUNICATIVE SKILLS : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings and able to communicate and engage effectively with diverse stakeholders.

PO6 : SELF-DIRECTED AND LIFE-LONG LEARNING: Recognize the need for Self-motivation to engage in lifelong learning to compete with the changing technology.

PO7 : ENHANCING RESEARCH CULTURE : Ability to use knowledge in various domains to identify research gaps and provide solution to new ideas and innovations.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1 : Capable to analyze a problem, identify the computing requirements and using procedures find a solution.

PSO2 : Design, implement and document solutions to significant computational problems.

PSO3 : Acquaintance with latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

PSO4 : Ability to work out effective and efficient real time solutions using acquired knowledge in variousdomains.

PSO5 : To pursue higher studies with good knowledge in core areas of Computer Technology, by aware of modern tools, techniques and good interpersonal

HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), COIMBATORE-641028

SCHEME OF EXAMINATIONS - CBCS & LOCF PATTERN

(For the Students admitted from the Academic year 2021-2022 and Onwards)

UG PROGRAMME

Programme: B.Sc   **Branch: Computer Technology**

Part	Course Code	Course Type	Course Title	Credit points	Lecture Hours/ Week		Exam Duration (hours)	MAX. MARKS		
					Theory	Practical		I.E.	E.E	Total
			Semester – I							
I	21LAT01/ 21LAH01/ 21LAM01/ 21LAF01	MIL	Tamil-I/ Hindi-I/ Malayalam – I/ French-I	4	6		3	30	70	100
II	21ENG01	AECC	English – I	4	6		3	30	70	100
III	21CTU01	DSC	**Core -I** Programming with C	4	4		3	30	70	100
III	21CTU02	DSC	**Track – 1** **Core -II**	4	4		3	30	70	100
	21CTIU02		**Track –2** **Core -II**					40	60	
III	21CTU03	DSC	**Core -III** **Practical - I :** Programming using C	2		4	3	40	60	100
III	21CTU04	GE	**Allied-I** Mathematics for Computing	4	5		3	30	70	100
IV	21CTUE01	AEE	Open Elective – I	2	3		3	100		100
IV	21GSU01	AECC	Environmental Studies	1	2		2	50	-	50
IV	21CTUV01	SEC	VAC-I/Life Skills-I @ / SEC-Communicative English	1*	2		2	50		50**
IV	-	SEC	SDR-Students Development Report	Assessment will be in the Fifth Semester						
V	-	AECC	Extension Activities NSS/NCC/SPORTS/YRC/SIS /SA	Assessment will be in the Fourth Semester						
Total				25	32	4	Track1	340	410	750
							Track2	350	400	
			Semester – II							

Sem	Code	Category	Title							
I	21LAT02/ 21LAH02/ 21LAM02/ 21LAF02	MIL	Tamil-II/ Hindi-II/ Malayalam-II/ French-II	4	6		3	30	70	100
II	21ENG02	AECC	English – II	4	6		3	30	70	100
III	21CTU05	DSC	Core -IV Python Programming	4	4		3	30	70	100
III	21CTU06	DSC	Track – 1 Core -V	4	4		3	30	70	100
	21CTIU06		Track – 2 Core -V					40	60	
III	21CTU07	DSC	Core – VI System Software	3	3		3	30	70	100
III	21CTU08	DSC	Core -VII **Practical - II** :Programming using Python	2		4	3	40	60	100
III	21CTU09	GE	**Allied-II** Numerical Methods	4	5		3	30	70	100
IV	21CTU10	SEC	Internship / Industrial Visit / **Mini Project**	1	-	-		100		100
IV	21CTUV02	SEC	VAC-II/Life Skills-II @ / **Language**	1*	2		2	50		50**
IV	21CTUJ01	SEC	**Aptitude / Placement Training**	Grade*	2		2	50		50**
Total				26	32	4	Track1	320	480	800
							Track2	330	470	
			Semester – III							
III	21CTU11	DSC	Core -VIII Database Management System	5	5		3	30	70	100
III	21CTU12	DSC	Track – 1 Core -IX	5	5		3	30	70	100
	21CTIU12		Track – 2 Core -IX					40	60	
III	21CTU13	DSC	Core -X **Practical - III** :DBMS Applications	3		5	3	40	60	100
III	21CTU14	DSC	Core -XI **Practical - IV** :Networking	3		5	3	40	60	100
III	21CTU15	DSC	Core -XII PC Hardware and Troubleshooting	3	3		3	30	70	100

III	21CTU16	GE	**Allied-III** Operations Research	4	5		3	30	70	100
IV	21CTUE02	AEE	Open Elective-II	2	3		3	100		100
IV	21GSU02	AECC	Human Rights	1	2		2	50		50
IV	21CTUJ02	SEC	**Aptitude / Placement Training**	Grade*	2		2	50		50**
IV	21CTUJ03	SEC	**Online Course**	-	1			-	-	C/NC≠
Total				**26**	**26**	**10**	Track1	350	400	**750**
							Track2	360	390	

			Semester – IV							
III	21CTU17	DSC	**Core -XIII** Java Programming	5	5		3	30	70	100
III	21CTU18	DSC	**Track – 1 Core -XIV**	5	5		3	30	70	100
	21CTIU18		**Track – 2 Core -XIV**					40	60	
III	21CTU19	DSC	**Core -XV Practical – V :** Programming Using JAVA	3		5	3	40	60	100
III	21CTU20	DSC	**Core -XVI Practical - VI** Web Technology Lab	3		5	3	40	60	100
III	21CTU21	GE	**Allied-IV** Business Accounting	4	5		3	30	70	100
III	21CTU22	DSE	Electives / **DSE-I**	4	4		3	30	70	100
IV	21CTU23	SEC	Internship / Institutional Training / **Mini-Project**	1	-		-	100	-	100
IV	21CTUV03	ACC	VAC–III	1*	2		2	50	-	50**
IV	21CTUJ04	SEC	**Aptitude / Placement Training**	Grade*	2		2	50		50**
IV	21CTUJ05	SEC	**Online Course**	-	1	-	-	-	-	C/NC≠
IV	21GSU03	AECC	Internet Security	1	2		2	50	-	50
V	21GSU04	AECC	Extension Activities NSS/NCC/SPORTS/YRC/SIS /SA#	2	-		-		-	C/NC≠
Total				**28**	**26**	**10**	Track1	350	400	**750**
							Track2	360	390	

