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

B.Sc. (COMPUTER SCIENCE)

Curriculum and Syllabus

Regulation – 2022

DEPARTMENT OF COMPUTER SCIENCE

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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 behaviour, communication skills, innovative research capabilities and leadership abilities.**

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1	**Establish a career in IT Industry, Government, Academia and work collaboratively with Peers**
PEO2	**Successfully pursue Higher Studies in the field of Science, Technology and Management and/or take up Research.**
PEO3	**Promote Design, Research and implementation of Products and Services in the field of Computer Science through strong Technology, Communication, Leadership and Entrepreneurial Skills.**
PEO4	**Engage himself/herself in a Professional, Ethical and Responsible manner to the Profession, Industry, Nation and the Society.**
PEO5	**Create contemporary Systems and Technologies using the combination of Hardware and Software.**

PROGRAMME OUTCOMES

PO1	**Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of the undergraduate programme of study.**
PO2	**Communication Skills: Ability to understand and express thoughts and ideas effectively in writing and orally; to present complex information in a clear and concise manner to different groups.**
PO3	**Critical thinking and Problem solving: Capability to analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development and apply their competency to solve different kinds of problems and apply to real life situations.**
PO4	**Analytical and Scientific reasoning:. Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.**
PO5	**Research-related skills: Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation.**
PO6	**Team work and Leadership qualities: Function effectively as an individual, and as a team member or leader in diverse teams, and in multidisciplinary environment.**
PO7	**Information/digital literacy: Capability to use ICT tools in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data and further presentation.**

PO8	**Moral and ethical awareness: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work**
PO9	**Lifelong learning: Ability to update knowledge and skills, participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.**

PROGRAMME SPECIFIC OUTCOMES

PSO1	**Ability to design various web based and mobile based applications which suits the real time scenarios and to assess and identify potential risks, and offer sustainable solutions**
PSO2	**Analyze, design, implement, test and evaluate computer programs in the areas related to algorithms, networking, cloud computing, web design IoT, data analytics and machine learning of varying complexity**
PSO3	**Software development fundamentals, including programming, data structures and Software engineering fundamentals, including software analysis and design, evaluation and testing, and software engineering processes**

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

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Semester: 1
Theory:

Course Code	Course Title	C	L	T/SLr	P/R	Ty / Lb/ ETP/IE
HBTA22001/ HBHI22001/ HBFR22001	LANGUAGE (TAMIL-I/FRENCH-I/HINDI-I)	3	3	0	0	Ty
HBEN22001	LANGUAGE (ENGLISH – I)	3	3	0	0	Ty
HBMA22ID1	ALLIED I- MATHEMATICS-I	3	3	0	0	Ty
HBCS22001	PROGRAMMING METHODOLOGY	3	3	0	0	Ty
HBCC22001	ENVIRONMENTAL STUDIES	3	3	0	0	Ty

Practical:

HBCC22L01	COMPUTER SOFTWARE LAB	2	0	0	3	Lb
HBCS22L01	PROGRAMMING METHODOLOGY LAB	2	0	0	3	Lb
HBCC22I01	COMMUNICATION SKILL LAB	1	0	0	2	IE
HBCC22I02	SOFT SKILL I	1	0	0	2	IE

Credits Sub Total:21

Semester: 2
Theory:

Course Code	Course Title	C	L	T/SLr	P/R	Ty / Lb/ ETP/IE
HBTA22002/ HBHI22002/ HBFR22002	LANGUAGE (TAMIL-II/FRENCH-II/HINDI-II))	3	3	0	0	Ty
HBEN22002	LANGUAGE (ENGLISH – II)	3	3	0	0	Ty
HBMA22ID2	ALLIED II- MATHEMATICS-II	3	3	0	0	Ty
HBCS22002	DATA STRUCTURES	4	3	1	0	Ty
HBCS22003	OBJECT ORIENTED PROGRAMMING	4	3	1	0	Ty

Practical:

HBCS22L02	DATA STRUCTURES USING C++ LAB	2	0	0	3	Lb
HBMA22IL1	ALLIED MATHEMATICS LAB	2	0	0	3	Lb
HBCC22I03	SOFT SKILL - II	1	0	0	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

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Semester : 3
Theory:

Course Code	Course Title	C	L	T/ SLr	P/R	Ty / Lb/ ETP/IE
HBPH22ID3	ALLIED III- ELECTRONICS-I	3	3	0	0	Ty
HBCS22004	PROGRAMMING IN JAVA	4	3	1	0	Ty
HBCS22005	COMPUTER SYSTEM ARCHITECTURE	4	3	1	0	Ty
HBCS22006	COMPUTER NETWORKS	3	3	0	0	Ty
HBCS22007	OPERATING SYSTEM	3	3	0	0	Ty

Practical:

HBCS22L03	PROGRAMMING IN JAVA LAB	2	0	0	3	Lb
HBPH22IL2	ALLIED LAB- ELECTRONICS-I LAB	2	0	0	3	Lb
HBCC22I04	STATISTICAL AND NUMERICAL METHODS LAB	2	0	0	3	IE
HBCC22I05	SOFT SKILL-III (QUALITATIVE AND QUANTITATIVE TECHNIQUES)	1	0	0	2	IE

Credits Sub Total: 24

Semester: 4
Theory:

Course Code	Course Title	C	L	T/ SLr	P/R	Ty / Lb/ ETP/IE
HBPH22ID4	ALLIED IV- ELECTRONICS-II	3	3	0	0	Ty
HBCS22008	SOFTWARE ENGINEERING	4	3	1	0	Ty
HBCS22009	DATABASE MANAGEMENT SYSTEM	4	3	1	0	Ty
HBXX22OEX	OPEN ELECTIVE –I	3	3	0	0	Ty
HBCS22EXX	PROGRAMME ELECTIVE –I	3	3	0	0	Ty

Practical:

HBXX22OLX	OPEN ELECTIVE LAB	2	0	0	3	Lb
HBCS22L04	DATABASE MANAGEMENT SYSTEM LAB	2	0	0	3	Lb
HBCC22I06	CRITICAL THINKING SKILL	1	0	0	2	IE
HBCS22I01	CORE SKILL -I MULTIMEDIA LAB	1	0	0	2	IE

Credits Sub Total: 23

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

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Semester : 5

Theory :

Course Code	Course Title	C	L	T/SLr	P/R	Ty / Lb/ ETP/IE
HBCS22010	INTERNET TECHNOLOGIES	4	3	1	0	Ty
HBCS22EXX	PROGRAMME ELECTIVE -II	3	3	0	0	Ty
HBCS22011	PYTHON PROGRAMMING	3	3	0	0	Ty
HBXX22OEX	OPEN ELECTIVE –II	3	3	0	0	Ty
HBCC22002	ENTREPRENURSHIP DEVELOPMENT	3	3	0	0	Ty

Practical:

HBCS22L05	INTERNET TECHNOLOGIES LAB	2	0	0	3	Lb
HBCS22I02	CORE SKILL -II PYTHON PROGRAMMING LAB	1	0	0	2	IE
HBFL22IXX	FOREIGN LANGUAGE	1	0	0	2	IE
HBCC22I07	NCC/NSS/INTERNSHIP	1	0	0	2	IE

Credits Sub Total: 21

Semester: 6

Theory:

Course Code	Course Title	C	L	T/SLr	P/R	Ty / Lb/ ETL/IE
HBCS22EXX	PROGRAMME ELECTIVE –III	3	3	0	0	Ty
HBCS22012	CLOUD COMPUTING	4	3	1	0	Ty
HBCC22ET1	UNIVERSAL HUMAN VALUES	3	2	0	2/0	ETP

Practical:

HBCS22L06	PROJECT	9	0	0	18	Lb

Credits Sub Total: 19

Credit Summary

Semester : 1 : 21
Semester : 2 : 22
Semester : 3 : 24
Semester : 4 : 23
Semester : 5 : 21
Semester : 6 : 19
Total Credits : 130

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

PROGRAMME ELECTIVES –I						
Course Code	**Course Title**	**C**	**L**	**T/SLr**	**P/R**	**Ty / Lb/ ETP/IE**
HBCS22E01	MOBILE APPLICATION DEVELOPMENT	3	0	0	3	Ty
HBCS22E02	MOBILE COMPUTING	3	0	0	3	Ty
HBCS22E03	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3	Ty

PROGRAMME ELECTIVES –II						
Course Code	**Course Title**	**C**	**L**	**T/SLr**	**P/R**	**Ty / Lb/ ETP/IE**
HBCS22E04	SOFTWARE TESTING AND QUALITY ASSURANCE	3	0	0	3	Ty
HBCS22E05	CRYPTOGRAPHY & NETWORK SECURITY	3	0	0	3	Ty
HBCS22E06	BIG DATA ANALYTICS	3	0	0	3	Ty

PROGRAMME ELECTIVES –III						
Course Code	**Course Title**	**C**	**L**	**T/SLr**	**P/R**	**Ty / Lb/ ETP/IE**
HBCS22E07	MACHINE LEARNING	3	0	0	3	Ty
HBCS22E08	INTERNET OF THINGS	3	0	0	3	Ty
HBCS22E09	ARTIFICIAL INTELLIGENCE	3	0	0	3	Ty

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 FOREIGN LANGUAGES						
Course Code	**Course Title**	**C**	**L**	**T/SLr**	**P/R**	**Ty / Lb/ ETP/IE**
HBFL22I01	FRENCH	1	0	0	2	IE
HBFL22I02	GERMAN	1	0	0	2	IE
HBFL22I03	JAPANESE	1	0	0	2	IE
HBFL22I04	ARABIC	1	0	0	2	IE
HBFL22I05	CHINESE	1	0	0	2	IE
HBFL22I06	RUSSIAN	1	0	0	2	IE
HBFL22I07	SPANISH	1	0	0	2	IE

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List of OPEN ELECTIVE-2022 Regulations.

For All H&S, Management Studies and Computer application faculties-UG Programmes.

Offering Department	S.NO	Theory/Lab	Subject Code	Subject Name
Mathematics	1.	Theory	HBMA22OE1	Graph Theory
	2.	Theory	HBMA22OE2	Optimization Techniques
Physics	3.	Theory	HBPH22OE1	Fundamentals of Optics and Sound
	4.	Theory	HBPH22OE2	Every day Physics
	5.	Lab	HBPH22OL1	Basic Physics lab
Computer Science	6.	Theory	HBCS22OE1	Office Automation
	7.	Theory	HBCS22OE2	Fundamentals of Computer and Internet
	8.	Lab	HBCS22OL1	Multimedia lab
Economics	9.	Theory	HBEM22OE1	Indian Economy
	10.	Theory	HBEM22OE2	Gender Economics
Chemistry	11.	Theory	HBCH22OE1	Chemistry in our Daily Life
	12.	Theory	HBCH22OE2	Food Chemistry
	13.	Lab	HBCH22OL1	General Chemistry Lab
English	14.	Theory	HBEN22OE1	English For Media
	15.	Theory	HBEN22OE2	Creative Writing
Geology	16.	Theory	HBGE22OE1	Disaster Mitigation and Management
	17.	Theory	HBGE22OE2	Remote Sensing and GIS
	18.	Lab	HBGE22OL1	Remote sensing and GIS lab

