

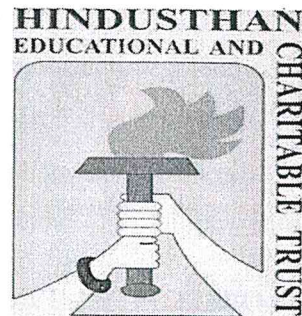
**LEARNING OUTCOMES-BASED CURRICULUM
FRAMEWORK (LOCF)**

in the

UNDERGRADUATE PROGRAMME

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

**FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2022-2023 AND ONWARDS**



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 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 industry and society by enhancing innovations, problem solving skills, leadership qualities, team spirit and ethical responsibilities.

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 computer education and there by the employability of the students is ensured.

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 of the 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-OPERATIVE 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 2022-2023 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	22LAT01/ 22LAH01/ 22LAM01/ 22LAF01	MIL	Tamil-I / Hindi-I/ Malayalam-I/ French-I	4	6		3	50	50	100
II	22ENG01	AECC	English-I	4	6		3	50	50	100
III	22CEU01	DSC	Core-I Programming with C	4	4		3	50	50	100
III	22CEU02	DSC	Track-1 Core-II	4	4		3	50	50	100
	22CEU02		Track-2 Core-II					50	50	
III	22CEU03	DSC	Core-III Practical – I : Programming using C	2		4	3	50	50	100
III	22CEU04	GE	Allied-I Mathematics for Computing	4	5		3	50	50	100
IV	22CEUE01	AEE	Open Elective-I	2	3		3	100		100
IV	22GSU01	AECC	Environmental Studies	1	2		2	50	-	50
IV	22CEUV01	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	450	300	750
							Track2	450	300	
Semester-II										
I	22LAT02/ 22LAH02/ 22LAM02/ 22LAF02	MIL	Tamil-II/ Hindi-II/ Malayalam-II/ French-II	4	6		3	50	50	100
II	22ENG02	AECC	English-II	4	6		3	50	50	100

III	22CEU05	DSC	Core-IV Python Programming	4	4		3	50	50	100
III	22CEU06	DSC	Track-1 Core-V					50	50	100
	22CEU06		Track-2 Core-V	4	4		3	50	50	
III	22CEU07	DSC	Core-VI Practical – II : Programming using Python	2		4	3	50	50	100
III	22CEU08	DSC	Core -VII Computer Installation and Service	3	3		3	50	50	100
III	22CEU09	GE	Allied-II Numerical Methods	4	5		3	50	50	100
III	22CEU10	SEC	Internship/ Industrial Visit/ Mini Project	1	-	-		100		100
IV	22CEUV02	SEC	VAC-II/Life Skills-II@/ Language	1*	2		2	50		50**
IV	22CEUJ01	SEC	Aptitude/ Placement Training	Grade*	2		2	50		50**
Total				26	32	4	Track1	450	350	800
							Track2	450	350	
			Semester-III							
III	22CEU11	DSC	Core-VIII Programming with JAVA	5	5		3	50	50	100
III	22CEU12	DSC	Track-1 Core-IX					50	50	100
	22CEU12		Track-2 Core-IX	5	5		3	50	50	
III	22CEU13	DSC	Core -X Practical – III : Programming using JAVA	3		5	3	50	50	100
III	22CEU14	DSC	Core -XI Practical – IV : Web Design	3		5	3	50	50	100
III	22CEU15	DSC	Core -XII Computer Networks	3	3		3	50	50	100
III	22CEU16	GE	Allied-III Operations Research	4	5		3	50	50	100

IV	22CEUE02	AEE	Open Elective-II	2	3		3	100		100
IV	22GSU02	AECC	Human Rights	1	2		2	50		50
IV	22CEUJ02	SEC	Aptitude/Placement Training	Grade*	2		2	50		50**
IV	22CEUJ03	SEC	Online Course	-	1			-	-	C/NC [‡]
Total				26	26	10	Track1	450	300	
							Track2	450	300	750
Semester-IV										
III	22CEU17	DSC	Core -XIII Relational Database Management System	5	5		3	50	50	100
III	22CEU18	DSC	Track-1 Core -XIV					50	50	100
	22CEU18		Track 2 Core -XIV	5	5		3	50	50	
III	22CEU19	DSC	Core -XV Practical - V: RDBMS Applications	3		5	3	50	50	100
III	22CEU20	DSC	Core -XVI Practical- VI : Software Testing	3		5	3	50	50	100
III	22CEU21	GE	Allied-IV Business Accounting	4	5		3	50	50	100
III	22CEU22	DSE	Electives / DSE-I	4	4		3	50	50	100
III	22CEU23	SEC	Internship/ Institutional Training / Mini-Project	1	-		-	100	-	100
IV	22CEUV03	ACC	VAC-III	1*	2		2	50	-	50**
IV	22CEUJ04	SEC	Aptitude/ Placement Training	Grade*	2		2	50		50**
IV	22CEUJ05	SEC	Online Course	-	1		-	-	-	C/NC [‡]
IV	22GSU03	AECC	Internet Security	1	2		2	50	-	50
V	22GSU04	AECC	Extension Activities/ NSS/NCC/SPORT S/YRC/SIS/SA#	2	-		-		-	C/NC [‡]
Total				28	26	10	Track1	450	300	
							Track2	450	300	750