			Semester – V							

Sem	Code	Category	Course								Total
III	21CTU24	DSC	Track – 1 Core - XVII	5	5			3	30	70	100
	21CTIU24		Track – 2 Core -XVII						40	60	
III	21CTU25	DSC	Track – 1 Core -XVIII	5	5			3	30	70	100
	21CTIU25		Track – 2 Core -XVIII						40	60	
III	21CTU26	DSC	Core -XIX Practical - VII	3		6		3	40	60	100
III	21CTU27	DSC	Core - XX Practical – VIII	3		6		3	40	60	100
III	21CTU28	DSE	Electives / DSE-II	4	5			3	30	70	100
IV	21CTUE03	AEE	Open Elective-III	2	3			3	100	-	100
IV	21GSU05	AECC	General Awareness	1	1			2	50	-	50
IV	21GSU06	AECC	Law of Ethics	1	-			2	50	-	50
IV	21CTUV04	ACC	VAC–IV	1*	2				50	-	50**
IV	21CTUJ06	SEC	Aptitude / Placement Training	Grade*	2			2	50		50**
IV	21CTUJ07	SEC	Online Courses	·	1				-	-	C/NC#
IV	21CTUJ08	SEC	SDR- Student Development Report	2*	-	-		-	-	-	-
Total				24	24	12		Track 1	370	330	700
								Track 2	390	310	
Semester – VI											
III	21CTU29	DSE	Electives – DSE-III	4	5	-	-		30	70	100
III	21CTU30	DSE	Electives – DSE-IV	4	5	-	-		30	70	100
III	21CTU31	SEC	Project Work /Student Research / Paper	5	5				40	60	100
III	21CTU32	DSC	Core XI Self-Study Course	3	-	-		3	30	70	100
Total				16	15				130	270	400
Grand Total				145							4150

- * denotes Extra credits which are not added with total credits.
- ** denotes Extra marks which are not added with total marks.
- **VAC**-Value Added Course (Extra Credit Courses)
-    * Grades depends on the marks obtained
- ≠C-Completed/ NC- Not Completed

Range of marks	Equivalent remarks
80 and above	Exemplary
70 – 79	Very good
60 – 69	Good
50 – 59	Fair
40 – 49	Satisfactory
Below 39	Not Satisfactory = Not completed

- Part IV & V not included in total marks and CGPA calculation.
- **I.E**-Internal Exam
- **E.E**-External Exam
- **JOC**-Job Oriented Course

PASSING MINIMUM

- Passing Minimum for UG 40% and for PG 50 %
- For UG : 35 % (25 marks) in EE and 40 % in Total Marks
- For PG 50 % (30 marks) in EE and 50 % in Total Marks

ABSTRACT FOR SCHEME OF EXAMINATION

(For the candidates admitted during the academic year 2021 - 2022 and onwards

Part	Course	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages/ (MIL)	2	4	8	100	200
Part II	English/AECC-I	2	4	8	100	200
Part III	Core /DSC	21	2/3/4/5	80	100	2100
	Allied /GE	4	4	16	100	400
	Electives/DSE	4	3/4	13	100	400
	Project SEC	1	5	5	100	100
	Internship/Institutional Training/Mini-Project (Summer Courses #)	2	1	2	100	200
Part IV	Open Electives /AEE	3	2	6	100	300
	AECC –EVS/ HR/IS/GA/LE	5	1	5	50	250
	Value Added Course	2	1	2*	50	100**
	Placement/Aptitude SEC	4	Grade*	Grade*	50	200**
	Online courses / SEC	3	-	-	-	C/NC
	Life Skills / SEC	2	1	2*	50	100**
	SDR- Student Development Report	1	2	2*	-	-
Part V	Extension Activities NSS / NCC/Sports/YRC / SIS / SA - AECC	1	-	2	-	C/NC
	Total			145 (6 Extra Credits)		4150 + (400**)

List of Papers	
Open Electives	Yoga for Human Excellence Human Health & Hygiene Indian Culture and Heritage Indian Constitution and Political System Consumer Awareness and Protection Professional Ethics and Human Values Human Rights, Women's Rights& Gender Equality Disaster Management Green Farming Corporate Relations start a Business? Research Methodology and IPR General Studies for Competitive Examinations IIT JAM Examination (for Science only) CUCET Examination
VAC Papers	-
Courses offered by the Departments to other Programmes	Open Source Software Introduction to Database and SQL

Track 1 - Regular

Track 2 – Industry Integrated (IBM Data Science)

Semester	Track -1		Track - 2	
	Sub.Code	Title of the Paper	Sub.Code	Title of the Paper
I	21CTU02	Computer System Architecture	21CTIU02	Software Foundation Program Using C++
II	21CTU06	Data Structures and Algorithms	21CTIU06	Data Visualization

List of Elective Papers/ DSE (Can choose any one of the paper as electives)		
	Course Code	Title
Electives/ DSE-I	21CTU22A	Client Server Technology
	21CTU22B	Microprocessor and ALP
Electives/ DSE-II	21CTU28A	Soft Computing
	21CTU28B	Wireless Networks
Electives/ DSE-III	21CTU29A	Cloud Computing
	21CTU29B	Deep Learning
	21CTU29C	Software Testing
Electives/ DSE-IV	21CTU30A	Big Data Analytics
	21CTU30B	Internet of Things
	21CTU30C	Machine Learning

Syllabus Coordinator

(MRS. D. MYTHILI)

BOS-Chairman/Chairperson

Academic Council – Member Secretary

PRINCIPAL

Regulations

1. Internship / Institutional Training / **Mini-Project** is related to the discipline can be permitted to complete during the end of I and III semesters for minimum seven days each and permitted to submit a report.

Internship / Institutional Training	Not more than seven days
Mini project	Depends on the departments

2. Project work is considered as a special course involving application of knowledge in problem solving / analyzing /exploring a real-life situation. A Project work may be given in lieu of a discipline specific elective paper.

3. **FAST TRACK SYSTEM:**

   Two Elective courses DSE- III & DSE- IV are the subjects which are to be related with NPTEL courses.

   The Students have the options of taking two subjects of the sixth semester of B.Sc Computer Technology programme through NPTEL / Swayam portal from the list given or offered by NPTEL and approved by the department for which credit transfer is permitted. The students should inform the department prior to the registration of the course and get due approval for the same. If the student completes these courses before the start of the sixth semester, the student can be considered for a fast track programme, and do the project work alone during the sixth semester apart from the self study paper. Once the student submits the successful course completion credentials as required by the college for the NPTEL/SWAYAM online courses, then the credit transfer will be considered for qualifying the degree.

4. **If the students who are all completed the NPTEL courses before semester -V, they can avail exemption from appearing exams of DSE- III & DSE- IV in Fast track scheme.**

5. NSS / NCC/Sports/YRC / SIS / SA is mandatory for all students as per New Education

Policy and the students must attend the allocated hours within two years and complete the programme. They will be evaluated during the end of second year (Fourth Semester) and also a certificate will be issued.

6. SDR – Student Development Report to be received by the department from the students till end of the fifth semester. (Evidences of Curriculum activities and Co-curriculum activities)

7. For online courses minimum of 2 certificates in any of the online platform is mandatory.

Extension Activities

NSS – National Service Scheme, as enrolled member with the College Unit.

NCC – National Credit Corps, as enrolled member with the College Unit.

SPORTS – Sports & Games Participation with College Team

YRC/RRC–Youth Red Cross / Red Ribbon Club, as enrolled member with the College Unit.

Rotaract Club - Rotaract Club, as enrolled member with the College Unit.