Psychology	19.	Theory	HBPY22OE1	Health & Yoga
	20.	Theory	HBPY22OE2	Organizational Behavior
	21.	Lab	HBPY22OL1	Understanding Self & Others
Fashion Design	22.	Theory	HBFD22OE1	Applications of Textiles
	23.	Theory	HBFD22OE2	Introduction to Fashion
	24.	Lab	HBFD22OL1	Embroidery Practical Lab
Computer Applications	25.	Theory	CBCA22OE1	Web design
	26.	Theory	CBCA22OE2	E-Commerce
	27.	Lab	CBCA22OL1	Web Designing Laboratory
Food Science Nutrition and Dietetics	28.	Theory	HBFS22OE1	Principles of Nutrition
	29.	Theory	HBFS22OE2	Food Safety and Quality Control
	30.	Lab	HBFS22OL1	Community Nutrition Practical
Hotel Management and Catering Technology	31.	Theory	HBHM22OE1	Fundamentals of Food Production and Patisserie
	32.	Theory	HBHM22OE2	Bakery and Confectionery Basics
	33.	Lab	HBHM22OL1	Fundamentals Front office operation practical
Defense and Strategic Studies	34.	Theory	HBDS22OE1	Independent India
	35.	Theory	HBDS22OE2	Human Rights
Financial Planning	36.	Theory	MBFP22OE1	Marketing of Financial Services
	37.	Theory	MBFP22OE2	Business strategy
	38.	Lab	MBFP22OL1	Interview Techniques
Bio Technology	39.	Theory	HBBT22OE1	Food and Nutrition
	40.	Theory	HBBT22OE2	Human Physiology
	41.	Theory	HBBT22OE3	Basic Bioinformatics
	42.	Lab	HBBT22OL1	Basic Bioinformatics Lab

Physical Education and Sports	43.	Theory	HBPE22OE1	Rule of Games and Sports
	44.	Theory	HBPE22OE2	Health and Fitness
Human Resource	45.	Theory	HBHR22OE1	Workplace Counseling
	46.	Theory	HBHR22OE2	Corporate Social Responsibility
Information Science and Cyber forensics	47.	Theory	HBCF22OE1	Introduction to Data Science
	48.	Theory	HBCF22OE2	Data Mining
	49.	Theory	HBCF22OE3	Introduction to IoT
	50.	Theory	HBCF22OE4	Introduction to Big Data
	51.	Lab	HBCF22OL1	Data Science Lab
	52.	Lab	HBCF22OL2	Data Mining Lab
Management Studies	53.	Theory	MBBA22OE1	Principles of Management and Science
	54.	Theory	MBBA22OE2	Business Ethics

Note: Students are permitted to choose open electives from the above list, other than their own department electives.

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Semester: 7
Theory:

Course Code	Course Title	C	L	T/SLr	P/R	Ty/Lb/ETP/IE
HBCC22003	RESEARCH METHODOLOGY	3	3	0	0	Ty
HBCS22013	COMPUTER GRAPHICS	4	3	1	0	Ty
HBCS22014	MOBILE AND WIRELESS NETWORKS	4	3	1	0	Ty
HBCS22015	IMAGE PROCESSING	4	3	1	0	Ty

Practical:

HBCS22I03	MINI PROJECT	2	0	0	3	IE
HBCS22I04	INTERNSHIP	1	0	0	2	IE

Credits Sub Total:18

Semester: 8
Theory:

Course Code	Course Title	C	L	T/SLr	P/R	TY/LB/ETP/IE
HBCC22004	STARTUP STRATEGIES	3	3	0	0	Ty
HBCC22005	PRINCIPLES OF DIGITAL MARKETING	3	3	0	0	Ty
HBCC22006	INTELLECTUAL PROPERTY RIGHTS AND PATENT	3	3	0	0	Ty

Practical:

HBCS22L07	MAJOR PROJECT	6	0	0	12	Lb
HBCS22I05	RESEARCH PUBLICATION	2	0	0	3	IE

Credits Sub Total:17

Total no. of credits (I to VIII semesters):165

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Components of Curriculum and Credit Distribution(B.Sc Computer Science)

S. No	CATEGORY	Description	No. of Courses	Credits	Total	Credit Weightage	Contact hours
1	CORE COURSES	Core Theory	12	44	54	42	660
		Core Lab	5	10			150
2	ELECTIVE COURSES	Department Electives/ Skill enhancement electives	3	9	9	7	135
3	OPEN ELECTIVES	Open Elective theory	2	6	8	6	90
		Open Elective Lab	1	2			30
4	INTERDISCIPLINARY/ ALLIED COURSES	Theory	4	12	16	12	180
		Lab	2	4			60
5	HUMANITIES & SOCIAL SCIENCES , LIFE SKILLS &SOFT SKILLS	Language 1 & 2	2	6	31	24	90
		English 1 & 2	2	6			90
		Soft Skills	3	3			45
		Life Skill	4	6			90
		Foreign Language	1	1			15
		Environmental Studies	1	3			45
		Management Papers	-	-			-
		Entrepreneurship Development	1	3			45
		Universal Human values	1	3			45
		Entrepreneurship	-	-			-
6	PROJECTS/INTERNSHIP/ CORE SKILL	Project	1	9	12	9	135
		Core Skills	2	2			30
		Internship / NSS / NCC	1	1			15
7	Research Component	Research methodology, Publication,IPR and Patents etc.	-	-	-	-	-
8	Any other		-				-
Total			**48**	**130**	**130**	**100**	**1950**

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Components of Curriculum and Credit Distribution :(Honors Programme)

S. No	CATEGORY	Description	No. of Courses	Credits	Total	Credit Weightage	Contact hours
1	CORE COURSES	Core Theory	15	56	66	40	840
		Core Lab	5	10			150
2	ELECTIVE COURSES	Department Electives/ Skill enhancement electives	3	9	9	5	135
3	OPEN ELECTIVES	Open Elective theory	2	6	8	5	90
		Open Elective Lab	1	2			30
4	INTERDISCIPLINARY/ ALLIED COURSES	Theory	4	12	16	10	180
		Lab	2	4			60
5	HUMANITIES & SOCIAL SCIENCES , LIFE SKILLS &SOFT SKILLS	Language 1 & 2	2	6	37	22	90
		English 1 & 2	2	6			90
		Soft Skills	3	3			45
		Life Skill	4	6			90
		Foreign Language	1	1			15
		Environmental Studies	1	3			45
		Management Papers	1	3			45
		Entrepreneurship Development	1	3			45
		Universal Human values	1	3			45
		Entrepreneurship	1	3			45
6	PROJECTS/INTERNSHIP/ CORE SKILL	Project	1	9	13	8	135
		Core Skills	2	2			30
		Internship / NSS / NCC	2	2			30
7	Research Component	Research methodology, Publication,IPR and Patents etc.	3	8	8	5	120
8	Any other(Mini Project)		2	8	8	5	120
Total			**59**	**165**	**165**	**100**	**2475**

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
1.	B.Sc CS HBCS22002	Data Structures	-	Evaluating arithmetic expressions, threaded binary tree, B+ tree, euler circuits	20%
2.	B.Sc CS HBCS22003	Object Oriented Programming	Streams ,member function of istream class, manipulators,	Application, OOPS paradigm, simple classes, pure virtual function, working with files	25%
3.	B.Sc CS HBCS22004	Programming in Java	Inner class, Wrapper class	Inserting data, Updating data	10%
4.	B.Sc CS HBCS22006	Computer Networks	Theoretical basis for data communication, guided transmission media, channel allocation problem, multiple access protocol, network security, cryptography.	Analog and digital signal, multiplexing techniques, transmission media, guided and unguided media, network switching techniques, connection, three way handshake, application layer protocol, DNS protocol.	50%
5.	B.Sc CS HBCS22007	Operating System	Single and multiple partitioned allocation, UNIX system.	Multiprogramming system, batch system, time sharing system, mass storage system, linux system, mobile OS, Android	35%
6.	B.Sc CS HBCS22008	Software Engineering	Software project and project metrics, technical metrics for software	Layered technology, agility, Requirement engineering process, classical analysis, data dictionary, Estimation, unit testing	35%
7.	B.Sc CS HBCS22009	Database Management System	File system structure, Indexing and hash, pitfalls	Selection and projection, Grouping and ungrouping,optimistic method s,XML Database, NoSQL Database.	25%

8.	B.Sc CS HBCS22012	Cloud Computing	Cloud enabling technologies, deployment model, cloud service delivery model, cloud storage model and devices, cloud file system	Service oriented architecture, database as a service, service providers, tools and mechanisms, standards for application developers and security.	30%
9.	B.Sc CS HBCS22E01	MOBILE APPLICATION DEVELOPMENT	Eclipse simulator, Event based ,Animation	IOS android,SOC,Acitivity lifecycle,Layout manager	65%
10.	B.Sc CS HBCS22L02	DATA STRUCTURES USING C++ LAB	BFS,Heap sort,Quick sort	Infix to post fix expression,BST,Linear search	70%
11.	B.Sc CS HBCS22L03	PROGRAMMING IN JAVA LAB	Scanner class,Random class,String Manipulation,GUI based ,File Stream	Method overloading,over riding,constructor overloading,Abstract class	80%
12.	B.Sc CS HBCS22L04	DBMS LAB	Nested Queries,insert command,	Triggers,predefined functions.	60%

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TABLE 3:

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

S.No	New courses(Subjects)	Value added courses	Life skill	Electives	Inter Disciplinary	Focus on employability/entrepreneurship /skill development.
1	PROGRAMMING METHOOLOGY					✔
2	ICT TOOLS LAB					✔
3	PROGRAMMING METHOOLOGY LAB					✔
4	COMMUNICATION SKILL					✔
5	ALLIED MATHEMATICS LAB				✔	
6	ALLIED ELECTRONICS –I LAB				✔	
7	ANALYTICAL SKILL LAB				✔	
8	CRITICAL THINKING SKILL					✔
9	MULTIMEDIA LAB					✔
10	INTERNET TECHNOLOGIES					✔
11	PYTHON PROGRAMMING					✔
12	ENTREPRENURSHIP DEVELOPMENT					✔
13	INTERNET TECHNOLOGIES LAB					✔

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S.No	**New courses(Subjects)**	**Value added courses**	**Life skill**	**Electives**	**Inter Disciplinary**	**Focus on employability/entrepreneurship/skill development.**
14	CORE SKILL -II PYTHON PROGRAMMING Lab					✔
15	FOREIGN LANGUAGE	✔				
16	NCC/NSS/INTERNSHIP		✔			
17	UNIVERSAL HUMAN VALUES		✔			
18	MOBILE COMPUTING			✔		
19	DESIGN AND ANALYSIS OF ALGORITHMS			✔		
20	SOFTWARE TESTING AND QUALITY ASSURANCE			✔		
21	BIG DATA ANALYTICS			✔		
22	MACHINE LEARNING			✔		
23	INTERNET OF THINGS			✔		
24	ARTIFICIAL INTELLIGENCE			✔		

Dr.M.G.R Educational & Research Institute (Deemed to be University)
Department of Computer Science
Regulation 2022 – 2023

Semester: 1

Subject Code: **HBTA22001**	Subject Name: **TAMIL PAPER - l**	**Ty /Lb ETL**	**L**	**T / S.Lr**	**P / R**	**C**
	Prerequisite: +2 Tamil Language	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

- Understand the aims and objectives of teaching Tamil.
- Understand the rational for learning Tamil.
- To motivate and stimulate the students to overcome their inferiority complex and improve fluency in the language.
- Learn significance of spoken skill.
- The relationship between language &culture and the implications for language teaching.

COURSE OUTCOMES (COs) - Students completing this course were able to

CO1	Tamil students are actively engaged in learning Tamil language and culture in a meaningful setting
CO2	Focus on applying the language in real life situations.
CO3	Use proficiency descriptors to motivate learners to progress to the next stage of learning. .
CO4	Lessons are customized to arouse students interest and ignite the joy of learning Tamil language.
CO5	Develop a strong foundation in listening & speaking skills.

