NEHRU ARTS AND SCIENCE

(Autonomous)

Department of Computer Science

Syllabus for B. Sc. CS

Odd Semester 2022 - 2023

NEHRU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution affiliated to Bharathiar University)
(Reaccredited with "A" Grade by NAAC, ISO 9001:2015 & 14001:2004 Certified
Recognized by UGC with 2(f) &12(B), Under Star College Scheme by DBT, Govt. of India)
Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105, Tamil Nadu.

Scheme of Examination

(Applicable to the students admitted during the year 2022 - 2023)

B. Sc. Computer Science

Semester	Part	Sub. Code	Name of the Subject	Instruction hours/week	Duration of Examination	Examination Marks			Credits
						CIA	ESE	Total	
I	I	22U1TAM101/ 22U1HIN101 / 22U1MAL101/ 22U1FRN101	Language – I	5	3	50	50	100	4
	II	22U2ENG101	English – I	5	3	50	50	100	4
	III	22U3CSC101	Core Paper I : Python Programming	4	3	50	50	100	4
	III	22U3CKC102	Core Paper II : Digital Fundamentals and Computer Architecture	4	3	50	50	100	4
	III	22U3CSP101	Core Paper III : Practical in Python Programming	4	3	50	50	100	4
	III	22U3MIA101	Allied Paper I : Mathematics for Computer Science	5	3	50	50	100	4
	IV	22U4ENV101	Ability Enhancement Compulsory Course: Environmental Studies	2	3	50	-	50	2
	IV	22U4HVY201	Value Education – Human Values and Yoga Practice I	1	-	-	-	-	-
				30				**650**	**26**
II	I	22U1TAM202/ 22U1HIN202/ 22U1MAL202/ 22U1FRN202	Language – II	5	3	50	50	100	4
	II	22U2ENG202	English – II	5	3	50	50	100	4
	III	22U3CKC203	Core Paper IV : Java Programming	4	3	50	50	100	4
	III	22U3CKC204	Core Paper V : Data Structures	4	3	50	50	100	4
	III	22U3CSP202	Core Paper VI : Practical in Java Programming and Bio-Computing	4	3	50	50	100	4
	III	22U3MIA202	Allied Paper II : Discrete Mathematics	5	3	50	50	100	4
	IV	22U4HRC202	Ability Enhancement Compulsory Course: Human Rights and Constitution of India	2	3	50	-	50	2
	IV	22U4HVY201	Value Education : Human Values and Yoga Practice I	1	2	50	-	50	2
				30				**700**	**28**

III	III	22U3CKC305	Core Paper VII : Operating Systems	5	3	50	50	100	4
	III	22U3CSC303	Core Paper VIII: Object Oriented System and Design	5	3	50	50	100	4
	III	22U3CSP304	Core Paper IX : Case Tools Lab	6	3	50	50	100	4
	III	22U3MIA303	Allied Paper III : Operations Research	5	3	50	50	100	4
	IV	22U4CSZ301	Skill Based Paper I : Practical in HTML and CSS	4	3	30	45	75	3
	IV	22U4NM3BT1/ 22U4NM3AT1/ 22U4NM3CAF/ 22U4NM3GTS/ 22U4NM3WRT	# @Basic Tamil-I/ ##Advanced Tamil-I/ *NME: Consumer Affairs/ Gandhian Thoughts/ Women's Rights	2	3	50		50	2
	IV	22U4CS3ED1/ 22U4CS3ED2	Extra Departmental Course	2	3	-	50	50	2
	IV	22U4HVY402	Value Education: Human Values and Yoga Practice II	1	-	-	-	-	-
	IV	22U4CSVALC	**Skill Enhancement : Value Added Course - Institute Industry Linkage	-	-	-	-	-	-
				30				**575**	**23**
IV	III	22U3CSC405	Core Paper X : RDBMS and MySQL	4	3	30	45	75	3
	III	22U3CKC407	Core Paper XI: R Programming	5	3	50	50	100	4
	III	22U3CSP406	Core Paper XII : Practical in R Programming	5	3	30	45	75	3
	III	22U3CSC407	Core Paper XIII: Software Engineering	5	3	30	45	75	3
	III	22U3BTA404	Allied Paper IV : Fundamentals of Bioinformatics	5	3	30	45	75	3
	IV	22U4CSZ402	Skill Based Paper II: Practical in JavaScript	3	3	30	45	75	3
	IV	22U4NM4BT2/ 22U4NM4AT2/ 22U4NM4GEN	# @Basic Tamil-II /##Advanced Tamil-II/ General Awareness	2	3	50		50	2
	IV	22U4HVY402	Value Education – Human Values and Yoga Practice II	1	2	50	-	50	2
	IV	22U4CSVALC	** Skill Enhancement : Value Added Course-Institute Industry Linkage	-	-	-	-	-	Grade
				30				**575**	**23**

