LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)

in the

UNDERGRADUATE PROGRAMME

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2021-2022 AND ONWARDS

HICAS

HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

(Affiliated to Bharathiar University and Accredited by NAAC)
COIMBATORE-641028
TAMILNADU,INDIA.
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PREAMBLE

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

This Programme is designed to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals. This programme also gives an opportunity to the students to test their ability through project implementation. This programme is designed with challenging and varied subjects aligned with current trend like Artificial Intelligence, Data Mining, Cloud Computing, and Internet of Things.

VISION

- To provide quality education to meet the need of profession and society. Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team spirit and ethical responsibilities. To provide value based insights towards moulding technocrats with social commitment and leadership.

MISSION

- To prepare students to be the leaders of research and development in computer science.
- To provide leadership in high technology application to improve the educational experience.
- To make students embark on a journey of intellectual transformation.
- To discover, preserve and disseminate knowledge and promote a culture of broad inquiry throughout and beyond the Computer science Community.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1: Provide solutions to challenging problems in their profession by applying Computer Science 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 ofthe society with high ethical and professional standards.

PROGRAMME OUTCOME (PO)

PO1: DISCIPLINARY KNOWLEDGE: Having ability to apply knowledge of computing and mathematics appropriate to the discipline.

PO2: PROBLEM SOLVING AND ANALYZING: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

PO3: ENVIRONMENT SUSTAINABILITY AND ETHICS: An ability to understand Professional, ethical, legal, security, and social issues and responsibilities for the computing Profession.

PO4: MODERN TOOL USAGE: An ability to use appropriate techniques, skills, and tools necessary for computing practice.

PO5: CO-OERATIVE TEAM WORK & COMMUNICATIVE SKILLS: An ability to communicate and engage effectively with diverse stakeholders. Function effectively as a member or leader of a team engaged in activities appropriate to the Computer Science discipline.

PO6: SELF-DIRECTED AND LIFE-LONG LEARNING: Recognition of the need for and ability to engage in continuing professional development.

PO7: ENHANCING RESEARCH CULTURE: An ability to apply design and development principles in the construction of software systems of varying complexity.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Ability to use current technologies, skills, and models for computing practices.

PSO2: Recognize social and ethical responsibilities of a profession working in the discipline.

PSO3: Develop ability to use Research and experiment contemporary issues to solve industrial experiences.

PSO4: To study and develop next generation computer systems, search engines, networking devices, web browsers, and knowledge discovery tools.

PSO5: To inculcate effective communication skills with professional attitude.

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 Science**

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	21CEU01	DSC	**Core-I** Programming with C	4	4		3	30	70	100
III	21CEU02	DSC	**Track-1 Core-II**	4	4		3	30	70	100
	21CEIU02		**Track-2 Core-II**					40	60	
III	21CEU03	DSC	**Core-III** Practical – I : Programming using C	2		4	3	40	60	100
III	21CEU04	GE	**Allied-I** Mathematics for Computing	4	5		3	30	70	100
IV	21CEUE01	AEE	Open Elective–I	2	3		3	100		100
IV	21GSU01	AECC	Environmental Studies	1	2		2	50	-	50
IV	21CEUV01	SEC	VAC-I/Life Skills-I@/ 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							
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	21CEU05	DSC	**Core-IV** Python Programming	4	4		3	30	70	100
III	21CEU06	DSC	**Track-1 Core-V**	4	4		3	30	70	100
	21CEIU06		**Track-2 Core-V**					40	60	
III	21CEU07	DSC	**Core-VI** Practical – II : Programming using Python	2		4	3	40	60	100
III	21CEU08	DSC	**Core -VII** Computer Installation and Service	3	3		3	30	70	100
III	21CEU09	GE	**Allied-II** Numerical Methods	4	5		3	30	70	100
III	21CEU10	SEC	Internship/ Industrial Visit/ **Mini Project**	1	-	-		100		100
IV	21CEUV02	SEC	VAC-II/Life Skills-II@/ **Language**	1*	2		2	50		50**
IV	21CEUJ01	SEC	**Aptitude/ Placement Training**	Grade*	2		2	50		50**
Total				**26**	**32**	4	**Track1**	**320**	**480**	**800**
							Track2	**330**	**470**	
			Semester–III							
III	21CEU11	DSC	**Core-VIII** Programming with JAVA	5	5		3	30	70	100
III	21CEU12	DSC	**Track-1 Core-IX**	5	5		3	30	70	100
	21CEIU12		**Track-2 Core -IX**					40	60	
III	21CEU13	DSC	**Core -X** Practical – III : Programming using JAVA	3		5	3	40	60	100
III	21CEU14	DSC	**Core -XI** Practical – IV : Web Design	3		5	3	40	60	100
III	21CEU15	DSC	**Core -XII** Computer Networks	3	3		3	30	70	100
III	21CEU16	GE	**Allied-III** Operations Research	4	5		3	30	70	100