SIS – Special Interest Subjects, as approved by the Academic Council

SA – Social Activity for not less than 50 hours with NGGO like Aram Foundation / Shanthi Social Service / Siruthuli / KulangalPathukappuAmaipu /Old age Home / Nature Foundation / etc.

SEC-Skill Enhancement Course (Life Skills/ Aptitude/Placement Training/online course/Internship/SDR)

ECC- Ability Enhancement Compulsory Course (Environmental Studies/ Human Rights/Internet Security/ General Awareness/ Law of Ethics/Extension Activities)

UG Courses- Scheme of Evaluation Internal & External Components)

(For the students admitted during the academic year 2021-2022 and onwards)

1. Internal Marks for all UG

Components	Marks
Test I	5
Test II	5
Model Exam	10
Assignment	5
Attendance'*	5
TOTAL	**30**

*Split-up of Attendance Marks

- ♣ 75-79 - 1 marks
- ♣ 80 84 - 2 marks
- ♣ 85-89 - 3 marks
- ♣ 90-94 - 4 marks
- ♣ 95-100 - 5 marks

2. a) Components for Practical I.E.

Components	Marks
Test - II	20
Test- II	20
Total	40

b) Components for Practical E.E.

Components	Marks
Experiments	50
Record	5
Viva	5
Total	60

3. Institutional/ Industrial Training, Mini Project and Major Project Work

Institutional / Industrial Training (I.E)		Mini Project (I.E)	Major Project Work		
Component	Marks	Marks	Component	Marks	Total Marks
Work diary Report Viva-voce	25 50 25	50 50	I.E a)Attendance b)Review/Work diary"	10 30	40
Total	100	100	E.E '* a) Final report b) Viva-voce	40 20	60
				Total	100

*Review is for Individual Project and Work Diary is for Group Projects
(group consisting of minimum 3 and maximum 5)

**Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

4. Guidelines for Internet Security/Human Rights/Law of Ethics/Environmental studies (Part IV)

Components	Marks
Two Tests (each 2 hours) of 20 marks each [4 out of 7 descriptive type questions 4 x 5 = 20 Marks]	40
Two assignments (2 x 5)	10
Total	50

5. Guidelines for General Awareness (Part IV)

Components	Marks
Two Tests (each 2 hours) of 25 marks each [50 objective type questions 5 0 x 1/2 = 25 Marks]	50

6. Guidelines for Open Elective (Part IV)

No of Activities	Marks
Two Tests (each 3 hours) of 50 marks each [5 out of 8 descriptive type questions 5 x 10 = 50 Marks]	100

7. Value Added Courses / Aptitude/Placement courses:

Components	Marks
Two Test (each 1 hour) of 25 marks each OP is objective pattern (25x 1=25)	50
Total	50

Guidelines:

1. The passing minimum for these items should be 40%
2. If the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent Semesters
3. Item No's:4,5,6 and 7are to be treated as 100% Internal papers.
4. For item No.07, Tests conducted through online modules (Google Form/any other)

QUESTION PAPER PATTERN FOR CIA I and CIA II EXAM

Reg.No:------------------   Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
-------------------- DEGREE CIA-I/CIA-II EXAMINATIONS ----------20---
(----------- SEMESTER)
BRANCH: - --------------- -
SUBJECT NAME: ------------------

Time: Two Hours   Maximum:50 Marks

SECTION - A (6 x 1 = 6 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks
(Q.No: 1 to 6: Multiple choice/Fill up the blanks /True or False questions)

SECTION - B (4x 5 = 20 marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks
(Q.No: 7 to 10 Either Or type)

SECTION - C (2x12 = 24 marks)
Answer any TWO Questions out of THREE Questions
ALL Questions Carry EQUAL Marks
(Q.No: 11 to 13)

QUESTION PAPER PATTERN FOR MODEL/END SEMESTER EXAMINATION

Reg.No:------------------   Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
-------------------- DEGREE MODEL EXAMINATIONS -----------20---------
(----------- SEMESTER)
BRANCH : ....
SUBJECT NAME:----------------

Duration: Three Hours   Maximum: 70 Marks

SECTION - A (10x1=10 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks
(Q.No 1 to 10 Multiple choice/Fill up the blanks /True or False questions)
(Two questions from each unit)

SECTION - B (5x6=30 Marks)
Answer ALL Question
ALL Questions Carry EQUAL Marks
(Q.No 11 to 15 Either or type)
(One question from each Unit)

SECTION- C (3x10=30 Marks)
Answer any THREE Questions out of FIVE Questions
ALL Questions carry EQUAL Marks
(Q.No 1fi to 20) (One question frem each Unit)

For UG (Question paper pattern) (Max. 70 marks)

Sec—A (10x1=10marks)	All Questions will be in KI Level
Sec—B (5x6=30 marks) Either or type	4 Questions will be in Kl Level, 3 Questions will be in K2, K3 each
Sec—C (3x10=30marks) Any 3 out of 5 questions	2 Questions will be in K2, 3 Questions will be in K3 & K4 level

Track-2 Industry Integrated (IBM Data Science)

1. **Internal Marks : 40 Marks**

Components	Marks
Two Test*	10
Practical #	10
Assignment $	10
Project &	10
TOTAL	40

*-Two internals will be conducted for 30marks. Both the exam marks will be converted to 10 mark
Internal: 30marks

    2marks: 5 x 2 = 10(Description type)

    5marks: 4 x 5 = 20(Description type)

    Total: 30marks

$-Two assignments will be given in the semester which will be like a use case

&-One project to be done based on the subject. Marks will be divided based on the project execution and presentation.

#-Practical exercise will be done in the lab based on scenario based question. Evaluation will be on the students input in the lab and viva

2. **External exam : 60 Marks**

Two marks: 5 x 2: 10 (Description type)

Ten marks: 5 x 10:50 (Description type)

Total: 60 marks

Guidelines:

1. The passing minimum for Internal Examination and External Examination should be 50%.

UG Course – B.SC Computer Technology

Track – 2 Industry Oriented (IBM Data Science)

Question Paper Pattern for CIA – I and CIA – II Examination

Duration: Two Hours   **Maximum: 30 Marks**

SECTION - A (5x2=10 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks

Q.No 1 to 5: (Descriptive Questions)

SECTION - B (4x5=20 Marks)
Answer **ALL** Question
ALL Questions Carry **EQUAL** Marks

Q.No 6 to 9: Either or type questions
(One question from each Unit)

External Exam : 60marks

SECTION - A (5x2=10 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks

Q.No 1 to 5: (Descriptive Questions)

SECTION - B (5x10=50 Marks)
Answer **ALL** Question
ALL Questions Carry **EQUAL** Marks

Q.No 6 to 10: Either or type questions
(Two question from each Unit)

Course Code:	21CTU01			Programming with C				Batch:	2021-2022 & onwards
								Semester:	I
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVES

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop an in-depth understanding of functional and logical concepts of C Programming.
- To familiarize the basic syntax and semantics of C Language.
- To develop programs using pre-processor directives and Files.
- Introduces the more advanced features of the C language.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recollect various programming constructs and to develop C programs.	K1
CO2	Understand the fundamentals of C programming.	K2
CO3	Choose the right data representation formats based on the requirements of the problem.	K3
CO4	Compare different Operations on arrays, functions, pointers, structures, unions and files.	K4
CO5	Illustrate the concepts of various data structures.	K3
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze		

SYLLABUS

21CTU01	Programming with C	I
Unit No.	**Topics**	**Hours**
I	**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 – Data Types –Variables –Constants –I/O operations –Operators and Expressions -Programming Examples –Type Conversion and Type Casting.	10
II	**Decision Control and Looping Statements:** Introduction to Decision Control Statements –Conditional Branching Statements –Looping Statements –Nested Loops –Jumps in loops – Goto Statement. **Functions:** Introduction –using functions –Function declaration –Function definition –Function call –Return statement –Categories of Functions–Recursive function.	10
III	**Arrays:** Introduction –One dimensional- Declaration of Arrays –Two dimensional –Multi dimensional –Dynamic arrays – Character arrays and Strings. **Pointers:** Understanding pointers–Declaring Pointer Variables – Initialization of pointer variables - Accessing a variable through its pointer - Pointer Expressions –Pointers and Arrays- Array of Pointers-Pointers to Functions.	10
IV	**Structure and Union:** Introduction- Defining a Structures- Declaring structure variables-Accessing Structure members-Initialization-Array of structures-Arrays within structures-Structure within structures-Unions.**Files:** Introduction to Files –Defining and opening a file-Closing a file-I/O operation on files-Random access to files-Command line arguments.	9
V	**Dynamic Memory Allocation and Linked List:** Introduction-Allocating a block of memory-Multiple block of memory-Altering the size of block-Concept of linked list-Advantage-Types-Pointers revisited-Creating linked list-Inserting-Deleting-Application of linked list.	9

Note: Distribution of marks for Internal Examination -30 and External Examination –70

Teaching methods:
Lecturing, PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1. E.Balagurusamy, "Computing Fundamentals and C Programming", TMH 7th reprint 2011

REFERENCE BOOKS

1. E.Balaguruswami, " Programming in ANSI C", TMH 21st reprint 1998
2. Y.Kanetkar, "Let us C", BPB Publications, 15th Edition 2017 revised.
3. Brian W Kwenighan, Dennis M.Ritchie, "The C Programming Language", Prentice Hall Software Series 2nd Edition

WEB RESOURCES

1. https://www.tutorialspoint.com/cprogramming/index.html
2. https://www.geeksforgeeks.org/c-language-set-1-introduction/
3. https://fresh2refresh.com/c-programming/

MAPPING WITH PROGRAM OUTCOMES

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	S	L	M	M	L
CO2	S	S	S	L	M	M	L
CO3	S	S	S	M	S	L	L
CO4	S	S	S	M	S	M	L
CO5	S	S	S	M	S	S	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
Mr.M.Karthi	Mrs.K.Mythili	

K.MYTHILI M.Sc., M.Phil., (Ph D)
Associate Professor & HOD
Department of Computer Technology.
Hindusthan College of Arts and
Science (Autonomous)
Coimbatore - 641 028.

Co-ordinator
Academic Audit Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

CourseCode:	21CTU02		Computer System Architecture				Batch:	2021-2022 & Onwards
							Semester:	I
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSEOBJECTIVE

- Learn the basic concepts of Computer Architecture and Organization.
- Impart the knowledge on data representation and logic circuits.
- Learn the concepts of Registers, Interrupts and computer instructions.
- Develop the skills to design the components CPU, IO and Memory.
- Inculcate knowledge on multiprocessor concepts

COURSEOUTCOMES (CO)

S.No	COURSEOUTCOME	BLOOMS LEVEL
CO1	Describe various data representation and logic circuits and components of Computers.	K1
CO2	Discuss the basic concepts of computer organization and Architecture	K2
CO3	Explain the internal components of combinational circuits, CPU, I/O and Memory.	K3
CO4	Analyze the design of Logic Circuits ,CPU, IO and Memory	K4
CO5	Discuss the concepts of multiprocessor.	K2
K1- Remember, K2-Understand, K3-Apply, K4-Analyze		

SYLLABUS

21CTU02	Computer System Architecture	I
UnitNo.	Topics	Hours
I	**Data Representation:** Number Systems-Binary-Octal-Hexadecimal number-Complements-Floating Point Representation-Other Binary codes –Error Detection Codes - **Logic Circuits:** Logic Gates-Combinational Circuits-Half-Adder-Full-Adder- Flip-Flops-SR - JK – D and Tflip-flop.	9
II	**Basic computer organization:** Instruction codes-Computer registers - Computer instructions - Timing and Control - Instruction cycle-Memory - Reference Instructions - Input-output and interrupt - Complete computer description.	10
III	**Central processing unit:** Introduction - General Register Organization- Stack Organization- Instruction format - Addressing Modes - Data Transfer and Manipulation - Program Control - Reduced Instruction Set Computer (RISC) - Complex Instruction Set Computer (CISC) - Characteristics of RISC and CISC- Comparison of RISC and CISC. **Pipeline and Vector Processing:** Parallel processing - Pipelining - Arithmetic Pipeline - Instruction Pipeline - RISC Pipeline – Vector Processing.	10
IV	**Input – Output organization:** Input-output interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt – DMA - Input-Output Processor (IOP) - CPU-IOP Communication - Serial Communication.	10
V	**Memory Organization:** Memory Sub System - Memory hierarchy - Main memory - Auxiliary memory - Flash memory - Associative memory - Cache memory - Virtual memory. **Multiprocessors:** Characteristics- Interprocessor Arbitration- Interprocessor Communication and Synchronization- Cache Coherence **Self Study :** Intel 8086 Microprocessor	9

Note: Distribution of marks for Internal Examination- 30 and External Examination –70

Teachingmethods: PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOK

1.M. Morris Mano, "Computer System and Architecture", Pearson Education, Third Edition, (30 June2017).

REFERENCE BOOKS

1.Badri Ram , "Advanced Microprocessors and Interfacing",TMH,2012.
2.W. Stallings, "ComputerOrganization&Architecture",PearsonEducation, 8thEdition.2012.
3.M.Carter,"ComputerArchitecture",Schaum'soutlineseries,TMH,SpecialIndian Edition.

WEBRESOURCES

1.*https://www.javatpoint.com/computer-organization-and-architecture-tutorial*

2.*https://www.tutorialspoint.com/computer_logical_organization/index.htm*

3.*https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/*
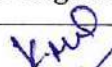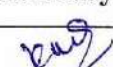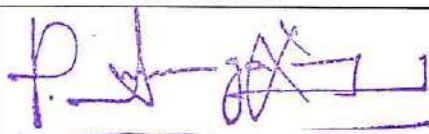
MAPPINGWITHPROGRAMOUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	M	S	M	S	M
CO2	S	S	S	S	S	S	S
CO3	S	S	S	M	M	S	S
CO4	S	S	M	M	M	M	S
CO5	S	S	S	S	S	S	M

S-Strong, M-Medium,L–Low

ASSESSMENTPATTERN

FollowscommonpatternofInternalandExternalAssessmentsuggestedinthe Regulations.