Mapping of Course Outcome with Program Outcome (POs)

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

	PSOs			
COs	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	3	3
CO2	2	2	3	3
CO3	3	3	3	2
CO4	2	2	3	3
CO5	3	2	2	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
			√						

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Subject Code: **HBTA22001**	Subject Name: **TAMIL I**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : + 2 Tamil Language	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						

பொதுத்தமிழ்

இளநிலை மாணாக்கருக்கு

B.A/B.Sc/B.Com/B.B.A/B.C.A/B.PES

HBTA22001

முதலாம் ஆண்டு - முதல் பருவம்

கற்றல் நோக்கம்: 1.மாணவர்களின் கவிதை,கட்டுரை எழுதும் திறன் வளர்த்தல்
2. தமிழில் பிழையின்றி பேசும் எழுதும் திறன் வளர்த்தல்

அலகு – 1 **11 மணி நேரம்**

அ) மரபுக்கவிதை

1**.** செந்தமிழ் நாடு - மகாகவி பாரதியார்
2.தமிழின் இனிமை, இன்பத்தமிழ், எங்கள் தமிழ், சங்கநாதம் - பாரதிதாசன்
3.தமிழ் வளர்க்க சபதம் - நாமக்கல் கவிஞர் வெ.இராமலிங்கம் பிள்ளை
4. கோயில் வழிபாடு, வாழ்க்கைத் தத்துவங்கள் - கவிமணி தேசிக விநாயகம் பிள்ளை
5.கும்மிப்பாடல் - சுத்தானந்த பாரதியார்
6. தமிழ்த்தாய் வாழ்த்து - மனோன்மணியம் பெ.சுந்தரம் பிள்ளை
7.விடுதலை விளைத்த உரிமை - கவியரசர் கண்ணதாசன்
8. அன்பெனும் பிடியுள்... ... ..., முரசறைத்தல் - வள்ளலார் இராமலிங்க அடிகள்

ஆ) புதுக்கவிதை

1.பாட்டாளிகளின் குரல் - பட்டுக்கோட்டை கலியாணசுந்தரம்
2. மகாத்மா காந்தியடிகள் - கவிஞர் வாலி
3. காகிதப் பூக்கள் - நா.காமராசு
4.வள்ளுவர் வழங்கும் விடுதலை - ஈரோடு தமிழன்பன்
5. உலகம் - வைரமுத்து
6. இன்னமுத மாமழை - பேரா. முனைவர் பொற்கோ
7.தமிழ்ப்பற்று – மீரா
8.ஐந்தாம் வகுப்பு அ பிரிவு - நா.முத்துக்குமார்

அலகு - 2 **7 மணி நேரம்**

நாட்டுப்புற இலக்கியம்

1. பொது அறிமுகம்
2. நாட்டுப்புற இலக்கிய வகைகள்
3.நாட்டுப்புறக்கலைகள்

அலகு – 3 **12 மணி நேரம்**

அ) சிறுகதைகள்

1. தேங்காய்த் துண்டுகள் (மு.வரதராசனார்)
2. அறம் (மாலன்)
3. நாற்காலியும் நான்கு தலைமுறைகளும் (திலகவதி)
4. அன்னையும் பிதாவும் (இராஜாஜி)
5. விடியுமா? (கு.ப.ராஜகோபாலன்)

ஆ) உரைநடை

1. மு.வ. என்னும் மந்திரம் (இரா.மோகன்)
2. தமிழிசை இயக்கம் (க.வெள்ளைவாரணனார்)
3. மதுரை மாநகரம் (ரா.பி.சேதுப்பிள்ளை)

அலகு - 4 **6 மணி நேரம்**

1. புதுக்கவிதை - தோற்றமும் வளர்ச்சியும்
2. உரைநடை - தோற்றமும் வளர்ச்சியும்
3. சிறுகதை - தோற்றமும் வளர்ச்சியும்

அலகு - 5 **9 மணி நேரம்**

அ) இலக்கணம்

1. வழக்கு
2. தொகாநிலைத் தொடர்
3. எழுத்துப் போலி
4. பதவியல்

ஆ) மொழிப்பயிற்சி

1. தன்வினை - பிறவினை
2. ஒருமை பன்மை மயக்கம்
3. பிறமொழிச் சொற்களை நீக்குதல்
4. விண்ணப்பம் எழுதுதல்

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Subject Code:	**HBFR22001**	**Semester**	**I**			
Category	**All UG Programs**		**L**	**T/SLr**	**P/R**	**C**
Course Title	**French I**		**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

OBJECTIVES

1. The students will acquire a different perspective of their own culture in relation to the French culture
2. The students will discover new attitudes towards familiar practices
3. The students will acquire a sense of the French language, its music and rhythms and basic usage.
4. The students will acquire a comprehensive view of the European Union and the member states

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Identify the French language from other European language and to show and tell French words and expression
CO2	Understand how the language works discovering the pronunciation
CO3	• Start writing short dialogues of greetings • Try to interact with someone with life skill question –what where, who etc • Describe persons and places
CO4	• Discover France and its physical tributes, develop an idea about the importance of France in the world affairs • Analyze ideas in the content of short paragraphs, paintings etc., and everyday contexts. • Appreciate the culture and uniqueness of France. • Discuss in English various aspects of France and a new cultural event and compare with current scenario
CO5	• Develop enough confidence to introduce oneself and ask others simple questions about personal details. • Interact as long as other person speaks slowly and clearly
CO6	Plan a rendezvous, a casual meeting by Interacting with basic sentences and expressions as long as the person to with whom he/she speaks can help to reformulate the sentences
CO7	Write a simple message can fill a simple questionnaire. write ones names, nationality, address etc. on a hotel registration card /passport etc.

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**P07**	**PO8**	**P09**
CO1	3	2	2	2	2	1	2	2	3
CO2	2	2	2	2	1	1	3	2	3
CO3	2	3	2	3	1	1	2	2	3
CO4	3	3	3	2	2	2	2	3	3
CO5	2	2	2	3	3	2	3	2	3
CO6	3	3	2	2	3	3	3	3	3
CO7	3	3	2	2	3	3	3	3	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
			√						

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Subject Code: **HBFR22001**	Subject Name: **FRENCH I**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : +2 French Language	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						

FRENCH– I

UNIT I **9**

Se saluer, La Graphie- écrire (compréhension orale, expression orale)

- Se Présenter-
- La langue française
- La Graphie – écrire L'alphabet, L'abécédaire
- Les Accents et les Ponctuations
- L'interaction de base.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

UNIT II **9**

S'informer-Interactions aidant des Compétences De base

- Des modèles interrogatifs
- Les nombres, demander le cout /le prix
- Demander l'heure, Les jours, Les mois de l'année.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

UNIT III **9**

Localiser –La France

- Quelque symbole de la France.
- La carte de l'Europe, La France dans le contexte international, La France et les Fuseaux horaires, La francophonie, L'union Européen
- La France physique, industrielle, touristique rt administrative
- Quelque symbole de Paris.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

UNIT IV **9**
Lire et prononcer Le française

- Les son française, les voyelles françaises, les sons nasaux, les consonné, Quelque sons uniques.
- Les syllabus français, Les Rythme de la langue française.

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales.(20 –durée moins de 2 minutes)
  - **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises ,6 audio reading

UNIT V **9**
Observer et Comprendre

- La vie de la France quotidienne, En cas d'urgence.
- La grammaire initiale

  - **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)
  - **Audio clips** - For oral expressions, oral assignments and oral test -20 duration less than 2 minutes (10 oral exercises, 6 audio Reading compositions& 4 tests).

Total no. of Periods: 45

Reference Books:

1. **Parlez-vous français? Partie 1 -** Dr.M.Chandrika.V.Unni & Mrs. Meena Mathews 2019 by Universal publisher

2. **CLE INTERNATIONAL** Lectures Clé en français facile. (2012) Hachette Paris

3. **Cosmopolite**: Livre d'élève A1 by Nathalie Hirsch sprung, Tony Tricot, Claude Le Ninan

4. **Latitudes-**1 - Régine Mérieux & Yves l'oiseau, Didier 2017

5. **Alter Ego 1** - Catherine Dolez, Sylvie Pons : (2014) Hachette, Paris

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Subject Code: **HBHI22001**	Subject Name: **HINDI I**	**Ty/ Lb/ ETL/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : +2 Hindi Language	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

OBJECTIVES

1. To Understand the Hindi Literature, culture and the usage of language in the various streams
2. To Build up the Confidence in conversing in Hindi language.
3. To acquire Knowledge of the usage of Hindi language in the various Government Offices

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	understand the basic concepts and Origin of Hindi
CO2	Know about the roots of Hindi Literature ands its perspective and methods.
CO3	Elaborate and understand philosophical methods of Hindi Literature.
CO4	Evaluate the concept of Hindi from past to present and to study the society closely throughLiterature
CO5	understand the importance of Hindi in the contemporary world.

Mapping of Course Outcome with Program Outcome (POs)

Sem I	**Course code: HBH122001**								
	Programme Outcomes(POs)								
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	3	2	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	2
CO3	3	3	2	3	3	3	3	3	2
CO4	2	3	3	3	3	2	2	3	3
CO5	3	3	3	3	3	2	2	3	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
			√						

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Subject Code: **HBHI22001**	Subject Name: **HINDI I**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : +2 Hindi Language	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 Prose –Understanding the secret of the culture and how todraft the letters in Government offices, technical terms

1. Sabhyata kaRahasya
2. PersonalApplications
3. LeaveLetters
4. Government Order
5. Administrative Terminology Hindi to English (25 Words)

UNIT - II Prose-Understanding the human relations and also to know the procedures to open the account in the bank, technical terms

1. Mitrata
2. Letter to theEditor
3. Opening anA/C
4. Demi OfficialLetter
5. Administrative Terminology English to Hindi (25 Words)

UNIT-III Prose-the contribution of youth in developing India, drafting memo and technicalthings used in memo

1. YuvavonSe
2. Application for Withdrawal
3. Circular
4. Memo
5. Administrative Terminology Hindi to English (25 Words)

UNIT-IV Prose-The effect of Nuclear energy and usage of technical terms in offices

1. Paramanu Oorja evam Khadya PadarthSanrakshan
2. Transfer of an A/C
3. Missing of Pass Book / ChequeLeaf
4. OfficialMemo
5. Administrative Terminology English to Hindi (25 Words)

UNIT-V Prose-The Obstacles faced by the youth for getting employment, drafting complaint letters, technical terms

1. Yougyata aur Vyavasay kaChunav
2. Complaints
3. Ordering forBooks
4. Notification
5. Official Noting Hindi to English (25 words)

Total no. of Hrs: 45

REFERENCE:

1. Prayojan MoolakHindi:Dr. Syed Rahamathulla, PoornimaPrakashan
4/7, Begum III Street, Royapettah, Chennai – 14
2. Hindi Gadhya Mala Dr. Syed Rahamathulla, PoornimaPrakashan4/7, Begum III Street, Royapettah, Chennai

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HBEN 22001	**ENGLISH I (Common to all UG Programs under H&S)**	**L**	**T**	**P**	**C**
	Total contact hours – 45	3	0	0	3
	Prerequisite – Plus2 English Language				
	Course designed by – Department of English				

Objectives:

1. Develop English Language skills (LSRW) to communicate in English without any inhibition.
2. Learn lexis and syntax to be fluent in English for social and academic communication
3. Demonstrate content knowledge through appropriate language use for academic success.
4. Develop in them analytical and interpretative skills for research, projects, placement etc.,
5. Engage in academic and business writing with professional ethics.

