V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Re-accredited with 'A' Grade (3rd Cycle) by NAAC

VIRUDHUNAGAR – 626 001

PEOs, POs, PSOs and COs
M.Sc. COMPUTER SCIENCE

Programme Educational Objectives (PEOs)

PEOs are broad statements that describe the career and professional achievements that the Programme is preparing the graduates to achieve within the first few years after graduation. PEOs are framed for each Programme and should be consistent with the Mission of the Institution.

Programme Outcomes (POs)

POs shall be based on Graduate Attributes (GAs) of the Programme. The GAs are the attributes expected of a graduate from a Programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co-operation/Team Work, Scientific Reasoning, Reflective Thinking, Information/Digital Literacy, Multicultural Competence, Moral and Ethical Awareness/Reasoning, Leadership Qualities and Lifelong Learning.

On successful completion of the Programme, the students will be able to

1 Apply their in depth domain knowledge and practical skills in interdisciplinary fields for research-based endeavours, employment and entrepreneurship development. (*Disciplinary Knowledge)*

2 Communicate proficiently and confidently with the ability to present complex ideas in a concise manner to assorted groups. (*Communication Skills*)

3 Identify, formulate and solve problems in a consistent and systematic way with updated skills using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)

4   Analyze the data, synthesise the findings and provide valid conclusion by critical evaluation of theories, policies and practices for the betterment of society. (*Critical Thinking and Analytical Reasoning*)

5   Explore and evaluate globally competent research methodologies to apply appropriately in interdisciplinary research; Develop and sustain the research capabilities to meet the emerging needs for the welfare of the society. (*Research Related Skills*)

6   Use ICT to mould themselves for lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning*)

7   Self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence*)

8   Uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness*)

Programme Educational Objectives (PEOs)

The students will be able to

PEO1 - utilize the gained knowledge and adapt current emerging technologies through independent thinking in the rapid changing world.

PEO2 - enhance the technocrats as successful computer professionals, researchers or entrepreneurs with global competence.

PEO3 - acquire professional integrity, moral ethics and become responsible for sustainable development of society and industrial needs through research outcomes.

Key Components of Mission Statement	Programme Educational Objectives		
	PEO1	PEO2	PEO3
in-depth Knowledge	✔	✔	-
good attitude, team work and personality skills	-	✔	✔
promote inquiry and innovation	-	✔	✔
knowledge, skills and attitude	✔	✔	✔
moral ethical and social responsibility	-	-	✔

Programme Specific Outcomes (PSOs)

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each PG Programme. Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are Programme-specific and it is mandatory that each PO should be mapped to the respective PSO.

On successful completion of M.Sc Computer Science Programme, the students will be able to

PO 1: Disciplinary Knowledge

PSO 1.a: explore in depth knowledge in diverse areas of Computer Science and advanced programming skills to carry research.

PSO 1.b: adapt to new computing technologies with broad range of programming languages and open source platforms for attaining professional excellence and entrepreneurial skill.

PO 2: Communication Skill

PSO 2: effectively communicate the concepts and ideas of new emerging technologies in computer science through effective reports, documentation and clear presentations.

PO 3: Scientific Reasoning

PSO 3: apply the attained knowledge in computer science for problem solving and in developing new application software.

PO 4: Critical Thinking

PSO 4: transform original ideas into novel solutions and apply it with ease to adapt recent trends in diverse areas of computer science.

PO 5: Research Related Skills

PSO 5: enhance technical skills to promote interdisciplinary research in various domains of computer science to fulfill the needs of the society.

PO 6: Digital Literacy

PSO 6.a: use online collaboration tools like google classroom, youtube channel, slideshare and MOOC platform to negotiate content to enhance their learning behaviour through green environment.

PSO 6.b: adapt to new technologies and constantly upgrade their technical skills with an attitude towards independent and life-long learning to become successful in computer industry.

PO 7: Cooperation/TeamWork

   PSO 7: implement and evaluate the software projects as a member in a team by utilizing modern software tools.

PO 8: Moral Ethical Values

   PSO 8: promote ethical values and make them professionally responsible with the ability to relate computer applications to broader social context for the growth of the nation.