V	III	22U3CSC508	Core Paper XIV : PHP Programming	6	3	50	50	100	4
	III	22U3CSP509	Core Paper XV : Practical in PHP Programming and BioPerl	5	3	50	50	100	4
	III	22U3CSC510	Core Paper XVI : Data Communication and Networks	5	3	30	45	75	3
	III	22U3CSC511	Core Paper XVII : Artificial Intelligence	5	3	30	45	75	3
	III	22U3CKE501/ 22U3CKE502/ 22U3CKE503/ 22U3CKE504	Discipline Specific Elective Paper–I	6	3	50	50	100	4
	IV	22U4CSZ503	Skill Based Paper III : Practical in Multimedia	3	3	30	45	75	3
	III	22U3CSV512	In-plant Training	-	-	50	-	50	2
				30				**575**	**23**
VI	III	22U3CSC613	Core Paper XVIII : Android Programming	5	3	30	45	75	3
	III	22U3CSC614	Core Paper XIX : Augmented and Virtual Reality	3	3	25	25	50	2
	III	22U3CSV615	Project and Viva-Voce	5	-	30	45	75	3
	III	22U3CKE605/ 22U3CKE606/ 22U3CKE607/ 22U3CKE608	Discipline Specific : Elective Paper- II	6	3	50	50	100	4
	III	22U3CSE609/ 22U3CSE610/ 22U3CSE611/ 22U3CSE61 2	Discipline Specific : Elective Paper–III	6	3	50	50	100	4
	IV	22U4CSZ604	Skill Based Paper IV : Practical in Android Programming with Augmented and Virtual Reality	5	3	30	45	75	3
	V	22U5CS6EXT	Extension Activities	-	-	50	-	50	2
				30				**525**	**21**
							Total	**3600**	**144**

Additional Credit (Optional)	**Semester II - VI**	**8$**

\# **Basic Tamil** - Students who have not studied Tamil up to 12th standard.

\## **Advanced Tamil** - Students who have studied Tamil language up to 12th standard and chosen other languages under part I of the UG programme but would like to advance their Tamil language skills.

* **NME** - Student shall choose any one course out of three courses.

@ No End Semester Examinations. Only Continuous Internal Assessment (CIA).

$ Not included in Total marks and CGPA Calculation.

** Examination and Evaluation for value added courses hall be conducted by the Industry and the marks shall be submitted to the Controller of Examination for the award of the degree.

List of Discipline Specific Elective Papers (Choose any one of the paper):

Elective Papers	Course Code	Group	Name of the Course
Elective Paper I	21U3CKE501	A	Block chain Technology
	21U3CKE502	B	Next Generation Networks
	21U3CKE503	C	Internet of Things
	21U3CKE504	D	Big Data Analytics
Elective Paper II	21U3CKE605	A	Software Quality Assurance
	21U3CKE606	B	Information Security
	21U3CKE607	C	Cloud Computing
	21U3CKE608	D	Cyber Security
Elective Paper III	21U3CSE609	A	Data Mining and Warehousing
	22U3CSE610	B	Machine Learning Techniques
	21U3CSE611	C	PC Hardware and Trouble Shooting
	21U3CSE612	D	E-Learning

Extra Departmental Course (EDC):

S. No.	Semester	Course Code	Course Title
1	III	21U4CS3ED1	Multimedia Technologies
2		21U4CS3ED2	Web Designing

Self Study Paper offered by Department of Computer Science:

S. No.	Semester	Course code	Course Title
1	Semester II to V	21UCSSS01	Libre Office
2		21UCSSS02	Management Information System

Chairman
Board of Studies in Computer Science
Nehru Arts and Science College
Coimbatore

Course Code	Title		
22U3CKC102 21U3CKC102	Core Paper II: Digital Fundamentals and Computer Architecture		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

(Common to B. Sc. CS / IT / BCA)

Course Objective	To enable the students to know about the Operations in digital computer, Boolean algebra, CPU Architecture, memory design and its functionality
Course Category	Skill Development /Employability/Entrepreneurship
Development Needs	Global/National/Local/Regional
Course Description	Understand Number Conversion, the concept of I/O organization and logic circuits. Analyze memory organization and multiprocessor in digital computers.