IV	21CEUE02	AEE	Open Elective-II	2	3		3	100		100
IV	21GSU02	AECC	Human Rights	1	2		2	50		50
IV	21CEUJ02	SEC	**Aptitude/Placement Training**	Grade*	2		2	50		50**
IV	21CEUJ03	SEC	**Online Course**	-	1			-	-	C/NC≠
Total				**26**	**26**	10	**Track1**	**350**	**400**	**750**
							Track2	**360**	**390**	
			Semester–IV							
III	21CEU17	DSC	**Core -XIII** Relational Database Management System	5	5		3	30	70	100
III	21CEU18	DSC	**Track-1 Core -XIV**	5	5		3	30	70	100
	21CEIU18		**Track 2 Core -XIV**					40	60	
III	21CEU19	DSC	**Core -XV** Practical - V: RDBMS Applications	3		5	3	40	60	100
III	21CEU20	DSC	**Core -XVI** Practical–VI : Software Testing Lab	3		5	3	40	60	100
III	21CEU21	GE	**Allied-IV** Business Accounting	4	5		3	30	70	100
III	21CEU22	DSE	**Electives / DSE-I**	4	4		3	30	70	100
III	21CEU23	SEC	Internship/ Institutional Training / **Mini-Project**	1	-		-	100	-	100
IV	21CEUV03	ACC	VAC–III	1*	2		2	50	-	50**
IV	21CEUJ04	SEC	**Aptitude/ Placement Training**	Grade*	2		2	50		50**
IV	21CEUJ05	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							
III	21CEU24	DSC	**Track- I Core -XVII**	5	5		3	30	70	100
	21CEIU24		**Track-2 Core - XVII**					40	60	
III	21CEU25	DSC	**Track-1 Core -XVIII**	5	5		3	30	70	100
	21CEIU25		**Track-2 Core -XVIII**					40	60	
III	21CEU26	DSC	**Core -XIX** Practical – VII : Programming using .NET	3		6	3	40	60	100
III	21CEU27	DSC	**Core- XX Practical - VIII** Open Source Tools	3		6	3	40	60	100
III	21CEU28	DSE	**Electives / DSE-II**	4	5		3	30	70	100
IV	21CEUE03	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	21CEUV04	ACC	VAC–IV	1*	2			50	-	50**
IV	21CEUJ06	SEC	**Aptitude/ Placement Training**	Grade*	2		2	50		50**
IV	21CEUJ07	SEC	**Online Courses**		1			-	-	C/NC≠
IV	21CEUJ08	SEC	**SDR-Student Development Report**	2*	-	-	-	-	-	-
Total				**24**	**24**	12	**Track1**	**370**	**330**	**700**
							Track2	**390**	**310**	
			Semester–VI							
III	21CEU29	DSE	**Electives-DSE- III**	4	5	-	-	30	70	100
III	21CEU30	DSE	**Electives- DSE - IV**	4	5	-	-	30	70	100
III	21CEU31	SEC	**Project Work / Student Research/Paper**	5	5			40	60	100
III	21CEU32	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 40	Not Satisfactory=Not completed

