



**FACULTY OF HUMANITIES AND SCIENCE
LEARNING OUTCOME BASED CURRICULUM**

M.Sc.

COMPUTER SCIENCE

CURRICULUM & SYLLABUS

REGULATION – 2022

Department of Computer Science

Sponsored by

Dr. M.G.R. EDUCATIONAL AND RESEARCH INSTITUTE TRUST

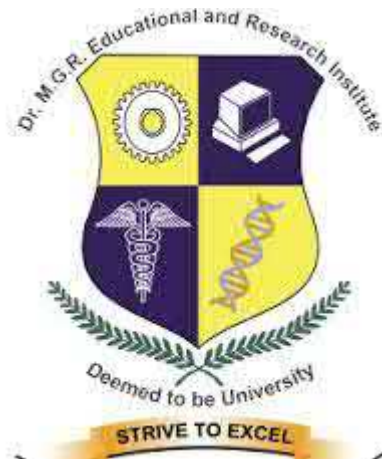


Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
DEEMED TO BE UNIVERSITY
University with Graded Autonomy Status



(An ISO 21001 : 2018 Certified Institution)
Periyar E.V.R. High Road, Maduravoyal, Chennai-95. Tamilnadu, India.

FACULTY OF HUMANITIES & SCIENCE



LEARNING OUTCOME BASED CURRICULUM

M.Sc. (COMPUTER SCIENCE)

Curriculum and Syllabus

Regulation – 2022

DEPARTMENT OF COMPUTER SCIENCE

DECLARATION

I, **Dr. A.R.ARUNACHALAM** Head of Computer Science Department, hereby declare that this copy of the syllabus (M.Sc. –Computer Science - 2022 Regulation) from page number 1 to 96 is the final version which is being taught in the class and uploaded in our University website. I assure that the Syllabi available in our university website is verified and found correct. The Curriculum and Syllabi have been ratified by our Academic Council / Vice Chancellor.

Date:

Signature



Dr. M.G.R. **EDUCATIONAL AND RESEARCH INSTITUTE** **DEEMED TO BE UNIVERSITY**



University with Graded Autonomy Status

(An ISO 21001 : 2018 Certified Institution)

Periyar E.V.R. High Road, Maduravoyal, Chennai-95. Tamilnadu, India.

FACULTY OF HUMANITIES & SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

VISION STATEMENT

To become a Premier Institution of Excellence in the field of Computer Science that would develop self-sustaining and globally competent Computer science professionals and to facilitate the students to pursue higher studies.

MISSION STATEMENT

M1	To provide a strong theoretical and practical background across the computer science discipline with an emphasis on nurturing and entitlement of computing principles and foundations.
M2	Equip the department laboratories with the power of in-demand technologies and software for the on-demand industry.
M3	Impart the students with ethical values, critical thinking and broad based computing skills.
M4	Provide necessary opportunities to enable the students to innovate and become entrepreneurs.
M5	To teach professional behavior, communication skills, innovative research capabilities and leadership abilities.

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1	Graduates will possess a strong theoretical and practical foundation in computer science, enabling them to pursue advanced research or higher education and contribute to the development of knowledge in emerging areas of computing.
PEO2	Graduates will be equipped with in-demand technical skills and proficiency in contemporary software tools and technologies, making them competent professionals capable of addressing real-world industry challenges.
PEO3	Graduates will exhibit professional ethics, critical thinking, and social responsibility, contributing positively to society through responsible computing practices.
PEO4	Graduates will demonstrate the ability to innovate, design solutions, and initiate entrepreneurial ventures, thereby contributing to the growth of the knowledge-based economy.
PEO5	Graduates will develop effective communication, leadership, and teamwork skills, while engaging in lifelong learning to adapt to evolving technologies and professional demands.

PROGRAMME OUTCOMES

PO1	Acquire in-depth knowledge related to the discipline.
PO2	Apply the recent advancement in the domain knowledge for solving real-life problems.
PO3	Demonstrate critical thinking skills by analyzing, synthesizing and evaluating various research problems
PO4	Identify and use qualitative and quantitative methods of research in order to pursue a wellresearched written work that makes use of wide range of disciplinary techniques and scientific methods applicable.
PO5	Conceive the ways and means to address various social, economic, environmental, human rights and other ethical issues faced by humanity at the local, national and global levels.
PO6	Demonstrate Professional, leadership and Management skills required for professional development and employability.
PO7	Demonstrate the ability for collaborative work and scientific communication through projects, internship and on-site training.
PO8	Use mathematical, analytical, statistical and information technology tools.
PO9	Ability to update knowledge and skills, participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development..

PROGRAMME SPECIFIC OUTCOMES

PSO1	Apply advanced concepts in algorithms, data structures, artificial intelligence, and machine learning to design and implement efficient computing solutions for complex problems.
PSO2	Design, develop, and deploy robust software systems using modern programming paradigms, cloud computing, web technology, and information security principles for real-world applications.
PSO3	Conduct independent research, innovate new computational models or techniques, and contribute to scholarly and entrepreneurial advancements in specialized areas of computer science.

PEO WITH MISSION STATEMENT MAPPING

	M1	M2	M3	M4	M5
PEO1	3	2	3	3	3
PEO2	3	2	3	2	3
PEO3	3	3	3	3	3
PEO4	3	2	3	3	3
PEO5	3	3	2	3	2

PEO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
PEO1	3	3	3	3	3	3	3	3	3
PEO2	2	2	3	3	3	2	3	3	3
PEO3	3	3	3	3	3	3	2	3	3
PEO4	2	3	3	3	2	3	2	3	3
PEO5	3	3	3	3	2	3	3	3	3

PEO-PSO MAPPING

	PSO1	PSO2	PSO3
PEO1	3	3	3
PEO2	3	3	3
PEO3	3	3	3
PEO4	3	2	2
PEO5	3	3	3

Dr.M.G.R Educational & Research Institute (Deemed to be University)
Department of Computer Science
Regulation 2022
M.Sc Computer Science

Semester I

Theory

S. No.	Code	Course	L	T	P	C	Ty/Lb/ETP/IE
1	HMMA22001	Mathematical Foundation for Computer Science	3	1	0	4	Ty
2	HMCS22001	Advanced Data Structures and Algorithms	3	1	0	4	Ty
3	HMCS22002	Advanced Operating System	3	0	0	3	Ty
4	HMCS22EXX	Programme Elective I	3	0	0	3	Ty
5	HMCC22001	Research Methodology	3	0	0	3	Ty
Practical							
6	HMCS22L01	Data Structures and Algorithms Lab	0	0	4	2	Lb
7	HMCS22L02	Operating System Lab	0	0	4	2	Lb
8	HMAC22I01	Audit Course	2	0	0	0	IE

Credits Sub Total: 21

Semester II

Theory

S. No.	Code	Course	L	T	P	C	Ty/Lb/ETP/IE
1	HMCS22003	Advanced JAVA Programming	3	1	0	4	Ty
2	HMCS22004	Advanced Database Systems	3	0	0	3	Ty
3	HMCS22005	Compiler Design	3	0	0	3	Ty
4	HMCS22EXX	Programme Elective II	3	0	0	3	Ty
5	HMCC22002	Intellectual Property Rights and Patents	3	0	0	3	Ty
Practical							
6	HMCS22L03	JAVA Programming Lab	0	0	4	2	Lb
7	HMCS22L04	Database Systems Lab	0	0	4	2	Lb
8	HMCS22I01	Summer Internship	0	0	4	2	IE

Credits Sub Total: 22

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research
 Ty/Lb/ETP/IE: Theory/Lab/Embedded Theory and Practice/ Internal Evaluation

Semester III

Theory

S. No.	Code	Course	L	T	P	C	Ty/Lb /ETP/ IE
1	HMCS22006	Advanced Computer Networks	3	0	0	3	Ty
2	HMCS22007	Web Technology	3	0	0	3	Ty
3	HMCS22008	Artificial Intelligence and Expert systems	3	1	0	4	Ty
4	HMCS22009	Data Science Using Python	3	0	0	3	Ty
5	HMCS22EXX	Programme Elective III	3	0	0	3	Ty
6	HMOL22IE1	Open Elective -Swayam/NPTEL	3	0	0	3	IE
Practical							
7	HMCS22L05	Project Phase I	0	0	4	2	Lb

Credits Sub Total: 21

Semester IV

S. No.	Code	Course	L	T	P	C	Ty/Lb /ETP /IE
1.	HMCS22L06	Project Phase II	0	0	18	9	Lb
2	HMCS22I02	Research Publication	0	0	4	2	IE

Credits Sub Total: 11

Credit Summary

Semester I : 21

Semester II : 22

Semester III : 21

Semester IV : 11

75

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research
Ty/Lb/ETP/IE: Theory/Lab/Embedded Theory and Practice/ Internal Evaluation

LIST OF PROGRAMME ELECTIVES

Programme Elective - I

Sub. Code	Subject Name	L	T	P	C
HMCS22E01	Cloud Computing	3	0	0	3
HMCS22E02	Software Project Management	3	0	0	3
HMCS22E03	Mobile Computing	3	0	0	3

Programme Elective - II

Sub. Code	Subject Name	L	T	P	C
HMCS22E04	Object Oriented Analysis & Design	3	0	0	3
HMCS22E05	Digital Image Processing	3	0	0	3
HMCS22E06	Computer Graphics	3	0	0	3

Programme Elective - III

Sub. Code	Subject Name	L	T	P	C
HMCS22E07	Machine Learning	3	0	0	3
HMCS22E08	Internet of Things	3	0	0	3
HMCS22E09	Information Security	3	0	0	3

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research
Ty/Lb/ETP/IE: Theory/Lab/Embedded Theory and Practice/ Internal Evaluation

LIST OF AUDIT COURSES

AUDIT COURSE							
S.No	Sub.Code	Title of the Subject	Ty/Lb/ ETL/IE	L	T/SLR	P/R	C
1.	HMAC22I01	English for Research paperWriting	Ty	2	0/0	0/0	0
2.	HMAC22I02	Disaster Management	Ty	2	0/0	0/0	0
3.	HMAC22I03	Sanskrit forTechnical Knowledge	Ty	2	0/0	0/0	0
4.	HMAC22I04	Value Education	Ty	2	0/0	0/0	0
5.	HMAC22I05	Constitution of India	Ty	2	0/0	0/0	0
6.	HMAC22I06	Pedagogy Studies	Ty	2	0/0	0/0	0
7.	HMAC22I07	Stress Management by Yoga	Ty	2	0/0	0/0	0
8.	HMAC22I08	Personality Development through Life Enlightenment Skills	Ty	2	0/0	0/0	0
9.	HMAC22I09	Life skill	Ty	2	0/0	0/0	0

Components Of Curriculum and Credit Distribution (M.Sc Computer Science)

S. No	CATEGORY	DESCRIPTION	NO. OF COURSES	CREDITS	TOTAL	CREDIT WEIGHTAGE	CONTACT HOURS
1.	CORE COURSES	Core Theory	9	30	38	51%	450
		Core Lab	4	8			120
2.	ELECTIVE COURSES	Department Core Electives/ Skill enhancement electives	3	9	9	12%	135
3.	OPEN ELECTIVES	Open Elective theory	1	3	3	4%	45
		Open Elective Lab					
4.	INTERDISCIPLINARY/ ALLIED COURSES	Theory	1	4	4	5%	60
		Lab					
5.	HUMANITIES & SOCIAL SCIENCES , LIFE SKILLS &SOFT SKILLS	Language 1 & 2			0	0	
		English 1 & 2					
		Soft Skills					
		Life Skill	1	0			15
		Foreign Language					
		Environmental Studies					
		Management Papers					
		Entrepreneurship Development					
6.	PROJECTS/INTERNSHIP/ CORE SKILL	Project	2	11	13	17%	165
		Core Skills(ETL)					
		Internship / NSS /NCC	1	2			30
7.	RESEARCH COMPONENT						
8.	ANY OTHER	Research Methodology	1	3	8	11%	45
		Intellectual Property Rights	1	3			45
		Research Publication	1	2			30
TOTAL			24	75	75	100%	1140

TABLE 2: Revision / Modification done in syllabus content:

S. No	Course (Subject) Code	Course (Subject) Name	Concept/ topic if any, removed in current curriculum	Concept/topic added in the new curriculum	% of Revision / Modification done
1.	M.Sc CS HMCS22001	Advanced Data Structures and Algorithms		Abstract Data Types, Heap Operations, Hash Set, Prim's and Kruskal's Algorithms, Time and space complexity, Tree vertex splitting.	75 %
2.	M.Sc CS HMCS22002	Advanced Operating System	Replaced Subject (Distributed Operating System)		
3.	M.Sc CS HMCC22001	Research Methodology	New Subject		
4.	M.Sc CS HMCS22L02	Operating System Lab	New Subject		
5.	M.Sc CS HMCC22I01	Audit Course: English for Research Paper writing	New Subject		
6.	M.Sc CS HMCS22004	Advanced Database Systems	Replaced Subject (RDBMS)		
7.	M.Sc CS HMCS22003	Advanced Java Programming		Applets, Working with Java Mail, Java Beans, RMI Architecture	75 %
8.	M.Sc CS HMCS22005	Compiler Design		Specification of Tokens, Introduction to LALR Parser, Heap Management	25 %
9.	M.Sc CS HMCC22002	Intellectual Property Rights and Patterns	New Subject		

10.	M.Sc CS HMCS22L04	Database System Lab	Replaced Lab (RDBMS)		
11.	M.Sc CS HMCS22I01	Summer Internship	New Subject		
12.	M.Sc CS HMCS22006	Advanced Computer Networks	New Subject		
13.	M.Sc CS HMCS22007	Web Technology	New Subject		
14.	M.Sc CS HMCS22008	Artificial Intelligence and Expert Systems	New Subject		
15.	M.Sc CS HMCS22009	Data Science using Python	New Subject		
16.	M.Sc CS HMOL22IE1	Open Elective – SWAYAM / NPTEL	New Subject		
17.	M.Sc CS HMCS22I02	Research Publication (Internal Evaluation)	New Subject		
18.	M.Sc CS	<ol style="list-style-type: none"> 1. DOTNET Programming, 2. XML and Web Services, 3. Data Warehousing and Data Mining, 4. Mobile and Wireless Networks, 5. Software Testing and Quality Assurance 	Removed Subjects		