Course Outcomes		Teaching Methods	Assessment Methods
CO1	Perform number conversion and identify the logic gates.	Smart Board	Quiz
CO2	Design basic combinational logical circuit.	Demonstration	Quiz
CO3	Understand the concept of I/O organization	Video Lessons	Assignment
CO4	Apply priority to interrupts and use it for data transfer.	Smart Board	Assignment
CO5	Analyze memory organization and multiprocessor in digital computers.	Smart Board	Seminar

Offered by **Computer Science**

Course Content **Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapters
I	**Digital Logic – Digital Operations - Digital Computers.** **Number System and Binary Codes:** Decimal, Binary, Octal, Hexadecimal Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Serial Adder, Half subtractor, Full subtractor, Parallel binary subtractor- Digital Logic: The Basic Gates –NOR, NAND, XOR Gates.	1,2	1,3,4
		Instructional Hours	**12**
Suggested Learning Methods : Number System Problem Solving			**03 Hrs**
II	**Combinational Logic Circuits:** Boolean algebra-Karnaugh map – Canonical form 1 – Construction and properties –Implicants – Don‘t care combinations - Product of sum, Sum of products, simplifications. Sequential circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers – Decoder -Encoder – shift registers-Counters	1,2	2,5,6
		Instructional Hours	12
Suggested Learning Methods : Video Presentation			**02 Hrs**
III	**Input – Output Organization:** Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking- Modes of Transfer	3	11
		Instructional Hours	12
Suggested Learning Methods : Report Preparation			**02 Hrs**

IV	**Priority Interrupt:** Daisy- Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication-Serial Communication-Character Oriented Protocol, Data Transparency, Bit Oriented Protocol.	3	11
		Instructional Hours	12
Suggested Learning Methods : Report Preparation			**02 Hrs**
V	**Memory Organization**: Memory Hierarchy – Main Memory-Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization. **Multiprocessor: Interconnection** Structure, Interprocessor Arbitration, Interprocessor Communication and Synchronization.	1	13,17
		Instructional Hours	12
Suggested Learning Methods : Video Presentation			**03 Hrs**
		Total Hours	60 Hrs

Text Books	1. V.K. Puri&Henry**Digital Electronics Circuits and Systems**, TMH, 1997. 2. M. Morris Mano,**Computer System Architecture**, PHI publications, 2000.
Reference Books	1. M. Carter, Computer Architecture, Schaum'S Outline Series, TMH, 1996.
Web. URLs	https://www.educba.com/digital-computer-fundamentals/

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	-	M	M	-	M	H	H	H	H	M	M
CO2	H	H	-	M	M	-	M	H	H	H	H	M	M
CO3	H	H	-	M	M	-	M	H	H	H	H	H	H
CO4	H	H	-	M	M	-	M	H	H	H	H	H	H
CO5	H	H	-	M	M	-	M	H	H	H	H	H	H

H-High; M-Medium; L-Low.

Course designed by	Verified by

Course Code	Title		
22U3CSC101	Core Paper I : Python Programming		
Semester: I	Credits: 4	CIA:50 Marks	ESE: 50 Marks
Course Objective	To develop algorithmic solutions to simple computational problems using Python		
Course Category	Employability / Skill Development		
Development Needs	Global		
Course Description	Develop Problem Solving Skills to solve the computer based problems at Global needs.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand the basics of Python and write simple Python program.	Lecture / Flipped Classroom	Assignment
CO 2	Develop Python programs using control statement and list method.	Constructivist Approach/ Tutorial	Seminar
CO 3	Apply tuples, Functions, Set iterators to develop simple applications.	Lectures / Video Lessons	Quiz
CO 4	Apply Python Strings, multithreading and exception, Files for problem solving	Tutorial / Case Studies	Program Execution
CO 5	Create applications using Tkinter and Pandas	Lecture / Class Projects	Program Execution

Offered by	Computer Science

Course Content	Instructional Hours / Week : 4

Unit	Description	Text Book	Chapters
I	**Fundamentals of Python Programming:** Introduction – Features – Applications – Installation-Sample Program-Python Virtual Machine- Memory management in Python-Comparison between C, Java and Python- Keywords, Identifiers, Statements, Indentation. **Syntax and Styles:** Data Types – Literals – Variables-Operators and Expressions-Evaluation of Expression-Sample Programs.	1	1,2
		Instructional Hours	**12**
Suggested Learning Methods : **Video lectures about the basics of Python Programming**			**02 Hrs**
II	**Control Flow:** If – While – For – Break – Continue-Pass-Entry Controlled Loop - Exit Controlled Loop – Counter Controlled Loop - Condition Controlled Loop - Nested Loop - Sample Programs. Arrays-Sequences - Python Lists: Read a List type from a Keyboard-Accessing Elements of a List- Modifying Elements of a List. Basic Operations-Built-in Functions – Python List Methods.	1 2	3,4 ,5 9