Course Outcomes (COs)

CO1	Possess Language skills (LSRW) to communicate in English without any inhibition.
CO2	Express with appropriate lexis and syntax in English for social and academic communication
CO3	Demonstrate content knowledge through appropriate language use for academic success.
CO4	Analyse and interpret any genre of literature in English for research, projects, placement etc.,
CO5	Engage themselves in organized academic and business writing with professional ethics

Program Specific Outcome

PSO1	Demonstrating mastery of the components of English language and literature.
PSO2	Explaining through literature in English, diverse historical cultural and social ethics
PSO3	Applying literary critical perspectives to generate original analysis of literature in English
PSO4	Promoting cultural values and real-life skills through English language and Literature

Mapping of course outcomes (COs) with Program Outcomes (POs)
(H/M/L indicates the strength of correlation) H= High; M= Medium; L= Low

COs	POs	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	3	3	1	2	2	1	2	3
2	3	3	3	1	2	2	1	2	3
3	3	3	3	1	2	2	1	2	3
4	3	3	3	3	3	2	1	2	3
5	3	3	3	3	3	2	1	2	3

Mapping of course outcomes (COs) with program Specific outcomes (PSOs)

COs	PSO 1	PSO2	PSO3	PSO4	
CO1	3	2	2	2	
CO2	2	2	2	2	
CO3	3	2	2	2	
CO4	3	2	2	2	
CO5	3	2	2	2	
3/2/1 Indicates Strength Of Correlation, 3 – High, 2- Medium, 1- Low					

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
			√						

HBEN22001	Semester I	L	T	P	C
	ENGLISH I **(Common to all UG Programs under H&S)**	**3**	**0**	**0**	**3**

Course Objectives:

The students will be facilitated to

1. Develop English Language skills (LSRW) to communicate in English without any inhibition.
2. Learn vocabulary and syntax to be fluent in English for social and academic communication
3. Demonstrate content knowledge through appropriate language use for academic success.
4. Develop in them analytical and interpretative skills for research, projects, placement etc.,
5. Engage in academic and business writing with a focus on social and professional ethics.

Unit I: Prose

1. Beware the loss of Biodiversity
2. The Urban - Rural Divide
3. Grading down Plastics
4. The Unsung Hero of Covid – 19 in India
5. From Aircrafts to Drones
6. My Vision for India

Unit II: Poetry

1. On Killing a Tree
2. The Road Not Taken
3. Anthem for Doomed Youth

Unit III: Short Story

1. Portrait of a Lady
2. The Connoisseur

Unit IV: Drama

1. The Never-Never Nest
2. Frederick Douglass

Unit V: Functional Grammar – Charts & LSRW Development

Functional Grammar: ***(Grammar exercises spread up in all four units)***

Parts of speech- use of articles- prepositions – their uses – verb + prepositions- words followed by prepositions – modals -tenses- active -passive- impersonal passive forms- concord- conditional sentences – question tags - Common errors - Punctuation

Vocabulary development- word formation - prefixes-suffixes – synonyms-antonyms – homophones -homonyms – words often confused

Charts/Diagrams and their interpretation - their use

Tables - Flow chart - Pie chart -Bar chart

Letters: Formal and Informal

LSRW Development: audio, video and tasks for the content of lessons under each unit.

Course Outcomes:

On completing the course the students will be able to

1. Possess Language skills (LSRW) to communicate in English without any inhibition.
2. Express with appropriate lexis and syntax in English for social and academic communication
3. Demonstrate content knowledge through appropriate language use for academic success.
4. Analyse and interpret any genre of literature in English for research, projects, placement etc.,
5. Engage themselves in organized academic and business writing with professional ethics.

Prescribed Text:

1. M. Chandrasena Rajeswaran, R. Pushkala & S. Bhuvaneswari, Pinnacle: A Skills Integrated Textbook
2. V. Karpagavadivu, S. Bhuvaneswari, J. Valentina Rani , S. Magdelin Percy, English Workbook

Suggested Reading: Wren and Martin: Grammar and Composition, Chand & Co, 2006

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Subject Code: **HBMA22ID1**	Subject Name: **ALLIED I- MATHEMATICS-I**	**L**	**T**	**C**
	Prerequisite: Higher Secondary Mathematics	3	0	3

L : Lecture T : Tutorial C: Credits

OBJECTIVES

- To understand the concepts in Matrices and its operations
- To understand the Basic concepts in Trigonometry
- To understand the Basic concepts in Integration
- To understand the Basic concepts in Probability
- To understand the Basic concepts in Standard Distributions

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the basic concept of Rank matrices and Solving simultaneous equations .
CO2	Understand to solve the problem of Expansions of Sin nθ, Cos nθ in powers of Sinθ and Cosθ . Expansions of $Sin^n\theta$ and $Cos^n\theta$ in terms of Sines and Cosines of multiples of θ and also problem in Hyperbolic functions.
CO3	Learn how to solve problems in Methods of Integration, Integration by substitution , Integration by parts , Definite Integrals , Properties of Definite Integrals and Problems on finding Area
CO4	Understand the concept of Axioms of Probability, Conditional probability , Total probability Baye‘s Theorem , Random variable ,Probability mass function , Probability density function.
CO5	Analyses summation of series using Binomial, Exponential , Poisson and normal distribution

Mapping of Course Outcome with Program Outcome (POs)

COs/ POs	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**			
CO1	3	2	3	3	3	2	1	2	3			
CO2	3	2	2	3	2	2	1	1	3			
CO3	2	2	3	3	3	2	1	1	2			
CO4	2	2	3	2	3	1	1	2	3			
CO5	3	2	3	3	3	2	2	2	2			

COs/PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	3
CO2	3	3	3
CO3	2	3	1
CO4	2	1	2
CO5	2	2	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
						√			

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HBMA22ID1	ALLIED I- MATHEMATICS I	L T P C 3 0 0 3

(Common to I yr / I sem - BCA /B.Sc [CS, Physics,Chemistry, ISCF, Electronics])

Course Outcomes:

To understand the Basic concepts in Matrices
To understand the Basic concepts in Trigonometry
To understand the Basic concepts in Integration
To understand the Basic concepts in Probability
To understand the Basic concepts in Standard Distributions

UNIT I MATRICES 9

Elementary operations on Matrices – Rank of a Matrix – Solving simultaneous equations (atmost three equations with three unknowns).

UNIT II TRIGONOMETRY 9

Expansions of Sin nθ, Cos nθ in powers of Sinθ and Cosθ – Expansion of Tan nθ – Expansions of $\text{Sin}^n\theta$ and $\text{Cos}^n\theta$ in terms of Sines and Cosines of multiples of θ – Hyperbolic functions – Separation into real and imaginary parts.

UNIT III INTEGRATION 9

Basic concepts of Integration – Methods of Integration– Integration by substitution – Integration by parts –Definite Integrals – Properties of Definite Integrals – Problems on finding Area using single integrals (simple problems).

UNIT IV INTRODUCTION TO PROBABILITY 9

Axioms of Probability – Conditional probability – Total probability – Baye‘s Theorem – Random variable – Probability mass function – Probability density function – Properties (Definition and simple problems).

UNIT V STANDARD DISTRIBUTIONS 9

Binomial – Poisson –Exponential –Normal distributions.

Total no. of periods: 45

Reference Books:

1) Vittal.P.R, *Allied Mathematics*, Margham Publications., Chennai, (2012).
2) Venkatachalapathy.S.G, *Allied Mathematics*, Margham Publications., Chennai, (2007).
3) Singaravelu, *Allied Mathematics*, Meenakshi Agency., Chennai, (2001).
4) Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics*, S.Chand& Co., (2007).
5) Vittal.P.R, Malini, *Statistical & Numerical Methods*, Margham Publications., Chennai,(2012).

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Subject Code: **HBCS22001**	Subject Name: **PROGRAMMING METHODOLOGY**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : +2 Computer Science	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

- Learn to develop simple algorithms and flow charts to solve a problem, Develop problem solving skills coupled with top down design principles, Learn about the strategies of writing efficient and well-structured computer algorithms/programs, Develop the skills for formulating iterative solutions to a problem.
- Learn to develop modular oriented software solutions using sub functions.
- Learn array processing algorithms coupled with iterative methods.
- Understand the difference between Structure and Union, usage scenario of structure, Learn to create records using structure in a file.
- Learn text and string processing functions, developing efficient algorithms.

COURSE OUTCOMES (COs)

Students completing this course were able to

CO1	Deep understanding in basics of programming techniques
CO2	Ability to develop C++ solutions with sub functions thus supporting Modularity.
CO3	Ability to write algorithms for Array data structure using iterations and decision making
CO4	Complete gain of knowledge in using Structure and Union, File Input-Output.
CO5	Well versed in processing String with library and non-library functions.

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	2	3
CO3	3	3	3
CO4	3	3	3
CO5	2	3	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
	√								

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HBCS22001	PROGRAMMING METHODOLOGY	3	0	0	3

UNIT I **9**

Introduction: Objectives, Fundamental of Programming, Concept of Structured Programming, Flowchart-definition, Symbols used in writing the flow-chart and flow-chart of simple problems. Algorithm-definition, Characteristics, notations

UNIT II **9**

Introduction to C: Basics of C, features, basic C program structure, character set, tokens, keywords and identifiers. Constants, variables, data types, variable declaration, symbolic constant definition

UNIT III **9**

Operators, Expressions and **Conditional Statements:** C operators- arithmetic, relational, logical, bitwise, assignment, increment and decrement, conditional and special operators, Arithmetic expressions, precedence of operators, Type conversions, mathematical functions. control statements- if, if-else, nested if, switch, go to statement, continue and return statements. Storage class.

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UNIT IV **9**

Loops, Array and Strings: while, do-while and for statements. Unconditional control statements- break, of an array, types-one and multi-dimensional array, Strings–definition, declaration and initialization of string variable, string handling functions

UNIT V **9**

Functions – definition, need, syntax for function declaration, function prototype, category of functions, nesting of functions, function with arrays, scope of variables parameter passing mechanism- call by value and call by reference. Recursion and Recursive functions, Declaration, processing a Structure, Declaring, Initialization of Pointer Variables, Address of Variable, Accessing a Variable through its Pointer

Total no. of periods: 45

TEXT BOOKS:

1. E. Balagurusamy, Programming in ANSI C, , McGraw Hill Education, 8th Edition March2019
2. Ashok N.Kamthane ,Programming with ANSI and Turbo C , Pearson Education, Aug 2009

REFERENCE BOOKS:

1. B.W. Kernighan and D.M.Ritchie, The C Programming Language, 2nd Edition, PHI, 2013.
2. Kanetkar Y., Let us C, BPB Pub., New Delhi, 2016.

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Subject Code : **HBCC22001**	Subject Name : **ENVIRONMENTAL STUDIES**	**L**	**T**	**P**	**C**
	Prerequisite : None	3	0	0	3

L : Lecture T : Tutorial P : Project C: Credits

OBJECTIVES :

- To acquire knowledge of the Environment and Ecosystem & Biodiversity
- To acquire knowledge of the different types of Environmental pollution
- To know more about Natural Resources and social issues and the Environment
- To attain familiarity of human population and Environment

COURSE OUTCOMES (COs) :

Students completing the course were able to

CO1	To know about Environment and Ecosystem & Biodiversity
CO2	To clearly comprehend air, water, Soil, Marine, Noise, Thermal and Nuclear Pollutions and Solid Waste management and identify the importance of natural resources.
CO3	To know about the natural resources and environmental problems associated with climate change, global warming, acid rain, ozone layer depletion etc., and explain possible solution.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1	1	1	2	1		**2**	**2**			
CO2	2	1	1	1	2	1		**2**	**2**			
CO3	2	1	1	1	2	1		**2**	**2**			

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
			√						

HBCC22001	ENVIRONMENTAL STUDIES	3	0	0	3

UNIT I ENVIRONMENT AND ECOSYSTEMS **9**

Definition, scope and importance of environment – need for public awareness – concept, structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem. Biodiversity at National and local levels – India

UNIT II ENVIRONMENTAL POLLUTION **9**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Nuclear hazards (g) E-Wastes and causes, effects and control measures

UNIT III NATURAL RESOURCES **9**

Forest resources: Use and over-exploitation, deforestation. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **9**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns climate change, global warming, acid rain, ozone layer depletion, nuclear accidents ,central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **9**

Population growth, variation among nations – population explosion, environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health

Total no. of periods: 45

TEXT BOOKS:

1. Gilbert M.Masters, _Introduction to Environmental Engineering and Science‘, 2nd edition, Pearson Education (2004).
2. Benny Joseph, _Environmental Science and Engineering‘, Tata McGrawHill,NewDelhi, (2006).