Table 3:

List of New courses/ value added courses/life skills/Electives/interdisciplinary /courses focusing on employability/entrepreneurship/skill development. (M.Sc Computer Science)

S.No.	New courses (Subjects)	Value added courses	Life skill	Electives	Inter Disciplinary	Focus on employability/entrepreneurship/skill development.
1.	Research Methodology	✓				
2.	Operating System Lab	✓				
3.	Audit Course: English for Research Paper writing		✓			
4.	Intellectual Property Rights and Patterns	✓				
5.	Summer Internship	✓				
6.	Advanced Computer Networks	✓				
7.	Web Technology	✓				
8.	Artificial Intelligence and Expert Systems	✓				
9.	Data Science using Python	✓				
10.	Open Elective – SWAYAM / NPTEL	✓				
11.	Research Publication (Internal Evaluation)	✓				
12.	Mobile Computing			✓		
13.	Internet of Things			✓		
14.	Information Security			✓		

SEMESTER I

Subject Code HMMA22001	Subject Name: MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE	Ty/Lb/ETL	L	T/ S.Lr	P/R	C
	Prerequisite: UG level Mathematics and Statistics	Ty	3	1	0	4

L: Lecture T: Tutorial S.Lr: Supervised Learning P: Project R: Research C: Credits

Ty/Lb/ETL: Theory/Lab/Embedded Theory and Lab

OBJECTIVES:

The student should be made to:

- To understand the Logical and Inference theory
- To provide the expertise in the application of generating functions
- To gain knowledge in algebraic structures
- To understand the concepts of Probability and Random Variables
- To provide knowledge in various types of Standard Distributions

COURSE OUTCOMES (COs):

CO1	To formulate Logics and understand the Predicate calculus
CO2	To explore the concepts of Combinatorics and Pigeon hole Principle with the generating functions and recurrence relations
CO3	To understand the concepts of groups and semi-groups
CO4	To gain knowledge in the concepts of Probability.
CO5	To understand and analyze the concepts of standard distributions.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	2	3	2	3	2	3	3
CO2	2	2	3	3	2	3	2	3	3
CO3	3	3	3	2	3	2	3	2	2
CO4	2	2	3	3	2	3	3	3	2
CO5	3	3	2	2	3	3	3	3	2

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
	↙											

Subject Code HMMA22001	Subject Name: MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE	Ty/Lb/ETL	L	T/ S.Lr	P/R	C
	Prerequisite: UG level Mathematics and Statistics	Ty	3	1	0	4

UNIT I

12

Logic: Statements - Connectives - Truth Tables - Normal forms - Predicate calculus - Inference Theory.

UNIT II

12

Combinatorics: Review of Permutation and Combination - Mathematical Induction - Pigeonhole principle - Principle of Inclusion and Exclusion - generating function - Recurrence relations

UNIT III

12

Algebraic structures: Semi group - Monoid – Groups (Definition and Examples only) cyclic group - Permutation group (S_n and D_n) - Substructures - Homomorphism of semi group, monoid and groups - Cosets and Lagrange Theorem –Normal Subgroups - Rings and Fields (Definition and examples only)

UNIT IV

12

Probability And Random Variable- Axioms of Probability – Conditional probability – Total probability – Baye’s Theorem – Random variable – Probability mass function – Probability density function – Properties – Moments (Definition and simple problems).

UNIT V

12

Standard Distributions - Binomial – Poisson – Geometric –Uniform – Exponential –Normal distributions.

Total Periods: 60

TEXT BOOKS:

1. J. P. Trembley, Manohar, *Discrete Mathematical Structures with Applications to Computer Science*, TMH
2. K.H. Rosen, “*Discrete Mathematics and its Applications*”, McGraw - Hill Book Company, 1999
3. Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics*, S.Chand & Co., (2007).
4. Richard Johnson A., *Miller & Freund’s Probability and statistics for Engineers* ((9th ed), Prentice Hall of India, (2016).

REFERENCES BOOKS:

1. Mott, Kandel & Baker, *Discrete Mathematics for Computer Scientists & Mathematics* 2nd Edition, PHI 2002
2. Veerarajan T., *Probability, Statistics and, Random Processes*, Tata McGraw Hill Publishing Co., (2008).
3. Singaravelu, *Probability and Random Processes*, Meenakshi Agency, (2017).

Subject Code: HMCS22001	Subject Name: ADVANCED DATA STRUCTURES AND ALGORITHMS					Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of Data structures					Ty	3	1/0	0/0	4
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab										
OBJECTIVES										
<ul style="list-style-type: none"> Understand and apply linear data structures-List, Stack and Queue. Understand the graph algorithms. Learn different algorithms analysis techniques. Apply data structures and algorithms in real time applications Able to analyze the efficiency of algorithm 										
COURSE OUTCOMES (Cos)										
Students completing this course were able to										
CO1	Able to use abstract data types including stacks, queues and lists.									
CO2	Design and Implement Tree data structures and Sets.									
CO3	Able to understand and implement nonlinear data structures – graphs.									
CO4	Understand various algorithm design and implementation									
CO5	Apply suitable design strategy for problem solving.									
Mapping of Course Outcome with Program Outcome (POs)										
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	2	2	2	2	3	3	3	2	3	
CO2	2	3	3	3	3	2	2	2	3	
CO3	2	3	3	2	2	3	3	1	3	
CO4	3	2	3	2	3	2	3	2	3	
CO5	3	3	2	3	1	3	3	2	3	
COs /PSOs	PSO1			PSO2			PSO3			
CO1	3			2			3			
CO2	3			3			2			
CO3	2			3			2			
CO4	3			2			2			
CO5	2			3			3			
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low										
Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internships / Technical Skills	Soft Skills	
				√						

Subject Code: HMCS22001	Subject Name: ADVANCED DATA STRUCTURES AND ALGORITHMS	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of Data structures	Ty	3	1/0	0/0	4

UNIT I: 12

LINEAR DATA STRUCTURES: Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double EndedQueue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications -Applications of Queue - Linked Lists - Singly Linked List - Circularly linked List – DoublyLinked lists – Applications of linked list – Polynomial Manipulation.

UNIT II: 12

NON-LINEAR TREE STRUCTURES: Binary Tree – expression trees – Binary tree traversals – applications of trees – HuffmanAlgorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap operations- -Binomial Heaps - Fibonacci Heaps- Hash set.

UNIT III: 12

GRAPHS: Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra’s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.

UNIT IV: 12

Algorithm- - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity –big- “oh” notation – practical complexities – randomized algorithms – repeated element – primality testing - Divide and Conquer: General Method - Finding maximum and minimum – merge sort.

UNIT V: 12

Divide and conquer contd. Quicksort, Selection, Strassen's matrix multiplication – GreedyMethod: General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optimal storage on tapes.

Total Periods : 60

TEXT BOOKS:

1. Ellis Horowitz, “Computer Algorithms”, Galgotia Publications.
2. Alfred V.Aho,JohnE.Hopcroft,JeffreyD.Ullman, "Data Structures and Algorithms".

REFERENCE BOOKS:

- 1.Goodrich, “Data Structures & Algorithms in Java”, Wiley 3rd edition.
2. Skiena, ”The Algorithm Design Manual”, SecondEdition, Springer , 2008

Subject Code: HMCS22002	Subject Name: ADVANCED OPERATING SYSTEM	Ty/Lb/L ETL	T / S.Lr	P/R	C
	Prerequisite : Basic Knowledge about Operating System.	Ty	3	0/0	0/0 3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab

OBJECTIVES

1. To get a comprehensive knowledge of the architecture of distributed systems.
2. To understand the deadlock and shared memory issues and their solutions in distributed environments.
3. To know the security issues and protection mechanisms for distributed environments.
4. To get a knowledge of multiprocessor operating system.
5. To get a knowledge of database operating systems

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the design approaches of advanced operating systems.
CO2	Analyze the design issues of distributed operating systems.
CO3	Evaluate design issues of multi processor operating systems.
CO4	Identify the requirements Distributed File system and Distributed Shared Memory.
CO5	Formulate the solutions to schedule the real time applications.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	2	3	3	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	3	3	2	2	2	3	3	1	2
CO4	2	2	3	3	3	2	2	2	3
CO5	2	3	1	3	2	3	3	2	3

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	2	2	3
CO3	3	3	3
CO4	2	3	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internships / Technical Skills	Soft Skills
				√					

Subject Code: HMCS22002	Subject Name: ADVANCED OPERATING SYSTEM	Ty/L b/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : Basic Knowledge about Operating System.	Ty	3	0/0	0/0	3

UNIT: I

9

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks – communication primitives. Theoretical Foundations – inherent limitations of a distributed system– lamp ports logical clocks – vector clocks–casual ordering of messages – global state – cuts of a distributed computation – termination detection. Distributed Mutual Exclusion.

UNIT: II

9

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems – issues in deadlock detection and resolution – control organizations for distributed deadlock detection – centralized and distributed deadlock detection algorithms –hierarchical deadlock detection algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – design issues – log structured file systems.

UNIT: III

9

Distributed shared memory-Architecture– algorithms for implementing DSM – memory coherence and protocols – design issues. Distributed Scheduling – introduction – issues in load distributing – components of a load distributing algorithm. Failure Recovery and Fault tolerance: introduction– basic concepts – classification of failures – backward and forward error recovery, backward error recovery- recovery in concurrent systems – synchronous and asynchronous check pointing and recovery – check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT: IV

9

Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security – cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard- public key cryptography – multiple encryption – authentication in distributed systems.

UNIT: V

9

Multiprocessor operating systems - basic multiprocessor system architectures – inter connection networks for multiprocessor systems – caching – hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control distributed database systems, concurrency control algorithms – introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms.

Total Periods: 45

TEXT BOOKS:

1. Mukesh Singhal, Niranjana G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, "Modern operating system", PHI 2003.
2. Pradeep K.Sinha, "Distributed operating system– Concepts and design", PHI 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education,2003.

SubjectCode: HMCC22001	Subject Name: Research Methodology	Ty/Lb/ ETL/IE	L	T/ SLr	P/ R	C
	Prerequisite: None	Ty	3	0	0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab						

Unit I

9

Introduction to research, Definitions and characteristics of research, Types of Research, Research Process, Problem definition, Objectives of Research, Research Questions, Research design, Quantitative vs. Qualitative Approach, Building And Validating Theoretical Models, Exploratory vs. Confirmatory Research, Experimental vs. Theoretical Research, Importance of reasoning in research.

Unit II

9

Problem Formulation, Understanding Modeling & Simulation, Literature Review, Referencing, Information Sources, Information Retrieval, Indexing and abstracting services, Citation indexes, Development of Hypothesis, Measurement Systems Analysis, Error Propagation, Validity of experiments, Statistical Design of Experiments, Data / Variable Types & Classification, Data collection, Numerical and Graphical Data Analysis: Sampling, Observation, Interpretation of Results.

Unit III (This Unit has to be handled by Mathematics Faculty)

9

Statistics: Probability & Sampling distribution, Estimation, Measures of central Tendency, Arithmetic mean, Median, Mode, Standard deviation, Co efficient of variation (Discrete serious and continuous serious), Hypothesis testing & application, Correlation & regression analysis, Orthogonal array, ANOVA, Standard error, Concept of point and interval estimation, Level of significance, Degree of freedom, Analysis of variance, One way and two way classified data, F' test.

Unit IV

9

Preparation of Dissertation and Research Papers, Tables and illustrations, Guidelines for writing the abstract, introduction, methodology, results and discussion, conclusion sections of a manuscript. References, Citation and listing system of documents.

Unit V

9

Intellectual property rights (IPR) patents copyrights Trademarks Industrial design geographical indication. Ethics of Research Scientific Misconduct Forms of Scientific Misconduct. Plagiarism, Unscientific practices in thesis work, Ethics in science.

Total Periods: 45

Text Book:

1. K.S. Bordens, and B.B. Abbott,— Research Design and Methods—A Process Approach, 8th Edition, Mc Graw Hill, 2011.
2. C.R. Kothari,— Research Methodology – Methods and Techniques, 2nd Edition, New Age International Publishers

Subject Code: HMCS22L01	Subject Name: DATA STRUCTURES AND ALGORITHMS LAB	Ty /Lb/ ETL	L	T / S.Lr	P / R	C
	Prerequisite: Basic knowledge in Data structures	Lb	0	0/0	4/0	2

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To learn good principles of algorithm design;
- To learn how to analyse algorithms and estimate their worst-case and average case.
- To become familiar with fundamental data structures.
- To the description of algorithms in both functional and procedural styles;
- To learn how to apply their theoretical knowledge in practice.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues.
CO3	Describe the hash function and concepts of collision and its resolution methods
CO4	Solve problem involving graphs, trees and heaps.
CO5	Design programs based on the concept of sorting and searching techniques

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	2	3	3	2	3	3	3	3
CO2	2	3	3	3	3	2	3	2	3
CO3	3	2	2	2	2	2	2	3	2
CO4	2	3	3	3	3	3	3	2	3
CO5	2	3	3	3	3	2	2	3	3

COs/PSOs	PSO1			PSO2			PSO3		
CO1	3			2			2		
CO2	2			3			3		
CO3	2			3			2		
CO4	3			2			3		
CO5	2			3			2		

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/ Technical Skills	Soft Skills
							√		

Subject Code: HMCS22L01	Subject Name: DATA STRUCTURES AND ALGORITHMS LAB	Ty /Lb/ ETL	L	T / S.Lr	P / R	C
	Prerequisite: Basic knowledge in Data structures	Lb	0	0/0	4/0	2

1. Write a program to Implement singly and doubly linked lists.
2. Write a program to Represent a polynomial as a linked list and write functions for polynomial addition.
3. Write a program to Implement stack and use it to convert infix to postfix expression.
4. Write a program to Implement Merge Sort using Divide and conquer.
5. Write a program to Implement Quick Sort using Divide and conquer.
6. Write a program to implement greedy algorithm for job sequencing.
7. Write a program to implement greedy algorithm for Knapsack Problem.
8. Write a program to implement greedy algorithm for Tree vertex splitting.
9. Write a program that implements Prim's algorithm to generate minimum cost spanning Tree.
10. Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree.

