PONDICHERRYUNIVERSITY
(ACENTRALUNIVERSITY)

B.Sc. COMPUTER SCIENCE - SYLLABUS

FIRSTSEMESTER								
S.No.	**Component**	**Course Code**	**Title of the Course**	**H/S**	**Credits**	**Hours/Week**		
						L	**T**	**P**
1	MJD1	CSCS101	Digital Logic Fundamentals	H	4	3		2
2	MID1	CSCS102	Microprocessor and Assembly Language Programming	S	4	3		2
3	MLD1		Basic Botany (Natural Sciences)	H	3	4		
4	AEC1		English-I	H	2	4		
5	SEC1	CSCS103	Python Programming (LAB)	S	3	2		2
6	VAC1		Understanding India	H	2	4		
7	VAC2		Environmental Sciences / Education/Higher Order Thinking	H	2	4		
8			Digital Logic Fundamentals – (LAB)					
9			Microprocessor and Assembly Language Programming-(LAB)					
Total					**20**	**30Hours**		

Year	I	CourseCode:CSCS101 Course Title: Digital Logic Fundamentals	Credits	4
Sem.	I		Hours	75
			Category	C
Course Prerequisites, If any	NIL			
Internal Assessment Marks:25	EndSemesterMarks:75	Duration of ESA (Theory): 03 hrs. DurationofESA(Practical):03hrs.		
Course Outcomes	• Understand the principles of digital systems and binary number operations • Apply Karnaugh mapping to simplify Boolean expressions and optimize digital circuits • Analyze and design basic combinational circuits. • Synthesize and evaluate synchronous sequential circuits using storage elements and HDL • Design and implement various types of registers and counters using HDL			
Unit No.	**Course Content**		**Hours**	
Theory Component				
Unit I	**Introduction** Digital Systems – Binary Numbers – Conversions – Types – Codes–Storage and Registers–Binary Logic–Boolean Algebra – Theorems and Properties – Functions – Canonical and Standard Forms–Other Logic Operations–Digital Logic Gates – Integrated Circuits		9	
Unit II	**Gate-Level Minimization** Map Method – Four-Variable K-Map – Product-of-Sums Simplification – Don't-Care Conditions – NAND and NOR Implementation–Other Two-Level Implementations– Exclusive-OR Function–Hardware Description Language		9	
Unit III	**Combinational Logic** Analysis Procedure – Design Procedure – Binary Adder–Subtractor – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – Multiplexers – HDL Models of Combinational Circuits		9	
Unit IV	**Synchronous Sequential Logic** Storage Elements – Latches – Flip-Flops – Analysis of Clocked Sequential Circuits–Synthesizable HDL Models of Sequential Circuits–State Reduction and Assignment–Design Procedure		9	
Unit V	**Registers and Counters** Registers–Shift Registers–Ripple Counters–Synchronous Counters–Other Counters–HDL for Registers and Counters		9	

Digital Logic Fundamentals

Practical Component		
Exercises	1. Binary to Decimal and vice-versa 2. Decimal to Hexadecimal and Vice-Versa 3. Digital Logic Gates 4. Simplification of Boolean Functions 5. Combinational Logic Circuits i. Code Converters ii. Arithmetic(Adders, Subtractors, Multipliers, Comparators) iii. Data Handling(Multiplexers, De-multiplexers, Encoders & Decoders)	30
	6. Combinational Logic Circuit Design 7. Binary Adder-Subtractor Simulation 8. Decimal Adder Simulation 9. Binary Multiplier Simulation 10. Sequential Circuit Storage Elements: Flip-Flop Simulation	
Recommended Learning Resources		
Print Resources	1. M.Morris Mano, MichaelD.Ciletti,"DigitaldesignWithanIntroduction to the Verilog HDL", Pearson, Sixth Edition, 2018. 2. M.Rafiquzzaman,"FundamentalsofDigitalLogicandMicrocomputer Design", John Wiley & Sons, Inc., Fifth Edition, 2009.	
Syllabus Design: Dr.M.Sathya,AssistantProfessor,PUDoCS		

Year	I	CourseCode:CSCS102	Credits	4
Sem.	I	Course Title: Microprocessor & Assembly Language Programming	Hours	75
			Category	C

Course Prerequisites, if any	• Number Systems(binary, octal, hexadecimal)and their conversions • Boolean Algebra, logic gates, flip-flops and registers • Concepts in Combinational and Sequential logic	
Internal Assessment Marks:25	EndSemesterMarks:75	Duration of ESA (Theory): 03 hrs. Duration of ESA(Practical):03hrs.
Course Outcomes	• Learnthearchitecture&organizationof8085Microprocessor • Understand and classifytheinstructionsetofthe8085Microprocessor • Apply the memory &I/OInterfacingwith8085Microprocessor • Analyze the architecture and operation of Programmable Interface • CreateapplicationstointerfacevariousperipheralIC'swithIntel8085 microprocessor	