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Subject Code: **HBCC22L01**	Subject Name : **COMPUTER SOFTWARE LAB (WORD, EXCEL, POWERPOINT, PAINT, INTERNET)**	**Ty/ Lb/ ETP/IE**	**L**	**T/ S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0/0	3	2

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

OBJECTIVES :

- To train students how to use MS Office applications use in office work such as creating professional-quality documents; store, organize and analyze information; arithmetic operations and functions.
- MS Excel to enable the students for creating tables, scatter plots, and completing data analysis.
- Gain knowledge in practical applications of Word, Excel, Power point, Paint and Internet.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Demonstrate the usage of various operations in MS Word
CO2	Perform calculations in Microsoft Excel using both manually inputting formulas and built-in functions.
CO3	Develop dynamic slide presentations with animation, narration, images, and much more, digitally and effectively.
CO4	Create drawings to include clipart, color, shape, size, text, enhance text
CO5	Understanding how to search specific website, sending mails etc

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	3	1	2	1	2	3	2	2
CO2	3	2	3	2	2	2	3	2	3
CO3	3	3	1	2	1	2	3	2	2
CO4	3	2	1	1	1	2	2	2	2
CO5	3	3	1	1	1	2	3	2	3

COs / PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3
CO2	3	3	3
CO3	3	2	3
CO4	3	2	2
CO5	2	3	1

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

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HBCC22L01	COMPUTER SOFTWARE LAB	0	0	3	2

Computer software lab (MS office-Word, Excel, Powerpoint, Paint and Internet)

UNIT 1: OFFICE APPLICATIONS – I
MS OFFICE: MS-WORD

UNIT 2: OFFICE APPLICATIONS - II
MS OFFICE: MS-EXCEL

UNIT 3: OFFICE APPLICATIONS - III
MS OFFICE: MS-POWERPOINT

UNIT 4: MICROSOFT PAINT EXERCISES - IV

UNIT 5: INTERNET & ITS APPLICATIONS - V

Total no. of Periods: 45

SUGGESTED HANDS ON EXERCISES — OFFICE APPLICATIONS - I

1. Preparing a Govt. Order / Official Letter / Business Letter / Circular Letter
   Covering formatting commands - font size and styles - bold, underline, upper case, lower case, superscript, subscript, indenting paragraphs, spacing between lines and characters, tab settings etc.

2. Preparing a news letter:
   To prepare a newsletter with borders, two columns text, header and footer and inserting a graphic image and page layout.

3. Creating and using styles and templates
   To create a style and apply that style in a document
   To create a template for the styles created and assemble the styles for the template.

4. Creating and editing the table
   To create a table using table menu
   To create a monthly calendar using cell editing operations like inserting, joining, deleting,splitting and merging cells
   To create a simple statement for math calculations viz. Totalling the column.

5. Creating numbered lists and bulleted lists
   To create numbered list with different formats (with numbers, alphabets, roman letters)To create a bulleted list with different bullet characters.

6. Printing envelopes and mail merge.
   To print envelopes with from addresses and to addresses
   To use mail merge facility for sending a circular letter to many personsTo use mail merge facility for printing mailing labels.

7. Using the special features of word To find and replace the text
   To spell check and correct.
   To generate table of contents for a documentTo prepare index for a document.

8. Create an advertisement
   Prepare a resume.

SUGGESTED HANDS ON EXERCSES **OFFICE APPLICATIONS - II**

9. Using formulas and functions:
To prepare a Worksheet showing the monthly sales of a company in different branchoffices (Showing Total Sales, Average Sales).
Prepare a Statement for preparing Result of 10 students in 5 subjects (using formula toget Distinction, A Grade, B Grade, C Grade and Fail under Result column against each student).

10. Operating on the sheets:
Finding, deleting and adding records, formatting columns, row height, merging, splittingcolumns etc. Connecting the Worksheets and enter the data.

11. Creating a Chart:
To create a chart for comparing the monthly sales of a company in different branch offices.

12. Using the data consolidate command:
To use the data consolidate command to calculate the total amount budgeted for all departments (wages, travel and entertainment, office supplies and so on) or to calculate the average amountbudgeted for – say, department office expenses.

13. Sorting Data, Filtering Data and creation of Pivot tables.

SUGGESTED HANDS ON EXERCISES **OFFICE APPLICATIONS - III**

14. Creating a new Presentation based on a template – using Auto content wizard, design templateand Plain blank presentation.

15. Creating a Presentation with Slide Transition – Automatic and Manual with different effects.

16. Creating a Presentation applying Custom Animation effects –
Applying multiple effects to the same object and changing to a different effect and removingeffects.

17. Creating and Printing handouts.

SUGGESTED HANDS ON EXERCISES **OFFICE APPLICATIONS - IV**

18. To show your understanding of Microsoft Paint, label the drawing with the following labels: zoom tool, eraser, line thickness, example clipart, arrow shape, line tool, get more colors, add text, document title, save icon, undo, select, rotate, icon, fill, freehand tool,

copy, color 2. You only need to use each label once.

19. Microsoft Paint Exercise
A. Create a logo for a business.
B. Examples: for a computer shop, a greengrocer, a garage, an education centre, a restaurant, a sports club, or anything you choose!
C. Get ideas by looking at other business/popular logos.
D. You can insert clipart.
E. Save your drawing as Logo.
F. Print your logo. Use Page Setup to fit your logo to the page.
*Ensure your logo represents the business and contains some text.

SUGGESTED HANDS ON EXERCISES **OFFICE APPLICATIONS - V**

20. Searching for a web site / application / text documents viewing and downloading.

21. Create an E-mail account, Retrieving messages from inbox, replying, attaching files filtering and forwarding

22. Operating on a Tablet / Smart Phone - browsing and practising on some important applications (UcBrowser, Skype) - operating on internet – creating and sending messages / mails using the applications like WhatsApp and WeChat - downloading text and media files and video conferencing using Skype.

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Subject Code: **HBCS22L01**	Subject Name: **PROGRAMMING METHODOLOGY LAB**	**Ty/ Lb ET L /IE**	**L**	**T / S.L r**	**P/R**	**C**
	Prerequisite : +2 Computer Science	Lb	0	0/0	3/0	2

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

OBJECTIVES

- Learn to IMPLEMENT simple algorithms and flow charts to solve a problem, Develop problem solving skills coupled with top down design principles, Learn about the strategies of writing efficient and well-structured computer algorithms/programs, Develop the skills for formulating iterative solutions to a problem.
- Learn to IMPLEMENT modular oriented software solutions using sub functions.
- Learn to IMPLEMENT array processing algorithms coupled with iterative methods.
- Learn to IMPLEMENT the creation of records using structure and union concepts in file.
- Learn to IMPLEMENT the text and string processing functions.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Hands on experience in basics of programming techniques
CO2	Hands on experience to develop C++ solutions with sub functions thus supporting Modularity.
CO3	Hands on experience in Array data structure along with iterations and decision making
CO4	Hands on experience in usage of Structure and Union, File Input-Output.
CO5	Hands on experience in library functions that is for String processing.

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	3	1	3
CO2	3	1	3	3	3	1	3	1	3
CO3	3	1	3	3	3	1	3	1	3
CO4	3	1	3	3	3	1	3	1	3
CO5	3	1	3	3	3	1	3	1	3

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

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HBCS22L01	PROGRAMMING METHODOLOGY LAB	0	0	3	2

1. Simple program to implement the **input/output** function.
2. Program to implement the Arithmetic **operators**.
3. Find whether the given number is even by using simple **if statement**.
4. Execute a program with **if-else** statement to check the voting eligibility.
5. Arithmetic calculator, capable of performing addition, subtraction, multiplication, division, modulo division for two operands using **switch –case** construct.
6. Largest of three numbers using **Conditional operator**
7. Program to find the sum of n numbers using **Array.**
8. Find the factorial of ’n‘numbers using **for loop.**
9. Check whether the given number is palindrome or not using **while loop**.
10. Implement a simple program to swap the values of two variables using **call by value.**
11. Implement a simple program to swap the values of two variables using **call by reference.**

Total no. of Periods: 45

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SUBJECT CODE: **HBCC22I01**	**COMMUNICATION SKILL LAB (B.Sc./BCA/BPES Programs)**	**L**	**T**	**P**	**C**
	Total contact hours – 15	0	0	2	1
	Prerequisite – Plus 2 English				
	Course designed by – Department of English				

Course Objectives:

1. Understand the concepts of communication and the use of language as a medium of communication.
2. Shed off language anxieties and gain confidence to speak in English with activities focused on grammar and conversation.
3. Listen and speak for interpersonal communication and academic activities.
4. Read and write for lifelong learning, knowledge enhancement and research.
5. Communicate to work in teams and follow social ethics in the global culture.

Course Outcomes (COs)

1	Use English as a medium of communication for academic and professional attainment
2	Shed off language anxieties and gain confidence to speak with different kinds of people in varied contexts.
3	Listen and speak for interpersonal communication and academic activities.
4	Read and write for lifelong learning, knowledge enhancement and research.
5	Communicate to work in teams and follow social ethics in the global culture.

Program Specific Objectives

PSO1	Understanding of the basic concepts of English language and literature.
PSO2	Learning through literature in English, diverse historical cultural and social ethics
PSO3	Application of literary critical perspectives to generate original analysis of literature in English
PSO4	Promotion of cultural values and real-life skills through English language and literature

Mapping of course outcomes (COs) with Program Outcomes (POs)

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

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	3	3	1	3	3	2	2	3
CO2	3	3	3	1	3	3	2	2	3
CO3	3	3	3	1	3	3	2	2	3
CO4	3	3	3	1	3	3	2	2	3
CO5	3	3	3	1	3	3	2	2	3

Mapping of course outcomes (COs) with program Specific outcomes (PSOs)

COs	**PSO1**	**PSO2**	**PSO3**	**PSO4**	
CO1	2	2	2	2	
CO2	2	2	2	2	
CO3	3	3	3	3	
CO4	3	3	3	3	
CO5	3	3	3	3	

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
							√		

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COMMUNICATION SKILL

(Common to all UG H&S Courses) 30 HOURS

Prefatory note:

The paper seeks to train students in communicative skills and also give a firm foundation in listening and speaking by engaging students with authentic audios and videos ; the students will immensely benefit from strategy instruction for effective reading and writing; they will be able to recognize the importance of grammar and vocabulary for effective reading and writing. The present global scenario requires increasing need for clear and cordial communication with people from different culture. Cultural Intelligence is given as a unit to help students learn about low and high context cultures. It aligns with the University's mission of disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

Methodology: Flipped Classrooms and Mobile Assisted Language Learning

Course Objective

The students will be facilitated to

1. Use English as a medium of communication for academic and professional attainment
2. Shed off language anxieties and gain confidence to speak with different kinds of peoplein varied contexts.
3. Listen and speak for interpersonal communication and academic activities.
4. Read and write for lifelong learning, knowledge enhancement and research.
5. Communicate to work in teams and follow social ethics in the global culture.

Unit-I Listening

- Listening for Social and Academic purposes
- Non-verbal and coverbal communication
- Imitating for pronunciation, intonation, word stress, etc.,

Cognitive Activity: Note taking during lecture sessions

Unit-II Speaking

The art of speaking and negotiating

Interpersonal Communication

1. Opening conversation
2. Introducing oneself
3. Asking about others
4. Making small talk
5. Asking for directions
6. Enquiring
7. Thanking
8. Appreciating
9. Offering help
10. Requesting
11. Persuading
12. Warning
13. Expressing regret
14. Agreeing
15. Disagreeing
16. Ending a conversation
17. Saying what you intend to do
18. Expressing dislikes
19. Comparing
20. Complaining

Academic Communication

1. Instructional conversations
2. Power Point Presentation
3. Narrating about incidents
4. Public speaking – explaining success stories of self and others
5. Group Discussion
6. Interview for Projects and Placement

Unit-III Reading skills

1. Types and mechanics of reading
2. Tips for effective reading
3. Reading Strategies
4. Cognitive Strategy: Note Making, Comprehension exercise, oral and written review,

Unit- IV Writing Skills

- The Process of Writing
  1. Grammar, vocabulary, discourse markers and sentence construction
  2. Writing & Rewriting: drafting, revising, editing.
- Writing as a scaffolding activity
  1. Summarising
  2. Paraphrasing
  3. Precis writing
  4. Short notes and Essay writing

Unit -V Intercultural communication skills

1. Go local
2. Group behaviour
3. E mail and intercultural communication
4. High and low context cultures
5. Cultural diversity in terms of time and space

ASSESSMENT

Clubbed with each unit in the form of Audio listening, watching Videos, quiz, roleplay –public speaking, PPT presentation, reading and writing.