Total Periods : 60

Subject Code: HMCS22L02	Subject Name: OPERATING SYSTEM LAB				Ty/Lb / ETL	L	T / S.Lr	P/R	C
Prerequisite: Basic Knowledge of Operating system					L b	0	0/0	4/0	2
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab									
OBJECTIVES									
<ul style="list-style-type: none"> To learn Unix commands and shell programming To implement various CPU Scheduling Algorithms To implement Process Creation and Inter Process Communication. To implement Deadlock Avoidance and Deadlock Detection Algorithms To implement Page Replacement Algorithms To implement File Organization and File Allocation Strategies 									
COURSE OUTCOMES (Cos)									
Students completing this course were able to									
CO1	Compare the performance of various CPU Scheduling Algorithms								
CO2	Implement Deadlock avoidance and Detection Algorithms								
CO3	Implement Semaphores								
CO4	Create processes and implement IPC								
CO5	Analyze the performance of the various Page Replacement Algorithms								
Mapping of Course Outcome with Program Outcome (POs)									
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	1	2	3	3	2	3	3	3
CO2	3	2	2	3	1	2	3	3	3
CO3	1	2	3	3	2	2	3	1	2
CO4	2	3	2	3	2	3	3	2	3
CO5	3	2	1	3	2	2	3	2	2
COs /PSOs	PSO1			PSO2			PSO3		
CO1	3			2			2		
CO2	2			2			3		
CO3	3			3			3		
CO4	2			2			2		
CO5	3			2			3		
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low									
Category	Basic Sciences	Engg Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical / Project	Internships/ Technical Skills	Soft Skills
							√		

Subject Code: HMCS22L02	Subject Name: OPERATING SYSTEM LAB	Ty/Lb / ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of Operating system	Lb	0	0/0	4/0	2

List of Experiments:

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
4. Shell Programming
5. Write C programs to implement the various CPU Scheduling Algorithms
6. Bankers Algorithm for Deadlock Avoidance
7. Implementation of Deadlock Detection Algorithm
8. Implementation of the following Memory Allocation Methods for fixed partition
 1. First Fit
 2. Worst Fit
 3. Best Fit
9. Implementation of Paging Technique of Memory Management
10. Implementation of the following Page Replacement Algorithms
 1. FIFO
 2. LRU
 3. LFU
11. Implementation of the various File Organization Techniques
12. Implementation of the following File Allocation Strategies
 1. Sequential
 2. Indexed
 3. Linked

Total Periods : 60

SEMESTER –II

Subject code: HMCS22003	Subject Name: ADVANCED JAVA PROGRAMMING					Ty/ Lb/ ETL	L	T / S. Lr	P/ R	C
	Prerequisite: Basic knowledge of JAVA Programming					Ty	3	1/0	0/0	4
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb /ETL: Theory / Lab / Embedded Theory andLab										
OBJECTIVES										
<ul style="list-style-type: none"> • Design and develop GUI applications using Abstract Windowing Toolkit (AWT). • Understanding JDBC programming concept. • Overview of servlets and JSP. • To Implement java Beans concepts. • Understanding the RMI concepts. 										
COURSE OUTCOMES (Cos)										
Students completing this course were able to										
CO1	learn the Internet Programming, using Java Applets.									
CO2	learn to access database through Java programs, using Java Data Base Connectivity.									
CO3	create dynamic web pages, using Servlets and JSP.									
CO4	To make a reusable software component, using Java Bean.									
CO5	Design and Implement RMI programs.									
Mapping of Course Outcome with Program Outcome (POs)										
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	2	3	2	2	3	2	2	3	3	
CO2	3	2	3	3	3	2	2	2	3	
CO3	3	2	2	3	2	3	3	2	2	
CO4	2	3	3	2	2	3	2	2	2	
CO5	3	3	2	2	2	2	3	3	3	
COs /PSOs	PSO1			PSO2			PSO3			
CO1	3			3			3			
CO2	3			2			3			
CO3	2			2			2			
CO4	3			3			3			
CO5	3			2			2			
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low										
Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical / Project	Internships/ Technical Skills	Soft Skills	
				√						

Subject code: HMCS22003	Subject Name:	Ty/ Lb/ ETL	L	T / S. Lr	P/ R	C
	ADVANCED JAVA PROGRAMMING					
	Prerequisite: Basic knowledge of JAVA Programming	Ty	3	1/0	0/0	4

UNIT I

12

AWT & Swings -Applets- Architecture, Basics, skeleton, simple applets, Requesting and Repainting HTML applet tag, passing parameters to applets- Graphics- Font, -Color classes - AWT Controls - Layout Managers and menus -Swing-JApplet, JFrame, JComponent Differences between Component and Container, Icons, JLabel, JTextField, JButton, JCheckBox, JRadioButton, JComboBox.

UNIT II

12

JDBC: JDBC Architecture - Installing the ODBC Driver - Connecting to a Database - Structured Query language. Query with JDBC - Populating a Database - Executing Queries - Metadata - Scrollable and Updatable Result Sets. Servlets - Life Cycle of Servlet, Generic Servlet, HTTP Servlet Session Tracking - Security Issues – using JDBC in Servlets – HTML to Servlet Communication - applet to servlet communication.

UNIT III

12

JSP: JSP Introduction to JSP - JSP life cycle - Attributes in JSP - JSP elements - Directives - Declarations - Expressions - Script let - Action Elements - using session Object and Cookies-Working with Java Mail - -Understanding Protocols in Java Mail-Components-Java mail API-Integrating into J2EE-Understanding Java Messaging Services-Introducing Java Transactions.

UNIT IV

12

Java Beans: The software component assembly model- The java bean development kit-developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool-JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

UNIT V

12

RMI - Overview – RMI Architecture - Developing Application with RMI Declaring and implementing remote interfaces –Stub and Skeleton –registering Remote objects – writing RMI server –client- EJB Introduction Entity bean –session bean –EJB Transaction.

Total Periods: 60

TEXT BOOKS:

1. Herbert Schildt - The Complete Reference Java - Tata McGraw Hill Publishing Company Limited Edition 7, 2007.
2. Cays Horstmann and Gary Cornell - Core Java Volume II, Pearson Edition, 2001

REFERENCE BOOKS:

1. P. Naughton and H. Schildt - Java2: The Complete Reference - Tata McGraw Hill Publishing Company Limited, Edition 3, 1999.
2. Deitel&Deitel, "Java How to program", 8th ed., PHI.

Subject Code: HMCS22004	Subject Name: ADVANCED DATABASE SYSTEMS	Ty/Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge in Database Systems	Ty	3	0/0	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab

OBJECTIVES

- To understand and critique on each type of databases.
- Be exposed to query languages.
- Be familiar with the indexing techniques.
- To acquire knowledge on parallel and distributed databases and their applications.
- To understand the usage of advanced data models.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	To understand the design of databases.
CO2	To understand the Transparencies in Distributed Databases;
CO3	Extended about the Multimedia Databases
CO4	To Study about the Spatial databases.
CO5	To learn about the Complex Queries

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	3	3	3	2	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	2	3	2	3	2	3	3	1	2
CO4	2	2	3	3	2	3	2	2	3
CO5	3	3	1	3	2	3	3	2	3

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	2	2	3
CO3	2	3	2
CO4	2	3	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical / Project	Internships/ Technical Skills	Soft Skills
				√					

Subject Code: HMCS22004	Subject Name: ADVANCED DATABASE SYSTEMS	Ty/Lb / ETL	L	T / S.L r	P/R	C
	Prerequisite: Basic Knowledge in Database Systems	Ty	3	0/0	0/0	3

UNIT I

9

PARALLEL AND DISTRIBUTED DATABASE SYSTEMS: Introduction: Distributed Database Concepts - Database System Architectures: Centralized and Client-Server Architectures - Server System Architectures - Parallel Systems - Parallel Databases: I/O Parallelism - Inter and Intra Query Parallelism - Query Evaluation - Inter and Intra operation Parallelism - Design of Parallel Systems

UNIT II

9

ACTIVE DATABASES: Syntax and Semantics (Starburst, Oracle, DB2) - Taxonomy - Applications - Integrity Management - Workflow Management - Business Rules - Design Principles - Properties Rule Modularization - Rule Debugging - IDEA methodology - Spatial Databases- Spatial Data Types - Spatial Relationships- Spatial Data Structures - Spatial Access Methods - Spatial DB Implementation.

UNIT III

9

TEMPORAL AND OBJECT DATABASES: Overview - Data types - Associating Facts - Temporal Query Language - TSQL2 - Time Ontology - Language Constructs - Architecture - Object Database and Change Management - Change of Schema - Object Database Standards, Languages and Design: ODMG Model - ODL - OQL - Object Relational and Extended - Relational Systems: Object Relational features in SQL/Oracle - Case Studies.

UNIT IV

9

ADVANCED DATA MODELS: Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols - Multimedia Databases- Information Retrieval- Data Warehousing - Data Mining- Text Mining.

UNIT V

9

COMPLEX QUERIES AND REASONING: Logic of Query Languages - Relational Calculi - Recursive rules - Syntax and semantics of Data log - Fix point semantics - Implementation Rules and Recursion - Rule rewriting methods - Compilation and Optimization - Recursive Queries in SQL - Open issues.

Total Periods: 45

TEXT BOOKS:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, - Database System Concepts, Sixth Edition, McGraw Hill, 2011
2. Database Systems: The Complete Book, by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom. Prentice Hall. 2002

REFERENCE BOOKS:

1. Introduction to Database Systems, Bipin C Desai, Galgotia, 2012
2. Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T. Snodgrass, V.S. Subrahmanian, Roberto Zicari, — Advanced Database Systems, Morgan Kaufmann publishers, 2006.

Subject Code: HMCS22005	Subject Name COMPILER DESIGN	Ty/ Lb/ ETL	L	T / S.L r	P/R	C
	Prerequisite: Basic Knowledge of Compilation Process	Ty	3	0/0	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits
Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab

OBJECTIVES

- To learn the various phases of compiler.
- To learn the various parsing techniques.
- To understand intermediate code generation and run-time environment.
- To learn to implement front-end of the compiler.
- To learn to implement code generator.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the different phases of compiler.
CO2	Design a lexical analyzer for a sample language.
CO3	Apply different parsing algorithms to develop the parsers for a given grammar.
CO4	Understand syntax-directed translation and run-time environment.
CO5	Learn to implement code optimization techniques and a simple code generator.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	2	3	3	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	2	3	2	2	2	3	3	1	2
CO4	2	2	3	3	3	2	2	2	3
CO5	3	3	1	3	2	3	3	2	3

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	2	2	3
CO3	3	3	3
CO4	2	3	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internship s/ Technical Skills	Soft Skills
				√					

Subject Code: HMCS22005	Subject Name COMPILER DESIGN	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of Compilation Process	Ty	3	0/0	0/0	3

UNIT I

9

INTRODUCTION TO COMPILERS: Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimization DFA.

UNIT II

9

SYNTAX ANALYSIS: Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar – Top Down Parsing – General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item Construction of SLR Parsing Table - Introduction to LALR Parser

UNIT III

9

INTERMEDIATE CODE GENERATION: Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.

UNIT IV

9

RUN-TIME ENVIRONMENT AND CODE GENERATION: Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management – Issues in Code Generation – Design of a simple Code Generator.

UNIT V

9

CODE OPTIMIZATION: Principal Sources of Optimization – Peep-hole optimization – DAG-Optimization of Basic Blocks Global Data Flow Analysis – Efficient Data Flow Algorithm.

Total Periods:45

TEXT BOOKS:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles Techniques and Tool | Second Edition | By Pearson Paperback – 1 January 2013

REFERENCES:

1. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers – Elsevier Science, India, Indian Reprint 2003.

SubjectCode: HMCC22002	Subject Name: INTELLECTUAL PROPERTY RIGHTS and PATENTS		Ty/Lb/ETL/IE	L	T	P/R	C					
	Prerequisite:Nil		Ty	3	0	0	3					
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab												
OBJECTIVE:												
<ul style="list-style-type: none"> ➤ To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries. ➤ To develop expertise in the learners in IPR related issues and sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR. 												
COURSE OUTCOMES (COs): (3-5)												
CO1	Imbibe the knowledge of Intellectual Property and its protection through various laws.											
CO2	Apply the knowledge of IPR for professional development											
CO3	Develop a platform for protection and compliance of Intellectual Property Rights & knowledge											
CO4	Create awareness amidst academia and industry of IPR and Copy right compliance											
CO5	Deliver the purpose and function of IPR and patenting											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	3	3	2	2			
CO2	3	3	2	2	2	2	2	2	2			
CO3	3	3	2	2	2	2	2	3	2			
CO4	3	3	2	3	2	2	2	1	2			
CO5	3	2	2	2	2	2	3	2	2			
Category	H&S	Programcore	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/Allied	Skillcomponent	PracticalProject/ Internship	others			
									√			

Subject code: HMCC22002	Subject Name: INTELLECTUAL PROPERTY RIGHTS and PATENTS	Ty/Lb/ETL/IE	L	T / S.Lr	P/R	C
	Prerequisite: Nil	Ty	3	0	0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab						

UNIT-I **9**
Introduction to IPRs, Basic concepts and need for Intellectual Property—Meaning and practical Aspects of Patents, Copy rights, Geographical Indications, IPR in India and Abroad. Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT-II **9**
Intellectual Property Rights. The IPR tool kit, Patents, the patenting process, patent cooperation treaties: International Treaties and conventions on IPRs: Trade Related Aspects of Intellectual Property Rights Agreement, Patent Cooperation Treaty, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT-III **9**
Intellectual Property Protections IPR of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, bio-piracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IPLaws, Cyber Law and Digital Content Protection. Case studies: The basmati rice issue, revocations of turmeric patent, revocation of neem patent.

UNIT-IV **9**
Exercising and Enforcing of Intellectual Property Rights of an IPR owner, licensing agreements, criteria for Patent infringement. Case studies of patent infringement, IPR—contract, unfair competitions and control, provisions in TRIPS.

UNIT-V: **9**
Role of Patents in Product Development & Commercialization Recent changes in IPR laws impacting patents and copyrights intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies.

Total Periods: 45

Textbook:

1. Nithyananda, K.V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
2. Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI Learning Private Limited.