CourseDesignedby	Verifiedby HOD	Approved by CDC Coordinator
Mrs.K.Mythili	Mrs.K.Mythili	

Course Code:	21CTIU02	Software Foundation Program Using C++					Batch:	2021-2022 & onwards
Hrs/Week:	4	L	4	T	-	P	Semester:	I
							Credits:	4

COURSE OBJECTIVE

- Learn the fundamentals of computing techniques and to develop the simple applications in 'C++' language.
- To remember that, how C++ improves C with object-oriented features.
- To learn how to write inline functions for efficiency and performance.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Explain the basic concept of programming languages	K2
CO2	Recallthe fundamentals of C++ programming language.	K1
CO3	Apply and experiment the concepts of pointers, arrays, structures and Files in C++	K3
CO4	Analyze and develop application using C++	K4
C05	Solve programs using preprocessor directives and Files for a given scenario	K3

21CTIU02	Software Foundation Program Using C++	I
Unit No.	Topics	Hours
I	**Introduction to C++:** OOPS, Essentials of programming, Features of C++, Inheritance, polymorphism and Encapsulation, operator overloading, I/O in C++, Advanced topics	9
II	**Information Management:** Information as a service, IBM Information management software, order fulfillment system – Example case, Open source derby, cloudscape, DB2 9 pure XML technology, DB2 Express C, DB2 data server editions, Information Integration Business drivers	10
III	**Introduction to XML and related technologies:** Issues in information Exchange, XML, XML Namespaces, XML Schema, XPATH, XSL Transformation, Introduction to IDE, Eclipse, Eclipse architecture, Eclipse plugin architecture, Eclipse platform architecture, Eclipse case studies	10
IV	**Java Development Tools:** JDT environment, creating and running a program, automating testing using junit, Use ant and Javadoc.	10
V	**Debugging Application:** Using the debugger, Start the debugger, setting breakpoints, setting through the code, inspecting variables and expression, Software in the real world	9

Note: Distribution of marks for Internal Examination- 40 and External Examination –60

Teaching methods: Lecturing, PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1. *IBM Course ware*

REFERENCE BOOKS

1. *"Object Oriented Programming with C++" by Balagurusamy,MCGraw Hill Company,8ᵗʰ edition,2020*
2. *"C++ Weekend Crash Course" by Stephen R Davis,2000*
3. *"The C++ Programming Language"byBjarneStroustrup,Addison Wesley,4ᵗʰ edition, ,2013*

WEBRESOURCES

1. https://www.geeksforgeeks.org/c-plus-plus/
2. https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.htm

3. https://www.cplusplus.com/files/tutorial.pdf

MAPPING WITH PROGRAM OUTCOMES

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	M	S	S
CO2	S	M	M	M	S	S	M
CO3	S	S	S	S	M	M	S
CO4	M	S	M	M	S	M	S
CO5	S	L	S	S	M	S	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN

ollows Track – 2 Industry Oriented (IBM Data Science) pattern of Internal and External Assessment, as mentioned
the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
IBM	Mrs.K.Mythili	

K. MYTHILI M.Sc., M.Phil., (Ph.D)
Associate Professor & HOD
Department of Computer Technology
Hindusthan College of Arts and
Science (Autonomous)
Coimbatore - 641 028.

Co-ordinator
Academic Audit Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	21CTU03	Practical – I : Programming using C					Batch:	2021-2022 & onwards
							Semester:	I
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE
- To learn the fundamentals of C Programming
- To enhance their analyzing and problem solving skills
- To gain knowledge about arrays, structures, pointers and functions
- To develop the ability to apply file I/O operations.
- To develop skills to design and analyze simple linear data structures.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Choose the right data representation formats based on the requirements of the problem.	K3
CO2	Compare the various programming constructs and choose the right one for the task in hand.	K4
CO3	Construct programs that demonstrate effective use of C features including arrays, structures and pointer.	K3
CO4	Illustrate file access.	K2
CO5	Develop C program for Linear data structure operations and its applications	K3
K1 – Remember, K2 – Understand, K3 – Apply, K4 - Analyze		

21CTU03	PRACTICAL I : PROGRAMMING USING C	I
Ex. No.	Program List	Hours
1	Program to develop a Simple Calculator using switch case.	4
2	Program to print the Alphabet A to E and reverse the same decreasing one by one line by line using for Loop.	4
3	Program to sort numbers in Ascending and descending order using Arrays..	4
4	Program to accept two number from user and swap the values using call by reference method	4
5	Program to find the Prime numbers between two integers using functions	4
6	Program to Multiply two Matrices by Passing Matrix to a Function	4
7	Program to generating Fibonacci Numbers using recursive functions	4
8	Program for String manipulations without using string functions (string length, string comparison, string copy) (Using function pointers).	4
9	Define a structure Employee having elements emp_id, name, DOB, DOJ etc. Accept data and reprint it. (use structure within structure)	4
10	Program to Find Largest Number Using Dynamic Memory Allocation	4
11	Program to read and write a file line by line.	4
12	Program to know the working of linked list.	4

Note: Distribution of marks for Internal Examination -40 and External Examination –60

Teaching methods:
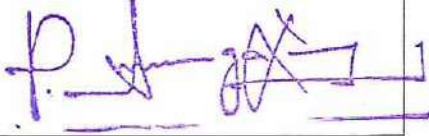PowerPoint Projection through LCD, Demonstration

MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	M	S	S	S	M	L
CO2	S	S	S	M	S	S	M
CO3	S	S	S	S	S	M	L
CO4	M	S	M	S	S	S	M
CO5	S	M	S	M	M	L	L

S-Strong, M-Medium, L – Low

ASSESSMENT PATTERN

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
Mr.M.Karthi	Mrs.K.Mythili	

Course Code:	21CTU05		Python Programming					Batch:	2021-2022 & Onwards
								Semester:	II
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVE:
1. To describe the Fundamental elements of Python programming basics and paradigm.
2. To Discover the Knowledge on functions and pass arguments in Python.
3. To Relate about List, Dictionaries, Tuples and Files.
4. Solve the problems using String Concepts.
5. Interpret the concepts of object oriented programs with Python classes.