Course Outcome

On completing the course, the students will be able to

- Use English as a medium of communication for academic and professional attainment
- Shed off language anxieties and gain confidence to speak with different kinds of peoplein varied contexts.
- Listen and speak for interpersonal communication and academic activities.
- Read and write for lifelong learning, knowledge enhancement and research.
- Communicate to work in teams and follow social ethics in the global culture.

Prescribed Text

J. C. Richards with J. Hull & S.Proctor, Interchange, Level 2, Cambridge UniversityPress, 2015

Recommended Reading

1. P.D. Chaturvedi & M. Chaturvedi, Communication Skills, Pearson, 2012
2. Anderson, Kenneth Joan Maclean and Tony Lynch. Study Speaking , Cambridge:CUP 2004
3. Dutt, Kiranmai, P., Geetha Rajeevan, CLN Prakash, A Course in CommunicationSkills, Delhi: Foundations Books , 2008
4. Sethi, J. , P.V. Dhamija. A Course in Phonetics and Spoken English2nd Ed. NewDelhi, Prentice Hall of India Pvt Ltd.2005.
5. Yadugiri, M.A., The Pronunciation of English, New Delhi, Viva Books, 2013.
6. Bailey, Stephen: Academic Writing: A Practical Guide for Students, London and Newyork: Routledge Falmer,2004.
7. M.C. Rajeswaran, Permuting Role play in Oral Skill Assessment, International Journal of Innovative Research & Studies, Vol. 13, Issue 12, pp. 91-100, Dec. 2014

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SUBJECT CODE: HBCC22I02	**SOFT SKILL I**	**L**	**T**	**P**	**C**
	Total contact hours – 30	0	0	2	1
	Prerequisite – Plus 2 English				
	Course designed by – Department of English				

Objectives:

1. Become good listeners to get engaged in interactive communication for effective team building.
2. Develop assertive and adaptive behaviour to be leaders
3. Develop peer interaction for a successful lifelong learning.
4. Learn skills necessary for a cooperative living in academic and professional environments
5. Use soft skills for the purposes of research and follow ethics in society and profession.

Course Outcomes (COs)	
001	Become good listeners to get engaged in interactive communication for effective team building.
002	Develop assertive and adaptive behaviour to be leaders
003	Develop peer interaction for a successful lifelong learning.
004	Learn skills necessary for a cooperative living in academic and professional environments
005	Use soft skills for the purposes of research and follow ethics in society and profession
Program Specific Objectives	
PSO1	Understanding of the basic concepts of English language and literature.
PSO2	Learning through literature in English, diverse historical cultural and social ethics
PSO3	Application of literary critical perspectives to generate original analysis of literature in English
PSO4	Promotion of cultural values and real-life skills through English language and literature

Mapping of course outcomes (COs) with Program Outcomes (POs)
(H/M/L indicates the strength of correlation) H= High; M= Medium; L= Low

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	3	3	1	2	2	1	2	3
2	3	3	3	1	2	2	1	2	3
3	3	3	3	1	2	2	1	2	3
4	3	3	3	3	3	2	1	2	3
5	3	3	3	3	3	2	1	2	3

Mapping of course outcomes (COs) with program Specific outcomes (PSOs)

COs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2
CO2	2	2	2	2
CO3	3	2	2	2
CO4	3	2	2	2
CO5	3	2	2	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
							√		

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Prefatory Note

SOFT SKILL I

(COMMON TO ALL UG DEGREE PROGRAMS)

This paper aims to equip students with skills essential for work place and global environment to which they will move on from the university, once they complete the course. As such, this paper provides students with a set of ten interlinked soft skills: Listening, team work, emotional intelligence, assertiveness, learning to learn, problem solving, attending interviews,adaptability, non-verbal communication and written communication. Students will get engaged in pair work, group work, role play, discussion, presentation, story telling, writing assignments etc.,

Course Objective

The students will be facilitated to

1. Become good listeners to get engaged in interactive communication for effective team building.
2. Develop assertive and adaptive behaviour to be leaders
3. Develop peer interaction for a successful lifelong learning.
4. Learn to learn skills necessary for a cooperative living in academic and professional environments
5. Use soft skills for the purposes of research and follow ethics in society and profession.Unit -I

Listening, Speaking, Reading and Writing skills (LSRW)Unit -II

Team work skills: adaptability, emotional intelligence, learning skills Unit -III Leadership Qualities: assertiveness, reasoning, compassion and compatibility Unit -IV

Problem solving: willingness to learn, creative thinking, developing observation skills Unit -V Interview skills: employability skills, resume writing

Course outcome

On completion of the course the students will

1. Become good listeners to get engaged in interactive communication for effective team building.
2. Develop assertive and adaptive behaviour to be leaders
3. Develop peer interaction for a successful lifelong learning.
4. Learn skills necessary for a cooperative living in academic and professional environments
5. Use soft skills for the purposes of research and follow ethics in society and profession.

Suggested reading

S.P. Dhanavel, English and Soft Skills, Vol. 1, Orient Blackswan Pvt. Ltd. 2010.

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Semester : 2

Subject Code: **HBTA22002**	Subject Name: **TAMIL PAPER - ll**	**Ty/Lb ETL /IE**	**L**	**T / S.Lr**	**P/ R**	**C**
	Prerequisite: Tamil Paper I	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

- Communicating with friends from around the world via social networking opportunities.
- To develop 21st century learners who love & appreciate Tamil language.
- Learn significance of spoken skill.
- The relationship between language &culture and the implications for language teaching
- Travelling to other countries and learning about other cultures.

COURSE OUTCOMES (COs)

Students completing this course were able to

CO1	Strengthen literacy skills
CO2	Engage in learning Tamil language and culture in a meaningful setting
CO3	Engross in independent and life-long learning
CO4	Develop a strong foundation in listening & speaking skills.
CO5	Arouse students interest and ignite the joy of learning Tamil language.

Mapping of Course Outcome with Program Outcome (POs)

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

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

COs	PSOs			
	PSO1	**PSO2**	**PSO3**	**PSO4**
CO 1	3	3	3	3
CO 2	2	2	3	3
CO 3	3	3	3	3
CO 4	2	2	3	3
CO 5	3	3	3	2

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / internship	Others
			√						

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பொதுத்தமிழ்

இளநிலை மாணாக்கருக்கு

B.A/B.Sc/B.Com/B.B.A/B.C.A/B.PES

HBTA22002

முதலாம் ஆண்டு - இரண்டாம் பருவம்

கற்றல் நோக்கம்: 1.தமிழர் பண்பாட்டினை அறியச் செய்தல்
2. கடிதம் எழுதும் திறன் வளர்த்தல்
3.தமிழ் இலக்கிய வரலாற்றினை அறிதல்

அலகு - 1 சங்க இலக்கியம் 9 மணி நேரம்

1. புறநானூறு - பா.எண் - 183,184,192
2. குறுந்தொகை - பா. எண் 2,40,167
3. நெடுநல்வாடை - 1 முதல் 44 வரிகள் வரை
4.கலித்தொகை - பா.எண் 102,133

அலகு - 2 காப்பியம் 9 மணி நேரம்

1. சிலப்பதிகாரம் - வழக்கு உரை காதை முழுவதும்

அலகு - 3 நீதி இலக்கியம் 9 மணி நேரம்

1.திருக்குறள் - 34,72,96,102,103,116,124,136,158,395 (10 குறள்கள்)
2.நாலடியார் - 1,11,29,32,43,51,74,103,116,135 (10 பாடல்கள்)
3.ஆசாரக்கோவை - 20,23,25,76,96 (5 பாடல்கள்)
4.திரிகடுகம் - 7,12,27,31,38,(5 பாடல்கள்)

அலகு - 4 தமிழ் இலக்கிய வரலாறு 9 மணி நேரம்

1. பக்தி இலக்கியம்
2. சிற்றிலக்கியம்

அலகு - 5 இலக்கணம் 9 மணி நேரம்

1.வல்லினம் மிகும் இடங்கள்
2. வல்லினம் மிகா இடங்கள்
3. வினா வகைகள்
4. விடை வகைகள்

மொழிப்பயிற்சி

1. கடிதம் எழுதும் முறை
2.செய்வினை - செயப்பாட்டு வினை
3.மயங்கொலிப் பிழையை நீக்குக

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Course /subject Code	**HBFR22002**	**Semester**	**II**			
Category	**All UG Programs**		**L**	**T / S.Lr**	**P/R**	**C**
Course Title	**French II (THEORY)**		**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

OBJECTIVES

.. Students will be able to understand the familiar words and expressions when someone talks slowly and distinctly.
. The students will be able to reads; he/she will be able to understand the posters, advertisements or catalogues.
. The students will be able to communicate and ask and reply to simple questions on familiar subjects
. The students will be able to use expressions and write simple sentences without faults to describe their living spaces

FRENCH-II(THEORY) LANGUAGE-II
HBFR22002

COURSE OUTCOMES	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
COURSE OUTCOME 1	3	2	2	2	2	1	2	2	3
COURSE OUTCOME 2	2	2	2	2	1	1	3	2	3
COURSE OUTCOME 3	2	3	2	3	1	1	2	2	3
COURSE OUTCOME 4	3	2	2	2	2	2	2	3	3
COURSE OUTCOME 5	2	2	2	3	3	3	3	2	3
COURSE OUTCOME 6	3	3	2	2	3	3	3	3	3
COURSE OUTCOME 7	3	3	2	2	3	3	3	3	3

MAPPING OF COs WITH POs

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
			√						

FRENCH– II (THEORY) Language-II 45 hrs

UNIT I 9

Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles

- Se saluer, prendre congé, se présenter quelqu‘un/quelque chose, Salutations, présentatifs, détails d‘identité, professions, quartiers
- Genres, nombres, articles, présentatifs, pluriels des noms, c‘est/il est, pronoms toniques
- Salutations française, comportement des salutations, les quartiers parisiens, le peintre Monet

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignments and oral test-20- duration less than 2 minutes (10 oral exercises, 6 audio reading compositions& 4 tests).

UNIT II 9

Compétences communicatives, phonologiques, linguisiques, grammaticales et culturelles

- Dialogue de la vie d‘étudiant, des liens familiaux, de l‘appartenance, des habitudes ; poème, le son « eu » énonces a répéter, lecture guidée.
- S‘exprimer de la fréquence, des habitudes, articles, present de l‘indicatif, verbes a la terminaison – er, adjectifs possessifs et qualificatifs, locutions avec « avoir »
- Demander l‘heure, Les jours, Les mois de l‘année.

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales.(20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral exercises, oral assignments and oral test-20 duration less than 2 minutes (10 oral excercises ,6 audio reading compositions& 4 tests).