			Semester-V							
III	22CEU24	DSC	Track- I Core-XVII	5	5		3	50	50	100
	22CEU24		Track-2 Core -XVII					50	50	
III	22CEU25	DSC	Track-1 Core-XVIII	5	5		3	50	50	100
	22CEU25		Track-2 Core-XVIII					50	50	
III	22CEU26	DSC	Core -XIX Practical – VII : Programming using .NET	3		6	3	50	50	100
III	22CEU27	DSC	Core- XX Practical - VIII Open Source Tools	3		6	3	50	50	100
III	22CEU28	DSE	Electives / DSE-II	4	5		3	50	50	100
IV	22CEUE03	AEE	Open Elective-III	2	3		3	100	-	100
IV	22GSU05	AECC	General Awareness	1	1		2	50	-	50
IV	22GSU06	AECC	Law of Ethics	1	-		2	50	-	50
IV	22CEUV04	ACC	VAC-IV	1*	2			50	-	50**
IV	22CEUJ06	SEC	Aptitude/ Placement Training	Grade*	2		2	50		50**
IV	22CEUJ07		Online Courses		1			-	-	C/NC ^z
IV	22CEUJ08	SEC	SDR-Student Development Report	2*	-	-	-	-	-	-
Total				24	24	12	Track1	450	250	700
							Track2	450	250	
			Semester-VI							
III	22CEU29	DSE	Electives-DSE- III	4	5	-	-	50	50	100
III	22CEU30	DSE	Electives-DSE - IV	4	5	-	-	50	50	100
III	22CEU31	DSC	Core-XXI Self-Study Course	3	-	-	3	50	50	100
III	22CEU32	SEC	Project Work / Student Research/Paper	5	5			50	50	100
Total				16	15			200	200	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)
- Grade-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% (Both Internal and External)

ABSTRACT FOR SCHEME OF EXAMINATION

(For the candidates admitted during the academic year 2022-2023 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	77	100	2100
	Allied /GE	4	4	16	100	400
	Electives/DSE	4	3/4	16	100	400
	Project SEC	1	5	5	100	100
	Internship/Institutional Training/Mini-Project	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 Campus to Corporate Start up Business Research Methodology and IPR General Studies for Competitive Examinations IIT JAM Examination (for Science only) CUCET Examination
VAC Papers	Digital Marketing E Learning MongoDB Project Management
Courses offered by the Departments to other Programmes	Digital Marketing E Learning

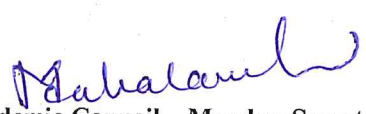
Track 1 - Regular


Track 2 - Industry Integrated (IBM Artificial Intelligence)

Semester	Track - 1		Track - 2	
	Course Code	Title of the Course	Course Code	Title of the Course
I	22CEU02	Computer System Architecture	22CEIU02	Software Foundation Program Using C++
II	22CEU06	Data Structures and Algorithms	22CEIU06	Data Visualization

List of Elective Papers / DSE (Can choose any one of the paper as electives)		
	Course Code	Title
Electives/ DSE-I	22CEU22A	Elective I: Artificial Intelligence and Machine Learning
	22CEU22B	Elective I: Software Testing
Electives/ DSE-II	22CEU28A	Elective II: Data Mining and warehousing
	22CEU28B	Elective II: Enterprise Resource Planning
Electives/ DSE-III	22CEU29A	Elective III: Cloud Computing
	22CEU29B	Elective III: Mobile Applications
	22CEU29C	Elective III: Block Chain Technology
Electives/ DSE-IV	22CEU30A	Elective IV: Big Data Analytics
	22CEU30B	Elective IV: Internet of Things
	22CEU30C	Elective IV: Cyber Security


Syllabus Coordinator


Academic Council – Member Secretary


BOS – Chairman/Chairperson

Head of the Department
Dept. of Computer Science,
Hindusthan College of Arts & Science
Coimbatore - 641 028


PRINCIPAL

PRINCIPAL

Hindusthan College of Arts & Science (Autonomous),
Hindusthan Gardens, Behind Nava India,
Coimbatore - 641 028.

UG - Scheme of Evaluation (Internal & External Components)

(For the students admitted during the academic year 2022-2023 and onwards)

1. Internal Marks for all UG

Components	Marks
Test I	10
Test II	10
Model Exam	10
Assignment	5
Attendance*	5
Internal Assessment components **	10
TOTAL	50

*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

** List of components for Internal Assessment (MCQ Compulsory)

S.No	Components
1	Multiple choice questions
2	Club activities
3	Assignment
4	Seminar

(Any two components from the above list with five marks each will be calculated
.2x5=10 marks)

2. a) Components for Practical I.E.

Components	Marks
Test -I	15
Test - II	15
Observation	10
Application*	10
Total	50

b) Components for Practical E.E.

Components	Marks
Experiments/Exercise	40
Record	5
Viva	5
Total	50

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	25	-	I.E: a)Attendance	20	50
Report	50	50	b)Review/Work diary*	30	
Viva-voce	25	50			
Total	100	100	E.E** a) Evaluation	30	50
			b)Viva-voce	20	
			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 50 x 1/2 = 25 Marks]	50

6. Guidelines for open Elective (Part IV)

Components	Marks
Two Tests (each 2 hours) of 50 marks each [5 out of 8 descriptive type questions 5 x 10 = 50 Marks]	100

7. Value Added Courses and 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 7 are to be treated as 100% Internal papers.
4. For item No.7, Tests conducted through online modules (Google Form/any other)
5. Item No.2: * - Application should be from the relevant practical subject other than the Listed programmes. It must be enclosed in the practical record.