References:

1. P.B. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy. Tata McGraw Hill, 2001.
2. Steve Smith, The Quality Revolution. 1st ed., Jaico Publishing House, 2002.
3. Komal Bansal and Praishit Bansal. Fundamentals of IPR for Engineers, 1st Edition, BSP Publications, 2012.
4. Prabhuddha Ganguli. Intellectual Property Rights. 1st Edition, TMH, 2012.
5. R. Radha Krishnan & S. Balasubramanian. Intellectual Property Rights. 1st Edition, Excel Books, 2012.
6. M Ashok Kumar & Mohd. Iqbal Ali. Intellectual Property Rights. 2nd Edition, Serial Publications, 2011. Vinod V. Scople, Managing Intellectual Property. Prentice Hall of India Pvt Ltd, 2012.

E-resources:

1. Subramanian., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from <http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf>
2. World Intellectual Property Organization. (2004). WIPO Intellectual property Handbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

Reference Journal:

1. Journal of Intellectual Property Rights (JIPR): NISCAIR

Useful Websites:

1. Cell for IPR Promotion and Management (<http://cipam.gov.in/>)
2. World Intellectual Property Organization (<https://www.wipo.int/about-ip/en/>)

Subject Code: HMCS22L03	Subject Name: JAVA PROGRAMMING LAB	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
Prerequisite: Basic Knowledge of Java		Lb	0	0/0	4/0	2

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/L/ETL:
Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- This lab work provides hands-on for Advanced Java programs.
- Design and develop GUI applications using Abstract Windowing Toolkit.
- Develop programs using JDBC.
- Design and develop Web applications.
- Design and develop Web applications.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Learn the Internet Programming, using Java Applets.
CO2	Apply event handling on AWT and Swing components.
CO3	Create dynamic web pages, using Servlets and JSP.
CO4	Make a reusable software component, using Java Bean.
CO5	Develop Stateful, Stateless and Entity Beans.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	3	2	3	3	2	3	2	3
CO2	3	2	2	3	3	2	3	3	3
CO3	2	2	3	3	2	2	3	2	2
CO4	2	3	2	3	2	3	2	2	3
CO5	3	2	1	3	2	2	3	3	2

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	2	3	3
CO3	3	3	3
CO4	2	2	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internships/ Technical Skills	Soft Skills
							√		

Subject Code: HMCS22L03	Subject Name: JAVA PROGRAMMING LAB	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of Java	Lb	0	0/0	4/0	2

1. Write an Applet Program to use various Controls and perform Font Animation.
2. HTML to Servlet Applications
3. Applet to Servlet Communication
4. Designing online applications with JSP
5. Creating JSP program using JavaBeans
6. Working with Enterprise JavaBeans
7. Performing Java Database Connectivity.
8. Creating Web services with RMI.
9. Creating and Sending Email with Java
10. Building web applications

Total periods : 60

Subject Code: HMCS22L04	Subject Name: DATABASE SYSTEMS LAB	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge in Database Systems	Lb	0	0/0	4/0	2

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab

OBJECTIVES

- To understand the practical applicability of database management system concepts.
- The lab course also provides practical knowledge to understand advanced database concepts
- Be exposed to query languages.
- Students will be able to design and implement database applications on their own
- Learn SQL basics for data definition and data manipulation

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	To understand the design of databases.
CO2	To understand the Transparencies in Distributed Databases.
CO3	Extended about the Multimedia Databases.
CO4	To Study about the Spatial databases.
CO5	To learn about the Complex Queries.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	3	3	3	2	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	2	3	2	3	2	3	3	1	2
CO4	2	2	3	3	2	3	2	2	3
CO5	3	3	1	3	2	3	3	2	3

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	2	2	3
CO3	2	3	2
CO4	2	3	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical / Project	Internships/ Technical Skills	Soft Skills
							√		

Subject Code: HMCS22L04	Subject Name: DATABASE SYSTEMS LAB	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge in Database Systems	Lb	0	0/0	4/0	2

1. Data Definition Language Commands
2. In Built Functions
3. Procedure and Function
4. Query Processing
5. Active Database
6. Set Operators
7. Key Constrains-Normalization
8. My – SQL Installation

Total Periods : 60

Subject Code: HMCS22I01	Subject Name: Summer Internship	Ty/Lb/ ETL/IE	L	T / S.Lr	P/R	C
	Prerequisite: Nil	IE	0	0/0	4/0	2

Summer Internship:

Students are supposed to undergo internship in related Industries for a minimum period of 30 days cumulatively during the semester. They have to prepare a report on the Internship with a certificate in proof from competent authority in the industry. At the end of the semester Viva-Voce examination will be conducted by the Examiners duly appointed by the Head of the department and the students will be evaluated.

SEMESTER –III

Subject Code: HMCS22006	Subject Name: ADVANCED COMPUTER NETWORKS					Ty/Lb / ETL	L	T	P/R	C
	Prerequisite: Basic Knowledge in Computer Networks					Ty	3	0	0/0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab										
OBJECTIVES										
<ul style="list-style-type: none"> To develop an understanding of computer networking basics. Familiarize the student with the basic taxonomy and terminology of the computer networking area. Configure network protocols at different layers of TCP/IP protocol set. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications. Describe the Session layer design issues and Transport layer services. 										
COURSE OUTCOMES (Cos)										
Students completing this course were able to										
CO1	Implement Network Layer Protocol.									
CO2	Configure IPv6 Network.									
CO3	Choose routing protocol in the given network situation.									
CO4	Implement different Transport Layer Protocol.									
CO5	Configure various Application Layer Protocol.									
Mapping of Course Outcome with Program Outcome (POs)										
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	3	2	2	3	3	3	2	3	3	
CO2	2	3	3	2	2	3	2	3	3	
CO3	3	3	2	2	3	2	3	2	2	
CO4	2	2	2	3	2	3	3	3	3	
CO5	3	3	3	2	3	3	3	3	2	
COs /PSOs	PSO1			PSO2			PSO3			
CO1	2			2			3			
CO2	3			2			2			
CO3	2			3			2			
CO4	2			2			3			
CO5	3			2			3			
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low										
Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical /Project	Internships/ Technical Skills	Soft Skills	
				√						

Subject Code: HMCS22006	Subject Name: ADVANCED COMPUTER NETWORKS	Ty/Lb / ETL	L	T	P/R	C
	Prerequisite: Basic Knowledge in Computer Networks	Ty	3	0	0/0	3

UNIT I – NETWORK LAYER AND PROTOCOLS

9

IP Addressing: Address Space – Notations – Classfull addressing – Network Address Translation(NAT). **Internet Protocol:** Datagram Format – Fragmentation. **ICMPv4:** Messages – Debugging Tools, ICMP Checksum. **Mobile IP:** Addressing – Agents – Three Phase – Inefficiency in Mobile IP. **Virtual Private Network:** VPN Technology.

UNIT II – NEXT GENERATION IP

9

IPv6 Addressing: Representation – Address Space Allocation – Auto configuration – Renumbering. **Transition from IPv4 to IPv6:** Dual Stack – Tunneling – Header – Translation. **IPv6 Protocol:** Packet format – Extension Header.

UNIT III – UNICAST AND MULTICAST ROUTING PROTOCOLS

9

Introduction: Inter-Domain, Intra-Domain Routing. **Routing Algorithms:** Distance Vector Routing – Bellman-Ford Algorithm – Link State Routing – Path Vector Routing. **Unicast Routing Protocols:** Internet Structure – Routing Information Protocol(RIP) – Open Shortest Path First(OSPF), Border Gateway Protocol Version 4(BGP4). **Introduction:** Unicast – Multicast and Broadcast. **Intradomain Multicast Protocols:** Multicast Distance Vector(DVMRP) – Multicast Link State(MOSPF) – Protocol Independent Multicast(PIM).

UNIT IV – TRANSPORT LAYER PROTOCOLS

9

User Datagram Protocol: User Datagram – UDP Services – UDP Applications. **Transmission Control Protocol:** TCP Services – TCP features – Segment – TCP Connection – State Transition Diagram – Windows in TCP – Flow Control – Error Control – TCP Congestion Control – TCP Timers. **SCTP:** SCTP Services – SCTP Features – Packet Format – An SCTP Association – Flow Control – Error Control.

UNIT V – APPLICATION LAYER PROTOCOL

9

World Wide Web and HTTP – **File Transfer:** TP and TFTP. Electronic Mail: Architecture – Web-Based Mail – Email Security – SMTP, POP, IMAP and MIME, SNMP. **DNS:** Concept of Domain Name Space – DNS Operation. **DHCP:** State and Dynamic Allocation – DHCP Operation. **Remote Login:** TELNET and SSH.

TOTAL Periods: 45

TEXT BOOK:

1. Data Communication and Networking 5E, ForouzanBehrouz A, McGraw Hill Education (India), New Delhi, 2005, ISBN-13:978-1-25-906475-3.
2. Internetworking with TCP/IP, Volume I, Fourth Edition, Comer Douglas E, Prentice Hall of India Private Limited, New Delhi, 2014, ISBN – 81-203-2065-4
3. Computer Networks, Fourth Edition, Tenenbaum Andrew S, PHI Learning, New Delhi – 2014, ISBN – 81-203-21758

REFERENCES:

1. Advanced Computer Networks, B.M. Harwani and DT Editorial Services, Dreamtech New Delhi – 2014, ISBN – 978-93-5004-013-3.
2. Computer Networks Principles, Technologies and Protocols for Network Design, Natalia Olifer, Victor Olifer, Wiley ISBN

Subject Code: HMCS22007	Subject Name: WEB TECHNOLOGY	Ty/ Lb/ ETL	L	T / S.Lr	P / R	C
Prerequisite: Basic Knowledge of Web Technology		Ty	3	0/0	0 / 0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL:
Theory / Lab / Embedded Theory andLab

OBJECTIVES

- To understand best technologies for solving web client/server problems.
- To understand web architecture and web languages.
- To understand web development environment and methodology.
- To analyze and design real time web applications.
- To develop modern interactive web applications using PHP, AJAX and MySQL.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Describe the concepts of World Wide Web, and the requirements of effective web design.
CO2	Use the JavaScript to develop the dynamic web pages.
CO3	To develop and deploy real time web applications in web servers and in the cloud.
CO4	Develop application using AJAX to communicate and exchange data to and from server.
CO5	Use server-side scripting with PHP to generate the web pages dynamically using the database connectivity.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	3	2	3	2	2	3	2
CO2	2	2	3	3	2	2	2	2	3
CO3	3	3	2	1	3	2	3	2	2
CO4	3	1	3	3	3	1	3	2	3
CO5	3	3	2	2	2	3	3	1	3
COs /PSOs	PSO1			PSO2			PSO3		
CO1	2			3			3		
CO2	3			3			2		
CO3	3			2			3		
CO4	3			3			3		
CO5	3			2			3		

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical /Project	Internships / Technical Skills	Soft Skills
				√					

Subject Code: HMCS22007	Subject Name: WEB TECHNOLOGY	Ty/ Lb/ ETL	L	T/ S.Lr	P/ R	C
	Prerequisite: Basic Knowledge of Web Technology	Ty	3	0/0	0/0	3

UNIT I - INTRODUCTION

9

Introduction: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of latest version of Web. Web Design: Web site design principles, Planning and publishing website, Designing effective navigation

UNIT II – CLIENT-SIDE SCRIPTING

9

Style sheet and HTML - Javascript Basics -History and Versions Introduction JavaScript in Perspective- Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers. -JSON-Jquery.

UNIT III – SERVER-SIDE SCRIPTING

9

Java Servlets- Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle- Parameter Data-Sessions-Cookies-URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency- Databases and Java Servlets – Case study – Related Technologies.

UNIT IV – DHTML & AJAX

9

DHTML: Combining HTML, CSS and Javascript, events and buttons, controlling your browser, Ajax: Introduction, XML Http Request Object-Call Back Methods, advantages & disadvantages, Purpose of it, ajax based web application, alternatives of ajax

UNIT V - INTEGRATING PHP AND MYSQL

9

Introduction, PHP Document, Language Fundamentals - Introduction to SQL & MySQL & its Versions, Administration & Query Browser - PHP interfacing with MySQL, connecting to MySQL, Database Connecting, Executing SQL, Retrieving the data set & refining the fetch.

TOTAL Periods: 45

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press.
2. The Complete reference PHP – Steven Holzner, Tata Mc-Graw-Hill

REFERENCE BOOKS

1. Ralph Moseley and M. T. Savaliya, Developing Web Applications, Wiley-India Private Limited, 2011.
2. B. M. Harwani, Developing Web Applications in PHP and AJAX, Tata McGraw-Hill, 2010.
3. Web Technologies, Black Book, Dreamtech Press

Subject Code: HMCS22008	Subject Name: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	Ty/ Lb/ ETL	L	T / S.L r	P/R	C
	Prerequisite: Basic Knowledge about programming languages, Analytical Skills, Mathematics.	Ty	3	1/0	0/0	4

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab

OBJECTIVES

1. Enable the students to learn the basic functions of AI.
2. Provide knowledge on concepts of Searching Techniques.
3. Introduce data collection on Machine Learning.
4. Knowledge on Neural Networks, NLP.
5. Study about Applications & Impact of AI.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Demonstrate AI problems and techniques.
CO2	Understand the challenges of AI.
CO3	Build the strategy with Machine Learning Models for an enterprise.
CO4	Apply the Neural Networking, Natural Language Processing algorithms.
CO5	Analyze the real-world applications of AI.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	2	3	3	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	3	3	2	2	2	3	3	1	2
CO4	2	2	3	3	3	2	2	2	3
CO5	2	3	1	3	2	3	3	2	3

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	2	2	3
CO3	3	3	3
CO4	2	3	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Sci ence	Humanit ies & social Science	Program Core	Program Elective	Open Elective	Practical /Project	Internsh ips/ Technic al Skills	Soft Skills
				√					

Subject Code: HMCS22008	Subject Name: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge about programming languages, Analytical Skills, Mathematics.	Ty	3	1/0	0/0	4

UNIT: I

12

FOUNDATIONS OF AI: Basic Terminologies of AI - AI vs AGI - Modern AI Techniques - Machine Intelligence - Systems that Act - Systems that Predict - Systems that Learn - Systems that Create - Systems that Relate - Systems that Master - Systems that Evolve.