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Semester I		ADVANCED OPERATING SYSTEMS	Hours/Week: 5	
Core Course 1			Credits: 5	
Course Code			Internal	External
20PCSC11			40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: describe the functions, design approaches, design issues, synchronization mechanisms and classification of failures for distributed operating system. [K2]

CO2: observe the concepts of distributed file system, virtualization, distributed resource management and virtual machine. [K2]

CO3: determine the agreement problem on distributed system, process of deadlocks, various deadlock detection algorithms, memory and I/O management in virtual environment, failure recovery algorithms and fault tolerance protocols. [K3]

CO4: analyze the centralized deadlock detection algorithms, issues in distributed file system, error recovery in distributed system, different scheduling algorithms, mutual exclusion algorithms, critical section problems in distributed operating systems and issues of processor in virtual environment. [K4]

CO5: assess the deadlock detection algorithms, deadlock avoidance algorithms, recovery algorithms and features of hypervisor virtualization platforms. [K5]

Course Code 20PCSC11	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	-	L	L	-	-	M	L	-	-
CO2	M	-	M	L	L	-	M	L	-	-
CO3	M	M	M	L	L	M	H	M	-	-
CO4	M	M	M	M	M	H	H	H	-	-
CO5	H	H	H	H	M	H	H	H	-	-

Semester I		DATA STRUCTURES USING C++	Hours/Week: 5	
Core Course 2			Credits: 5	
Course Code			Internal	External
20PCSC12			40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: describe the concepts of linear and non-linear data structure through ADT Class and its applications. [K2]

CO2: illustrate standard operations on various tree and graph data structures. [K2]

CO3: employ vector and STL on linear and non-linear data structures. [K3]

CO4: analyze various methods on stack, queue, tree, graph data structures, different types of sorting and hashing techniques. [K4]

CO5: evaluate stack applications, time complexity of sorting, hashing techniques, tree and graph operations. [K5]

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Course Code 20PCSC12	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	L	M	L	L	-	M	L	-	-
CO2	H	M	M	L	L	L	M	L	-	-
CO3	H	M	M	L	L	-	H	M	-	-
CO4	H	H	H	M	M	M	H	H	-	-
CO5	H	H	H	H	M	M	H	H	-	L

Semester I		RELATIONAL DATABASE MANAGEMENT SYSTEMS	Hours/Week: 5	
Core Course 3			Credits: 5	
Course Code 20PCSC13			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: relate Queries, basic operations, set operations and views in SQL, indexing in B+ Tree and hashing. [K2]

CO2: review ACID property in transaction, protocols that handle concurrency in transaction, distributed databases and parallelism approaches in parallel databases. [K2]

CO3: implement relational operations, view constraints in SQL, decomposing algorithms using functional dependencies, ordered indices and hashing technique in B+ Tree, serializability in transaction, serializability in distributed databases and I/O parallelism. [K3]

CO4: analyze aggregate and set theory operations in SQL, normal forms, B+ tree index files, multiple key access and working of parallelism in parallel databases, transaction management in distributed databases. [K4]

CO5: assess the usage of subqueries and constraints in SQL, deadlock handling in transactions, commit protocols in distributed databases, multivalued dependencies for decomposition, operations on B+ Tree and relational operations on parallel databases. [K5]

Course Code 20PCSC13	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	M	L	-	-	-	M	L	-	-
CO2	M	M	M	L	-	L	M	M	-	-
CO3	M	M	M	M	L	L	H	M	-	L
CO4	M	H	H	M	M	M	H	H	-	M
CO5	H	H	H	M	M	M	H	H	-	M

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Semester I		Hours/Week: 5	
Core Practical 1	**DATA STRUCTURES USING C++ LAB**	Credits: 3	
Course Code		Internal	External
20PCSC11P		40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write proper syntax to create a class, declaration of function and the data structures needed for the particular program. [K3]

CO2: write complete source code with its logic for linear and non-linear data structure for a specified problem. [K3]

CO3: execute various data structure operations for the specified problem and evaluate the performance and the completion of their record work. [K3]

CO4: explore the performance of stack, queue, linked list, trees and graphs methods. [K4]

CO5: modify the program with another possible data structure. [K5]

Course Code 20PCSC11P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	L	M	-	-	-	M	L	L	L
CO2	M	L	M	-	-	-	M	M	L	L
CO3	H	M	M	M	M	L	H	M	L	M
CO4	H	H	H	M	M	M	H	H	M	M
CO5	H	H	H	H	H	M	H	H	M	M

Semester I		Hours/Week: 5	
Core Practical 2	**RDBMS LAB**	Credits: 3	
Course Code		Internal	External
20PCSC12P		**40**	**60**

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write commands for table creation, insertion and updation with its proper syntax. [K3]

CO2: write PL/SQL programs to implement the concepts of exception handling, implicit and explicit cursors, functions, procedures, triggers, packages. [K3]

CO3: execute the PL/SQL program through procedures, functions, packages with different parameters to obtain the desired output and evaluate the performance and the completion of their record work. [K3]

CO4: point out the working of triggers, function and procedures, exception handling, implicit and explicit cursors in PL/SQL programs. [K4]

CO5: modify the PL/SQL program from implicit to explicit cursor, from function to procedure and vice versa. [K5]

Course Code 20PCSC12P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	L	M	L	-	-	M	M	L	L
CO2	M	M	M	L	L	-	M	M	L	L
CO3	M	M	H	M	M	M	H	M	L	M
CO4	M	H	H	M	M	M	H	H	M	H
CO5	H	H	H	M	M	M	H	H	M	M