UG PATTERN
QUESTION PAPER PATTERN FOR CIA I and CIA II EXAM

Reg.No:-----

Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS & 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 6 = 24 marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(Q.No: 7 to 10 Either Or type)

SECTION - C (2x10 = 20 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 & 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** Questions

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)

Blue Print of Question Paper for all UG Programmes

(For the academic year 2021-22, 2022-23)

FOR CIA I, CIA II - QUESTION PATTERN

Max. Marks: 50

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 6	MCQ/ True or False/ Fill up	6	6	1 (6x1=6)	All Questions will be K1
B	7 to 10	Either or Type (a or b)	8	4	6 (4x6=24)	4 Questions will be in K2 4 Questions will be in K3
C	11 to 13	Open choice	3	2	10 (2x10=20)	1 Question will be in K3 2 Question will be in K4

FOR MODEL/ESE - QUESTION PATTERN

Max. Marks:70

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 10	MCQ/ True or False/ Fill up	10	10	1 (10x1=10)	All Questions will be K1
B	11 to 15	Either or Type (a or b)	10	5	6 (5x6=30)	6 Questions will be in K2 4 Questions will be in K3
C	16 to 20	Open choice	5	3	10 (3x10=30)	2 Question will be in K3 3 Question will be in K4

(For the academic year 2020-21)

FOR CIA I, CIA II - QUESTION PATTERN

Max. Marks:50

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 6	MCQ/ True or False/ Fill up	6	6	1 (6x1=6)	All Questions will be K1
B	7 to 10	Either or Type (a or b)	8	4	5 (4x5=20)	4 Questions will be in K2 4 Questions will be in K3
C	11 to 13	Either or Type (a or b)	6	3	8 (3x8=24)	3 Question will be in K3 3 Question will be in K4

FOR MODEL/ESE - QUESTION PATTERN

Max. Marks:70

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 10	MCQ/ True or False/ Fill up	10	10	1 (10x1=10)	All Questions will be K1
B	11 to 15	Either or Type (a or b)	10	5	4 (5x4=20)	6 Questions will be in K2 4 Questions will be in K3
C	16 to 20	Either or Type (a or b)	10	5	8 (5x8=40)	5 Question will be in K3 5 Question will be in K4

Blue Print of Question Paper

Distribution of section-wise marks with K levels for UG 2021-22, 2022-23

CIA							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A -MCQ/T or F /Fill up	6				6	6	6x1=6
B - Either or type		4	4		8	4	4x6=24
C - Open choice			1	2	3	2	2x10=20
Total Marks	6	24	34	20			84
% of marks without choice	7.14	28.57	40.48	23.81			100

Model Exam							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A- MCQ/T or F/ Fill up	10				10	10	10x1=10
B - Either or type		6	4		10	5	5x6=30
C - Open choice			2	3	5	3	3x10=30
Total Marks	10	36	44	30			120
% of marks without choice	8.33	30	36.67	25			100

Distribution of section-wise marks with K levels for UG (2020-21)

CIA							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A MCQ/T or F/ Fill up	6				6	6	6x1=6
B - Either or type		4	4		8	4	4x5=20
C - Either or type			3	3	6	3	3x8=24
Total Marks	6	20	54	24			104
% of marks without choice	5.77	19.23	51.92	23.08			100

Model Exam							
Sec.	K1	K2	K3	K4	Total questions	Questions to be answered	Total marks
A MCQ/True or False/ Fill up	10				10	10	10x1=10
B - Either or type		6	4		10	5	5x4=20
C - Either or type			5	5	10	5	5x8=40
Total Marks	10	24	56	40			130
% of marks without choice	7.69	18.46	43.08	30.77			100

UG Programme Regulations for the academic year 2022-2023

1. Internal marks components for the candidates admitted from the academic year 2022-2023 and onwards is as follows.

For Theory courses

Components	Marks
Test I	10
Test II	10
Model Exam	10
Assignment	5
Attendance	5
Internal Assessment components	10
TOTAL	50

For Practical courses

Components	Marks
Test -I	15
Test - II	15
Observation/Exercise	10
Application*	10
TOTAL	50

2. The pattern of the question paper for External Examination will be maximum of 70 marks for theory courses, the marks obtained will be converted into 50 as per the scheme.
3. Passing minimum for all UG programme is 40% in Internal and 40 % in External and the composition of total 40 marks out of 100 marks.
4. Internship / Institutional Training / Mini-Project is related to the discipline. The students can be permitted to complete the Internship / Institutional Training / Mini-Project before the end of First year (end of II semester) and before the end of the second year (end of IV semester) and submit a report.

Internship / Institutional Training	Duration: Not more than seven days
Mini project	During the course of study for not more than seven days.

5. 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. Distribution of marks for major project for all UG programme will be 50:50 pattern for both Internal and External in total of 100/200 marks.
6. Two tests for fully internal subjects should be conducted during CIA-I and CIA -II by the department.
7. Retest for the failure candidates in CIA I or CIA II or Part IV or Part V or Extra credit courses should be conducted during the model examination after getting approval from the COE office. The candidates who are not able to complete the minimum pass mark in internal components even getting chance of reappearance, will be treated as arrear candidates.
8. For the Theory cum Practical blended courses, 50:50 Internal and External pattern will be followed for theory examination and Fully internal pattern will be followed for Practical examination. For theory part, External examination will be conducted as regular pattern (max of 70 marks) and it will be converted into 25 marks.

Course	Internal Marks		External marks		Total marks (Max. marks 50)	
	Min.	Max.	Min.	Max.	Min.	Max.
Theory	10	25	10	25	20	50
Practical	20	50	-		20	50

For Practical components for Theory cum Practical courses (Fully Internal)

Components	Marks
Test I	10
Test II	10
Experiment/Excercise	20
Record	5
Viva	5
Total	50

The Internal mark 50 will be converted into 25.

9. For the candidates admitted under the Fast Track System (FTS) must register their names to their concerned department heads and get approval from the COE office at the beginning of the III semester.
10. Students who are not willing to select the Project/Research work in Semester VI, can chose the theory papers offered by their departments as per the prescribed theory pattern.
11. Self Study will be a Core Paper of the department for which the examination pattern will be as like part III courses is followed.
12. 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.
13. SDR – Student Development Report to be received by the department from the students till end of the fifth semester. (Evidences of Curricular activities and Co-curricular activities)
14. For online courses minimum of 2 certificates in any of the online platform is mandatory.
15. Open elective courses:
Departments can offer list of subjects which teaches moral ethics to the young community for the better future. The topics relevant to Indian ethics, Culture, Women rights, Yoga, Green farming, Indian constitution etc., as an open elective courses. These courses can be offered by the department or other department as inter department courses. Marks earned for this courses will not be included for CGPA calculations.