		Instructional Hours	12
Suggested Learning Methods : Practice using Flow Charts			**02 Hrs**
III	**Tuples:** Need of a Tuple-Sequence of Unpacking – Methods – Sample programs. Dictionaries: Making a Dictionary-Basic Operations-Dictionary Operations – Sets-Iterators and Generators- Sample Programs. **Functions:** Defining Functions-Calling Functions-Passing Arguments-Keyword Arguments-Default Arguments-Required Arguments-Variable Length Arguments-Return Statements-Nesting of Passing Arguments-Anonymous Functions-Recursive Functions- Scope of Local and Global Variables.	1	6,7,8
		Instructional Hours	12
Suggested Learning Methods : Develop small programmes using tuples			**02 Hrs**
IV	**Strings in Python:** Reading – Accessing – Modifying – Finding- Iterating through a String-Build-in String Functions. Errors and Exceptions-Multithreading **Files and Directory Access:** Files and Streams-Opening a File-Reading/Writing Operations in a File-Other operations in a File	2 1	8 14, 15
		Instructional Hours	
Suggested Learning Methods : Apply the programs in the Python Software			**02 Hrs**
V	**Tkinter:** Introduction-Widget- Label Widget- Button Widget Checkbutton widget- Entry Widget- Listbox Widget-Radiobutton Widget- Scrollbar Widget-Text Widget-Container Widgets. **Pandas:** Pandas Data Frame Basics- Introduction- Concept Map- Objectives- Loading your first Data Set-Looking at Rows, Column and Cell-Grouped and Aggregated calculations-Basic Plots.	1 3	16 1
		Instructional Hours	12
Suggested Learning Methods : Laboratory practice			**02 Hrs**
		Total Hours	60 Hrs

Text Books	1. Ch.Satyanaryana, M.Radhika Mani, B.N. Jagadesh, Python Programming, University Press Pvt. Ltd.2018. 2. Dr.S.A.Kulkarni, Problem Solving and Python Programming, 2nd Edition, Yesdee Publishing,2018 3. Daniel Y.Chen Pandas for everyone. Python Data Analysis, Rough Cuts 2017.
Reference Books	1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers,2016 2. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd.,2011.
Web. URLs	

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping													
CO \ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO 5**
CO1	H	H	H	L	M	M	L	M	M	H	H	M	M
CO2	M	M	M	M	H	M	M	M	H	H	H	M	H
CO3	H	L	M	H	M	M	L	H	M	H	H	M	M
CO4	M	H	L	M	L	L	H	M	H	M	H	H	M
CO5	M	M	H	H	M	H	M	H	H	H	M	H	H
H-High; M-Medium; L-Low													

Course designed by	Verified by

Course Code	Title		
22U3CSP101 21U3CSP101	Core Paper III: Practical in Python Programming		
Semester: I	Credits: 4	CIA: 50 Marks	ESE:50 Marks

Course Objective	To introduce the concepts of python programming constructs.
Course Category	Skill Development /Employability
Development Needs	Global/Local
Course Description	To development skill set in python programming and apply the concepts to develop applications in order to meet the Local and Global needs Course Outcomes.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Develop simple Python programs.	Program Demonstration	Program Creativity
CO 2	Understand and apply the concept of control statements.	Program Demonstration	Debugging
CO 3	Apply the concept of looping constructs and functions for solving basic programs.	Program Demonstration	Application of Logic
CO 4	Develop programs for sorting of Strings, Lists, Tuples and File handler.	Program Demonstration	Program Development
CO 5	Create programs using Linear and Binary Search Techniques	Program Demonstration	Program Development

Offered by	**Computer Science**

Course Content	Instructional Hours / Week : 4

Program List

1. Write a python program that displays the following information: Your name, Full Address Mobile, number, College name, Course subjects.
2. Write a python program to find the largest three integers using if-else and conditional operator.
3. Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
4. Write a python program to find the product of two matrices.
5. Write recursive functions for GCD of two integers.
6. Write recursive functions for the factorial of positive integer.
7. Write recursive functions for Fibonacci Sequence upto given number n.
8. Write recursive functions to display prime number from 2 to n.

9. Write a python program that writes a series of random numbers to a file from 1 to n and display.
10. Write a python program to sort a given sequence: String, List and Tuple.
11. Write a python program to make a simple calculator.
12. Write a python program for Linear Search and Binary Search.
13. Write python program in which a function(with single string parameter)is defined and Calling that function prints the string parameters given to function.
14.Write python program in which a class is define, then create object of that class and call Simple print function define in class.

Solving Case studies and Program development	**10 hrs**
Total Hours	60 Hrs

Tools for Assessment (50 Marks)

Laboratory Performance- Application of Logic	Laboratory Performance- Program Creativity	Laboratory Performance- Program Debugging	Test 1	Test 2	Observation Note Book	Total
8	8	8	10	10	6	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3MIA101	Allied Paper I : Mathematics for Computer Science		
Semester: I	Credits: 4	CIA: 50 MARKS	ESE: 50 MARKS

Course Objective	To enable the students to learn concepts of Statistical and Numerical Methods used in Computer applications.
Course Category	**Skill Development**
Development Needs	**Regional**
Course Description	This course covers a mix of applied linear algebra, Statistics and Numerical Analysis, it covers a central point of contact between Mathematics and Computer science.