Semester I		SOFT COMPUTING AND MACHINE LEARNING	Hours/Week: 5	
DSEC 1			Credits: 5	
Course Code			Internal	External
20PCSE11			40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1:   comprehend soft computing techniques like neural networks, fuzzy sets, fuzzy rules, fuzzy reasoning and basics of machine learning. [K2]

CO2:   infer machine learning algorithms, supervised learning and unsupervised learning neural networks. [K2]

CO3:   implement fuzzy inference system, apply least-squares methods for system identification, apply supervised and unsupervised learning algorithms, demonstrate machine learning algorithms. [K3]

CO4:   analyze fuzzy system, genetic algorithm, machine learning paradigm, supervised learning and unsupervised learning networks. [K4]

CO5:   assess fuzzy relations, SGD, supervised learning and unsupervised learning networks. [K5]

Course Code 20PCSE11	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	L	H	M	-	M	H	M	-	-
CO2	H	L	H	M	-	M	H	M	-	-
CO3	H	M	H	M	M	H	H	H	-	-
CO4	M	M	M	M	M	H	H	H	-	M
CO5	M	M	M	M	M	H	L	H	-	M

Semester I		AUTOMATA THEORY	Hours/Week: 5	
DSEC 1			Credits: 5	
Course Code			Internal	External
20PCSE12			40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: understand automata theory, finite automata, regular expressions and turing machines. [K2]

CO2: describe context free grammars, pushdown automata. [K2]

CO3: determine regular expressions, deterministic and non-deterministic finite automata for any regular language. [K3]

CO4: explore the application of regular expressions and context free grammars. [K4]

CO5: validate grammars and automata (recognizers) for particular Languages. [K5]

Course Code 20PCSE12	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	L	M	-	-	-	M	-	-	-
CO2	M	L	L	-	-	-	M	L	-	-
CO3	M	M	L	-	-	-	M	M	-	-
CO4	H	M	H	M	L	M	H	M	-	-
CO5	H	M	M	M	L	M	H	H	-	M

Semester I			Hours/Week: 5	
DSEC 1			Credits: 5	
Course Code 20PCSE13		**NEURAL NETWORKS**	Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: understand ANS technology, mathematical foundations of backpropagation, self organizing maps and adaptive resonance theory. [K2]

CO2: discuss the architecture of adaline, madaline, counter propagation network, spatiotemporal network and necognitron. [K2]

CO3: express data processing in counter propagation network, self organizing maps and neocognitron. [K3]

CO4: investigate BAM, hopfield memory and simulated annealing. [K4]

CO5: validate backpropagation, self organizing maps and spatiotemporal network for application. [K5]

Course Code 20PCSE13	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	L	M	-	-	-	M	-	-	-
CO2	M	L	L	L	-	-	M	-	-	-
CO3	M	M	H	M	L	M	M	M	-	-
CO4	H	M	L	M	M	M	H	L	-	-
CO5	H	H	M	M	H	M	M	L	-	M

Semester II	ADVANCED COMPUTER ARCHITECTURE	Hours/Week: 5	
Core Course 4		Credits: 5	
Course Code 20PCSC21		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: comprehend the computer models, program flow mechanism, multiprocessor system interconnects, processor and memory hierarchy. [K2]

CO2: understand the concepts of parallelism, cache memory, pipelining and synchronization mechanisms. [K2]

CO3: demonstrate various multiprocessors, multicomputers, multivector computer, network properties, vector processor, bus systems, shared memory organization, pipelining techniques and message passing mechanism. [K3]

CO4: classify various computer models, processor technologies, memory hierarchies and memory organization, pipeline processor and synchronization mechanisms. [K4]

CO5: assess the system performance through system attributes, hardware and software parallelism, memory allocation, memory replacement policies, pipeline performance, and cache coherence protocols. [K5]

Course Code 20PCSC21	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	-	H	-	-	-	M	L	-	-
CO2	H	L	H	L	L	-	H	M	-	-
CO3	H	L	H	M	M	L	H	H	-	-
CO4	H	L	M	M	M	M	H	H	-	-
CO5	H	-	M	H	M	H	M	H	-	L

Semester II			Hours/Week: 5	
Core Course 5		**DIGITAL IMAGE PROCESSING**	Credits: 5	
Course Code 20PCSC22			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1:   describe digital image fundamentals, relationship between pixels, image compression, Discrete Fourier Transform. [K2]

CO2:   discuss various filters in spatial and frequency domain, color image processing, image segmentation, image restoration and reconstruction. [K2]

CO3:   demonstrate image smoothing and sharpening filters, color model conversion, intensity transformation on images, histograms, various algorithms for image restoration, reconstruction and compression methods. [K3]

CO4:   examine image acquisition, image segmentation, compression techniques, functionalities of Spatial and Frequency filters for image enhancement, color models. [K4]