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.

Regulations of Fast Track System (FTS)

- From the academic year 2021-22, our college is offering Fast Track System (FTS) for all UG and PG programmes. In this system, we are offering two courses under the course type of Discipline Specific Elective (DSE) in the sixth semester for all UG programmes and fourth semester for all PG programmes, which are equivalent and related with **National Programme on Technology Enhanced Learning/Study Webs of Active-Learning for Young Aspiring Minds (NPTEL/SWAYAM)** courses.
- The students have the option of taking two subjects of the sixth semester of their programme through NPTEL/SWAYAM portal from the list given by NPTEL and can complete the online course before fifth semester and submit the received original certificates to the COE office for getting approval. If the student completes these courses before the beginning of the sixth semester (UG)/fourth semester (PG), the candidate can be considered and exempted to write the examination from the assigned DSE courses in the sixth semester/fourth semester. They should complete only the self study course and project work during the VI/IV semester as assigned in the scheme. The candidate who completes the online courses and submits the successful course completion credentials, the credit transfer will be considered as per our Scheme of Examination for qualifying the degree. **The minimum duration of the registered online course must be 12 weeks.** Course duration of less than 12 weeks will not be considered.
- For all PG programmes, the candidates who were admitted during the academic year 2021-2022 under the Fast track system, for the self study course, the internal mark component will be as follows. For others regular internal pattern follows.

TEST	Max. Marks	Mode
CIA I	50 (50x1=50)	Online objective type
Model Exam.	50 (50x1=50)	Online objective type

Out of these two tests, the total marks will be converted into 40 marks as Internal.

- For all UG programmes, the candidates who were admitted during the academic year 2021-2022 under the Fast track system, for the self study course, the internal mark component will be as follows. For others regular internal pattern follows.

TEST	Max. Marks	Mode
CIA I	50 (50x1=50)	Online objective type
CIA II	50 (50x1=50)	Online objective type
Model Exam.	50 (50x1=50)	Online objective type

Out of three tests, the total mark will be converted into 30 marks as Internal.

- For the students admitted in Fast Track System, must enroll their names to the concerned department heads and get approval from the COE office at the beginning of III semester for all UG Programmes and at the beginning of II semester for all PG programmes.
- The students who cleared and got certified for online courses under the fast track system, the grade obtained will be converted into average marks of range. The received certificates must be submitted to the COE office for approval of the Controller and the Principal. The FTS courses will be treated as fully external.

Track – II (Industry Integarted Program with IBM Artificial Intelligence)

Departments : B.sc CT , B.sc CS

Subject: Software Foundation With C ++ Programming

Internal Exam: Total 50 marks

Components	Marks
Two test	10
Model	10
Industry Case Studies	10
Projects	10
Practical	10
Total	50

1.) Internal Exam: 10 marks

Two internals will be conducted for 30 marks. Both the exam marks will be converted to 10 marks.

Internal: 30 marks

2marks: $5 * 2 = 10$ (Description type)

5marks: $4 * 5 = 20$ (problem Solving)

Total : 30 marks

2)Model Exam: 10 marks

one model will be conducted for 50 marks. The exam marks will be converted to 10 marks.

1 marks: $10 * 1 = 10$ (MCQ)

5marks: $6 * 5 = 30$ (problem Solving)

10 marks: $10 * 1 = 10$ (Use Cases)

Total : 50 marks

2.) Industrial case studies:: 10 marks

One Industry Case study will be given in the semester which will be like a use case.

3.) Projects: 10 marks

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

4.) Practical: 10 marks

Practical exercises will be done in the lab-based on scenario-based questions. The evaluation will be done based on the student's input in the lab and viva

External exam: 50 marks

Two marks: $5 * 2 = 10$ (Description type)

Ten marks : $4 * 10 = 40$ (Problem solving)

Total: 50 marks

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.Sc CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22CEU01	Core-I Programming with C	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- The course is oriented to those who want to advance structured and procedural programming
- Understanding and improving C programming skills.
- The major objective is to provide students with an understanding of code organization and functional hierarchical decomposition by using complex data types.
- Students will be able to develop logics that will help them to create programs, and applications in C.
- To practice the fundamental programming methodology via lab program experiences.

Unit	Course Contents	Hours	K Level
I	Overview of C: History of C – Importance of C – Basic Structure of C – Programming style. Introduction to C: Introduction –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.	10	Upto K4
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-String function.	10	Upto K4
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	Upto K4
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	9	Upto K4

	a file-I/O operation on files- Random access to files- Command line arguments.		
V	Dynamic Memory Allocation and Linked List: Introduction-Allocating a block of memory-Multiple blocks 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	Upto K4

Note : The Questions should be asked in the ratio of 20% of programs and 80 % of Theory.

Book for Study

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

Books for Reference

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
4. K N King, " C Programming A modern Approach", Second Edition.
5. Ashok N. Kamathane, "Computer Programming", ITL Education Solutions Limited

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/>

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

The rationale for Nature of the Course: Can be professionals in programming and logical solving skills.

Activities to be given

1. Logical thinking for complex problems:
2. Prepare concept-wise programs to develop programming skills.
3. Preparing the students for technical Exercises and programs to attend and clear interview rounds.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Illustrate and Experiment the fundamental concept of C	Upto K4
CLO2	Select the suitable loops and decision making statements to solve problems	Upto K4
CLO3	Analyze the concepts of arrays and string handling function	Upto K4
CLO4	Differentiate structures and unions	Upto K4
CLO5	Explain the concepts of Pointers and Files	Upto K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7
CLO 1	3	2	2	2	3	3	3
CLO 2	3	2	2	2	3	3	2
CLO 3	3	3	2	2	3	3	3
CLO 4	3	2	2	2	3	3	3
CLO 5	3	2	2	2	3	2	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
Mr.Karthi M	Dr Rangaraj R	

Head of the Department
Dept.of Computer Science,
Mindusthan College of Arts & Science,
Coimbatore - 641 028.