- Part IV& V not included in total marks and CGPA calculation.
- **I.E**-Internal Exam
- **E.E**-External Exam
- **J**-Job Oriented Course
- **E**– Open Elective Papers

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 EqualityDisaster 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	Digital Marketing E Learning

Semester	Track -1		Track - 2	
	Sub. Code	Title of the Paper	Sub. Code	Title of the Paper
I	21CEU02	Computer System Architecture	21CEIU02	Software Foundation Program Using C++
II	21CEU06	Data Structures and Algorithms	21CEIU06	Data Visualization

Track 1 - Regular

Track 2 – Industry Integrated (IBM Artificial Intelligence)

List of Elective Papers / DSE (Can choose any one of the paper as electives)		
	Course Code	**Title**
Electives/ **DSE-I**	**21CEU22A**	**Elective I:** Artificial Intelligence and Expert Systems
	21CEU22B	**Elective I:** Software Testing
Electives/ **DSE-II**	**21CEU28A**	**Elective II:** Data Mining and warehousing
	21CEU28B	**Elective II:** Enterprise Resource Planning
Electives/ **DSE-III**	**21CEU29A**	**Elective III:** Cloud Computing
	21CEU29B	**Elective III:** Mobile Applications
	21CEU29C	**Elective III:** Block Chain Technology
Electives/ **DSE-IV**	**21CEU30A**	**Elective IV:** Big Data Analytics
	21CEU30B	**Elective IV:** Internet of Things
	21CEU30C	**Elective IV:** Cyber Security

Syllabus Coordinator

BOS- Chairman/Chairperson

Academic Council - Member Secretary

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

PRINCIPAL

PRINCIPAL
Hindusthan College of Arts and Science
Hindusthan Gardens, Behind Nava India
Coimbatore - 641 028

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 core 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 science** 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 DSC- III & DSC- 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 / Kulangal Pathukappu Amaipu /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 –I	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 QP is objective pattern (25x1=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)

UG PATTERN

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 16 to 20) (One question from each Unit)

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

Sec–A (10x1=10marks)	All Questions will be in K1 Level
Sec–B (5x6=30marks) Either or type	4 Questions will be in K1 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-II (Industry Integrated Program with IBM Artificial Intelligence)

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 based 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

Course Code:	21CEU01	Course Title						Batch:	2021-2022 & onwards
		Programming with C						Semester:	I
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVE

- 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

21CEU01	Programming with C	Sem: 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

Web Link:

1. *https://www.tutorialspoint.com/cprogramming/index.html*

MAPPING WITH PROGRAM OUTCOMES

CO \ PO	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-coordinator
Mr.M.Karthi	Dr. R Rangaraj	

Dr.R.Rangaraj
M.Sc.(CS),M.Phil.,Ph.D.,M.Sc(Psy).
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Course Code:	21CEU02	Course Title						Batch:	2021-2022 & Onwards
		Computer System Architecture						Semester:	I
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVE

- 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

COURSE OUTCOMES (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

21CEU02	Computer System Architecture	Sem: I
Unit No.	**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 T flip-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

Teaching methods:

PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOK

1. *M. Morris Mano, "Computer System and Architecture", Pearson Education, Third Edition, (30 June 2017).*

REFERENCE BOOKS

1. *Badri Ram, "Advanced Microprocessors and Interfacing", TMH, 2012.*
2. *W. Stallings, "Computer Organization & Architecture", Pearson Education, 8th Edition.2012.*
3. *M. Carter ,"Computer Architecture", Schaum„s outline series, TMH, Special Indian Edition.*

WEB RESOURCES

Web Link:

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/*

MAPPING WITH PROGRAM OUTCOMES

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

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	Dr. R Rangaraj	

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Co-ordinator
Curriculum Development Cell
Hindusthan College of Arts & Science,
Coimbatore-641 028.