COURSE OUTCOMES (CO):

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Describe the Syntax and semantics of Python Programming Languages.	K1
CO2	Observe the fundamental principles of Object-Oriented Programming	K1
CO3	Discuss the programming concepts to solve real world problems using Functions and Modules.	K2
CO4	Experiment with structuring the data using Lists, Dictionaries, and Tuples.	K3
CO5	Applying File Concepts to read and write data operations.	K4

21CTU05	Python Programming	II
Unit No.	**Topics**	**Hours**
I	**Getting Started with Python Programming**: Running Code in the Interactive Shell, Input, Processing, and Output, Editing, Saving, and Running a Script , Behind the Scenes: How Python Works, Detecting and Correcting Syntax Errors, Strings, Assignment, and Comments **Data Types:** String Literals, Escape Sequences, String Concatenation, Variables and the Assignment Statement, Program Comments and Docstrings, Numeric Data Types and Character Sets, Integers , Floating-Point , Character Sets , Arithmetic Expressions, Mixed-Mode Arithmetic and Type Conversions .	10
II	**Using Functions and Modules**: Calling Functions: Arguments and Return Values, The math Module, The Main Module, Program Format and Structure, Running a Script from a Terminal Command Prompt. **Loops and Selection Statements:** Definite Iteration: The for Loop , Executing a Statement a Given Number of , Count-Controlled Loops , Augmented Assignment , Loop Errors: Off-by-One Error, Traversing the Contents of a Data Sequence , Specifying the Steps in the Range , Loops That Count Down .Statements Conditional Iteration: The while Loop The Structure and Behavior of a while Loop Count Control with a while Loop The while True Loop and the break Statement, Random Numbers, Loop Logic, Errors, and Testing	10
III	**Selection: if and if-else Statements:** The Boolean Type, Comparisons, and Boolean Expressions, if-else Statements, One-Way Selection Statements, Multi-Way if Statements, Logical Operators and Compound Boolean Expressions, Short-Circuit Evaluation , Testing Selection **Lists and Dictionaries:** **Lists: List** Literals and Basic Operators, Replacing an Element in a List, List Methods for Inserting and Removing Elements , Searching a List, Sorting a List , Mutator Methods and the Value None , Aliasing and Side Effects , Equality: Object Identity and Structural Equivalence, Tuples. **Defining Functions:** The Syntax of Simple Function Definitions, Parameters and Arguments, The return Statement, Boolean Functions, Defining a main Function Case Study: Generating Sentences	10
IV	**Strings:** Accessing Characters and Substrings in Strings, The Structure of Strings, The Subscript Operator, slicing for Substrings, Testing for a Substring with the in Operator, String Methods **Text Files :** Text Files and Their Format, Writing Text to a File, Writing Numbers to a File , Reading Text from a File , Reading Numbers from a File , Accessing and Manipulating Files and Directories on Disk .	10
V	**Classes and OOP:** classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, Inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes; exception handling, try block	8

Note: Distribution of marks for Internal Examination -30 and External Examination –70

Teaching methods: Slides Projection through LCD, Assignments and Class Tests

TEXT BOOKS

1. Fundamentals of Python: First Programs, Second Edition Kenneth A. Lambert, Cengage Learning, 2019.
2. Updated for Python 3, Shroff/O'Reilly Publishers, 2016 http://greenteapress.com/wp/think-python

REFERENCE BOOKS

1. Allen Downey, Jeffrey Elkner, Chris Meyers.How to think like a computer scientist learning with Python / 1st Edition,2012.
2. Dr.K.Selvamani, Dr.K.Kulothungan, Dr.E.Anbalagam, Dr. R.RameshProblem, solving and Python Programming, Sri Maruthi Publishers, 2019.
3. Timothy A. Budd , Exploring Python,12th Edition, McGraw Hill , 2010.

WEB RESOURCES

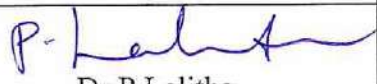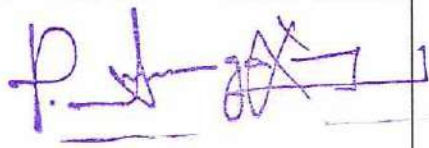1. https://www.learnpython.org/
2. https://www.tutorialspoint.com/python/index.htm
3. http://greenteapress.com/wp/think-python

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	S	S	M	-	M	M	M
CO2	M	M	S	-	M	-	M
CO3	S	M	S	S	-	M	M
CO4	M	S	M	M	-	M	M
CO5	S	S	S	M	M	M	M

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN (if deviation from common pattern)

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
Dr.P.Lalitha	Mrs.K.Mythili	

CourseCode:	21CTU06		Data Structures and Algorithms				Batch:	2021-2022 & Onwards
Hrs/Week:	4	L	4	T	-	P	Semester:	II
							-	Credits:	4

COURSE OBJECTIVE

- Impart the basic concepts of data structures and algorithms.
- Understand algorithms and its analysis procedure.
- Inculcate knowledge on importance of data structures in context of writing efficient programs.
- Develop skills to apply appropriate data structures in problem solving.
- Explore the concepts of File Organizations, Symbol tables, Searching and sorting techniques.

COURSEOUTCOMES (CO)

S.No	COURSEOUTCOME	BLOOMS LEVEL
CO1	Define basic types for data structure, implementation and application	K1
CO2	Illustrate the procedures for implementing data structures and algorithms.	K2
CO3	Develop programming skills to apply appropriate data structures in problem solving.	K3
CO4	Analyze Linear and Non-Linear data structures, file organization, searching and sorting techniques	K4
CO5	Select appropriate tree and graph for solving the given problem.	K4
K1- Remember, K2-Understand, K3-Apply, K4-Analyze		

SYLLABUS

21CTU06	Data Structures and Algorithms	II
UnitNo.	Topics	Hours
I	**Introduction to Algorithms :**Asymptotic Notations: Big-Oh, Omega and Theta-Best, Worst and Average case Analysis: Definition and an example - Arrays - Stacks and Queues - Fundamentals. **Linked List:**-Singly Linked List - Doubly linked list -Sparse Matrices-Polynomial addition.	10
II	**Trees:** Binary tree representations – Binary Tree Traversal – Threaded Binary Trees -Counting binary trees. **Graphs:** Terminology and representations - Traversals, Connected Components.	10
III	**Internal sorting** – Searching-Insertion sort-Quick sort-Heap Sort-2 way merge sort-Sorting on several keys. **External Sorting:** Storage device- Magnetic tape - Disk storage - Sorting with disk- K-way merging -Sorting with tape-Balanced Merge sorts-PolyphaseMèrge.	10
IV	**Symbol tables:** Static tree table - Dynamic Tree tables-Hash tables -Hashing Functions-overflow handling-Theoretical evaluation of overflow techniques. **Files:** Files, Queries and Sequential organizations	10
V	**Index Techniques:**-Hashed Index-tree indexing-B trees. **File organizations:** Sequential organizations-Random Organization- Linked Organization- Inverted Files-Storage Management.	8

Note: Distribution of marks for Internal Examination- 30 and External Examination –70

Teachingmethods: PowerPointProjectionthroughLCD,Assignment,DiscussionandActivity.