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

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.Sc CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22CEU02	Core-II Computer System Architecture	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- 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, I/O and Memory.
- Inculcate knowledge on multiprocessor concepts

Unit	Course Contents	Hours	K Level
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 Fop.	9	Upto K4
II	Digital Components: Integrated Circuits- Decoders- NAND Gate Decoder- Decoder Expansion- Encoders- Multiplexers- Memory Unit- Random-Access Memory -Read-Only Memory-Types of ROMs.	10	Upto K4
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 C180 Comparison of RISC and CISC. Pipeline and Vector Processing: Parallel processing - Pipelining - Arithmetic Pipeline - Instruction Pipeline - RISC Pipeline - Vector Processing.	10	Upto K4
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	Upto K4
V	Memory Organization: Memory Sub System- Memory hierarchy – Main memory - Auxiliary memory - Flash memory - Associative memory – Cache memory - Virtual memory. Multiprocessors: Characteristics- Intel-processor Arbitration- Interprocessor Communication and Synchronization- Cache Coherence Self Study 5 Intel 8086 Microprocessor.	9	Upto K4

Note: The Questions should be asked in the ratio of 10% Problems and 90 % for Theory

Book for Study

LM. Morris Mano, “Computer System and Architecture”, Pearson Education, Third Edition, (30 June 2017).

Books for Reference

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.
4. P.V.S Rao, “Computer System Architecture”, PHI Learning Private Ltd, New Delhi, 2009.
5. Aharon Yadin, “ Computer Systems Architecture”, 2020 by Chapman and Hall/CRC.

Web Resources

1. <https://www.javatpoint.com/computer-organization-and-architecture-tutorial>
2. <https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/>

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

Rationale for Nature of the Course: Can be professional in analyzing the architecture and organization of Digital computers.

Activities to be given

1. Number system conversion exercises.
2. Seminar on Digital components of a computer
3. Demonstrating Central Processing Unit using PPT



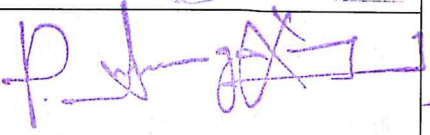
Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Describe various data representation and logic circuits in a Computer.	Upto K4
CLO2	Discuss the concepts of Digital Components of a computer.	Upto K4
CLO3	Discuss the concepts of multiprocessor.	Upto K4
CLO4	Explain the internal components of combinational circuits, CPU, I/O and Memory.	Upto K4
CLO5	Analyze the design of Logic Circuits ,CPU, and Memory	Upto K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO1	1	2	2	2	2	3	2
CLO2	2	2	1	2	2	2	1
CLO3	2	2	2	2	2	2	2
CLO4	2	3	2	3	2	3	3
CLO5	3	3	3	2	3	3	3

3 – Advance Application 2 – Intermediate Level 1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Mrs. P. Shanthi	 Dr. Rangaraj R.	

Head of the Department
 Dept. of Computer Science,
 Hindusthan College of Arts & Science,
 Date: 14/02/2023

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

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.Sc CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22CEIU02	Core-II Software Foundation Program Using C++	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	
	Entrepreneurship Oriented	✓
	Skill Development	

Course Objectives

- Learn the fundamentals of computing techniques and to develop simple applications in the '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.

Unit	Course Contents	Hours	K Level
I	Introduction to C++ OOPS, Essentials of programming, Features of C++, Inheritance, polymorphism and Encapsulation, operator overloading, I/O in C++, Advanced topics	10	Upto K4
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	Upto K4
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 plug in architecture, Eclipse platform architecture, Eclipse case studies	10	Upto K4
IV	Java Development Tools: JDT environment, creating and running a program, automating testing using junit, Use ant and Javadoc.	10	Upto K4

V	Debugging Application Using the debugger, Start the debugger, setting breakpoints, setting through the code, inspecting variables and expression, Software in the real world	8	Upto K4
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Book for Study

IBM Courseware

Books for Reference

- Programming: Principles and Practice Using C++ (2008) By Bjarne Stroustrup
- C++ Primer (5th Edition) By Stanley B. Lippman, Josee Lajoie, and Barbara E Moo
- Effective Modern C++ (2014) By Scott Meyers
- Practical C++ Programming (2nd Edition) By Steve Oualline
- C++ Primer (5th Edition)

Web Resources

- <https://www.geeksforgeeks.org/c-plus-plus/>
- https://www.tutorialspoint.com/cplusplus/cpp_object_oriented.htm
- <https://www.cplusplus.com/files/tutorial.pdf>

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: can be able to create applications and deep knowledge on tools.