Course Code:	21CEIU02	Course Title						Batch:	2021-2022 & Onwards
		Software Foundation Program Using C++						Semester:	I
Hrs/Week:	4	L	4	T	-	P	-	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	Recall the 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

K1- Remember, K2-Understand, K3-Apply, K4-Analyze

SYLLABUS

21CEIU02	Software Foundation Program Using C++	Sem: 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

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"by BjarneStroustrup,Addison Wesley,4th edition, ,2013*

WEB RESOURCES

Web Link:

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

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

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
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Course Code:	21CEU03	Course Title						Batch:	2021-2022 & onwards
		Practical – I : Programming using C						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

SYLLABUS

21CEU03	Practical - I : Programming Using C	Sem: 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

CO \ PO	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-coordinator
Mr.M.Karthi	Dr.R Rangaraj	

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Course Code:	21CEU05	Course Title						Batch:	2021-2022 & onwards
		Python Programming						Semester:	II
Hrs/Week:	4	L	4	T	-	P	-	Credits:	4

COURSE OBJECTIVE:

- To describe the Fundamental elements of Python programming basics and paradigm.
- To Discover the Knowledge on functions and pass arguments in Python.
- To Relate about List, Dictionaries, Tuples and Files.
- Solve the problems using String Concepts.
- 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

SYLLABUS

21CEU05	Python Programming	Sem: 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 froma 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.Howto 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

Web Link:

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

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	Dr.R Rangaraj	

Dr.R.Rangaraj
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Course Code:	21CEU06	Course Title						Batch:	2021-2022 & Onwards
		Data Structures and Algorithms						Semester:	II
Hrs/Week:	4	L	4	T	-	P	-	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.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	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

21CEU06	Data Structures and Algorithms	Sem: II
Unit No.	**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 - Polyphase Merge.	**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

Teaching methods:

PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOK

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

REFERENCE BOOKS

1. *MarkAllenWeiss,"DataStructure and Algorithm analysis in ",Pearson Education, Second Edition, Sixteenth Impression 2014.*
2. *Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi, 2006.*
3. *Reema Thareja, "Data Structures using C", Second Edition, Oxford University Press, 2011.*

WEB RESOURCES

Web Link:

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/*

MAPPING WITH PROGRAM OUTCOMES

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

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
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Course Code:	21CEIU06	Course Title						Batch:	2021-2022 & Onwards
		Data Visualization						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

K1- Remember, K2-Understand, K3-Apply, K4-Analyze

SYLLABUS

21CEIU06	Data Visualization	Sem: 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

IBM Course ware

REFERENCE BOOKS

1. *Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython" Oreilly, 20112.Andreas C. Muller, Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists",Oreilly, 2016*

WEB RESOURCES

Web Link:

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 Artificial Intelligence) pattern of Internal and External Assessment, as mentioned in the Regulations.

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
IBM	Dr R Rangaraj	

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Course Code:	21CEU07	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 concept in Python Programs.	K3
CO3	Analyze and apply Data structure concepts using python programming.	K4
CO4	Develop applications using Object oriented Programming.	K5
CO5	Develop application for Bio computing	K5

K1- Remember, K2-Understand, K3-Apply, K4-Analyze

SYLLABUS

21CEU07	Practical II: Programming Using Python	Sem: 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

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
Dr.P.Lalitha	Dr. R Rangaraj	

Dr.R.Rangaraj
M.Sc.(CS),M.Phil.,Ph.D.,M.Sc(Psy).
Professor & Head,
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Co-ordinator
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Coimbatore-641 028.

Course Code:	21CEU08	Course Title						Batch:	2020-2021 & Onwards
		Computer Installation and Service						Semester:	II
Hrs/Week	3	L	3	T	-	P	-	Credits:	3

COURSE OBJECTIVE

- To enable the student understand the different components of the computer
- To enable the student install various hardware devices.
- To enable the students know the basic installation process in a PC
- To enable the students understand the various parts of a motherboard.
- To enable the students work with various parts of the hardware

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Recognize technology ethically, safely, securely, and legally.	K1
CO2	Identify and analyze computer hardware, software, and networkcomponents.	K2
CO3	Develop basic hardware components using current codingstandards for business.	K3
CO4	Classify software and hardware.	K4
CO5	Devise software and hardware	K4