TEXT BOOK

1. *Ellis Horowitz, SartajSahni, Susan Anderson Freed, "Fundamentals Of Data StructuresIn C",Universities Press (India) Limited ,2017*

REFERENCE BOOKS

1. *MarkAllenWeiss,"DataStructure and Algorithm analysis in ",Pearson Education, SecondEdition, Sixteenth Impression2014.*
2. *Alfred V.Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi,2006.*

3. ReemaThareja, "Data Structures using C", Second Edition, Oxford University Press, 2011.

WEBRESOURCES

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

2. https://www.javatpoint.com/data-structure-introduction

3. https://www.geeksforgeeks.org/data-structures/

MAPPINGWITHPROGRAMOUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	M	M	M	S	S
CO2	S	S	M	S	M	M	M
CO3	S	S	M	S	M	M	M
CO4	S	S	S	S	M	S	S
CO5	S	S	S	S	M	S	S

S-Strong, M-Medium,L–Low

ASSESSMENTPATTERN

FollowscommonpatternofInternalandExternalAssessment,suggestedinthe Regulations.

CourseDesignedby	Verifiedby HOD	Approved by CDCCo-ordinator
Ms.G.Priyanka	Mrs.K.Mythili	

K. MYTHILI M.Sc., M.Phil., (Ph.D)
Associate Professor & HOD
Department of Computer Technology
Hindusthan College of Arts and
Science (Autonomous)
Coimbatore - 641 028.

Co-ordinator
Academic Audit Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	21CTIU06			Data Visualization				Batch:	2021-2022 & onwards
								Semester:	II
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVE
- To give overview of descriptive and inferential statistics.
- To provide basics of R and Python.
- To manipulate and visualize data using R, python and Watson Studio
- To focus on plots using Matplotlib and seaborn.
- To analyze data using various visualization tools.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Distinguish descriptive and inferential statistics.	K4
CO2	Solve R tool to do statistics and to visualize data.	K3
CO3	Classify data using IBM Watson Studio.	K2
CO4	Demonstrate python scripts used for visualization.	K2
CO5	Find advance visualization tool and sea born functionalities.	K1

SYLLABUS

21CTIU06	Data Visualization	II
Unit No.	Topics	Hours
I	**Introduction to statistics**-Descriptive Statistics: Mean, Median, Mode-Inferential Statistics :Random Variables, Probability Distributions, Normal Distribution, Sampling and Sampling Distribution	10
II	**Overview of R** - Descriptive data analysis using R – Data manipulation with R – Data visualization with R - R studio installation - Data manipulation with R (dplyr,data.table,reshape2package,tidyr package, Lubridate package) - Data Visualization with R (working with BaseR Graphics,ggplot2)	10
III	**Data Visualization in Watson Studio** – Adding data to data refiner - Visualization of data in Watson Studio.	8
IV	**Introduction python**-Python scripiting basics-Introduction to Jupyter notebook-Numpy and Pandas –Python and Anaconda installation - Pandas (text data, date time columns, indexing and selecting data, groupby ,Merge/join datasets)	10
V	**Visualization using python**-Data Visualization tools in python – Basic plots using Matplotlib - Specialized Visualization tools using Matplotlib - Advanced Visualization tools using Matplotlib-**Advanced visualization tool**-Seaborn functionalities – Spatial visualization and analysis in python in folium – Usage of Seaborn functionalities – Case studies.	10

Note: Distribution of marks for Internal Examination -40 and External Examination –60

Teaching methods: Lecturing, PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1. IBM Course ware

REFERENCE BOOKS

1 Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython" , Oreilly, 2011
2 .Andreas C. Muller, Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Oreilly, 2016

WEB RESOURCES

1. http://www2.cs.uh.edu/~gnawali/courses/cosc6397-f13/intro-visualization.pdf
2. https://www.geeksforgeeks.org/short-note-on-data-visualization/
3. https://haralick.org/DV/Handbook_of_Data_Visualization.pdf

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	M	S	S
CO2	S	M	M	M	S	S	M
CO3	M	S	M	S	S	M	M
CO4	M	S	S	M	S	S	S
CO5	M	S	S	S	M	S	M

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN

Follows Track – 2 Industry Oriented (IBM Data Science) pattern of Internal and External Assessment, as mentioned in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
IBM	Mrs.K.Mythili	

K. MYTHILI M.Sc., M.Phil., (Ph.D)
Associate Professor & HOD
Department of Computer Technology
Hindusthan College of Arts and
Science (Autonomous)
Coimbatore - 641 028.

Co-ordinator
Academic Audit Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	21CTU07	System Software						Batch:	2021-2022 & onwards
Hrs/Week:	3	L	3	T	-	P	-	Semester:	II
								Credits:	3

COURSE OBJECTIVE

- Make the students to understand the design concepts of various system software.
- Understand the relationship between system software and machine architecture.
- Learn the design of Assemblers, Loader and Macro Processor.
- Learn the implementation process of Assemblers, Loader and Macro Processor.
- Study the Functions of Text Editor and Debugger.

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	List the functions of various System Software.	K1
CO2	Choose the concepts of addressing modes and Instruction sets based on Machine Architecture.	K3
CO3	Apply the techniques to design Assembler, Loader and Macro Processor.	K3
CO4	Analyze the techniques to implement Assembler, Loader and Macro Processor	K4
CO5	Illustrate the functions of Text Editor and Debugger.	K2

SYLLABUS

21CTU07	System Software	II
Unit No.	Topics	Hours
Unit I	The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.	7
Unit II	A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.	8
Unit III	Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker	7
Unit IV	Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.	7
Unit V	Overview of the Editing Process - User Interface – Editor Structure - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.	7

Note: Distribution of marks for Internal Examination -30 and External Examination -70

Teaching methods: Lecturing, PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1.   Leland L. Beck, "System Software – An Introduction to Systems Programming", 4 th Edition, Pearson Education Asia, 2010.

REFERENCE BOOKS

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 2009.
2. John J. Donovan, "Systems Programming", Tata McGraw-Hill Edition, 2009.
3. John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2009.

WEB RESOURCES

https://systemsoftware.org/

MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	M	S	S
CO2	S	M	M	M	S	S	M
CO3	S	S	S	S	M	M	S
CO4	M	S	M	M	S	M	S
CO5	S	L	S	S	M	S	L

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN

Follows common pattern of Internal and External Assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
Mrs.K.Mythili	Mrs.K.Mythili	

Course Code:	21CTU08	Practical II: Programming Using Python						Batch:	2021-2022& Onwards
								Semester:	II
Hrs/Week:	4	L	-	T	-	P	4	Credits:	2

COURSE OBJECTIVE:

- Developing adequate skills in python programming.
- Write, Test and Debug Python Programs.
- Implementation of Data Structure Concepts using Python.
- Implementation of various applications using Python.
- Interpret Object oriented programming in Python.