Activities to be given

1. Prepare Industry oriented problems on C++ and DB2
2. Assignment on advanced C++(GUI programming, Exception handling) to enhance their knowledge
3. Train the students to appear in the Cognitive Class (IBM PORTAL) assessment model.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CO1	Analyze the fundamentals of C++ programming language.	Upto K4
CO2	Examine the basic concept of programming languages	Upto K4
CO3	Assume and experiment the concepts of pointers, arrays, structures and Files in C++	Upto K4
CO4	Simplify programs using preprocessor directives and Files for a given scenario	Upto K4
CO5	Classify and develop application using C++	Upto K4


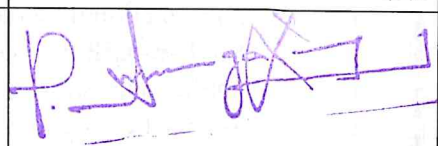
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	2	3	2	3	2	3	3
CLO 2	3	2	2	2	3	3	3
CLO 3	3	3	3	2	2	3	2
CLO 4	2	3	2	2	3	2	2
CLO 5	3	1	3	3	2	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

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

Head of the Department
Dept. of Compute Science,
Hindusthan College of Arts & Science,
Coimbatore - 641 028

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

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.Sc CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22CEU03	Core-III Practical - I: Programming using C	2	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- The course is oriented to those who want to advance structured and procedural programming
- Understanding and improving C programming skills.
- The major objective is to provide students with an understanding of code organization and functional hierarchical decomposition by using complex data types
- Students will be able to develop logics that will help them to create programs and applications in C.
- To practice the fundamental programming methodology via lab program experiences.

22CEU03	Practical - I: Programming using C	Hours	K-Level
1	Program to develop a Simple Calculator using a switch case.	4	Upto K4
2	Program for Nested loop.	4	Upto K4
3	Program to sort numbers in ascending and descending order using Arrays...	4	Upto K4
4	Program to accept two numbers from user and swap the values using call by reference method	4	Upto K4
5	Program to find the Prime numbers between two integers using functions	4	Upto K4
6	Program to Multiply two Matrices by Passing Matrix to a Function	4	Upto K4
7	Program to generating Fibonacci Numbers using recursive functions	4	Upto K4
8	Program for String manipulations without using string functions (string length, string comparison, string copy) (Using function pointers).	4	Upto K4
9	Program using Function Pointers.	4	Upto K4
10	Program to Find Largest Number Using Dynamic Memory Allocation	4	Upto K4

11	Program to read and write a file line by line.	4	Upto K4
12	Program to know the working of linked list.	4	Upto K4

Note: The Questions should be asked in the ratio of 100% Programs

Activities to be given

1. Logical thinking for complex programs
2. Prepare concept-wise programs to develop programming skills.
3. Preparing the students for technical Exercises and programs to attend and clear interview rounds.
4. To create and understand the programming concepts and methods used to develop a program.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Illustrate the fundamentals of C programming	Upto K4
CLO2	Select the suitable loops and decision making statements to solve problems	Upto K4
CLO3	Analyze the concepts of arrays and string handling function	Upto K4
CLO4	Differentiate structures and unions	Upto K4
CLO5	Experiment the concepts of Pointers, Files, command line, and linked list	Upto K4


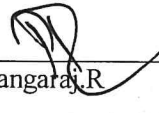
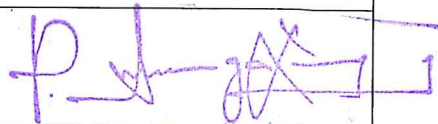
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	2	3	3	3
CLO 2	3	3	2	2	3	3	2
CLO 3	3	3	2	2	3	3	3
CLO 4	3	3	2	2	3	3	3
CLO 5	3	3	2	2	3	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-coordinator
Mr.Karthi M 	Dr Rangaraj R 	

Head of the Department
Dept. of Compute Science,
Hindusthan College of Arts & Science,
Coimbatore - 641 028

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

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.Sc CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22CEU05	Core-IV Python Programming	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- 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.

Unit	Course Contents	Hours	K Level
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 Doc strings. Character Sets. Expressions.	10	Upto K4
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. Conditional Iteration: The while Loop, The Structure and Behavior of a while Loop, Count Control with a while Loop, The <i>while True Loop</i> and the <i>break</i> Statement.	10	Upto K4
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: 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.	10	Upto K4
IV	String and Text Files: 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 its 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	Upto K4

V	Design with Classes: Objects and Classes: Method Definitions <code>_init_</code> and <code>_str_</code> , Accessors and Mutators. Data Modeling: Comparison Methods, Equality and <code>_equ_</code> method. Structuring Classes with Inheritance and Polymorphism: Inheritance Hierarchies and Modeling, Polymorphic Methods. Case Study	8	Upto K4
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Note: The Questions should be asked in the ratio of 100 % for Theory.

Book for Study

1. *Kenneth A. Lambert, Fundamentals of Python: First Programs, Second Edition, Cengage Learning, 2019.*

Books for Reference

1. *Updated for Python 3, Shroff/O'Reilly Publishers, 2016*
2. *Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist learning with Python / 1st Edition, 2012.*
3. *Dr. K. Selvamani, Dr. K. Kulothungan, Dr. E. Anbalagam, Dr. R. Ramesh Problem, solving and Python Programming, Sri Maruthi Publishers, 2019.*
4. *Timothy A. Budd, Exploring Python, 12th Edition, McGraw Hill, 2010.*
5. *Matin C. Brown, Python Complete Reference, TMH, 2018.*

Web Resources

<https://www.learnpython.org/>
<http://greenteapress.com/wp/think-python>
<https://www.tutorialspoint.com/python/index.htm>
<http://greenteapress.com/wp/think-python>

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Python's clean object-oriented design provides enhanced process control, and the language is equipped with excellent text processing and integration capabilities.

Activities to be given

1. Seminar on Functions & Modules
2. Seminar on Classes & Objects with PPT (Case Study):

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CO1	Describe the Syntax and semantics of Python Programming Languages.	Upto K4
CO2	Observe the fundamental principles of Object-Oriented Programming	Upto K4
CO3	Discuss the programming concepts to solve real world problems using Functions and Modules.	Upto K4
CO4	Experiment with structuring the data using Lists, Dictionaries, and Tuples.	Upto K4
CO5	Applying File Concepts to read and write data operations.	Upto K4


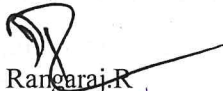

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	2	2	2	2	2	2
CLO 2	2	3	2	3	2	2	2
CLO 3	3	2	2	2	2	3	3
CLO 4	2	1	2	3	3	2	2
CLO 5	1	2	2	2	3	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Mr.S.Aravind	 Dr Rangaraj R	

Head of the Department
 Dept. of Computer Science,
 Hindusthan College of Arts & Science,
 Coimbatore - 641 028

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

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.Sc CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22CEU06	Core-V Data Structures and Algorithms	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To impart the basic concepts of data structures and algorithms.
- To understand and remember algorithms and its analysis procedure.
- To inculcate knowledge on stacks, queues, lists, trees and graphs.
- To learn concepts of searching and sorting techniques.
- To provide the knowledge of hashing techniques.