Unit No.	Course Content	Hours
	Theory Component	
Unit I	**IntroductiontoMicroprocessors&8085AssemblyLanguage Programming** Microprocessors–Instruction set and computer languages – 8085 programming model – Instruction classification – Instruction – Data format and storage – Execute a simple program – 8085 Instruction Set	9
Unit II	**8085Microprocessorarchitecture** Microprocessor Architecture and its operations – Memory – I/O Devices, 8085 MPU – 8085 based microcomputer – memory interfacing – 8155 memory segment Interfacing – Interfacing I/O devices: Basics–Interfacing input and output devices – memory mapped I/O	9
Unit III	**Programming8085** InstructionSetof8085 –Data Transfer–arithmetic–Logic–Branch – Writing ALP and Debugging programs – Looping – CountingandIndexing–16-bitArithmeticinstructions–Logic operations – Counters and Time Delay	9
Unit IV	**Interfacing I/O Devices** Stack and subroutines–Restart–Conditional call and Return instruction – Advanced subroutine concepts – Code conversion – BCD Arithmetic and 16-bit operations – BCD-Binary conversion–Binary to BCD conversion–BCD to seven segment LED code conversion – Binary to ASCII and ASCII to binary conversion – BCD addition and subtraction	9
Unit V	**Interfacing Peripheral(I/O) and Applications** Interrupts: 8085 Interrupt – RST instructions – Software and Hardware interrupt – multiple Interrupts and Priorities – 8085VectoredInterrupts–RestartasSoftwareInstructions– 8155 – Multipurpose programmable Device – 8279 Programmable Keyboard/Display Interface – 8255 Programmable peripheral Interface	9

Practical Component		
Exercises	1. Assembly Language Programming for Arithmetic Operations like Addition, Subtraction, Multiplication and Division on 8, 16-bit data 2. Assembly Language Programming for different logical operations 3. Assembly Language Programming for code conversions 4. Assembly Language Programming for sorting 5. Assembly Language Programming for Searching 6. Assembly Language Programming for memory block transfer 7. Assembly Language Programming using subroutines 8. Assembly Language Programming using counters and time delay	30
Recommended Learning Resources		
Print Resources	1. Ramesh S. Gaonkar, "Microprocessor – Architecture, Programming and Applications with the 8085", Penram International Publisher, Sixth Edition, 2013. 2. DouglasV.Hall,"MicroprocessorsandInterfacing",TataMcGrawHill publications,ThirdEdition,2017.	
SyllabusDesign:Dr.M.Sathya,AssistantProfessor,PUDoCS		

Year	I	CourseCode:CSCS103	Credits	3
Sem.	I	Course Title: Python Programming	Hours	60
			Category	B

Course Prerequisites, If any	Basic Knowledge in Programming Concepts	
Internal Assessment Marks:50	EndSemesterMarks:50	Duration of ESA(Practical):03hrs.
Course Outcomes	• Understand the basics of writing Python code • Implement programs using lists, tuples and dictionaries • Understand the use of control structures • Ability to write programs using packages • Understand the file manipulation	

Unit No.	Course Content	Hours
	Theory Component	
Unit I	**Introduction, Data types** Introduction to Python – Advantages of using Python – Executing Python Programs – Python's Core data types – Numeric Types – String Fundamentals	6
Unit II	**Lists, Tuples, Dictionaries** Lists: list operations, list slices – list methods – list loop – mutability – aliasing – cloning lists – list parameters; Tuples: tuple assignment – tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension	6
Unit III	**Control Flow, Functions, Modules** Python Statements: Assignments–Expressions–If condition – While and For Loops. Functions: Definition, Calls–Scopes–Arguments – Recursive Functions– Functional Programming tools Classes and Object-Oriented programming with Python – modules and Packages: Purpose, using packages – Exception Handling with Python	6
Unit IV	**Packages** Packages: NumPy, Pandas, Scikitlearn – Machine learning with Python–Cleaning up, Wrangling, Analysis, Visualization -Matplotlib package–Plotting Graphs	6
Unit V	**File Handling** Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions	6
	Practical Component	
Exercises	1. Exchange the values of two variables 2. Finding minimum among n variables 3. Perform Simple sorting 4. Generate Students marks statement 5. Find square root, GCD, exponentiation 6. Sum the array of numbers 7. Perform linear search, binary search 8. Perform Matrix operations using NumPy	30

	9. Perform Data frame operations using Pandas 10. Use Matplot lib on data set and visualise 11. Perform Word count, copy file operations	
Recommended Learning Resources		
Print Resources	1. MarkLutz,“LearningPython”,FifthEdition,O’Reilly,2013. 2. DanielLiang,“IntroductiontoprogrammingusingPython”,Pearson,First Edition, 2021. 3. WesMcKinney,“PythonforDataAnalysis”,O’ReillyMedia,2012. 4. TimHallandJ-PStacey,“Python3forAbsoluteBeginners”,Apress, First Edition,2009. 5. MagnusLieHetland,“BeginningPython:FromNovicetoProfessional”, Apress,SecondEdition,2005.	
SyllabusDesign:Dr.V.Uma,AssociateProfessor,PUDoCS		