COURSE OUTCOMES (CO)

S. No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Demonstrate and debug Python Programs.	K2
CO2	Apply Branching and looping concepts in Python Programs.	K3
CO3	Analyze and apply Data structure concepts using python programming.	K4
CO4	Explain applications using Object oriented Programming.	K2
CO5	Experiment with application for Bio computing	K3

21CTU08	Practical II: Programming Using Python	II
Ex. No.	Program List	Hours
1	Program to find first n prime numbers.	6
2	Program to find the exponentiation of a number.	4
3	Program to perform Binary Search.	4
4	Program to implement Linear Search.	5
5	Program to perform Classes and methods	5
6	Program to perform polymorphism	5
7	Program to perform Inheritance	5
8	Program to perform Encapsulation	5
9	Gene Sequence mining using Python.	5
10	Bio computing in Python.	4

Note: Distribution of marks for Internal Examination- 40 and for External Examination- 60

Teaching methods: Demonstration through LCD, Lab Practice and Class Tests

MAPPING WITH PROGRAM OUTCOMES

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	P07
CO1	S	S	S	M	M	-	S
CO2	S	M	M	M	M	M	S
CO3	S	S	S	M	-	M	S
CO4	S	S	M	M	-	M	S
CO5	M	M	S	M	M	-	S

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN

Follows common pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
Dr.P.Lalitha	Mrs.K.Mythili	

Open Electives Syllabus

Course Code	21CTUE01	Open Source Software					Batch	2021-2022& onwards
							Semester	I
IHrs/Week	3	L	3	T	-	P	-	Credits	2

COURSE OBJECTIVE

- Emphasize usability and a just works philosophy in default configurations and feature designs.
- Impart the basic knowledge of Open Source Technologies.
- Analyzing and implementing the concepts of Web Servers and My SQL with PHP Scripting Code.
- Use open source database software packages that each go head-to-head with commercial products from Oracle, Microsoft, Sybase, and IBM.
- Ability to build and modify one or more Free and Open Source Software packages.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Identify Client and Server side Scripting languages	K3
CO2	Demonstrate Apache to provide meaningful patterns for web server software.	K2
CO3	Analyze and solve various database tasks using the PHP language	K4
CO4	Demonstrate a complete website	K2
CO5	Summarize the various queries, triggers and stored routine of MYSQL	K2

21CTUE02	Open Source Software	I
Unit No.	Topics	Hours
I	**Introduction to open source** Open source Introduction: Open Source – Open source vs. Commercial Software – What is Linux? – Free Software – Where I can use Linux? Linux Kernel – Linux Distributions	6
II	**MY SQL** Introduction to MY SQL – The Show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database	6
III	**Open Source Web Servers** Open Source Web Servers: Installation, Configuration and administration of Apache, Nginx. Open Source Tools, IDE.	6
IV	RDBMS: Eclipse IDE, Open Stack cloud technology, Version Control Systems, GIT, CVS, Open Source.	6
V	Repositories: GitHub, SourceForge, Google Code, Open SourceRDBMS:MYSQL basics, installation and usage, PostgreSQL, NoSQL, Mongo DB, Hadoop.	6

Teaching methods:
Lecturing, PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

James Lee and Brent Ware: "Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", Dorling Kindersley(India) Pvt. Ltd, 2008

REFERENCE BOOKS

1. DacieCristian- "Pack Pub AJAX and PHP" - 2006.
2. ScouarnecYann- Stolz Jeremy Jeremy and Glass Michael - "Beginning PHP5- APACHE-MYSQL Web Development" - Wiley-India. New Delhi- 2005.
3. Christopher Diggins-" Linux Unwired"- Shroff Publishers & Distributors Pvt. Ltd-2004.
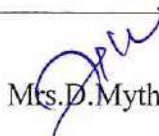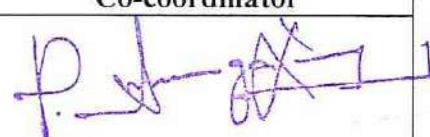
MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	M	S	S
CO2	S	M	M	M	S	S	M
CO3	M	S	M	S	S	M	M
CO4	M	S	S	M	S	S	S
CO5	M	S	S	S	M	S	M

S-Strong, M- Medium, L – Low

ASSESSMENT PATTERN

Follows pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
Mrs.D.Mythili	Mrs.K.Mythili	

Course Code:	21CTUE02	Introduction to Database & SQL						Batch:	2021-2022 & onwards
								Semester:	III
Hrs/Week:	3	L	3	T	-	P	-	Credits:	2

COURSE OBJECTIVE

- To learn about an introduction to database management systems.
- Emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from DBMS.
- Understand the basics of Relational Databases
- Write SQL code based on ANSI/ISO standards to build and maintain database structures
- Update database content with SQL and transaction handling

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Outlinethefundamentalelementsofrelationaldatabasemanagementsystems	K2
CO2	Explainthebasicconceptsofrelationaldatamodel,entity-relationshipmodel,relationaldatabasedesign,relationalalgebraan	K2
CO3	DefineER-modelstorepresentsimpledatabaseapplicationscenarios	K1
CO4	Experiment withtheER-modeltorelationaltables,populaterelationaldatabaseandformulate SQLqueriesondata.	K3
CO5	Examinethebasicdatabasestoragestructuresandaccesstechniques: fileandpageorganizations,indexingmethodsincludingBtree,andhashing.	K4

SYLLABUS

21CTUE02	Introduction to Database & SQL	I
Unit No.	Topics	Hours
I	Data modeling usingtheEntityRelationship(ER) modeling andEnhancedEntityRelationship(EER)modelingSpecializationandGeneralization.	6
II	**TheRelationalModel**:RelationaldatabasedesignusingERtorelationalmapping,Relationalalgebraandrelationalcalculus,Tuple RelationalCalculus,DomainRelationalCalculus,SQL.	6
III	**Database design theory and methodology:** Functional dependencies and normalization of relations, Normal Forms, Properties of relational decomposition, Algorithms for relational database schema design	6
IV	Structured Query Language - Basic Structure - Set Operations - Aggregate Functions - Date- Numeric- and Character Functions - Nested Sub queries - Modification Of Databases - Joined Relations-DDL.	6
V	Integrity Constraints – PL/SQL – PL/SQL Block – Procedure-Function –Triggers – Exception Handling.	6

Teaching methods:
Lecturing, PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOKS

1. RamezElmasriandShamkantB.Navathe,FundamentalsofDatabaseSystems(5/e),PearsonEducation,2008

REFERENCE BOOKS

1. Silberschatz,Korth, "DatabaseSystemConcepts",4thed.,McGrawhill,2006.

2. RaghuRama Krishnan and Johannes Gehrke, Database Management Systems(3/e), McGrawHill,2003.
3. PeterRobandCarlosCoronel, DatabaseSystems-
Design,ImplementationandManagement(7/e),CengageLearning,2007.

WEB RESOURCES

www.sql.org

MAPPING WITH PROGRAM OUTCOMES

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	M	S	S
CO2	S	M	M	M	S	S	M
CO3	M	S	M	S	S	M	M
CO4	M	S	S	M	S	S	S
CO5	M	S	S	S	M	S	M

S - Strong, M- Medium, L – Low

ASSESSMENT PATTERN

Follows pattern of Internal and External assessment, suggested in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
Mrs.D.Mythili	Mrs.K.Mythili	