Unit	Course Contents	Hours	K Level
I	Introduction to Algorithms: What is an algorithm –Why the analysis of algorithm-Goal of the analysis of algorithm – How to compare algorithm- Algorithms Design Techniques: Classification-Classification by Implementation and design method.	10	Upto K4
II	Arrays - Stacks and Queues - Fundamentals. Linked List:- Singly Linked List - Doubly linked list –Circular Linked List- Polynomial addition.	10	Upto K4
III	Trees: Binary tree representations – Binary Tree Traversal – Threaded Binary Trees –Binary search trees. Graphs: - Applications of Graphs- Traversals, Connected Components.	10	Upto K4
IV	Searching and Sorting: Searching: Linear search, Binary search and Hashing. Algorithms and data structures for sorting: Insertion Sort, Bubble sort, Selection Sort, Merge sort, Quick Sort, Heap Sort, Shell Sort, Tree Sort-Radix Sort- Topological Sort-External Sorting.	10	Upto K4
V	Hashing: Components of Hashing-Hash tables -Hashing Functions- Collision Resolution Techniques.	8	Upto K4

Note : The Questions should be asked in the ratio of 100 % Theory.

Book for Study (Only one)

1. *Narasimha Karumanchi "Data Structures and algorithms made easy", 5th Edition, CareerMonk Publications, 2017 .*

Books for Reference

1. *Mark Allen Weiss, " Data Structure and Algorithm analysis", Pearson Education, Second Edition, Sixteenth Impression 2014.*
2. *Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi, 2006.*
3. *E. Balagurusamy, "Data Structures Using C", Tata McGraw Hill, 2013.*
4. *Samanta. D , Classic Data Structure Prentice Hall of India Pvt Ltd 2007, 9th Edition*
5. *Seymour Lipchitz, Data Structures McGraw Hill Publications, 2014, 1st Edition*

Web Resources

1. https://www.tutorialspoint.com/data_structures_algorithms/index.html
2. <https://www.javatpoint.com/data-structure-introduction>
3. <https://www.geeksforgeeks.org/data-structures/>

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

1. Seminar on Threaded Binary Trees.
2. Seminar on Algorithms and data structures of sorting using PPT.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CO1	Examine Data Structures and Algorithms appropriately to solve a variety of computational problems.	Upto K4
CO2	List the Linear and Non-Linear data structures like Stacks, Queues and, Linked List.	Upto K4
CO3	Categorize Trees and Graph concepts.	Upto K4
CO4	Classify the concept of searching and sorting techniques.	Upto K4
CO5	Analyze the knowledge of Hashing and its techniques.	Upto K4

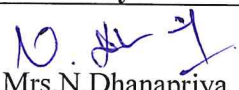


Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7
CLO 1	3	2	2	2	2	2	1
CLO 2	2	2	3	2	2	2	2
CLO 3	2	3	2	2	2	3	3
CLO 4	2	2	2	2	2	3	2
CLO 5	1	2	2	3	3	2	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co- ordinator
 Mrs.N.Dhanapriya	 Dr Rangraj.R	

Head of the Department
Dept. of Computer Science,
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Coimbatore - 641 028

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

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.SC CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22CEIU06	Core-V Data Visualization	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To give an 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.

Unit	Course Contents	Hours	K Level
I	Introduction to statistics Descriptive Statistics: Mean, Median, Mode- Inferential Statistics :Random Variables, Probability Distributions, Normal Distribution, Sampling and Sampling Distribution.	10	Upto K4
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	Upto K4
III	Data Visualization in Watson Studio Adding data to data refiner - Visualization of data in Watson Studio.	8	Upto K4
IV	Introduction python -Python scripting 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	Upto K4

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	Upto K4
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Book for Study

IBM Courseware

Books for Reference

- Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", Oreilly, 2011
- Andreas C. Muller, Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Oreilly, 2016
- Beautiful Visualization by Julie Steele, Noah Iliinsky
- Data Visualization by Kieran Healy
- Fundamentals of Data Visualization by Claus O. Wilke

Web Resources

- <https://www.kaggle.com/learn/data-visualization>
- <https://chartio.com/learn/charts/how-to-choose-data-visualization/>
- <https://multimedia.journalism.berkeley.edu/tutorials/data-visualization-basics/>

Pedagogy : Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: can be able to create applications and deep knowledge on tools.

Activities to be given

1. Prepare Industry oriented problems on Data Visualization.
2. Train them with advanced tools and make them do assignments.
3. Train the students to appear in the Cognitive Class (IBM PORTAL) assessment model.

Course Learning Outcomes



CLOs	On Completion of the Course, the students should be able to	K - Level
CO1	Analyze advanced visualization tools and sea born functionalities.	Upto K4
CO2	Assume python scripts used for visualization.	Upto K4
CO3	Classify data using IBM Watson Studio.	Upto K4
CO4	Test for R tool to do statistics and to visualize data.	Upto K4
CO5	Distinguish descriptive and inferential statistics.	Upto K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

3 – Advance Application 2 – Intermediate Level

1 – Basic Level

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	2	3	2	3	2	3	3
CLO 2	3	2	2	2	3	3	2
CLO 3	3	3	3	2	2	3	3
CLO 4	2	3	2	2	3	2	2
CLO 5	3	1	3	3	2	3	3

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

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 Dept. of Compute Science,
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Co-ordinator
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DEPARTMENT OF COMPUTER SCIENCE				CLASS: I B.SC CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22CEU07	Core-VI Practical – II : Programming using Python	2	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	<input checked="" type="checkbox"/>
	Entrepreneurship Oriented	<input type="checkbox"/>
	Skill Development	<input type="checkbox"/>

Course Objectives

- Understate and debug Python Programs.
- Apply Branching and looping concepts in Python Programs.
- Analyze and apply Data structure concepts using python programming.
- Develop applications using Object oriented Programming.
- Develop application for Bio computing.