UNIT: II

12

SEARCH TECHNIQUES: Heuristic Search techniques - Hill Climbing. Promises and Challenges of Artificial Intelligence: Microfinance - Social Justice - Medical Diagnosis - The Effects of Discrimination - Malicious AI - Designing Safe and Ethical AI - Ethics and Governance - Education as Remedy - Collaborative Design.

UNIT: III

12

DEVELOP AN ENTERPRISE AI STRATEGY: Build an AI -Ready Culture - Optimize Recruiting Strategies - Plan on implementation - Collect and prepare Data. AI with Machine Learning: Common Mistakes with Machine Learning Models -Machine Learning Workflow - Agile Development -Technical Debt -Deployment and Scaling -Iteration and Improvement.

UNIT: IV

12

NEURAL NETWORK: Biological and artificial neuron - Single layer Perceptron - Multilayer Perceptron – Back propagation learning - Neural networks as associative memories - Hopfield networks - Bidirectional Associative Memory - Topologically organized neural networks – Competitive learning - Kohonen maps.

UNIT: V

12

NATURAL LANGUAGE PROCESSING - Morphological Analysis - Syntax analysis - Semantic Analysis - AI applications – Language Models – Information Retrieval – Information Extraction. Obstacles and Opportunities - Business Intelligence and Analytics - Software Development - Marketing - Sales - Customer Support – Applications of AI.

Total Periods: 60

TEXT BOOKS:

1. Mariya Yao, Adelyn Zhou, Marlene Jia (2018), ” Applied Artificial Intelligence: A Handbook For Business Leaders”,(Kindle Edn.)
2. Kumar S., (2017), “Neural Networks - A Classroom Approach”, (2nd Edn.), TMH.

REFERENCE BOOKS:

1. Stuart Russell, Peter Norvig, (2010), " Artificial Intelligence: A Modern Approach", Third Edition, Pearson Education / Prentice Hall of India.
2. Elaine Rich and Kevin Knight, (2010), "Artificial Intelligence, (3rd Edn.), TMH.

Subject Code: HMCS22009	Subject Name: DATA SCIENCE USING PYTHON	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge about data analysis and programming	Ty	3	0/0	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab

OBJECTIVES

1. Students gain knowledge in the basic concepts of Data Analysis
2. Acquire skills in data preparatory and preprocessing steps
3. Learn the tools and packages in Python for data science
4. Understanding in Classification and Regression Model
5. Acquire knowledge in Data Interpretation and Visualization Techniques.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Apply the skills of data inspecting and cleansing.
CO2	Determine the relationship between data dependencies using statistics
CO3	Handle data using primary tools used for data science in Python
CO4	Represent the useful information using mathematical skills
CO5	Apply the knowledge for data describing and visualization using tools.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	3	2	3	2	2	3	3	3
CO2	3	2	3	3	3	2	3	2	3
CO3	2	3	3	2	2	3	3	1	2
CO4	2	2	2	3	3	2	2	2	3
CO5	3	3	1	3	2	3	3	2	3

COs /PSOs	PSO1			PSO2			PSO3		
CO1	3			3			3		
CO2	2			2			3		
CO3	3			3			3		
CO4	2			3			2		
CO5	3			2			3		

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Sci ence	Humanitie s & social Science	Progra m Core	Program Elective	Open Elective	Practical /Project	Internsh ips/ Technic al Skills	Soft Skills
				√					

Subject Code: HMCS22009	Subject Name: DATA SCIENCE USING PYTHON	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge about data analysis and programming	Ty	3	0/0	0/0	3

UNIT: I

9

INTRODUCTION: Need for data science – Benefits and uses – Facets of data – Data science process – Setting the research goal – Retrieving data – Cleansing, Integrating, and Transforming data – Exploratory data analysis – Build the models – Presenting and Building applications.

UNIT: II

9

DATA ANALYSIS: Frequency distributions – Outliers – Relative Frequency Distributions – Cumulative Frequency Distributions – Interpreting Distributions – Graphs – Averages – Mode – Median – Mean – Averages for Qualitative and Ranked Data – Describing Variability – Range – Variance – Standard Deviation – Degrees of Freedom – Interquartile Range.

UNIT: III

9

PYTHON FOR DATA HANDLING: Basics of Numpy Arrays – Aggregations – Computations on Arrays – Comparisons, Masks, Boolean Logic – Structured Arrays – Data manipulation with Pandas – Data Indexing and Selection – Operating on Data – Missing Data – Hierarchical Indexing – Combining Datasets – Aggregation and Grouping – Pivot Tables.

UNIT: IV

9

DESCRIBING DATA: Normal Distributions – Z Scores – Normal Curve Problems – Finding Proportions – Finding Scores – Correlation – Scatter Plots – Quantitative Data – Computational Formula – Regression – Regression Line – Standard Error of Estimate – Multiple Regression Equations.

UNIT: V

9

PYTHON FOR DATA VISUALIZATION: Visualization with Matplotlib – Line plots – Scatter plots – Visualizing Errors – Density and Contour plots – Histograms, Binnings, and Density – Geographic Data – Data Analysis using Statmodels and Seaborn – Graph plotting using Plotly – Interactive data Visualization using Bokeh.

Total Periods:45

TEXT BOOKS:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016.
2. Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017.
3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016.

REFERENCE BOOKS:

1. Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014

SubjectCode: HMOL22IE1	SubjectName: OpenElective–Swayam/NPTEL/AnyMOOC	Ty/Lb/ ETL/IE	L	T/ S.Lr	P/R	C
	Prerequisite:Nil	IE	3	0/0	0/0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab						

Open Elective (On Line Course through NPTEL/SWAYAM/Any MOOC)

Students should register for the online course with a minimum course duration of 8 weeks through the online portals such as NPTEL/SWAYAM/Any MOOC in the beginning of the semester. The course can be core/interdisciplinary in such a way that the same course is not repeated during the course of study.

Students are expected to attend the online classes regularly and submit the weekly assignments before the due dates. Students should appear for the online examination and submit the certificate at the end of the semester. Internal examination will be conducted by the examiners duly appointed by the head of the department.

Subject Code: HMCS22L05	Subject Name: Project Phase-I	Ty/Lb/ ETL/IE	L	T/ S.Lr	P/R	C
	Prerequisite: Basic Knowledge in computer science	LB	0	0/0	4/0	2
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab						

Project Phase- I

Students are expected to do the Project individually. They should identify the area/topic of the Project and should collect the literatures related to the project. Students intending to do Industrial projects will approach the industries with the support of the university, identify the industrial problem and finalize the project. In case of Industrial projects apart from Industry guide, an internal guide has to be appointed by the department. At the end of the Semester the students should submit their Project Phase - I report to the Department and Viva -Voce examination will be conducted by the examiners duly appointed by the Head of the department.

SEMESTER –IV

Subject Code: HMCS22L06	Subject Name: Project Phase-II	Ty/Lb/ ETL/IE	L	T/ S.Lr	P/R	C
	Prerequisite: Knowledge of Project Phase -I	LB	0	0/0	18/0	9
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab						

Project Phase -II

To make the students to make use of the knowledge and skill developed during their two years of study and to apply them for making an innovative product/process for the development of society and industries.

Students are expected to do a Project work either in an Industry or at the University in the field of relevant field /inter-disciplinary /multi-disciplinary area . The work to be carried out in Phase II should be continuation of Phase I. Each student will be allotted a guide based on the area of Project work. In case of industrial Project external guide has to be allotted from Industry. Inter disciplinary/multi-disciplinary project can be done with guidance of relevant department. Monthly reviews will be conducted during the semester to monitor the progress of the project by the project review committee. Students have to submit the Project thesis at the end of the semester and appear for the Project Viva-Voce examination conducted by the examiners duly appointed by the Controller of Examination. In case of industrial project certificate in proof has to be included in the report along with the bonofide certificate.

Subject Code: HMCS22I02	Subject Name: Research Publication	Ty/Lb/ ETL/IE	L	T / S.L r	P/R	C
	Prerequisite: Basic knowledge in Research Methodology	IE	0	0/0	4/0	2
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab						

Research Publication

Students are supposed to prepare and publish the article based on his/her area of research in peer reviewed referred journal. Code of research publication ethics should be followed. After publishing the article students should present a seminar in presence of department faculties and PG students. At the end of semester viva examination will be conducted by the examiners appointed by the Head of the department.

PROGRAMME ELECTIVE –I

Subject Code: HMCS22E01	Subject Name: CLOUD COMPUTING					Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of databases, Operating systems, Networking, Good Understanding of Object-Oriented Programming Concept					Ty	3	0/0	0/0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab										
OBJECTIVES										
<ul style="list-style-type: none"> To understand the concepts of virtualization and virtual machines To gain expertise in server, network and storage virtualization. To understand and deploy practical virtualization solutions and enterprise solutions To gain knowledge on the concept of virtualization that is fundamental to cloud computing To understand the various issues in cloud computing 										
COURSE OUTCOMES (Cos)										
Students completing this course were able to										
CO1	Employ the concepts of storage virtualization, network virtualization and its management									
CO2	Apply the concept of virtualization in the cloud computing									
CO3	Identify the architecture, infrastructure and delivery models of cloud computing									
CO4	Develop services using Cloud computing									
CO5	Apply the security models in the cloud environment									
Mapping of Course Outcome with Program Outcome (POs)										
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	3	3	2	3	3	2	2	2	3	
CO2	2	3	3	2	3	2	3	2	2	
CO3	2	3	2	3	3	3	2	1	2	
CO4	2	2	3	3	3	3	2	2	3	
CO5	3	3	3	3	2	3	2	2	3	
COs /PSOs	PSO1			PSO2			PSO3			
CO1	3			3			3			
CO2	3			2			2			
CO3	3			3			2			
CO4	3			3			3			
CO5	3			3			3			
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low										
Category	Basic Sciences	Engg .Scie nce	Humaniti es & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internshi ps/ Technica l Skills	Soft Skills	
					√					

Subject Code: HMCS22E01	Subject Name: CLOUD COMPUTING	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of databases, Operating systems, Networking, Good Understanding of Object-Oriented Programming Concept	Ty	3	0/0	0/0	3

UNIT I

9

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT II

9

Abstraction and Virtualization: Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Provisioning in the Cloud Context Virtualization of CPU, Memory , I/O Devices, Virtual Clusters and Resource management

UNIT III

9

Cloud Platform Architecture: Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software- A Generic Cloud Architecture Design – Layered cloud Architectural Development – Virtualization Support and Disaster Recovery –Architectural Design Challenges - Public Cloud Platforms: GAE, AWS – Inter-cloud Resource Management

UNIT IV

9

Programming Model: Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job –Developing Map Reduce Applications - Design of Hadoop file system –Setting up Hadoop Cluster - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Nimbus

UNIT V

9

Governance and Case Studies: Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Key privacy issues in the cloud –Cloud Security and Trust Management, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services

Total Periods: 45

TEXTBOOK:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi “Mastering Cloud Computing: Foundations and Applications Programming McGraw Hill, ISBN: 978 1259029950, 1259029956
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", McGraw-Hill Osborne Media, 2009

REFERENCES:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing , Kai Hwang, GeofferyC.Fox, Jack J.Dongarra, Elsevier, 2012.

Subject Code: HMCS22E02	Subject Name: SOFTWARE PROJECT MANAGEMENT					Ty/ Lb/ ETL	L	T	P/R	C
	Prerequisite: Basic Knowledge in Software Engineering.					Ty	3	0	0/0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab										
OBJECTIVES										
<ul style="list-style-type: none"> To understand the Software Project Planning and Evaluation techniques. To plan and manage projects at each stage of the software development life cycle (SDLC). To learn about the activity planning and risk management principles. To manage software projects and control software deliverables. To develop skills to manage the various phases involved in project management and people management. 										
COURSE OUTCOMES (Cos)										
Students completing this course were able to										
CO1	Understand Project Management principles while developing software.									
CO2	Gain extensive knowledge about the basic project management concepts, framework and the process models.									
CO3	Obtain adequate knowledge about software process models and software effort estimation techniques.									
CO4	Define the check points, project reporting structure, project progress and tracking mechanisms using project management principles.									
CO5	Learn staff selection process and the issues related to people management.									
Mapping of Course Outcome with Program Outcome (POs)										
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	3	3	2	3	3	2	2	2	2	
CO2	3	2	1	3	3	2	2	3	3	
CO3	2	2	2	3	2	3	3	1	2	
CO4	3	2	2	3	3	2	1	3	1	
CO5	3	3	1	3	3	2	1	2	2	
COs /PSOs	PSO1			PSO2			PSO3			
CO1	2			3			2			
CO2	3			2			3			
CO3	2			3			3			
CO4	2			3			2			
CO5	3			2			3			
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low										
Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internships/ Technical Skills	Soft Skills	
					√					

Subject Code: HMCS22E02	Subject Name: SOFTWARE PROJECT MANAGEMENT	Ty/ Lb/ ETL	L	T	P/R	C
	Prerequisite: Basic Knowledge in Software Engineering.	Ty	3	0	0/0	3

UNIT I – PROJECT EVALUATION AND PROJECT PLANNING 9

Importance of Software Project Management–Activities-Methodologies–Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management– Stepwise Project Planning.

UNIT II – PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software process and Process Models–Choice of Process models-Rapid Application development– Agile methods – Dynamic System Development Method – Extreme Programming–Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques –COSMIC Full function points -COCOMOII-a Parametric Productivity Model.

UNIT III – ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling –Network Planning models–Formulating Network Model–ForwardPass & BackwardPass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths–Costschedules.

UNIT IV - PROJECT MANAGEMENT AND CONTROL 9

Framework for Management and control–Collection of data –Visualizing progress– Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management–Managing contracts–Contract Management.

UNIT V - STAFFING IN SOFTWARE PROJECTS 9

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

Total Periods: 45

TEXT BOOK:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

REFERENCES:

1. Robert K. Wysocki “Effective Software Project Management” – Wiley Publication, 2011.
2. Walker Royce: “Software Project Management”- Addison-Wesley, 1998.
3. Gopaldaswamy Ramesh, “Managing Global Software Projects” – McGraw Hill Education (India), Fourteenth Reprint 2013.