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Know the concepts of Matrices and solve the problem using Eigen values.	Smart Board/ Chalk & Talk	Unit Test
CO 2	Solve simultaneous Linear Algebraic Equations	Peer Teaching/ Chalk & Talk	Assignment
CO 3	Relate various formulae in Numerical Differentiation and Integration	Smart Board/ Chalk & Talk	Seminar
CO 4	Evaluate the Measures of Central tendency and dispersion.	GLM/ Chalk & Talk	Unit Test
CO 5	Analyse Correlation and Regression	Smart Board/ Chalk & Talk	Quiz

Offered by	**Mathematics**

Course Content	Instructional Hours / Week :5

Unit	Description	Text Book	Chapters
I	**Matrices:** Introduction – Types of Matrices –Matrix Operations - Determination – Inverse of a matrix – Rank of a Matrix. Eigen value Problems.	3 1	4,4
		Instructional Hours	15
Suggested Learning Methods : Problem Solving Practise			**02 Hrs**
II	**System Of Simultaneous Linear Algebraic Equations:** Gauss elimination, Gauss Jordon, Gauss Jacobi Method, Gauss Seidal method.(up to 3x 3 matrix)	2	4
		Instructional Hours	15
Suggested Learning Methods : Class Test			**02 Hrs**
III	**Numerical Differentiations:** Newton's forward Difference - Backward Difference – Stirling's formula. **Numerical Integration:** Trapezoidal Rule - Simpson's $1/3^{rd}$ rule & Simpson's $3/8^{th}$ rule.	2 , 2	9, 9
		Instructional Hours	15
Suggested Learning Methods : Quiz			**02 Hrs**

IV	**Measures of Central Tendency:** Mean Median and Mode – Empirical Relationship between mean, median and mode. **Measures of Dispersion:** Range, Quartile deviation and Standard deviation.	3,3	7,8
		Instructional Hours	15
Suggested Learning Methods : Problem Solving Practise			**02 Hrs**
V	**Correlation:** Introduction, Scatter Diagram - Karl pearson's Correlation and Spearman's Rank Correlation. **Regression:** Regression equation of variables – Linear regression.	3	10,11
		Instructional Hours	15
Suggested Learning Methods : Assignment			**02 Hrs**
		Total Hours	75 Hrs

Text Books	1. P. Kandasamy, K.Thilgavathy, K. Gunavathy, **Engineering Mathematics**, **Volume I**, S.Chand Company, 2006. 2. P.Kandasamy, K.Thilagavathy and K.Gunavathy, **Numerical Methods**, S.Chand& Company LTD, Revised 2005. 3. S. P. Gupta, **Statistical Methods** ,Sultan Chand & Sons, Fourth edition, Reprint 2017.
Reference Books	1. E. Balagurusamy, **Numerical Methods**, Tata McGraw Hill Publishing company , LTD, Reprint, 2008. 2. P.A.Navanitham, **Business Mathematics and Statistics**, **(Part II),** Jai Publishers, Trichy – 21.
Web. URLs	1. https://www.youtube.com/watch?v=C7RmlrX-57M 2. https://www.youtube.com/watch?v=1MiT06JFNo4

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	M	M	M	H	H	H	H	H	H
CO2	H	H	L	M	M	M	M	H	M	M	H	M	M
CO3	H	M	L	M	M	M	M	M	M	L	H	H	M
CO4	H	M	L	M	M	H	M	H	H	M	H	M	H
CO5	H	M	L	M	M	H	M	H	H	M	H	H	M

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CKC203 21U3CKC203	Core Paper IV: Java Programming		
Semester: II	Credits: 4	CIA:50 Marks	ESE: 50 Marks

Course Objective	To gain knowledge about basic Java language syntax and semantics to write java programs and understand the principles of classes, methods, inheritance, polymorphism and packages.
Course Category	Employability / Skill Development
Development Needs	Global
Course Description	To understand the Object-Oriented Paradigm and develop programs using Control statements, arrays, packages and interfaces, Exception Handling, multithreading and Develop networking applications

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Remember the fundamental concepts of Object-Oriented Programming.	Smart Board	Class Participation
CO 2	Develop simple Java programs with Control statements and arrays.	Smart Board	Quiz
CO 3	Apply the principles of packages and interfaces.	Demonstration	Seminar
CO 4	Design Java application using the concepts of Exception Handling and Multithreading.	Video Lessons	Seminar
CO 5	Develop applications using IO Streams and AWT.	Smart Board	Assignment

Offered by	**Computer Science**
Course Content	**Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapters
I	**Fundamentals of Object-Oriented Programming:** Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object-Oriented Programming. **Java Evolution:** History – Features – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers. **Overview of Java:** simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine-Command Line Arguments.	1	1,2
		Instructional Hours	**12**
Suggested Learning Methods : **Video lectures about the basics of JAVA Programming**			**02 Hrs**