UNIT III 9

Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles

- Parler des voyages, identifier les vêtements, caractériser de personnes, faire des exclamations, s‘informer sur la vie d‘étudiant français.
- Poème, le « son i », décrire des personnes, prononcer le nom des pays et des nationalités, appréciation/exclamation
- Transport et voyages, les pays, nationalités, la mode, la partie du corps ,Adjectifs de nationalités et genres, adjectifs réguliers/irréguliers, prépositions de lieux, verbes aller- venir et verbes a la terminaison –ir
- L‘aéroport de Roissy, a la douane, les vêtements, a mode a paris, quelques professions, le sport et la sante ; a Joconde, la BD,

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignments and oral test-20-duration less than 2 minutes (10 oral exercises ,6 audio Reading compositions& 4 tests)

UNIT IV 9

Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles

- Communication au restaurant, des recettes, le gout et les préférences identifier le type des restaurants.
- Poème, le son « o » énonces simples, des sons nasaux, exercices de répétition
- Les repas français recette activités et sportives

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales.(20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignments and oral test-20 duration less than 2 minutes (10 oral exercises ,6 audio reading

UNIT V 9

Compétences communicatives, phonologiques, linguistiques, grammaticales et culturelles

- Planifier des vacances, parler des concours, du sport, du temps qu'il fait, s'exprimer au comparatif
- Poème le son « yu », répétition d'énonces, lire de noms de quelques villes
- Activités de vacances, mots de localisation, plan de Paris, le climat et l'écologie, un concours international, les saisons
- Adjectifs de couleur, nombres ordinaux, quelques verbes irréguliers,
- 3 temps autour du présent « de » et « a » et des verbes. Différentes formes du négatif, « il fait » le comparaient le superlatif absolu
- Auberges de jeunesse, vacance, plan de Parise arrondissements quelques monuments parisiens, tourisme fluvial français

➢ **Clip audios** : Exercices orales, compositions orales et épreuves orales. (20 –durée moins de 2 minutes)

➢ **Audio clips**- For oral expressions, oral assignements and oral test-20 duration less than 2 minutes (10 oral exercices ,6 audio Reading compositions& 4 tests).

Total no. of periods: 45

Reference Books :

1. **Parlez-vous français? Partie 1 -** Dr.M.Chandrika.V.Unni &Mrs. Meena Mathews 2019 by Universal publisher
2. **CLE INTERNATIONAL** Lectures Clé en français facile. (2012) Hachette Paris
3. **Cosmopolite**: Livre de eleve A1 by Nathalie Hirsch sprung, Tony Tricot, Claude LeNinan
4. **Latidudes**-1 by Régine Mérieux & Yves l'oiseau, Didier 2017
5. **Alter Ego 1 -** Catherine Dolez, Sylvie Pons : (2014) Hachette, Paris

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Subject Code: **HBHI22002**	Subject Name: **HINDI II**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Knowledge of Hindi	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

OBJECTIVES

1.To Understand the Ancient Hindi plays and its aspects. 2.To understand the medival stories and well known novels
3.To know the techniques in writing Annotation and Translation

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Introduce students to the real world situation with the help of Plays and stories written by various poets and writers.
CO2	Understand the Literature in broader areas than merely confined to the subject
CO3	Evaluate the concept of Hindi from past to present and to study the society closely through Literature.
CO4	Make the best use of Hindi language in various streams.
CO5	Helps in their Career acquiring knowledge in a language

Mapping of Course Outcome with Program Outcome (POs)

Sem	**Course code: HBH122002**								
I	**Programme Outcomes(POs)**								
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	3	2	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	2
CO3	3	3	2	3	3	3	3	3	2
CO4	2	3	3	3	3	2	2	3	3
CO5	3	3	3	3	3	2	2	3	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
			√						

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Subject Code: **HBHI22002**	Subject Name: **HINDI II**	**TY/ LB/ ETP /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Knowledge of Hindi	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 **One Act Play – novel and translation of hindi language)**

1. Auranzeb ki AakhiriRaat
2. Mukthidhan
3. Practice of AnnotationWriting
4. Practice of Summary and Literary evaluationWriting

UNIT – II **One Act Play – novel and translation of hindi language)**

1. Laksmi kaSwagat
2. Mithayeewala
3. Practice of AnnotationWriting
4. Practice of Summary and Literary evaluationWriting

UNIT-III **One Act Play – novel and translation of hindi language)**

1. Basant Ritu kaNatak
2. Seb Aur Dev
3. Practice of AnnotationWriting
4. Practice of Summary and Literary evaluationWriting

UNIT-IV **One Act Play – novel and translation of hindi language)**

1. Bahut BadaSawal
2. Vivah ki TeenKathayen
3. Practice of AnnotationWriting
4. Practice of Summary and Literary evaluationWriting

UNIT-V(**Translation of Hindi Lanaguage to English language-paragraph, technical terms)**

1. Translation Practice. (English to Hindi)

Total no. of periods: 45

REFERENCE:

1. Aath Ekanki, Edited by Devendra Raj Ankur, Mahesh Anand Vaani prakashan, 4695, 21- A Dariyagunj, New Delhi-110002
2. Swarna Manjari, Edited by Dr.Chitti Annapurna, Rajeshwari Publications 21/3, Mothilal street, (opp.Ranganthan Street) T.Nagar, Chennai-600017
3. Prayojan Mulak Hindi : Dr.Syed Rahmathullah, Poornima Prakashan,4/7, Begum III street, Royapettah, Chennai-14
4. Anuvad Abhyas Part III Dakshin Hindi Prachar Sabha, T.Nagar ,Chennai -17

HBEN 22002	**LANGUAGE II - ENGLISH II (Common to all UG Courses under H&S)**	Ty/Lb/ ETP	**L**	**T/ S.Lr**	**P/R**	**C**
	Total contact hours – 45	Ty	3	0/0	0	3
	Prerequisite – English Language					
	T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits					

Course Objectives

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

Course Outcomes (COs)

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

Program Specific Outcomes (PSOs)

- Demonstrating mastery of the components of English language and literature.
- Explaining through literature in English, diverse historical cultural and social ethics
- Applying literary critical perspectives to generate original analysis of literature in English
- Promoting cultural values and real-life skills through English language and Literature

Mapping of course outcomes (COs) with Program Outcomes (POs)& Program Specific Outcomes

(3/2/1 indicates the strength of correlation) 3= High; 2= Medium; 1= Low

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
1	3	3	3	3	3	3	3	1	3	3	3	3	3
2	3	3	3	3	3	3	3	1	3	3	3	3	3
3	3	3	3	3	3	3	3	1	3	3	3	3	3
4	3	3	3	3	3	3	3	1	3	3	3	3	3
5	3	3	3	3	3	3	3	1	3	3	3	3	3

Category	H&S	Program core	Program Elective	Open Elective	Interdisciplinary/ Allied	Skill enhancing Elective	Skill component	Practical	Project	Internship	Others
	√	√									

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Course Code	LANGUAGE-II : ENGLISH II	Ty/Lb/ ETP	L	T/ S.Lr	P/R	C
HBEN22002	(Common to all UG H&S Courses)	Ty	3	0/0	0/0	3
T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits						

Course Objective

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

Unit I: **9 Hours**

1. All the World's a Stage – William Shakespeare
2. Speech of Barack Obama
3. The Verger- Somerset Maugham

Unit II: **9 Hours**

1. Spider and the Fly - Mary Howitt
2. "They thought that a bullet would silence us, but they failed". - Malala Yousafzai
3. Refund – Fritz Karinthy

Unit III: **9 Hours**

1. Night of the Scorpion-Nissim Ezekiel
2. On Running after one's hat- G.K.Chesterton
3. The Last Leaf – O. Henry

Unit IV: **9 Hours**

1. Polonius Advice to Laertes-William Shakespeare
2. 'We Must Continue to Dream Big': An open letter from Serena Williams
3. The Necklace - Guy de Maupassant

Unit V: **9 Hours**

1. Functional English: Letter Writing (Formal, Informal, Email)
2. Resume
3. Précis
4. Reading Comprehension
   Developing the hints

Course Outcome: On completion of the course, the students will be able to

1. Develop four language skills appropriate to the level of education.
2. Demonstrate knowledge of vocabulary and sentence construction in appropriate contexts.
3. Express diverse forms of knowledge in different social and cultural contexts.
4. Attain a comprehensive knowledge of communication skills to use ethically.
5. Develop organized academic and business writing for professional careers.

Prescribed Text:

- 'Greatest Speeches of the Modern World', Rupa Publications India, 2018.
- Woudhuysen H.R. 'The Arden Shakespeare third series', the Arden Shakespeare Publishers, 2020.
- Karinthy. Fritz, 'Refund: A Play in One Act', French. Samuel, 1938.
- Simpson H. C & Wilson E. H, 'A Senior Anthology of Poetry', Macmillan Education, 1952.
- O'Brien. Terry, '50 Greatest Short Stories', Rupa Publications India; First Edition, 2015.
- J. C. Richards with J. Hull & S.Proctor, Interchange, Level 3, Cambridge University Press, 2021.
- Mark Hancock, English Pronunciation in Use, CUP, 2016.
- M. Chandrasena Rajeswaran &R. Pushkala, Communication Lab Work book 2022.
- M. Chandrasena Rajeswaran, R. Pushkala & S. Bhuvaneswari Pinnacle: A Skills Integrated Text,2022
- Dutt, K, Rajeevan, G & Prakash, , *A Course on Communication Skills*, 1st edn,CUP, Chennai,2008

Suggested Links:https://www.poetrybyheart.org.uk/poems/the-spider-and-the-fly/Reference.

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Subject Code: **HBMA22ID2**	Subject Name: **ALLIED II- MATHEMATICS-II**	**L**	**T**	**C**
	Prerequisite: Higher Secondary Mathematics	3	0	3

L : Lecture T : Tutorial C: Credits

OBJECTIVES

- To understand the Basic concepts in Ordinary Differential equations
- To understand the Basic concepts in Partial Differentiation
- To understand the Basic concepts in Multiple integrals
- To understand the Basic concepts in Linear programming
- To understand the Basic concepts in Transportation and Assignment

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the basic concept First order differential equations – Second and higher order linear differential equations with constant coefficients.
CO2	Understand how to solve the Problem in Partial derivatives ,Jacobians ,Maxima and Minima of functions of two variables and Lagrange‘s multipliers.
CO3	Learn how to solve problems in Cartesian and Polar Co-ordinates (Double and Triple integral) and Change of order of integration.
CO4	Understand the concept in Formulation of LPP, Standard form of LPP, Graphical method and Simplex method.
CO5	Learn to solve problems in Transportation using MODI method and Assignment problem using Hungarian method.

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**			
CO1	3	2	3	3	2	1	2	2	1			
CO2	3	2	2	3	3	2	1	2	3			
CO3	3	2	3	2	3	2	2	1	3			
CO4	3	3	2	3	2	2	2	1	2			
CO5	3	2	3	1	3	2	3	2	3			

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1
CO2	3	2	3
CO3	3	3	3
CO4	2	3	3
CO5	2	3	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
						√			

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HBMA22ID2	ALLIED II- MATHEMATICS II	L T P C 3 0 0 3

(Common to I yr / II sem BCA / B.Sc [CS, Physics, Chemistry, ISCF, Electronics])

Course Outcomes:

To understand the Basic concepts in Ordinary Differential equations
To understand the Basic concepts in Partial Differentiation
To understand the Basic concepts in Multiple integrals
To understand the Basic concepts in Linear programming
To understand the Basic concepts in Transportation and Assignment

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 9

First order differential equations – Second and higher order linear differential equations with constant coefficients and with RHS of the form: e^{ax}, x^n, Sin ax, Cos ax, e^{ax} f(x), x f(x) where f(x) is Sin bx or Cos bx (simple problems).

UNIT I PARTIAL DIFFERENTIATION 9

Partial derivatives – Jacobians – Maxima and Minima of functions of two variables – Lagrange‘s multipliers.

UNIT III MULTIPLE INTEGRALS 9

Double integrals in Cartesian and Polar Co-ordinates – Change of order of integration – Triple integrals in Cartesian Co-ordinates (simple problems).

UNIT IV LINEAR PROGRAMMING 9

Formulation of LPP – Standard form of LPP – Graphical method – Simplex method.

UNIT V TRANSPORTATION AND ASSIGNMENT 9

Formulation of Transportation problem – North West corner method – Least cost method – Vogel‘s approximation method – Optimality test – MODI method – Degeneracy – Assignment problem: Hungarian method.