CO5:   assess histogram processing, image restoration, reconstruction, segmentation and compression techniques. [K5]

Course Code 20PCSC22	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	M	H	L	L	-	M	L	-	-
CO2	H	M	H	L	L	L	H	M	-	-
CO3	H	M	H	M	M	H	H	H	-	L
CO4	H	M	M	M	M	H	H	H	-	L
CO5	H	M	M	M	M	H	M	H	-	-

Semester II		DIGITAL IMAGE PROCESSING	Hours/Week: 5	
Core Course 5			Credits: 5	
Course Code 20PCSC22N			Internal 40	External 60

COURSE OUTCOMES
On completion of the course, the learners will be able to

CO1:   describe digital image fundamentals, relationship between pixels, image compression, Discrete Fourier Transform and Object recognition. [K2]

CO2:   discuss various filters in spatial and frequency domain, color image processing, image segmentation, image restoration and reconstruction. [K2]

CO3:   demonstrate image smoothing and sharpening filters, color model conversion, intensity transformation on images, histograms, various algorithms for image restoration, reconstruction and compression methods. [K3]

CO4: examine image acquisition, image segmentation, compression techniques, functionalities of Spatial and Frequency filters for image enhancement, color models. [K4]

CO5: assess histogram processing, image restoration, reconstruction, segmentation and compression techniques. [K5]

Course Code 20PCSC22N	PO1		PO2	PO3	PO4	PO5		PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7	PSO 8
CO1	H	M	H	L	L	M	L	-	-	-
CO2	H	M	H	L	L	H	M	L	-	-
CO3	H	M	H	M	M	H	H	H	-	L
CO4	H	M	M	M	M	H	H	H	-	L
CO5	H	M	M	M	M	M	H	H	-	-

Semester II		OPEN SOURCE SOFTWARE	Hours/Week: 5	
Core Course 6			Credits: 5	
Course Code 20PCSC23			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: understand PHP Basics and creation of a web page using forms in PHP, sequence, tuples, conditions and loops in Python. [K2]

CO2: infer OOP's concept, MySQL, exception handling in Python applications. [K2]

CO3: illustrate lists, tuples, dictionaries in Python, error handling, string expression operations, session handling, AJAX and object oriented in PHP. [K3]

CO4: analyze OOP concepts, form validation using advanced validation methods in PHP, mathematical operations and exception handing , file operations in Python. [K4]

CO5: select necessary operations for application using PHP and Python. [K5]

Course Code 20PCSC23	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	M	H	L	L	L	L	L	-	-
CO2	H	M	H	L	L	L	M	M	-	-
CO3	H	H	H	M	M	H	M	H	-	-
CO4	H	H	H	H	H	H	H	H	-	M
CO5	H	H	H	H	H	H	H	H	-	M

Semester II			Hours/Week: 5	
Core Course 6		**OPEN SOURCE SOFTWARE**	Credits: 5	
Course Code 20PCSC23N			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1:   understand PHP Basics and creation of a web page using forms in PHP, sequence, tuples, conditions and loops in Python. [K2]

CO2:   apply OOP's concept, MySQL, exception handling in Python applications. [K2]

CO3:   illustrate lists, tuples, dictionaries in Python, error handling, string expression operations, session handling, AJAX and object oriented in PHP. [K3]

CO4:   analyze OOP concepts, form validation using advanced validation methods in PHP, mathematical operations and exception handing , file operations in Python. [K4]

CO5:   select necessary operations for application using PHP and Python. [K5]

Course Code 20PCSC23N	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	M	H	L	L	L	L	L	-	-
CO2	H	M	H	L	L	L	M	M	-	-
CO3	H	H	H	M	M	H	M	H	-	-
CO4	H	H	H	H	H	H	H	H	-	M
CO5	H	H	H	H	H	H	H	H	-	M

Semester II		MAT LAB	Hours/Week: 5	
Core Practical 3			Credits: 3	
Course Code 20PCSC21P			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write correct statements for vector & matrix creation, reading the image, displaying the image and looping statements with proper syntax. [K3]

CO2: write MATLAB programs using various geometric transformation operations, thresholding and stretching techniques, filtering operations and morphological operations. [K3]

CO3: execute MATLAB programs to get the desired output and evaluate the performance and the completion of their record work. [K3]

CO4: examine implementation of various logical operations, filtering operations, histogram calculation and equalization operations. [K4]

CO5: modify brightness of the image for various mean value, low pass filter into high pass filter & vice versa and mask window size. [K5]

Course Code 20PCSC21P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	M	L	-	-	-	M	M	-	-
CO2	M	M	M	L	L	-	M	M	L	-
CO3	M	M	M	L	L	-	M	M	L	-
CO4	H	H	M	M	M	M	H	H	M	-
CO5	H	H	H	H	M	M	H	H	H	L