MLD: BASIC BOTANY

Total Credit: 3 Hours: 4

Unit I Cell and Anatomy: Introduction to cell and its types - Prokaryotes and Eukaryotes; Study of plant cells; Introduction to tissues - simple and complex; Study of Leaf - monocot and dicot; Structure and function of flower

Unit II Ecology and Plant Diversity: Five Kingdom concept; Study of major groups - Bacteria, Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperm and Angiosperm (only general characteristics) Concepts of ecology; Structure and function of ecosystem; Trophic organization - food chain and food web; Ecological pyramid; Ecosystem types in India; Case study of any one of the following in relation to Andaman and Nicobar Islands - forest ecosystem, aquatic ecosystem (marine or freshwater) and mountain ecosystem. Concept of biodiversity hotspot

Unit III Plants and Human Affairs: Important vascular plants and products used as food, textiles and medicines, oils and perfumes; Spices of Andaman & Nicobar Islands; Study of harmful plants; Advantages and disadvantages of genetically modified plants

Reading List 1. Campbell NA, Reece JB (2008) Biology, 8th edition, Pearson Benjamin Cummings, SanFrancisco.

2. Evert RF, Eichhorn SE (2012) Raven Biology of Plants, 8th edition, New York, NY: W.H.Freeman and Company.

3. Singh V, Pandey PC, Jain DK (2001) A Text Book of Botany. Meerut, UP: Rastogi and Co. 4. Odum EP (2005) Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi.

The addition. Ambasht and Ambasht (2002) A text book of Plant Ecology. CBS publisher and Distribut

Year	II	CourseCode:CSCS204 CourseTitle:3D Modeling & Animation	Credits	3
Sem.	III		Hours	60
			Category	B
Course Prerequisites, if any	Basic Computer Knowledge			
Internal Assessment Marks:50	EndSemesterMarks:50	Duration of ESA (Practical): 03 hrs.		
Course Outcomes	• Understand the basics of 3D modeling and animation concepts. • Learn the various stages of the production pipeline. • Acquire skills to handle digital images, videos, and process them • Become proficient in the usage of 3D modeling and adding visual effects, lighting, and rendering • Develop a model for a given specification • Develop an animated game, story, virtual tour of a building, etc.			

Unit No.	Course Content	Hours
	Theory Component	
Unit I	**Introduction** Defining3DAnimation,Exploringthe3DAnimationIndustry –History of 3D Animation: Early Computers – The Dawn of Computer Animation – The Building Blocks of 3D Animation – The Foundations of Modern Computing – 3D Animation Achieves Commercial Success – The Refining of 3D Animation.	9
Unit II	**Production Pipeline** UnderstandingtheProductionPipeline'sComponents-Workingin3D AnimationPreproduction–Workingin3DAnimationProduction– Workingin3DAnimationPostproduction–UsingProductionTools	9
Unit III	**Understanding Digital Imaging and Video** Understanding the Production Pipeline's Components- Working in 3D Animation Preproduction – Working in 3D Animation Production – Working in 3D Animation Postproduction – Using Production Tools	9
Unit IV	**Understanding Modeling and Texturing** Modeling: Polygons, NURBS, Subdivision Surfaces– Texturing: UVs, Texture Maps, Texturing Work flows – Rigging and Animation	9
Unit V	**Understanding Visual Effects, Lighting, and Rendering** Creating Visual Effects – Lighting – Rendering – Hardware and Software Tools of the Trade: Choosing a computer – Using Monitors / Displays – Working with Graphics Tablets – Using 3D Scanners – Setting Up Render Farms – Finding Data Storage Solutions – Choosing Software	9
	Practical Component	

Exercises	1. Implementing basic rendering techniques and effects 2. Developing storyboards, scripts / screenplay, 3D Production layout for a sample scene Ex: Friends meeting at a bus stop 3. Creating 3D models of characters, props, and environments for the above scene 4. Adding visual effects to the above scene 5. Adding texturing and minimal animation to the above scene 6. Setting up lighting and rendering scenes to achieve desired visual results for early morning moon and night time happening of the above scene	30
	7. Animating the above scene when the friends board the bus and the bus moves 8. Developing an animated game 9. Developing an animated story 10. Developing an animated virtual building tool	
Recommended Learning Resources		
Print Resources	1. AndyBeane,"3DAnimationEssentials",FirstEdition,Wiley&Sons, 2012. 2. MageshChandramouli,"3DModeling&Animation:APrimer",CRC Press, 2021. 3. Tony Mullen, "Introducing Character Animation with Blender", Second Edition, Wiley Publishers, 2011.	
Syllabus Design: Dr. T. Chithralekha, Professor, PUDoCS Dr. S.L .Jayalakshmi, Assistant Professor, PUDoCS		

Understanding India (Syllabus)

https://aagasc.edu.in/cs/nep/notes/Understanding%20India%20VAC%20Syllabus.pdf

Environmental Sciences (Syllabus)

https://aagasc.edu.in/cs/nep/notes/EVS-Syllabus.pdf