II	Constants, Variables, Data Types, Operators and Expressions, **Decision Making and Branching:** if, if...else, nested if, switch, ? : Operator, **Decision Making and Looping:** while, do, for – Jumps in Loops - Labelled Loops, Classes, Objects and Methods. **Arrays:** One Dimensional Array-Creating an Array-Two Dimensional Array.	1 2	4,5,6,7 & 8
		Instructional Hours	12
Suggested Learning Methods : Code Debugging			**02 Hrs**
III	**Interfaces: Multiple Interface-**Introduction-Defining Interface-Extending Interface-Implementing Interface-Accessing Interface Variables. **Packages:** Introduction-Java API Packages-Using System Packages-Naming Conventions-Creating Packages-Accessing a Package-Using a Package-Adding a Class to a Package-Hiding Classes-Static Import.	1	10,11 & 12
		Instructional Hours	12
Suggested Learning Methods : Simple Application Development			**02 Hrs**
IV	**Exception Handling:** Fundamentals-Hierarchy of the Exception Classes- Types of Exception –Exception Class-Uncaught Exceptions-Handling Exception-User Defined Exception. **Multithreaded Programming:** The Java Thread Model-Concept of Thread-Runnable Interface-Thread Class-Thread Creation-Thread's Life Cycle-Thread Scheduling-Synchronization and Deadlock-Inter Thread Communication-Joining Threads-Suspending, Resuming and Stopping Threads-JDBC.	2	10 & 11
		Instructional Hours	
Suggested Learning Methods : Apply the programs in the JAVA Software			**02 Hrs**
V	**Input/Output Classes:** Input and Output Operations-Hierarchy of Classes in java.io Package-File Class-InputStream and OutputStream Classes-FileInputStream and FileOutputStream Classes-Reader and Writer Classes-RandomAccessFile Class-Stream Tokenizer. **Applets:** Applet Basics-Applet Life Cycle-Running Applets-Methods of the Applet Class-Graphics Class-Color Class-Font Class-Limitations of Applets. **Abstract Window Toolkit:** AWT-AWT Classes-Hierarchy of Classes in Java.awt Package-Control Fundamentals-Component Class-Basic Component Classes-Container Class.-Various Container Class.	2	16,18 & 19
		Instructional Hours	12
Suggested Learning Methods : Simple Application Development			**02 Hrs**
		Total Hours	60 Hrs

Text Books	1. E. Balagurusamy, **Programming with Java – A Primer**, Tata McGraw Hill Publication, 3rd Edition, 2007 2. ISRD Group, **Introduction to Object Oriented Programming Through Java**, Tata McGraw Hill Publication, Forth Reprint 2008. 3. Java Network Programming, 4th Edition, Orielly Publication
Reference Books	1. Patrick Naughton & Hebert Schildt, **The Complete Reference Java 2,** Tata McGraw Hill Publication**,** 3rdEdition, 2002 2. John R. Hubbard, **Programming with Java**, Tata McGraw Hill Publication, 2nd Edition, 2009

Web. URLs	https://www.w3schools.com/java/default.asp

Tools for Assessment (50 Marks)						
CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	H	H	-	M	H	-	M	H	H	H	H	M	M
CO2	H	H	-	M	H	-	M	H	H	H	H	M	M
CO3	H	H	-	M	H	-	M	H	H	H	H	H	H
CO4	H	H	-	M	H	-	M	H	H	H	H	H	H
CO5	H	H	-	M	H	-	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CKC204 21U3CKC204	Core Paper V: Data Structures		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
(Common to all UG Programmes)			
Course Objective	To enable the students to understand about the various techniques such as Linked list, Searching and Sorting, apply them to solve complex programs.		
Course Category	Skill Development		
Development Needs	Global/National /Local/Regional		
Course Description	To understand the concept of Arrays, Stacks , and Queues, Linked list, searching and sorting and apply to solve real world problem using appropriate Data Structure		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Understand the representation of Arrays, Stacks and Queues.	Smart Board	Group Discussion
CO 2	Solve the problems using Queues and List.	Smart Board	Quiz
CO 3	Demonstrate different types of Tree representation and Graph.	Demonstration	Seminar
CO 4	Design Algorithm to perform different types of Sorting.	Video Lessons	Seminar
CO 5	Illustrate Symbol, hash and File organization, apply to solve real world problem using appropriate Data Structure.	Smart Board	Assignment

Offered by	Computer Science

Course Content	Instructional Hours / Week : 4

Unit	Description	Text Book	Chapters
I	**Introduction:** Overview - Create Programs - Analyze Programs. **Arrays:** Axiomatization - Sparse Matrices - Representation of Arrays. **Stacks & Queues:** Fundamentals - Evaluation of Expressions - Multiple Stacks and Queues.	1	1,2,3
	Instructional Hours		12
Suggested Learning Methods : Write Algorithms for Real time Scenario			**03 Hrs**
II	**Recursion:** Recursive definition and process - recursion in C - Writing Recursive program - simulating Recursion - efficiency of recursion. **Queues and List:** The queue and its sequential representation - Linked list - List in C - An example Simulation using linked list - other list structure.	2	3,4
	Instructional Hours		12
Suggested Learning Methods : Write Algorithms for Real time Scenario			**03 Hrs**
III	**Trees:** Binary Tree - Binary Tree representation - the Huffman algorithm - representing list as Binary - Trees and their applications - Game trees.	2	5,8