Semester II		**MAT LAB**	Hours/Week: 5	
Core Practical 3			Credits: 3	
Course Code			Internal	External
20PCSC21PN			40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write correct statements for vector & matrix creation, reading the image, displaying the image and looping statements with proper syntax.[K3]

CO2: write MATLAB programs using various geometric transformation operations, thresholding and stretching techniques, filtering operations, histogram processing, morphological operations, edge detection and object recognition. [K3]

CO3: execute MATLAB programs to get the desired output and evaluate the performance and the completion of their record work. [K3]

CO4: examine implementation of various logical operations, filtering operations, histogram equalization operations and edge detection. [K4]

CO5: modify brightness of the image for various mean value, low pass filter into high pass filter & vice versa and mask window size. [K5]

Course Code 20PCSC21PN	PO1		PO2	PO3	PO4	PO5		PO6	PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7	PSO 8
CO1	M	M	L	-	-	M	M	-	-	-
CO2	M	M	M	L	L	M	M	-	L	-
CO3	M	M	M	L	L	M	M	-	L	-
CO4	H	H	M	M	M	H	H	M	M	-
CO5	H	H	H	H	M	H	H	M	H	L

Semester II		Hours/Week: 5	
Core Practical 4	**OPEN SOURCE SOFTWARE LAB**	Credits: 3	
Course Code 20PCSC22P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write the tags for designing the web pages with header and body section in PHP and give the correct library functions, proper indentation for the Python programs. [K3]

CO2: write a PHP/Python programs with accurate logic that helps to obtain the expected result. [K3]

CO3: build web pages using PHP programs and execute basic operations in Python program and evaluate the performance and the completion of their record work. [K3]

CO4: point out the working of form elements, exception handling in PHP and various data structures in Python. [K4]

CO5: alter the PHP and Python programs with the specified modifications. [K5]

Course Code 20PCSC22P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	M	M	L	L	-	M	L	L	-
CO2	H	M	M	L	L	-	M	L	M	-
CO3	H	H	H	M	M	H	H	H	H	H
CO4	H	H	H	M	M	M	H	H	H	M
CO5	H	H	H	M	M	M	H	H	H	M

Semester II		OPEN SOURCE SOFTWARE LAB	Hours/Week: 5	
Core Practical 4			Credits: 3	
Course Code 20PCSC22PN			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1:   write the tags for designing the web pages with header and body section in PHP

and give the correct library functions, proper indentation for the Python programs.

[K3]

CO2:   write a PHP/Python programs with accurate logic that helps to obtain the

expected result. K3]

CO3:   build web pages using PHP programs and execute basic operations in Python

program and evaluate the performance and the completion of their record work.

[K3]

CO4:   point out the working of form elements, exception handling in PHP and various

data structures in Python. [K4]

CO5:   alter the PHP and Python programs with the specified modifications. [K5]

Course Code 20PCSC22PN	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	M	M	L	L	-	M	L	L	-
CO2	H	M	M	L	L	-	M	L	M	-
CO3	H	H	H	M	M	H	H	H	H	H
CO4	H	H	H	M	M	M	H	H	H	M
CO5	H	H	H	M	M	M	H	H	H	M

Semester II		NETWORK SECURITY AND CRYPTOGRAPHY	Hours/Week: 5	
DSEC 2			Credits: 5	
Course Code 20PCSE21			Internal 40	External 60

COURSE OUTCOMES

On completion of course, the learners will be able to

CO1: summarize encryption techniques, public key cryptography and hash functions. [K2]

CO2: express authentication principles, key management, network & IP Security. [K2]

CO3: use block ciphers, encryption standards, public key cryptosystems, digital signature protocols, authentication protocols, cryptography algorithm for IP & Network

Security. [K3]

CO4: analyze various encryption algorithms, hash functions, digital signature algorithm, authentication protocols and security policies. [K4]

CO5: evaluate the performance of encryption standard algorithms, hash algorithms, message authentication functions and authentication services for security. [K5]

Course Code 20PCSE21	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	L	-	M	-	-	-	L	-	-	-
CO2	L	-	M	-	-	-	L	-	-	-
CO3	M	L	H	L	-	L	M	L	-	-
CO4	M	M	H	M	M	M	M	M	-	L
CO5	M	M	H	M	L	M	H	M	-	L

Semester II		INTERNET OF THINGS	Hours/Week: 5	
DSEC 2			Credits: 5	
Course Code 20PCSE22			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: express basic design of IoT, domain specific IoT, IOT and M2M communication. [K2]

CO2: summarize IoT system management, logical design of IoT using Python, IoT design methodology, physical servers and cloud offering in IoT. [K2]

CO3: use Python program for IoT system components and IoT system management protocols. [K3]

CO4: manage IoT system, physical servers and cloud offerings. [K4]

CO5: choose appropriate Python packages for IoT System and IOT System Management protocols. [K5]