Subject Code: HMCS22E03	Subject Name: MOBILE COMPUTING	Ty/ Lb/ ETL	L	T / S.Lr	P/ R	C
Prerequisite: Basic Knowledge of Computer and fundamentals of networking.		Ty	3	0/0	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab

OBJECTIVES

- To develop problem solving abilities using Mobile Computing
- To study foundations of Mobile Computing.
- To understand the principles of wireless communication
- To understand wireless LAN protocols
- To become familiar with mobile Routing protocols
- To study about various application languages and mobile application development platforms

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	ToImplement MAC protocols.
CO2	To understand network and transport layers of Mobile Communication
CO3	Able to perform Optimal Routing
CO4	To choose the required functionality at each layer for given application.
CO5	To analyse next generation Mobile Communication System

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	2	3	3	3	2	3	3	3
CO2	3	3	3	2	2	2	3	2	2
CO3	3	3	3	2	3	3	3	2	3
CO4	3	3	3	3	3	3	2	3	3
CO5	3	3	2	3	3	3	3	3	3
COs /PSOs	PSO1			PSO2			PSO3		
CO1	3			2			3		
CO2	3			2			3		
CO3	3			3			3		
CO4	2			3			3		
CO5	3			3			2		

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg. Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/Project	Internships/ Technical Skills	Soft Skills
					√				

Subject Code: HMCS22E03	Subject Name: MOBILE COMPUTING	Ty/ Lb/ ETL	L	T / S.Lr	P / R	C
	Prerequisite: Basic Knowledge of Computer and fundamentals of networking.	Ty	3	0/0	0 / 0	3

UNIT I

9

Mobile Computing Architecture: Programming languages, Functions of Operating Systems, Functions of Middleware for mobile Systems, Mobile Computing Architectural layers, Protocols, Layers. Mobile Devices: Handheld Mobile Smartphones with Multimedia Functionalities, Smartcards, Smart Sensors,

UNIT II

9

Wireless communication - Challenges of Wireless Transmission - Multi-carrier modulation - Spread Spectrum - Satellite Communication - Broadcast systems - Multiplexing - FDMA, TDMA and CDMA - Cellular organization of mobile telephone networks - Operation of cellular networks - Frequency Reuse - Tessellation - Handoff - Capacity Improvement.

UNIT III

9

Global System For Mobile Communications: IEEE 802.11 Wireless LAN - Architecture - Modes of Operation - CSMA/CA and its variants - Wireless LAN security - Bluetooth networks - Generation of cellular networks - Overview of GSM - GPRS Network Architecture and Operations - UMTS and IMT 2000 - Packet Switching Domain - Core Network - Radio Access Network - LTE - Control Plane - User Plane.

UNIT IV

9

Mobile Network and Transport Layer: Mobile IP - Mobility features in IPv6 - Proactive and reactive ad hoc routing protocols - DSDV, DSR and AODV - Limitations of Traditional TCP in wireless networks - TCP improvements for Wireless Networks – Indirect TCP, Snoop TCP, Mobile TCP - Security issues in network layer and transport layer

UNIT V

9

Data Dissemination and Data Synchronization in Mobile Computing: Communication Asymetry, classification of data delivery mechanism, data dissemination broadcast models, selective tuning and indexing techniques, synchronization, synchronization software for mobile devices, synchronization protocols.

Total Periods: 45

TEXTBOOK:

1. Jochen H. Schller, “Mobile Communications”, Pearson Education, New Delhi, 2007, 2nd Edition.
2. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt.Ltd, New Delhi 2012.
3. Raj Kamal, Mobile Computing, 2/e , Oxford University Press-New Delhi

REFERENCES:

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd. 2005.
2. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer 2003.
3. Mobile Computing, Rajkamal, Oxford University Press, 2011

PROGRAMME ELECTIVE –II

Subject Code: HMCS22E04	Subject Name: OBJECT ORIENTED ANALYSIS AND DESIGN					Ty/ Lb/ ETL	L	T / S.L r	P/R	C
	Prerequisite: Basic Knowledge of computer programming					Ty	3	0/0	0/0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab										
OBJECTIVES										
<ul style="list-style-type: none"> •To understand the fundamentals of object modeling and differentiate Unified Process from other approaches. • To design with static UML diagrams. • To design with the UML dynamic and implementation diagrams. • To improve the software design with design patterns. • To test the software against its requirements specification 										
COURSE OUTCOMES (Cos) Students completing this course were able to										
CO1	The fundamentals of object modeling and differentiate Unified Process from other approaches.									
CO2	Static UML diagrams.									
CO3	UML dynamic and implementation diagrams.									
CO4	Software design with design patterns.									
CO5	Test the software.									
Mapping of Course Outcome with Program Outcome (POs)										
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	3	1	2	2	3	2	2	3	3	
CO2	2	2	3	1	2	2	2	3	3	
CO3	1	3	2	2	3	2	3	1	3	
CO4	2	3	2	1	3	2	2	2	3	
CO5	3	2	3	2	1	3	2	3	2	
COs /PSOs	PSO1			PSO2			PSO3			
CO1	3			2			2			
CO2	3			2			3			
CO3	3			2			2			
CO4	3			3			2			
CO5	2			3			3			
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low										
Category	Basic Sciences	Engg.Sci ence	Humaniti es & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internshi ps/ Technica l Skills	Soft Skills	
					√					

Subject Code: HMCS22E04	Subject Name: OBJECT ORIENTED ANALYSIS AND DESIGN	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of computer programming	Ty	3	0/0	0/0	3

UNIT I **9**

UNIFIED PROCESS AND USE CASE DIAGRAMS: Introduction to OOAD with OO Basics – Unified Process – UML diagrams – Use Case –Case study – the Next Gen POS system, Inception -Use case Modelling – Relating Use cases – include, extend and generalization – When to use Use-cases.

UNIT II **9**

STATIC UML DIAGRAMS: Class Diagram— Elaboration – Domain Model – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition – Relationship between sequence diagrams and use cases.

UNIT III **9**

DYNAMIC AND IMPLEMENTATION UML DIAGRAMS: Dynamic Diagrams – UML interaction diagrams – System sequence diagram – Collaboration diagram – State machine diagram and Modelling – Activity diagram – UML package diagram – Component and Deployment Diagrams – When to use Component and Deployment diagrams

UNIT IV **9**

DESIGN PATTERNS: GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – observer.

UNIT V **9**

TESTING: Object Oriented Methodologies – Software Quality Assurance – Bugs and Debugging -Testing strategies-Impact of object orientation on Testing – Develop Test Cases-Test Plans-System Usability - Measuring User Satisfaction.

Total Periods: 45

TEXT BOOKS:

1. G. Booch, J. Rumbaugh, I. Jacobson : The Unified Modeling Language User Guide, 2/e Addison-Wesley Professional, 2005.
2. H-E. Eriksson, M. Penker, B. Lyons, D. Fado, UML 2 Toolkit, John Wiley, 2004.

REFERENCE BOOKS:

1. M. Page-Jones, Fundamentals of Object Oriented Design in UML, Addison-Wesley Professional, 1999.
2. P. Roques, Modeling Software Systems Using UML2, John Wiley, 2004.
3. A. Kahate, Object Oriented Analysis & Design, TMH, 2004

Subject Code: HMCS22E05	Subject Name: DIGITAL IMAGE PROCESSING				Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
Prerequisite: basic knowledge of Computer Graphics					Ty	3	0/0	0/0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab									
OBJECTIVES									
<ul style="list-style-type: none"> To become familiar with digital image fundamentals To get exposed to simple image enhancement techniques in Spatial and Frequency domain. To learn concepts of degradation function and restoration techniques. To study the image segmentation and representation techniques. To become familiar with image compression and recognition methods 									
COURSE OUTCOMES (Cos)									
Students completing this course were able to									
CO1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.								
CO2	Operate on images using the techniques of smoothing, sharpening and enhancement.								
CO3	Understand the restoration concepts and filtering techniques.								
CO4	Understand edge detection and region based segmentation.								
CO5	Learn the basics of segmentation, features extraction, compression and recognition methods for color models.								
Mapping of Course Outcome with Program Outcome (POs)									
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	3	3	3	1	1	1	2
CO2	3	1	3	3	3	1	1	1	2
CO3	3	1	3	3	3	1	1	1	2
CO4	3	1	3	3	3	1	1	1	2
CO5	3	1	3	3	3	1	1	1	2
COs /PSOs	PSO1			PSO2			PSO3		
CO1	3			3			3		
CO2	3			3			3		
CO3	3			3			3		
CO4	3			3			3		
CO5	3			3			3		
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low									
Category	Basic Sciences	Engg.Sci ence	Humaniti es & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internshi ps/ Technica l Skills	Soft Skills
					√				

Subject Code: HMCS22E05	Subject Name: DIGITAL IMAGE PROCESSING	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: basic knowledge of Computer Graphics	Ty	3	0/0	0/0	3

UNIT I

9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two- dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II

9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.

UNIT III

9

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV

9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V

9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL Periods: 45

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, Third Edition, 2010.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Pearson, 2002.

REFERENCES:

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
2. S. Sridhar, “Digital Image Processing”, Second Edition, Oxford University Press, 2016.

Subject Code: HMCS22E06	Subject Name COMPUTER GRAPHICS	Ty/ Lb/ ETL	L	T / S.L r	P/R	C
	Prerequisite: Basic Knowledge of Graphics Design	Ty	3	0/0	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL:
Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To Gain knowledge about graphics hardware devices and software used.
- To Understand the two-dimensional graphics and their transformations.
- To Understand the three-dimensional graphics and their transformations.
- To Appreciate illumination and colormodels.
- To Be familiar with understand clipping techniques.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Design two-dimensional graphics.
CO2	Design three-dimensional graphics.
CO3	Apply Illumination and color models.
CO4	Apply clipping techniques to graphics.
CO5	Design animation sequences.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	2	3	3	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	2	3	2	2	2	3	3	1	2
CO4	2	2	3	3	3	2	2	2	3
CO5	3	3	1	3	2	3	3	2	3

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	2	2	3
CO3	3	3	3
CO4	2	3	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Sci ence	Humaniti es & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internshi ps/ Technica l Skills	Soft Skills
					√				

Subject Code: HMCS22E06	Subject Name COMPUTER GRAPHICS	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge of Graphics Design	Ty	3	0/0	0/0	3

UNIT I

9

INTRODUCTION: Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

UNIT II

9

TWO-DIMENSIONAL GRAPHICS: Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations –point, line, and polygon clipping algorithms.

UNIT III

9

THREE - DIMENSIONAL GRAPHICS: Three dimensional concepts; Three- dimensional object representations – Polygon surfaces- Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. **TRANSFORMATION AND VIEWING:** Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three-dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping ; Visible surface detection methods.

UNIT IV

9

ILLUMINATION AND COLOUR MODELS: Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive colour concepts – RGB colour model – YIQ colour model – CMY colour model – HSV colour model–HLS colour model; Colour selection.

UNIT V

9

ANIMATIONS & REALISM 10 ANIMATION GRAPHICS: Design of Animation sequences – animation function – raster animation – key frame systems – motion specification –morphing – tweening. **COMPUTER GRAPHICS REALISM:** Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.

TOTAL Periods:45

TEXT BOOKS:

1. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,”Computer Graphics: Principles and Practice”, , 3rd Edition, Addison- Wesley Professional,2013. (UNIT I, II, III, IV).
2. Donald Hearn and Pauline Baker M, “Computer Graphics”, Prentice Hall, New Delhi, 2007 (UNIT V).

REFERENCES:

1. Donald Hearn and M. Pauline Baker, Warren Carithers,“Computer Graphics With Open GL”, 4th Edition.

PROGRAMME ELECTIVE -III

Subject Code: HMCS22E07	Subject Name: MACHINE LEARNING	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Statistics. Linear Algebra. Calculus.	Ty	3	0/0	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL:
Theory / Lab / Embedded Theory andLab

OBJECTIVES

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability-based learning techniques
- To understand graphical models of machine learning algorithms

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Distinguish between, supervised, unsupervised and semi-supervised learning
CO2	Apply the appropriate machine learning strategy for any given problem
CO3	Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
CO4	Design systems that use the appropriate graph models of machine learning
CO5	Modify existing machine learning algorithms to improve classification efficiency

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	2	3	3	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	2	3	2	2	2	3	3	1	2
CO4	2	2	3	3	3	2	2	2	3
CO5	3	3	1	3	2	3	3	2	3

COs /PSOs	PSO1	PSO2	PSO3
CO1	3	3	3
CO2	2	2	3
CO3	3	3	3
CO4	2	3	2
CO5	3	2	3

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Sci ence	Humaniti es & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internshi ps/ Technica l Skills	Soft Skills
					√				

Subject Code: HMCS22E07	Subject Name: MACHINE LEARNING	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Statistics. Linear Algebra. Calculus.	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION

9

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT II LINEAR MODELS

9

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multilayer Perceptron in Practice – Examples of using the MLP – Overview – Deriving BackPropagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT III TREE AND PROBABILISTIC MODELS

9

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – NearestNeighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

UNIT IV DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS

9

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

UNIT V GRAPHICAL MODELS

9

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TOTAL Periods: 45

TEXT BOOK

1. EthemAlpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)l, Third Edition, MIT Press, 2014
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionalsl, First Edition, Wiley, 2014

REFERENCES:

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
2. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
3. Tom M Mitchell, —Machine Learningl, First Edition, McGraw Hill Education, 2013, 2nd edition, Pearson Education, 2010.
4. Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers,2006.

Subject Code: HMCS22E08	Subject Name: INTERNET OF THINGS	Ty/ Lb/ ETL	L	T / S.L r	P/R	C
	Prerequisite: Basic Knowledge in Electronics and programming.	Ty	3	0/0	0/0	3

L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab

OBJECTIVES

- To understand the fundamentals of Internet of Things
- Introduce evolution of internet technology and need for IoT
- Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, RF and sensing modules
- Discuss on IoT reference layer and various protocols and software

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	To learn about the Evolution of IOT
CO2	To Understand about IOT Sensors
CO3	To learn about the IOT Security Framework
CO4	To understand the basics of android application development
CO5	To apply the concept of Internet of Things in the real-world scenario.