	Graphs: A Flow problem - The linked representation of Graph - Graph traversal and spanning forests		
		Instructional Hours	12
Suggested Learning Methods : Group Discussion			**03 Hrs**
IV	**Internal Sorting:** Insertion Sort - Quick Sort - 2-Way Merge Sort - Heap Sort - Shell Sort. **External Sorting:** Storage Devices - K-Way Merging- **Sorting With Tapes:** Balanced Merge Sorts - Polyphase Merge.	1	7, 8
		Instructional Hours	
Suggested Learning Methods : Group Discussion			**03 Hrs**
V	**Symbol Table:** Static Tree Tables - Dynamic Tree Tables - **HashTables:** Hashing Functions- Overflow Handling. **Files:** Files, Queries and Sequential Organizations- Index Techniques - **File Organization:** Sequential Organization- Random Organization- Linked Organization.	1	9,10
		Instructional Hours	12
Suggested Learning Methods : Video Presentation2			**03 Hrs**
		Total Hours	60 Hrs

Text Books	1. Ellis Horowitz &SartajSahni, **Fundamentals of Data Structures**, Galgotia Publication. 2. Aaron M. Tenenbaum, YedidyahLangsam, Moshe J.Augenstein, **Data Structure using C**, Pearson Education, 2009.
Reference Books	1. Ellis Horowitz, SartajSahni&SanguthevarRajasekaran, **Fundamentals ofComputer Algorithms**, GalgotiaPublicationsPvt Ltd, 1999. 2. Jean-Paul Tremblay and Paul G.Sorenson, **An Introduction to Data Structures with Applications**, Second Edition, Tata MaGraw Hill,2008 3. Mark Allen Weiss, **Data Structures and Algorithm Analysis in C**, Florida International University, Pearson Education, Second Edition, 1997.
Web. URLs	https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	-	M	M	-	M	H	H	H	H	M	M
CO2	H	H	-	M	M	-	M	H	H	H	H	M	M
CO3	H	H	-	M	M	-	M	H	H	H	H	H	H
CO4	H	H	-	M	M	-	M	H	H	H	H	H	H
CO5	H	H	-	M	M	-	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3CSP202 21U3CSP202	**Core Paper VI : Practical in Java Programming and Bio-Computing**		
Semester: II	**Credits: 4**	**CIA: 50 Marks**	**ESE:50 Marks**
Course Objective	To enable the students to develop problem solving skills and programming ability in Java Language		
Course Category	Skill Development /Employability		
Development Needs	Global/Local		
Course Description	Develop simple and complex applications at Global needs.		

Course Outcomes		**Teaching Methods**	**Assessment Methods**
CO 1	Develop programs to iimplement the string, array and multiple inheritance concepts.	Program Demonstration	Program Creativity
CO 2	Implement the multithreading, exception handling concepts to solve real world problems	Program Demonstration	Debugging
CO 3	Apply the concept of package to illustrate reusability.	Program Demonstration	Application of Logic
CO 4	Develop the programs for the concepts of Applets and AWT.	Program Demonstration	Program Development
CO 5	Create application for file handling.	Program Demonstration	Program Development

Offered by	**Computer Science**
Course Content	**Instructional Hours / Week : 4**

Program List

1. Write a Java Applications to extract a portion of a character string and print the extracted string
2. Write a Java Program to implement Quick Sort Algorithm
3. Write a Java Program to implement the concept of Interfaces
4. Write a program to implement the concept of Exception Handling
5. Write a Java Program to implement the concept of multithreading with the use of any three multiplication tables and assign three different priorities to them.
6. Write a Java program to import classes from user defined package and creating package
7. Write a java program to perform Linear and Binary Search
8. Write a Java Program to draw several shapes in the created windows

9. Write a Java Program to implement Stack and Queue Operations
10. Split DNA sequences into condon
11. Analyze and retrieve Protein sequences from protein database
12. Perform pair wise and multiple sequence alignment using BLAST tool
13. Read the Fasta file given in the input and print the identifier, name and description
14. Identify the disease from the given nucleotide sequences using BLAST tool.