K1- Remember, K2-Understand, K3-Apply, K4-Analyze

21CEU08	Computer Installation and Service	Sem: II
Unit No.	**Topics**	**Hours**
I	**Pc System:** Evolution of PC to Pentium, Personal Computer System -Functiona Blocks-System Unit-Display Unit-Keyboard. Inside PC: Motherboard Functiona Blocks.	7
II	**On-Board Memory:** PCs Memory Organization : External Memory: Floppy Disk Floppy Disk Drive - Floppy Disk Controller - Hard Disk: Hard Disk Drive Sub Assemblies-Hard Disk Controller, MMX: CD-ROM Disk-CD-ROM Drive-DVD.	8
III	**Input Devices:** Keyboard – Mouse - Scanner-Digitizer – Digital Camera. Outp Devices - Monitors and Adapters - CRT-VGA – Digital Display Technology – CRT Controller – Graphic Cards.	7
IV	**Computer Installation:** Power supply – PC Installation Troubleshooting and Services: POST – Troubleshooting the Motherboard - Troubleshooting the Keyboard.	7
V	**Computer Maintenance:** Computer Virus – Virus Prevention Techniques - Antivirus Software Packages – Firewalls Computers and Communication Networking: LAN-WAN-Network Component, MODEM .	7

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

Teaching methods:

Lecturing, PowerPoint Projection through LCD, Assignment, Discussion and Activity.

TEXT BOOK

1. *D.Balasubramaniam, "Computer Installation and Servicing", Tata McGraw-Hill, Second Edition, 2005.*

REFERENCE BOOKS

1. *M.Radhakrishnan," Computer Installation and Troubleshooting", ISTE- Learning Materials 2001.*
2. *B.Govind rajalu, "IBM PC and CLONES", Tata McGraw hill Publishers, 2002.*
3. *James K.L, "Computer Hardware: Installation, Interfacing, Troubleshooting and Maintenance", PHI, 2013.*

WEB RESOURCES

Web Link:

1. *https://www.geeksforgeeks.org/computer-network-tutorials/*

MAPPING WITH PROGRAM OUTCOMES

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

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
V Deepa	Dr R Rangaraj	

Dr.R.Rangaraj
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OPEN ELECTIVE - I

Course Code:		Course Title						Batch:	2021-2022 & onwards
		Digital Marketing						Semester:	I
Hrs/Week:	3	L	3	T	-	P	-	Credits:	2

COURSE OBJECTIVE:

- To provide knowledge on basic marketing concepts.
- To classify the working with digital relationship marketing.
- To build the confluence of marketing, operations and human resources in real time delivery.
- To examine and evaluate issue in adapting globalised markets .
- To Implement Knowledge Analytics of Digital Marketing.

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Remember and Comprehend basic marketing concepts.	K1
CO2	Classify the importance of conversion and working with digital relationship marketing.	K2
CO3	Build the confluence of marketing, operations, and human resources in real-time delivery.	K3
CO4	Examine and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked.	K4
CO5	Implement Knowledge Analytics of Digital Marketing	K4
K1- Remember, K2-Understand, K3-Apply, K4-Analyze		

SYLLABUS

	Digital Marketing	Sem: I
Unit No.	**Topics**	**Hours**
I	Principles of Digital Marketing: Basics of Marketing-What is Digital Marketing?-Comparison of Traditional and Digital Marketing-Statistics of Digital Marketing- Benefits of Digital marketing-Latest Digital marketing trends.	7
II	Digital marketing platforms-Digital Marketing strategy for websites-Career opportunities in digital marketing	7
III	Social Media Marketing: Introduction to social media Marketing-Facebook marketing-Facebook advertising-YouTube marketing-Twitter marketing-LinkedIn marketing-Instagram Marketing-Document Sharing Site Email Marketing: What is Email Marketing-Benefits of email marketing-Basic terminology in email marketing-Email Marketing software.	8
IV	Google AdSense and Affiliate Marketing: Online money earning strategies-Success stories of online entrepreneurs-Planning a website for Adsense-What is Adsense?-Types of Bidding-Implementing Ads in a Website.	7
V	What is Affiliate Marketing-Types of Affiliate Marketing-Making Money using Affiliate Marketing-Popular Affiliate Networks-Freelancing Business Strategies.	7