Course Code 20PCSE22	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	L	-	M	-	-	-	L	-	-	-
CO2	L	L	M	-	-	-	M	-	-	-
CO3	L	L	H	L	-	L	M	L	-	-
CO4	M	L	L	L	L	M	L	M	-	M
CO5	M	M	L	L	L	H	M	M	-	M

Semester II		Hours/Week: 5	
DSEC 2	**GRID COMPUTING**	Credits: 5	
Course Code		Internal	External
20PCSE23		40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: express the history, architecture, service elements and layered model. [K2]

CO2: recognize the deployment issues, approaches and tools of grid computing. [K2]

CO3: illustrate the different architecture views, Open Grid Service Architecture (OGSA) services, deployment and management issues of grid computing. [K3]

CO4: analyze the supporting standards of Open Grid Services Infrastructure (OGSI) & OGSA, service relationships and security of grid computing. [K4]

CO5: compare the constituent elements, Globus Toolkit systems, grid standards and grid services of grid computing. [K5]

Course Code 20PCSE23	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	L	-	M	-	-	-	M	-	-	-
CO2	L	-	M	-	-	-	M	-	-	-
CO3	L	-	M	M	L	-	M	-	-	M
CO4	M	L	H	M	L	L	H	L	-	M
CO5	M	L	H	M	M	L	H	L	-	-

Semester III		DATA MINING	Hours/Week: 6	
Core Course 7			Credits: 5	
Course Code			Internal	External
20PCSC31			40	60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: infer data mining basics, data preprocessing, data warehousing and online analytical processing. [K2]

CO2: describe associations, correlations, classification, mining frequent patterns, clustering and outlier detection methods. [K2]

CO3: illustrate the usage of data preprocessing, mining frequent patterns, WEKA functionalities, classification, clustering, outlier detection algorithms and data mining in WEKA. [K3]

CO4: analyse pre-processing methods, data warehousing, OLAP operations, various frequent itemset mining methods, classification methods, clustering methods and outlier detection methods. [K4]

CO5: justify data mining algorithms for particular data set. [K5]

Course Code 20PCSC31	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	M	-	M	-	-	-	L	L	-	-
CO2	M	L	M	-	-	-	L	L	-	-
CO3	H	H	H	L	M	M	M	M	-	-
CO4	H	H	H	H	M	H	H	H	-	L
CO5	H	H	H	H	H	H	M	H	-	L

Semester III		ADVANCED JAVA PROGRAMMING	Hours/Week: 6	
Core Course 8			Credits: 5	
Course Code 20PCSC32			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1:   understand the concepts of database connectivity and networking in Java, Applets, Servlets, Swing and Collections Framework. [K2]

CO2:   discuss Remote Method Invocation, Servlets, JSP and applets in Java. [K2]

CO3:   implement Remote Method Invocation, applications with database access and collection classes, JSP, Servlets, Swing applications and Applets. [K3]

CO4:   contrast applets with Java application programs, different classes in Swing and Collections framework, server side scripting programs using JSP with Servlet, analyse RMI and Networking concepts in Java. [K4]

CO5:   assess Java Database Connectivity, Remote Method Invocation, purpose of Collection classes, Swing and Servlets. [K5]

Course Code 20PCSC32	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	H	H	L	L	-	H	H	-	-
CO2	H	H	H	L	L	-	H	H	-	-
CO3	H	H	H	M	M	L	H	M	-	L
CO4	M	M	H	M	M	L	H	M	-	M
CO5	M	M	H	H	H	-	H	H	-	M

Semester III		Hours/Week: 6	
Core Practical 5	**ADVANCED JAVA PROGRAMMING LAB**	Credits: 3	
Course Code 20PCSC31P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write coding for importing required packages and creating main method class in all Java application programs. [K3]

CO2: write Java programs to implement the concepts of Networking protocols TCP/IP and UDP, Database connectivity, RMI, Applets, Swing Servlets and JSP. [K3]

CO3: develop Java console application programs, Applets and Web applications proficiently and evaluate the performance and the completion of their record work. [K3]

CO4: analyze the appropriate usage of various data structures for a given problem. [K4]

CO5: modify networking protocols used in the Java application program, Servlets to JSP programs and vice-versa. [K5]

Course Code 20PCSC31P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	H	H	L	L	-	H	H	H	-
CO2	H	H	H	L	L	L	H	H	H	L
CO3	H	H	H	L	L	L	H	H	H	L
CO4	M	L	H	M	M	L	H	H	L	L
CO5	M	L	M	M	M	-	L	H	L	M

Semester III		ASP.NET USING C# LAB	Hours/Week: 6	
Core Practical 6			Credits: 3	
Course Code 20PCSC32P			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write ASP.NET programs with appropriate controls and its properties. [K3]

CO2: write programs by using List Box, Dropdown List, Image Map, Site Map, Tree View, Database Connectivity, AD Rotator and Timer control in ASP.NET. [K3]