Unit	Course Contents	Hours	K-Level
1	Program to find first n prime numbers.	6	Upto K4
2	Program to find the exponentiation of a number.	4	Upto K4
3	Program to perform Binary Search.	4	Upto K4
4	Program to implement Linear Search.	5	Upto K4
5	Program to perform Classes and methods	5	Upto K4
6	Program to perform polymorphism	5	Upto K4
7	Program to perform Inheritance	5	Upto K4
8	Program to perform Encapsulation	5	Upto K4
9	Gene Sequence mining using Python.	5	Upto K4
10	Bio computing in Python.	4	Upto K4

Note: The Questions should be asked in the ratio of 100% Programs

Pedagogy: LCD, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can be professionals in solving advanced problems to pursue higher studies.

Activities to be given

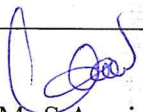

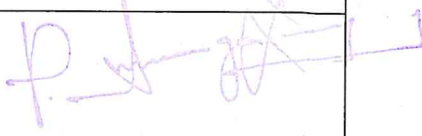
Case Study on Classes & Objects

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Understate and debug Python Programs.	Upto K4
CLO2	Apply Branching and looping concepts in Python Programs.	Upto K4
CLO3	Analyze and apply Data structure concepts using python programming.	Upto K4
CLO4	Develop applications using Object oriented Programming.	Upto K4
CLO5	Develop application for Bio computing	Upto K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7
CLO 1	3	2	2	2	2	3	3
CLO 2	2	3	1	3	2	2	2
CLO 3	3	2	2	2	2	3	3
CLO 4	2	2	2	2	2	2	3
CLO 5	1	2	2	3	3	2	3

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Mr.S.Aravind	 Dr Rangaraj R	

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 Dept. of Computer Science,
 Hindusthan College of Arts & Science,
 Coimbatore - 641 028

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

DEPARTMENT OF COMPUTER SCIENCE				CLASS: I BSC CS				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22CEU08	Core-VII Computer Installation and Service	3	3	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- 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

Unit	Course Contents	Hours	K Level
I	Pc System: Evolution of PC to Pentium, Personal Computer System -Function a Blocks-System Unit-Display Unit-Keybaord. Inside PC: Motherboard Function a Blocks.	7	Upto K4
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	Upto K4
III	Input Devices: Keyboard – Mouse - Scanner-Digitizer – Digital Camera. Outp Devices - Monitors and Adapters - CRT-VGA – Digital Display Technology – CRT Controller – Graphic Cards.	7	Upto K4
IV	Computer Installation: Power supply – PC Installation Troubleshooting and Services: POST – Troubleshooting the Motherboard - Troubleshooting the Keyboard.	7	Upto K4
V	Computer Maintenance: Computer Virus – Virus Prevention Techniques – Antivirus Software Packages – Firewalls Computers and Communications Networking: LAN-WAN-Network Component, MODEM .	7	Upto K4

Note: The Questions should be asked in the ratio of 100% for theory.

Book for Study

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

Books for Reference:

1. M.Radhakrishnan," Computer Installation and Troubleshooting", ISTE- Learning Materials, 2001.
 - 2.B.Govindrajalu, "IBM PC and CLONES", Tata McGrawhill Publishers, 2002.
 - 3.JamesK.L,"Computer Hardware: Installation, Interfacing, Troubleshooting and Maintenance", PHI, 2013.
 - 4.D.Balasubramanian, "COMPUTER INSTALLATION AND SERVICING"July 2005 .
 - 5.Stephen Bigelow, "Troubleshooting, Maintaining & Repairing PCs ", August 2001.
- Craig Zacker, PC Hardware: The Complete ReferenceJuly 2017 .

Web Resources

1. <https://www.geeksforgeeks.org/computer-network-tutorials/>
2. <https://www.pdfdrive.com/networking-2004-networking-technologies-services-and-protocols-performance-of-computer-and-communication-networks-mobile-and-wireless-communications-third-international-ifip-tc6-networking-conference-athens-greece-may-91-d184841357.html>

Pedagogy: Chalk& Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can be professionals in inventing new packages of hardware and software.

Activities to be given

1. Assignments on inventing or enhancing various hardware parts and its connectivity.
2. Upgrade new inventions to grow as scientist.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CO1	Predict technology ethically, safely, securely, and legally.	Upto K4
CO2	Illustrate and analyze computer hardware, software, and network components.	Upto K4
CO3	Practice in developing basic hardware components using current coding standards for business.	Upto K4
CO4	Connect software and hardware.	Upto K4
CO5	Devise software and hardware	Upto K4


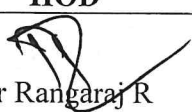
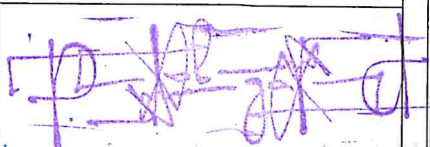
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	2	3	3	3
CLO 2	3	3	2	2	3	3	2
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CLO 4	3	3	2	2	3	3	3
CLO 5	3	3	2	2	3	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Co-ordinator
 Dr Deepa.V	 Dr Rangaraj R	

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