Teaching methods:

Lecturing, PowerPoint Projection through LCD, Assignment, Discussion

TEXT BOOKS

1. *Kevin Urrutia & Wilson Lin, "Digital Marketing Made Easy", FORBES, Kindle Edition.*

REFERENCE BOOKS

1. *"Digital Marketing For Dummies",Ryan Deiss & Russ Henneberry,Publisher: John Wiley & Sons, Inc.,*

WEB RESOURCES

Web Link:

1. *https://blendinfotech.com/digital-marketing-course-syllabus/India*
2. *https://www.deccansoft.com/Documents/SyllabusDocs/7f53e17e-b4a1-45d2-b3b0-bafd2a504d27_Syllabus_of_Digital_Marketing.pdf*

MAPPING WITH PROGRAM OUTCOMES

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

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
Mr.G.Ravishankar	Dr R Rangaraj	

Dr.R.Rangaraj
M.Sc.(CS),M.Phil.,Ph.D.,M.Sc(Psy).
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Course Code:		Course Title						Batch:	2021-2022 & Onwards
		E Learning						Semester:	I
Hrs/Week:	3	L	3	T	-	P	-	Credits:	2

COURSE OBJECTIVE:

- To learn various E-Learning Techniques
- To learn the concept of E-Learning
- To apply the deployment of E-Learning
- To examine issues in E-Learning
- To evaluate issues in E-Learning

COURSE OUTCOMES (CO)

S.No	COURSE OUTCOME	BLOOMS LEVEL
CO1	Find knowledge about the various E-learning Techniques	K1
CO2	Explain the importance of E-learning	K2
CO3	Apply the deployment of E-learning	K3
CO4	Examine issues in E-learning	K4
CO5	Evaluate issues in E-learning	K4

K1- Remember, K2-Understand, K3-Apply, K4-Analyze

SYLLABUS

	E Learning	Sem: I
Unit No.	**Topics**	**Hours**
I	**E-Learning – Introduction** History of E-Learning, Benefits of E-Learning, Unleashing E-Learning, E-Learning for Whom, E-Learning Checklist, Benefits of E-Learning , Methods of E-Learning	7
II	Strategies of E-Learning Process of E-Learning: Knowledge Acquisition and Creation, Sharing of Knowledge, Utilization of Knowledge – E-Learning Instructional Grounds: Behaviourism, Cognitivism and Constructivism.	7
III	**Potential of E Learning** Advantages And Disadvantages of E-Learning, Preparing for E-Learning , Types of E-Learning Training, Benefits of E-Learning for Organization	8
IV	**Deployment of E Learning and Tools** Using an LMS, Learning theories, Application of Learning theory (education) to E-Learning, Teacher use of technology, Exemplification of E Learning tools	7
V	Future of E-learning Technology 21st Century Education – Challenges of Distance Education – Electronic Media in Distance Education – Open Educational Resources / Open Learning – Internet in Distance Education – Virtual University System.	7

Teaching methods

Lecturing, PowerPoint Projection through LCD, Assignment.

TEXT BOOK

1. *Dr.S.Sasikala, "Perspectives of E-Learning", TPH Publishers.*
2. *E-Learning Concepts and Practice, Bryn Holmes and John Gardiner, Pine Forge Press, 2006.*
3. *The Integrated Technology Classroom, Joan Riedl, Allyn and Bacon, 1995.*

REFERENCE BOOKS

1. *W. Allen, " Guide to E-Learning: Building Interactive, Fun, and Effective Learning Programs for Any Company", KOBO*
2. *Richard E. Mayer and Ruth C. Clark, E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning, Wiley*

WEB RESOURCES

Website Link:

https://elearningindustry.com/deploy-effective-corporate-compliance-training-with-user-friendly-lms-free-ebook

MAPPING WITH PROGRAM OUTCOMES

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