CO3: execute ASP.NET programs by placing the needed tools for that program and prepare records and evaluate the performance and the completion of their record work.. [K3]

CO4: examine the control properties used in ASP.NET programs. [K4]

CO5: use bulleted list instead of list box control, Site Map instead of Tree View control and vice versa in programs. [K5]

Course Code 20PCSC32P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	H	M	L	L	-	H	H	M	L
CO2	H	H	M	L	L	-	H	H	M	L
CO3	H	H	H	M	M	M	M	M	-	-
CO4	H	M	M	M	M	H	M	M	M	-
CO5	H	H	M	M	M	H	H	H	M	L

Semester III		Hours/Week: 5	
NMEC	**WEB PROGRAMMING**	Credits: 4	
Course Code 20PCSN31		**Internal** 40	**External** 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: define Internet technologies, internet browsers, head, body sections and lists in HTML. [K1]

CO2: review tables, style sheets, frames and forms in HTML. [K2]

CO3: use anchor tags, hyperlinks, comment lines, list tag, table tag, style tag, frameset action & method attribute in form. [K3]

CO4: distinguish order and unordered list, various style sheets and various HTML tags. [K4]

CO5: choose appropriate HTML tags for elegant view of webpage. [K5]

Course Code 20PCSN31	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	M	-	-	-	L	-	-
CO2	M	M	-	-	-	M	-	L
CO3	H	M	L	-	L	H	-	L
CO4	H	H	M	M	-	H	-	-
CO5	H	H	H	M	L	H	-	M

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Semester III	PRACTICE FOR SET/NET – GENERAL PAPER	Hours/Week:1
Course Code		**Credit: 1**
20PGOL31		**Internal 100**

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: discuss various concepts related to higher education system, teaching, communication, research, ICT and environmental studies. [K2]

CO2: apply the skills of communication, mathematical, internet and research aptitude in competitive examinations. [K3]

CO3: analyze the circumstances, instances, contents and arrive at / choose the best option. [K4]

CO4: interpret the data using ICT tools and logical reasoning. [K5]

CO5: build self learning activities to face challenges in their life. [K6]

Course Code 20PGOL31	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	H	-	-	M	L	-	L
CO2	H	H	L	M	H	M	-	M
CO3	H	M	M	H	H	M	-	M
CO4	H	M	H	H	H	H	-	L
CO5	H	L	M	L	L	H	-	L

Semester III Extra Credit Course	COMPUTER ESSENTIALS FOR COMPETITIVE EXAMINATION	Hours: 0
		Credits: 2
Course Code 20PCSO31		Internal 100

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1:   comprehend the basic concepts of computer essentials for competitive exams. [K2]

CO2:   use current technologies, skills, and tools necessary for computing practices. [K3]

CO3:   apply design, coding and testing principles in Computer Aptitude. [K3]

CO4:   investigate problems to provide accurate reasoning. [K4]

CO5:   select proper methods to find solution. [K5]

Course Code 20PCSO31	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	-	M	L	L	-	L	L	-	-
CO2	H	-	M	L	L	-	M	M	-	-
CO3	H	-	H	M	M	L	M	M	-	L
CO4	H	-	M	M	M	M	M	M	M	L
CO5	H	-	M	M	M	M	H	H	M	L

Semester IV		DATA ANALYTICS	Hours/Week: 6	
Core Course 9			Credits: 5	
Course Code 20PCSC41			Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: infer basics of R, dataset, types of anova, tests to apply on data and graphs for various datasets. [K2]

CO2: comprehend basics data management, statistics, regression, power analysis and plots. [K2]

CO3: handle various kinds of plots, graphs, regression diagnostics techniques on datasets. [K3]

CO4: investigate appropriate data structure, data management techniques, graphs, statistical tests and variance in R. [K4]

CO5: choose appropriate data structure, regression methods, plots and graphs for any data sets. [K5]

Course Code 20PCSC41	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	L	L	-	-	-	L	-	-	-
CO2	H	L	L	L	L	-	L	L	-	-
CO3	H	M	M	M	M	M	M	M	-	L
CO4	H	M	M	M	M	L	M	H	-	L
CO5	H	H	M	-	-	L	L	H	-	L

Semester IV		Hours/Week: 6	
Core Practical 7	**R PROGRAMMING LAB**	Credits: 3	
Course Code 20PCSC41P		Internal **40**	External **60**

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write R programs to import library and desirable dataset with its proper statements. [K3]

CO2: write R programs with necessary data mining algorithms and plot the outputs. [K3]

CO3: execute R program through apriori, éclat, decision trees, K Means Clustering, scatter plot mosaic plot with different parameters to obtain the desired output and evaluate the performance and the completion of their record work. [K3]

CO4: compare the different data mining algorithms and plotting methods in R. [K4]