Mapping of Course Outcome with Program Outcome (POs)

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	3	3	3	2	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	2	3	2	3	2	3	3	1	2
CO4	2	2	3	3	2	3	2	2	3
CO5	3	3	1	3	2	3	3	2	3

COs /PSOs	PSO1			PSO2			PSO3		
CO1	3			3			3		
CO2	2			2			3		
CO3	2			3			2		
CO4	2			3			2		
CO5	3			2			3		

3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low

Category	Basic Sciences	Engg.Sci ence	Humaniti es & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internshi ps/ Technica l Skills	Soft Skills
					√				

Subject Code: HMCS22E08	Subject Name: INTERNET OF THINGS	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Basic Knowledge in Electronics and Programming	Ty	3	0/0	0/0	3

UNIT I **9**

Evolution Of Iot:Internet of Things Promises - Definition - Scope – Structure of IoT - IoT Map - Review of computer communication concepts (OSI layers – Components - Packet communication – Networks - TCP-IP, subnetting - IPV4 addressing and challenges) - IPV6 addressing.

UNIT II **9**

Iot Architecture:M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - Information model - Functional model - communication model - IoT reference architecture

UNIT III **9**

Seven Generations Of Iot Sensors: Industrial sensors - Description & Characteristics - First Generation - Description & Characteristics - Advanced Generation - Description & Characteristics - Integrated IoT Sensors - Description & Characteristics - Description & Characteristics - Sensors' Swarm - Description & Characteristics - Printed Electronics - Description & Characteristics - IoT Generation Roadmap

UNIT IV **9**

Iot Security Framework: IOT security frame work - Security in hardware - Boot process - OS & Kernel, Application, run time environment and containers - Need and methods of Edge Security - Network Security: Internet – Intranet – LAN - Wireless Networks - Wireless cellular networks - Cellular Networks and VOIP.

UNIT V **9**

Applications In Iot Enabled Smart Cities: Energy Consumption Monitoring - Smart Energy Meters - Home automation - Smart Grid and Solar Energy Harvesting - Intelligent Parking - Data Lake services scenarios

Total Periods: 45

TEXT BOOKS:

1. Vijay Madiseti ,ArshdeepBahga, Adrian McEwen (Author), Hakim Cassimally “Internet of Things A Hands-on Approach” ArshdeepBahga& Vijay Madiseti, 2014
2. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols, Wiley, 2012

REFERENCE BOOKS:

1. ArshdeepBahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press, 2015
2. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015

Subject Code: HMCS22E09	Subject Name: INFORMATION SECURITY					Ty/ Lb/ ETL	L	T	P/R	C
	Prerequisite: Basic Knowledge in Cloud Computing, Networking					Ty	3	0	0/0	3
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory andLab										
OBJECTIVES										
<ul style="list-style-type: none"> To understand the basics of Information Security To know the legal, ethical and professional issues in Information Security To know the aspects of risk management To become aware of various standards in this area To know the technological aspects of Information Security 										
COURSE OUTCOMES (Cos)										
Students completing this course were able to										
CO1	Discuss the basics of information security.									
CO2	Illustrate the legal, ethical and professional issues in information security.									
CO3	Demonstrate the aspects of risk management.									
CO4	Become aware of various standards in the Information Security System.									
CO5	Design and implementation of Security Techniques.									
Mapping of Course Outcome with Program Outcome (POs)										
Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	2	2	3	3	3	3	2	3	3	
CO2	2	3	3	2	2	3	2	3	3	
CO3	3	3	2	2	3	2	3	2	2	
CO4	2	2	2	3	2	3	3	3	3	
CO5	3	3	3	2	3	2	3	3	2	
COs /PSOs	PSO1			PSO2			PSO3			
CO1	2			2			3			
CO2	3			3			2			
CO3	3			3			2			
CO4	2			2			3			
CO5	3			2			3			
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low										
Category	Basic Sciences	Engg.Sci ence	Humaniti es & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internshi ps/ Technic al Skills	Soft Skills	
					√					

Subject Code: HMCS22E09	Subject Name: INFORMATION SECURITY	Ty/ Lb/ ETL	L	T	P/R	C
	Prerequisite: Basic Knowledge in Cloud Computing, Networking	Ty	3	0	0/0	3

UNIT I – INTRODUCTION

9

History, Definition, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II – SECURITY INVESTIGATION

9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues -An Overview of Computer Security-Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT III – SECURITY ANALYSIS

9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk-Systems: Access Control Mechanisms, Information Flow and Confinement Problem.

UNIT IV - LOGICAL DESIGN

9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT V - PHYSICAL DESIGN

9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

TOTAL Periods: 45

TEXTBOOK:

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003.

REFERENCES

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.

AUDIT COURSE

Subject Code: HMAC22I01	Subject Name ENGLISH FOR RESEARCH PAPER WRITING						Ty/Lb	L	T	P	C	
	Prerequisite:Nil						Ty	2	0	0	0	
L: Lecture T: Tutorial P: Project; R: ResearchC: Credits Ty/Lb: Theory/Lab												
Objectives												
<ul style="list-style-type: none"> To know the art of writing the research paper and thesis. To Ensure the good quality of paper at very first-time submission. 												
COURSE OUTCOMES(COs):At the end of this course the students would be able to												
CO1	Understand that how to improve your writing skills and level of readability											
CO2	Learn about what to write in each section											
CO3	Understand the skills needed when writing a Title											
Mapping of Course Outcomes with Program Outcomes(POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1	1	1
H/M/L indicates Strength of Correlation 3-High,2-Medium,1-Low												
Category	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ others				
									✓			

Subject Code: HMAC22I01	Subject Name ENGLISH FOR RESEARCH PAPER WRITING	Ty/Lb	L	T	P	C
	Prerequisite:Nil	Ty	2	0	0	0

L: Lecture T:Tutorial P:Project; R:Research C:Credits Ty/Lb: Theory/Lab

Course objectives:

- To know the art of writing the research paper and thesis.
- To Ensure the good quality of paper at veryfirst-time submission.

Syllabus

Units	CONTENTS	Hours
1	Planning and Preparation, Word Order,Breaking uplong sentences, Structuring Paragraphs and Sentences,Being Concise and Removing Redundancy,Avoiding Ambiguity and Vagueness.	5
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	5
3	Review of the Literature,Methods,Results,Discussion,Conclusions,The Final Check.	5
4	key skills are needed when writing a Title, key skills are needed when writing an Abstract,keyskills are needed when writing an Introduction, skills needed when writing a Review of the Literature.	5
5	Skills are needed when writing theMethods, skills needed whenwriting the Results,skills are needed when writing the Discussion,skills are Needed when writing the Conclusions.	5
6	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.	5

SuggestedStudies:

1. GoldbortR(2006)WritingforScience,YaleUniversityPress(availableonGoogleBooks)
2. DayR(2006)HowtoWriteandPublishaScientificPaper,CambridgeUniversityPress
3. HighmanN(1998),HandbookofWritingfortheMathematicalSciences,SIAM.Highman'sbook.
4. AdrianWallwork,Englishfor WritingResearch Papers,Springer New

York Dordrecht Heidelberg London, 20

Subject Code HMAC22I02	Subject Name:DISASTER MANAGEMENT						Ty/Lb	L	T	P	C	
	Prerequisite:Nil						Ty	2	0	0	0	
L:LectureT:TutorialP:ProjectR:ResearchC:Credits Ty/Lb:Theory/Lab												
Objectives: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.												
COURSEOUTCOMES(COs):At the end of this course the students would be able to												
CO1	Evaluate disaster risk reduction and humanitarian response policy and practice from Multiple perspectives.											
CO2	Develop an understanding of standards of humanitarian response and practical relevance in Specific types of disasters and conflict situations.											
CO3	Understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.											
Mapping of Course Outcomes with Program Outcomes(POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1	1	1
H/M/L indicates Strength of Correlation 3-High,2-Medium,1-Low												
Category	H&S	Programcore	Program Elective	Open elective	Skillenhan cing	Interdisciplinary/A	Skillcomponent	PracticalProj ect/	others			
									✓			

Subject Code: HMAC22I02	Subject Name:DISASTER MANAGEMENT Prerequisite:Nil	Ty/Lb	L	T	P	C
		Ty	2	0	0	0
L:Lecture T:Tutorial P:Project R:Research C:Credits Ty/Lb:Theory/Lab						
Course Objectives:- Students will be able to: <ul style="list-style-type: none"> Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in. 						
Syllabus						
Units	CONTENTS					Hours
1	Introduction Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.					5
2	Repercussions Of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Land slides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.					5
3	Disaster Prone Areas In India Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics					5
4	Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation of Risk: Application of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.					5
5	Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.					5
6	Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.					5

SUGGESTED READINGS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royalbook Company.
2. Sahni, Pardeep Et. Al. (Eds.), " Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi

Subject Code: HMAC22I03	Subject Name:SANSKRIT FOR TECHNICAL KNOWLEDGE						Ty/Lb	L	T	P	C	
	Prerequisite:Nil						Ty	2	0	0	0	
L: LectureT: TutorialP: ProjectR: ResearchC: Credits Ty/Lb:Theory/Lab												
Objectives To get a working knowledge in illustrious Sanskrit, the scientific language in the world Learning of Sanskrit to improve brain functioning,to develop the logic in mathematics,science&other subjects enhancing the Memory power.The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.												
COURSE OUTCOMES(COs):At the end of this course the students would be able to												
CO1	Understanding basic Sanskrit language											
CO2	Understanding ancient Sanskrit literature about science & technology											
CO3	Develop logic in students being a logical language.											
Mapping of Course Outcomes with Program Outcomes(POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1	1	1
H/M/L indicates Strength of Correlation 3-High,2-Medium,1-Low												
Category	H&S	Programcore	Program Elective	Open elective	Skillenhancing elective	Interdisciplinary/Allied	Skillcomponent	PracticalProject/ Internship	others			
									√			

Subject Code: HMAC22I03	Subject Name: SANSKRIT FOR TECHNICAL KNOWLEDGE	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0
L: Lecture T: Tutorial P: Project R: Research C: Credits Ty/Lb: Theory/Lab						

Course Objectives

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects
4. Enhancing the memory power
5. The engineering scholars equipped with Sanskrit will be able to explore the
6. Huge knowledge from ancient literature

Syllabus

Unit	Content	Hours
1	<ul style="list-style-type: none"> • Alphabets in Sanskrit, • Past/Present/Future Tense, • Simple Sentences 	10
2	<ul style="list-style-type: none"> • Order • Introduction of roots • Technical information about Sanskrit Literature 	10
3	<ul style="list-style-type: none"> • Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics 	10

Suggested reading

1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha - Vempati Kutumbashastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean Books (P) Ltd., New Delhi.

Subject Code: HMAC22I04	Subject Name :VALUE EDUCATION						Ty/Lb	L	T	P	C	
	Prerequisite:Nil						Ty	2	0	0	0	
L: LectureT: TutorialP: ProjectR: ResearchC: Credits Ty/Lb:Theory/Lab												
Objectives: Understand value of education and self-development,Imbibe good values in students. Let them should know about the importance of character.												
COURSEOUTCOMES(COs):At the end of this course the students would be able to												
CO1	Knowledge of self-development											
CO2	Learn the importance of Human values											
CO3	Developing the over all personality											
Mapping of Course Outcomes with Program Outcomes(POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1	1	1
H/M/L indicates Strength of Correlation 3-High,2-Medium,1-Low												
Category	H&S	Programcore	Program Elective	Open elective	Skillenhancingelective	Interdisciplinary/Allied	Skillcomponent	PracticalProject/	others			
									√			

Subject Code: HMAC22I04	Subject Name: VALUE EDUCATION	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L: Lecture T: Tutorial P: Project R: Research C: Credits Ty/Lb: Theory/Lab

Course Objectives: Students will be able to

1. Understand value of education and self-development
2. Imbibe good values in students
3. Let they should know about the importance of character

Syllabus

Unit	Content	Hours
1	<ul style="list-style-type: none"> • Values and self-development–Social values and individual attitudes. Work ethics, Indian vision of humanism. 	6
	<ul style="list-style-type: none"> • Moral and non-moral valuation. Standards and principles. • Value judgements 	
2	<ul style="list-style-type: none"> • Importance of cultivation of values. • Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. • Honesty, Humanity. Power of faith, National Unity. • Patriotism. Love for nature, Discipline 	8
3	<ul style="list-style-type: none"> • Personality and Behavior Development–Soul and Scientific attitude. Positive Thinking. Integrity and discipline. • Punctuality, Love and Kindness. • Avoid fault Thinking. • Free from anger, Dignity of labour. • Universal brotherhood and religious tolerance. • True friendship. • Happiness Vs suffering, love for truth. • Aware of self-destructive habits. • Association and Cooperation. • Doing best for saving nature 	8
4	<ul style="list-style-type: none"> • Character and Competence – Holybooks vs Blind faith. • Self-management and Good health. • Science of reincarnation. • Equality, Nonviolence, Humility, Role of Women. • All religions and same message. • Mind your Mind, Self-control. • Honesty, Studying effectively 	8

Suggested reading

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

Course outcomes: Students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality

Subject Code: HMAC22I05	Subject Name: CONSTITUTION OF INDIA	Ty/Lb	L	T	P	C
Prerequisite: Nil		Ty	2	0	0	0

L: Lecture T: Tutorial P: Project R: Research C: Credits Ty/Lb: Theory/Lab

Objectives Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

COURSE OUTCOMES (COs): At the end of this course the students would be able to

CO1	Understand and explain the significance of Indian Constitution as the fundamental law of the land
CO2	Exercise his fundamental rights in proper sense at the same time identifies his Responsibilities in national building.
CO3	Analyze the Indian political system, the powers and functions of the Union, State and Local Governments in detail
CO4	Understand Electoral Process, Emergency provisions and Amendment procedure.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1	1	1
CO4	1	1	1	1	1	3	1	1	1	1	1	1

H/M/L indicates Strength of Correlation 3-High, 2-Medium, 1-Low

Category	H&S	Program core	Program Elective	Open elective	Skill enhancing	Interdisciplinary/ Allied	Skill	Practical Project/ others			
									✓		