Suggested Learning Methods: **Simple Application development**	**10 hrs**
Total Hours	60 Hrs

Tools for Assessment (50 Marks)

Laboratory Performance- Application of Logic	Laboratory Performance- Program Creativity	Laboratory Performance- Program Debugging	Test 1	Test 2	Observation Note Book	Total
8	8	8	10	10	6	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	L	M	H	H	H	H	M	M
CO2	H	H	L	M	H	L	M	H	H	H	H	M	M
CO3	H	H	L	M	H	L	M	H	H	H	H	H	H
CO4	H	H	L	M	H	L	M	H	H	H	H	H	H
CO5	H	H	L	M	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by

Course Code	Title		
22U3MIA202	Allied Paper II : Discrete Mathematics		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
(Common to all UG Programmes)			
Course Objective	To learn about the discrete structure for computer based application.		
Course Category	Skill Development		
Development Needs	Regional		
Course Description	This course is to understand and use abstract discrete structures that are backbones of computer science. In particular, this course meant to introduce logic, proofs, sets, relations, functions, counting, and graph with an emphasis on applications in computer science.		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Learn the basic concepts of Set theory	Smart Board/ Chalk & Talk	Unit Test
CO 2	Implement the basic ideas of Mathematical Logic in Computer Science	Peer Teaching/ Chalk & Talk	Assignment
CO 3	Classify different types of Relations and Functions	Smart Board/ Chalk & Talk	Seminar
CO 4	Infer the concepts of Grammar and Automata theory.	GLM/ Chalk & Talk	Unit Test
CO 5	Know the concepts of Graph theory	Smart Board/ Chalk & Talk	Quiz

Offered by	Mathematics

Course Content	Instructional Hours / Week : 4

Unit	Description	Text Book	Chapters
I	**Fundamentals of Python Programming:** Introduction – Features – Applications – Installation-Sample Program-Python Virtual Machine-Memory management in Python-Comparison between C, Java and Python- Keywords, Identifiers, Statements, Indentation. Syntax and Styles: Data Types – Literals – Variables-Operators and Expressions-Evaluation of Expression-Sample Programs.	1	1,2
		Instructional Hours	15
Suggested Learning Methods : Problem Solving Practise			**02 Hrs**
II	**Mathematical Logic:** Introduction- prepositional calculus –Basic logical operations- Tautologies-Contradiction – Argument-PDNF & PCNF - Method of proof.	1	1,2
		Instructional Hours	15
Suggested Learning Methods : Class Test			**02 Hrs**
III	**Relations:** Binary Relations – Set operation on relations-Types of Relations – Partial order relation – Equivalence relation – Composition of relations. Functions – Types of functions – Invertible functions – Composition of functions.	1	3,4
		Instructional Hours	15

Suggested Learning Methods : Seminar			**02 Hrs**
IV	**Languages:** Operations on languages – Regular Expressions and regular languages. **Grammar:** Types of grammars – Grammar Construction-Finite state machine –Finite State Automata- DFA- NDFA- Conversion of NDFA into DFA.	1	15
		Instructional Hours	
Suggested Learning Methods : Quiz			**02 Hrs**
V	**Graph Theory:** Basic terminology – paths, cycle & Connectivity – Sub graphs – Types of graphs. Trees – Properties of trees – Binary trees-Traversal of Binary Trees.	1	9, 10
		Instructional Hours	15
Suggested Learning Methods : Problem Solving Practise			**02 Hrs**
		Total Hours	75 Hrs

Text Books	1. J.K. Sharma, **Discrete Mathematics**, Macmillan India Ltd, 2nd edition, 2005.
Reference Books	1. J. P. Tremblay, R. Manohar, **Discrete Mathematics Structures with Applications to Computer Science**,McGraw Hill International Edition, 2005. **2.** T.Veerarajan, **Discrete Mathematics with Graph Theory and Combinatorics**, McGraw Hill International Edition, 2008
Web. URLs	**1.** https://www.youtube.com/watch?v=oaOm2pnKkyY **2.** https://www.bing.com/ck/a?!&&p=15aa8c6b70a85b80JmltdHM9MTY2MTQyMjE4OSZpZ3VpZD01MDI3YjUxZS00ZDBiLTQ2ODEtYjUyZS0yZjdhNzU3MGY1NWMmaW5zaWQ9NTQ3OQ&ptn=3&hsh=3&fclid=0d43c102-245e-11ed-9fcf-eb6827fef90b&u=a1L3ZpZGVvcy9zZWFyY2g_cT1EaXNjcmV0ZSttYXRocyt5b3V0dWJlK2xpbmsrZnJvbStJSXQmZG9jaWQ9NjA4MDEyMDk3OTA4NzkxNzAwJm1pZD0wMjVENkM3NUZBNDEwOEY0QTAxNTAyNUQ2Qzc1RkE0MTA4RjRBMDE1JnZpZXc9ZGV0YWlsJkZPUk09VklSRQ&ntb=1

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	M	H	M	M	M	L	M	H	M	M
CO2	H	H	L	M	H	M	M	H	L	L	H	L	M
CO3	H	H	L	M	H	M	M	H	M	M	H	H	H
CO4	H	H	L	M	M	M	M	M	L	M	H	M	M
CO5	H	H	L	H	M	M	M	H	M	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by