CO5: test R program with different dataset and plot methods. [K5]

Course Code 20PCSC41P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	M	L	-	-	-	L	L	-	-
CO2	H	M	M	-	-	-	L	L	L	M
CO3	H	M	M	M	M	M	M	H	L	M
CO4	H	M	M	M	M	M	M	H	L	L
CO5	H	H	M	M	M	M	M	H	L	L

Semester IV		Hours/Week: 6	
Core Practical 7	**R PROGRAMMING LAB**	**Credits: 3**	
Course Code		**Internal**	**External**
20PCSC41PN		**40**	**60**

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write R programs to import library and desirable dataset with its proper statements.
[K3]

CO2: write R programs with necessary data mining algorithms and plot the outputs.
[K3]

CO3: execute R program through apriori, éclat, decision trees, K Means Clustering,

scatter plot mosaic plot with different parameters to obtain the desired output and

evaluate the performance and the completion of their record work. [K3]

CO4: compare the different data mining algorithms and plotting methods in R. [K4]

CO5: test R program with different dataset and plot methods. [K5]

Course Code 20PCSC41PN	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	M	L	-	-	-	L	L	-	-
CO2	H	M	M	-	-	-	L	L	L	M
CO3	H	M	M	M	M	M	M	H	L	M
CO4	H	M	M	M	M	M	M	H	L	L
CO5	H	H	M	M	M	M	M	H	L	L

Semester IV	ADVANCED WEB PROGRAMMING LAB	Hours/Week: 6	
Core Practical 8		Credits: 3	
Course Code 20PCSC42P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

  CO1:   write the tags for designing the web pages and use Angular JS Directives, Filters, Controllers, Services and CSS as needed. [K3]

  CO2:   write Angular JS programs by using built-in functions of Angular JS framework. [K3]

  CO3:   build web pages using Angular JS programs and evaluation of performance and completion of record work. [K3]

  CO4:   explore Angular JS programs using Database, Filters, Forms and Events. [K4]

  CO5:   change Angular JS programs with the specified modifications. [K5]

Course Code 20PCSC42P	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	H	H	L	-	-	M	H	L	L
CO2	H	H	H	L	-	-	H	H	L	L
CO3	H	H	H	H	M	M	M	H	H	M
CO4	H	M	L	M	-	M	M	H	M	M
CO5	H	H	M	M	M	-	M	M	M	M

Semester IV	ADVANCED WEB PROGRAMMING LAB	Hours/Week: 6	
Core Practical 8		Credits: 3	
Course Code 20PCSC42PN		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: write tags for designing the web pages and use JS Directives, Filters, Controllers, Services and CSS as needed. [K3]

CO2: write programs by using built-in functions of JS framework.[K3]

CO3: build web pages using JS programs and evaluation of performance and completion of record work [K3].

CO4: explore JS programs using Filters, Forms and Events. [K4]

CO5: change JS programs with the specified modifications. [K5]

Course Code 20PCSC42PN	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	H	H	L	-	-	M	H	L	L
CO2	H	H	H	L	-	-	H	H	L	L
CO3	H	H	H	H	M	M	M	H	H	M
CO4	H	M	L	M	-	M	M	H	M	M
CO5	H	H	M	M	M	-	M	M	M	M

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Semester IV		Hours/Week: 12	
Core Course 10	**PROJECT**	Credits: 6	
Course Code 20PCSC41PR		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1: discover the problem in specified domain utilizing the disciplinary knowledge. [K3]

CO2: investigate the methodology and solutions to the problem area. [K3]

CO3: apply the selected methodology to the problem. [K3]

CO4: transform the ideas to solution for the specified problem. [K4]

CO5: validate the finding of the problem. [K5]

Course Code 20PCSC41PR	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	H	H	M	M	H	H	H	M	H
CO2	H	H	H	M	M	H	H	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H	H

Semester IV	Project - Research Methodology & Ethics	Hours/Week: 12	
Core Course 10		Credits: 6	
Course Code 22PCSC41PR		Internal 60	External 40

COURSE OUTCOMES

On completion of the course, the learners will be able to

CO1:   discover the problem in specified domain utilizing the disciplinary knowledge. [K3]

CO2:   investigate the methodology and solutions to the problem area. [K3]

CO3:   apply the selected methodology to the problem based on research ethics [K3]

CO4:   transform the ideas to solution for the specified problem based on ethics. [K4]

CO5:   validate the finding of the problem. [K5]

Course Code 22PCSC41PR	PO1		PO2	PO3	PO4	PO5	PO6		PO7	PO8
	PSO 1.a	PSO 1.b	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6.a	PSO 6.b	PSO 7	PSO 8
CO1	H	H	H	M	M	H	H	H	M	H
CO2	H	H	H	M	M	H	H	H	M	H
CO3	H	H	H	H	H	H	H	H	H	H
CO4	H	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H	H