Subject Code:	Subject Name: CONSTITUTION OF INDIA	Ty/Lb	L	T	P	C
HMAC22I05	Prerequisite: Nil	Ty	2	0	0	0
L: Lecture T: Tutorial P: Project R: Research C: Credits Ty/Lb: Theory/Lab						
Course Objectives: Students will be able to:						
<ul style="list-style-type: none"> • Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. • To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism. • To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution. 						
Syllabus						
Units	Content					Hours
1	History of Making of the Indian Constitution: History, Drafting Committee, Composition & (Working)					3
2	Philosophy of the Indian Constitution: Preamble Salient Features					3
3	Contours of Constitutional Rights & Duties: <ul style="list-style-type: none"> • Fundamental Rights • Right to Equality • Right to Freedom • Right against Exploitation • Right to Freedom of Religion • Cultural and Educational Rights • Right to Constitutional Remedies • Directive Principles of State Policy • Fundamental Duties. 					6
4	Organs of Governance: <ul style="list-style-type: none"> • Parliament • Composition • Qualifications and Disqualifications • Powers and Functions Executive: <ul style="list-style-type: none"> • President • Governor • Council of Ministers • Judiciary, Appointment and Transfer of Judges, Qualifications • Powers and Functions 					6
5	Local Administration: <ul style="list-style-type: none"> • District's Administration head: Role and Importance, • Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation. • Pachayatiraj: Introduction, PRI: Zila Pachayat. • Elected officials and their roles, CEO Zila Pachayat: Position and role. • Blocklevel: Organizational Hierarchy(Different departments), • Village level: Role of Elected and Appointed officials, • Importance of grass root democracy 					6
6	Election Commission: <ul style="list-style-type: none"> • Election Commission: Role and Functioning. • Chief Election Commissioner and Election Commissioners. • State Election Commission: Role and Functioning. • Institute and Bodies for the welfare of SC / ST / OBC and women. 					6

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr.S.N. Busi, Dr.B.R. Ambedkar framing of Indian Constitution, 1st Edition, 2015
3. M.P.Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D.Basu, Introduction to the Constitution of India, Lexis Nexis, 2015

Subject Code: HMAC22I06		Subject Name: PEDAGOGY STUDIES					Ty/Lb	L	T	P	C	
		Prerequisite: Nil					Ty	2	0	0	0	
L: Lecture T: Tutorial P: Project R: Research C: Credits Ty/Lb: Theory/Lab												
Objectives: Students will be able to: Review existing evidence on the review topic to inform programme design and Policy making undertaken by the DfID, other agencies and researchers. Identify critical evidence gaps to guide the development.												
COURSE OUTCOMES(COs): At the end of this course the students would be able to know												
CO1	What pedagogical practices are being used by teachers informal and informal classrooms in developing countries?											
CO2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, And with what population of learners?											
CO3	How can teacher education (curriculum and practicum) and the school curriculum and Guidance materials best support effective pedagogy?											
Mapping of Course Outcomes with Program Outcomes (POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1	1	1
H/M/L indicates Strength of Correlation 3-High, 2-Medium, 1-Low												
Category	H&S	Programcore	Program Elective	Open elective	Skillenhancing elective	Interdisciplinary/Allied	Skillcomponent	PracticalProject/ Internship	others			
									√			

Subject Code: HMAC22106	Subject Name: PEDAGOGY STUDIES	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L: Lecture T: Tutorial P: Project R: Research C:Credits Ty/Lb:Theory/Lab

Course Objectives:Students will be able to:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Syllabus

Units	Content	Hours
1	<ul style="list-style-type: none"> • Introduction and Methodology: • Aims and rationale, Policy background, Conceptual framework and terminology • Theories of learning, Curriculum,Teacher education. • Conceptual framework, Research questions. • Overview of methodology and Searching. 	6
2	<ul style="list-style-type: none"> • Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. • Curriculum,Teacher education. 	6
3	<ul style="list-style-type: none"> • Evidence on the effectiveness of pedagogical practices • Methodology for the indepth stage: quality assessment of included studies. • How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? • Theory of change. • Strength and nature of the body of evidence for effective pedagogical practices. • Pedagogic theory and pedagogical approaches. • Teachers'attitudes and beliefs and Pedagogic strategies. 	6
4	<ul style="list-style-type: none"> • Professional development: alignment with classroom practices and follow-up support • Peer support • Support from the head teacher and the community. • Curriculum and assessment • Barriers to learning: limited resources and large class sizes 	6
5	<ul style="list-style-type: none"> • Research gaps and future directions • Research design • Contexts • Pedagogy • Teacher education • Curriculum and assessment • Dissemination and research impact. 	6

Suggested reading

1. Ackers J, HardmanF (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeam pong K (2003) Teacher training in Ghana – does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
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Subject Code: HMAC22I07	Subject Name: STRESS MANAGEMENT BY YOGA					Ty/Lb /ETL	L	T/ SLr	P/R	C		
	Prerequisite: None					Ty	2	0	0	0		
L: Lecture T:Tutorial SLr: Supervised Learning P:Project R:Research C: Credits Ty/Lb/ETL : Theory / Lab / Embedded Theory and Lab												
OBJECTIVES: To introduce health psychology and arrive at the introduction to the philosophy and practice of yoga.												
COURSE OUTCOMES (Cos): (3– 5) Students completing the course were able to												
CO1	Compile the models of health and the psychological component of health											
CO2	Classify healthy behavior and health compromising behavior											
CO3	Deduce the impact of stress on health and apply effective stress management strategies											
CO4	Extrapolate the role of yoga in health care.											
Mapping of Course Outcomes with Program Outcomes(POs)												
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	3						3	3			
CO2	3	3	2					3	3			
CO3	3	3	2				1	3	3			
CO4	3	3	2				1	3	3			
Category	H&S	Programcore	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ Internship	Others			
										√		

Subject Code: HMAC22I07	Subject Name: STRESS MANAGEMENT BY YOGA	Ty/Lb /ETL	L	T/ SLr	P/R	C
	Prerequisite: None	Ty	2	0	0	0
L: Lecture T:Tutorial SLr: Supervised Learning P:Project R:Research C:Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab						

Unit 1

6

Understanding Stress: Stress and lifestyle disorders: Meaning and definition, development of stress; nature of stressors: Frustration, pressure; Factors predisposing stress: life events and daily hassles; Burnout. Coping with stress: Problem oriented and emotion oriented. Stress management: Meaning and definition; Changing thoughts, behavior and physiological responses.

Unit 2

10

Yoga Philosophy: Introduction to Yoga and Yogic Practices – Definition, History, Aim and Objectives, Four Paths of Yoga and Principles of Yoga, Hatha Yoga–Distinction between Yoga and Non – Yogic Practices, Concept of Yogic diet, Purpose and Utility of Asanas in Hatha Yoga, Introduction to Patanjali,

Unit 3

14

Yoga in Health Care: Yoga for specific lifestyle disorders: Asthma, Sleeplessness, Diabetes, Blood pressure and heart diseases. Research evidence on the impact of yoga intervention on lifestyle disorders. Halasana and Matsyasana for Thyroid, Dhanurasana and Bhujangasana for Polycystic Ovarian Syndrome Disease, Shishuasana and Adho MukhaSvanasana for Arthritis, Supta Matsyendrasana and Vrikshasana for Lower backpain, Ardha Matsyendrasana and Chakrasana for Diabetes, Apanasana and Paschimottanasana for Indigestion and Stomach Disorder, Padmasana and Sirsasana for Migraine, Baddha Konasana and Sukhasana for Depression, Balasana and Shavasana for Sleeplessness. Evaluation of the applications of psychological knowledge in the area of health and identification of gaps.

Total Periods: 30

REFERENCES

- Taylor,S.E(2006). Health Psychology. New Delhi: Tata McGraw Hill
- Serafini, E.P&Smith T.W.(2012).Health Psychology: Bio psycho social Interventions.NewDelhi: Wiley
- HathaYoga Pradipika by Swami Svatmarama.
- BKS Iyengar (2013). YOGA -The Path to Holistic Health

Subject Code: HMAC22I08	Subject Name PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	2	0	0	0

L: Lecture T: Tutorial P: Project R: Research C: Credits Ty/Lb: Theory/Lab

Objectives To learn to achieve the highest goal happily, To become a person with stable mind, pleasing Personality and determination. To awaken wisdom in student

COURSE OUTCOMES(COs): At the end of this course the students would be able to know

CO1	Study of Shrimad- Bhagwad-Geeta will help the student in developing his personality and achieve The highest goal in life
CO2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity
CO3	Study of Neetishatakam will help in developing versatile personality of students.

Mapping of Course Outcomes with Program Outcomes (POs)

Os/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	3	1	1	1	1	1	1
CO2	1	1	1	1	1	3	1	1	1	1	1	1
CO3	1	1	1	1	1	3	1	1	1	1	1	1

H/M/L indicates Strength of Correlation H-High, M-Medium, L-Low

Category	H&S	Programcore	Program Elective	Open elective	Skillehancingelective	Interdisciplinary/Allied	Skillcomponent	PracticalProject/ Internship	others			
										√		

Subject Code: HMAC22I08	Subject Name: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	Ty/Lb	L	T	P	C
	Prerequisite:Nil	Ty	2	0	0	0
L: Lecture T: Tutorial P: Project R: Research C: Credits Ty/Lb: Theory/Lab						

Course Objectives

- 1.To learn to achieve the highest goal happily
- 2.To become a person with stable mind, pleasing personality and determination
- 3.To awaken wisdom in students

Syllabus

Unit	Content	Hours
1	<ul style="list-style-type: none"> • Neetisatakam-Holistic development of personality • Verses - 19,20,21,22 (wisdom) • Verses - 29,31,32 (pride & heroism) • Verses - 26,28,63,65 (virtue) • Verses - 52,53,59 (dont's) • Verses - 71,73,75,78 (do's) 	10
2	<ul style="list-style-type: none"> • Approach to day-to-day work and duties. • Shrimad BhagwadGeeta: Chapter 2 -Verses 41,47,48, • Chapter 3 – Verses 13,21,27,35,Chapter 6 – Verses 5,13,17,23, 35, • Chapter 18 – Verses 45,46,48. 	10
3	<ul style="list-style-type: none"> • Statements of basic knowledge. • Shrimad BhagwadGeeta: Chapter 2- Verses 56,62,68 • Chapter12 – Verses 13,14,15,16,17,18 • Personality of Role model. Shrimad BhagwadGeeta: Chapter 2 - Verses 17, Chapter 3 - Verses 36,37,42, • Chapter 4 – Verses 18,38,39 • Chapter 18 –Verses 37,38,63 	10

Suggested reading

- 1.“Srimad BhagavadGita” by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
- 2.Bhartrihari's Three Satakam (Niti – sringar - vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Subject Code: HMAC22I09	Subject Name: LIFE SKILLS						Ty/Lb /ETL	L	T/ SLr	P/R	C	
	Prerequisite: None						Ty	2	0	0	0	
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab												
OBJECTIVES: <ul style="list-style-type: none"> • Understand the positive effect of being open to experiences • Be familiar with impulse control and prosocial behaviour • Describe emotional intelligence, social intelligence, and integrative thinking for effective Leadership • Describe basic managerial skills. And self- management skills. 												
COURSE OUTCOMES (Cos): (3– 5) Students completing the course were able to												
CO1	Develop the tendency to accept self and others unconditionally											
CO2	Regulate their emotional impulsivity and demonstrate prosocial behaviour											
CO3	Inculcate emotional and social intelligence and integrative thinking for effective Leadership.											
CO4	Demonstrate a set of practical skills such as time management, self-management, handling conflicts, and team leadership.											
CO5	Create and maintain an effective and motivated team to work for the society											
Mapping of Course Outcomes with Program Outcomes (POs)												
Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1			1		3	2	2					
CO2			1		3	2	1		1			
CO3		2	1		3	3	1		2			
CO4	2	2	1		3	3	2		3			
CO5	1	2	1		3	3	2		2			
Category	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary / Allied	Skill component	Practical Project/ Internship	others			
										√		

Subject Code: HMAC22I09	Subject Name: LIFE SKILLS	Ty/Lb /ETL	L	T/ SLr	P/R	C
	Prerequisite: None	Ty	2	0	0	0
L: Lecture T: Tutorial SLr: Supervised Learning P: Project R: Research C: Credits Ty/Lb/ETL: Theory / Lab / Embedded Theory and Lab						

UNIT 1: **6**

Openness to experience: developing the tendency to accept and appreciate self and others, the Insights, ideas, values, feelings, and behaviors, cultivate willingness to try new things as well as engage in imaginative and intellectual activities, and creative thinking“thinking outside of the box.” Skills.

UNIT 2: **6**

Conscientiousness- developing the ability to regulate their impulse control in order to engage in goal-directed behaviors, managing negative emotions such as anger, worry, and sadness and Developing organized and structured approach.

Unit 3: **6**

Prosocial behavior: developing trust, altruism, kindness, affection, empathetic understanding, Sharing, comforting and cooperating, Assertiveness, emotional expressiveness and social interaction.

Unit 4: **6**

Innovative leadership Understanding: Concept of emotional and social intelligence,the persona of a leader for deriving holistic inspiration,Drawing insights for leadership, leadership qualities essential to sail through difficult situations, Importance of ethics, Ethical decision-making, Personal and professional moral codes of conduct, Creating a harmonious life.

Unit 5: **6**

Management Skills : Basic Managerial Skills - Planning for Effective Management, Organize Teams, Delegation of Tasks, Time Management,Conflict and Stress Management. Self-management Skills- Understanding Self-concept, Developing Self-awareness, Self-examination, Self-reflection and introspection, Self-regulation.

Total Periods: 30

REFERENCES AND SUGGESTED READINGS

- 1) A. Pervin & O.P.John (Eds.), Hand book of personality: Theory and research (Vol.2,pp.102–138). NewYork: Guilford Press.
- 2) Harry Beilin (1982) The Development of Prosocial Behavior, Academic Press
- 3) Ashokan, M.S. 2015.Karmayogi: A Biography of E.Sreedharan. London: Penguin.
- 4) O’Toole, J.2019.The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good. New York Harper Collins
- 5) Brown,T.2012.Change by Design. Harper Business, New, New York
- 6) Lynn A.B.2015. The Emotional Intelligence Activity Book: 50 Activities for Promoting EQ at Work, Gildan Media Corporation, New York
- 7) Kelly T., and Kelly D.2014. Creative Confidence: Unleashing the Creative Potential Within Us All. William Collins Harper Collins Publishers India
- 8) Kurien,V.,and Salve,G.2012. I Too Had a Dream.Roli Books Private Limited New Delhi