Total no. of periods: 45

Reference Books:

1) Vittal.P.R, *Allied Mathematics*, Margham Publications., Chennai, (2012).
2) Venkatachalapathy.S.G, *Allied Mathematics*, Margham Publications., Chennai, (2007).
3) Singaravelu, *Allied Mathematics*, Meenakshi Agency., Chennai, (2001).
4) Hamdy A. Taha, *Operations Research: An Introduction (10th ed.)*, Pearson, (2017).
5) Hira D.S., Gupta P.K., *Operations Research*, S.Chand & Co., (2014).

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Subject Code: **HBCS22002**	Subject Name: **DATA STRUCTURES**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Programming Methodology	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

- To be familiar with concepts of ADTs
- To gain Knowledge of Stacks, Queues
- To understand the Trees Data Structure
- To implement the Graph ADT
- Ability to apply knowledge of sorting and searching.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Be familiar with the concepts of class and object
CO2	Apply the different linear data structures like stack and queue to various computing problems.
CO3	Implement different types of trees and apply them to problem solutions.
CO4	Discuss graph structure and understand various operations on graphs and their applicability.
CO5	Analyze the various sorting and searching algorithms.

Mapping of Course Outcome with Program Outcome (POs)

COs /POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	2	2	3	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	1	3	2	2	2	3	3	1	2
CO4	2	2	3	3	3	2	2	2	3
CO5	3	3	1	3	1	3	3	2	3

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3
CO2	3	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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

HBCS22002	DATA STRUCTURES	3	1	0	4

UNIT I: **12**

Abstract Data Types (ADTs)-. Stack ADT-Operations- Applications- Evaluating arithmetic expressions – Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue- Priority Queue- dequeue- applications of queues.

UNIT II: **12**

List ADT-array-based implementation-linked list implementation-singly linked lists-circular linked lists-doubly-linked lists-applications of lists: Polynomial Manipulation, Memory management.

UNIT III: **12**

Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT-Threaded Binary Trees-B-Tree- B+ Tree – Heap Definition -Insertion-Deletion-Applications of heap.

UNIT IV: **12**

Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal-Bi-connectivity – Cut vertex- Euler Circuits-Applications of graphs.

UNIT V: **12**

Searching- Linear Search-Binary Search-Sorting-Bubble Sort-Selection Sort-Insertion sort-Shell Sort-Radix Sort-Hashing-Introduction-Hash Tables-Hash Functions-Separate chaining- Open Addressing-Rehashing Extendible Hashing.

Total no. of periods: 60

TEXT BOOKS:

1. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Universities Press,2008.
2. Mark Allen Weiss, ―Data Structures and Algorithm Analysis in C++‖, Pearson Education 2014, 4th Edition.
3. Reema Thareja, ―Data Structures Using C‖, Oxford Universities Press 2014, 2nd Edition.

REFERENCES:

1. Thomas H.Cormen,Chales E.Leiserson,Ronald L.Rivest, Clifford Stein, ―Introduction to Algorithms‖, McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, ―Data Structures and Algorithms‖, Pearson Education 2003.

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Subject Code: **HBCS22003**	Subject Name: **OBJECT ORIENTED PROGRAMMING**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Programming Methodology	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

1. Introduce the principles of object-oriented programming
2. Analyze a problem statement to develop a mental model of objects necessary to create a software architecture
3. Utilize object-oriented programming to frame software architectures, with care towards separation of concerns and abstraction
4. Gain skills in designing, and programming software for reuse of code.
5. Establish development methods in object-oriented programming to qualify students for teaching the language in other settings

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Explain the basic concepts of object-oriented programming language and their representation.
CO2	Illustrate dynamic memory allocation functions, access specifiers and the friend functions.
CO3	Demonstrate the use of constructors, destructors and also the behaviour of inheritance and its implementation.
CO4	Implement polymorphism and overloading of operators.
CO5	Apply the I/O operations to handle backup system using files and to develop general purpose templates.

Mapping of Course Outcome with Program Outcome (POs)

COs /POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	3	3	3	3	2	2	1
CO2	3	2	2	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	1	3
CO2	2	2	3
CO3	2	3	2
CO4	3	3	3
CO5	3	3	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

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HBCS22003	OBJECT ORIENTED PROGRAMMING	3	1	0	4

UNIT: I **12**

Object Oriented Methodology: Introduction, Advantages and Disadvantages of Procedure Oriented Languages, what is Object Oriented? What is Object Oriented Development? Object Oriented Themes, Benefits and Application of OOPS.

Principles of OOPS: OOPS Paradigm, Basic Concepts of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing

UNIT: II **12**

Classes and Objects: Simple classes (Class specification, class members accessing), Defining member functions, passing object as an argument, Returning object from functions, friend classes, Pointer to object, Array of pointer to object

Constructors and Destructors: Introduction, Default Constructor, Parameterized Constructor and examples, Destructors

UNIT: III **12**

Polymorphism: Concept of function overloading, overloaded operators, overloading unary and binary operators, overloading comparison operator, overloading arithmetic assignment operator, Data Conversion between objects and basic types,

Virtual Functions: Introduction and need, Pure Virtual Functions, static Functions, this Pointer, abstract classes, virtual destructors.

UNIT: IV **12**

Program development using Inheritance: Introduction, understanding inheritance, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, derived class constructors, class hierarchies, multiple inheritance, multilevel inheritance, containership, hybrid inheritance.

Exception Handling: Introduction, Exception Handling Mechanism, Concept of throw & catch with example

UNIT: V **12**

Templates: Introduction, Function Template and examples, Class Template and examples.

Working with Files: Introduction, File Operations, Various File Modes, File Pointer and their Manipulation

Total no. of periods: 60

TEXT BOOKS:

1. Object Oriented Analysis and Design Timothy Budd Edition :3,2012
2. Mastering C++, K R Venugopal, Rajkumar Buyya, T Ravishankar, Tata McGraw Hill 2nd edition,2011

REFERENCE BOOK:

1. E. Balagurusamy, Object Oriented Programming with C++, Mc Graw Hill, 4th edition, 2008.

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Subject Code: **HBCS22L02**	Subject Name: **DATA STRUCTURE USING C++LAB**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/ R**	**C**
	Prerequisite: Basic Knowledge of C++	Lb	0	0/0	3/0	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 identify appropriate data structures and algorithms for solving real world problems.
- To implement various kinds of searching and sorting techniques.
- To implement data structures such as Stacks and queues using Arrays and Pointers.
- To implement insertion, deletion operations using Linked Lists.
- To implement nonlinear data structures such as Trees and Graphs.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Students can design programs based on the concepts of arrays and pointers.
CO2	Students can demonstrate the concepts of Stack; Queue using arrays and pointers and apply various operations on them.
CO3	Demonstrate the concept of linked list and perform various operation like addition, deletion of elements in the beginning and at the end.
CO4	Demonstrate the concept of graph and its operation.
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	3	2	2	3	2	3	3	3	3
CO2	2	3	2	3	3	2	2	2	3
CO3	3	2	2	2	2	2	2	3	2
CO4	3	3	3	3	3	1	1	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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

HBCS22L02	DATA STRUCTURE USING C++ LAB	0	0	3	2

1. Write a C++ program to implement the Stack using Array.
2. Write a C++ program to implement the Stack using Pointer.
3. Write a C++ program that reads an infix expression, converts the expression to postfix.
4. Write a C++ program to implement the Queue using Array.
5. Write a C++ program to implement the Queue using Pointer.
6. Write a C++ program to implement the singly linked list.
7. Write a C++ program to implement the Binary search tree.
8. Write a C++ program to implement of DFS for a given graph.
9. Write a C++ program to implement the linear search.
10. Write a C++ program to implement the Merge sort.

Total no. of periods: 45

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Subject Code: **HBMA22IL1**	Subject Name: **ALLIED MATHEMATICS LAB**	L	P	C
	Prerequisite: Higher Secondary Mathematics	**0**	**3**	**2**

L : Lecture T : Tutorial C: Credits

OBJECTIVES

- Try to solve the problems in Matrices and its operations
- Try to solve the problems in Trigonometry
- Try to solve the problems in Integration
- Try to solve the problems in Probability
- Try to solve the problems in Standard Distributions

COURSE OUTCOMES (Cos)
Students completing this course were able to

CO1	Solving the problems of Rank matrices and Solving simultaneous equations .
CO2	Understand to solve the problem of Expansions of Sin nθ, Cos nθ in powers of Sinθ and Cosθ . Expansions of $Sin^n\theta$ and $Cos^n\theta$ in terms of Sines and Cosines of multiples of θ and also problem in Hyperbolic functions.
CO3	Learn how to solve problems in Methods of Integration , Integration by substitution , Integration by parts , Definite Integrals , Properties of Definite Integrals and Problems on finding Area
CO4	Understand the concept of Axioms of Probability , Conditional probability , Total probability Baye‘s Theorem , Random variable ,Probability mass function , Probability density function.
CO5	Analyses summation of series using Binomial, Exponential , Poisson and normal distribution

Mapping of Course Outcome with Program Outcome (POs)

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

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1
CO2	3	2	3
CO3	3	3	3
CO4	2	3	3
CO5	2	3	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
						√			

HBMA22IL1	ALLIED MATHEMATICS LAB	L T P C 0 0 3 2

(Common to I yr / II sem BCA / B.Sc [CS, Physics,Chemistry, ISCF, Electronics])

Experiments:

1. Finding the Trace and, Determinant of a Matrix
2. Finding the Rank of a Matrix
3. Solving Linear equations
4. Solving Polynomials
5. Solving Elementary functions in Trigonometry
6. 2D and 3D plot
7. Solving Definite Integrals
8. Problems in Binomial distribution
9. Problems in Poisson distribution
10. Problems in Normal distribution

Open-source MATH software: Scilab

Total no. of periods: 45

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Subject code	**SOFT SKILL II (B.A/BBA/BCOM/BSW Programs)**	**L**	**T**	**P**	**C**
HBCC22I03	Total contact hours – 30	0	0	2	1
	Prerequisite – UG I year English				
	Course designed by – Department of English				

Objectives:

1. Cultivate employability skills that they get employed even before they leave the university.
2. Build self-esteem and a sense of self-worth to be good team members
3. Cultivate empathy to think from others‘ point of view to be good team leaders.
4. Evolve as good global citizens with insights into social and professional ethics.
5. Develop lifelong learning skills to adapt in the multicultural context of workplaces.

Course Outcomes (COs)	
001	Cultivate employability skills that they get employed even before they leave the university
002	Build self-esteem and a sense of self-worth to be good team members
003	Cultivate empathy to think from others ‘point of view to be good team leaders.
004	Evolve as good global citizens with insights into social and professional ethics
005	Develop lifelong learning skills to adapt in the multicultural context of workplaces.
Program Specific Objectives	
PSO1	Understanding of the basic concepts of English language and literature.
PSO2	Learning through literature in English, diverse historical cultural and social ethics
PSO3	Application of literary critical perspectives to generate original analysis of literature in English
PSO4	Promotion of cultural values and real-life skills through English language and literature

Mapping of course outcomes (COs) with Program Outcomes (POs)

(H/M/L indicates the strength of correlation) H= High; M= Medium; L= Low

COs	POs	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	3	3	1	2	2	1	2	3
2	3	3	3	1	2	2	1	2	3
3	3	3	3	1	2	2	1	2	3
4	3	3	3	3	3	2	1	2	3
5	3	3	3	3	3	2	1	2	3

Mapping of course outcomes (COs) with program Specific outcomes (PSOs)

COs	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2
CO2	2	2	2	2
CO3	3	2	2	2
CO4	3	2	2	2
CO5	3	2	2	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
							√		

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SOFT SKILL II

HBCC22I03

(COMMON TO ALL UG DEGREE PROGRAMS)

Prefatory Note

This paper aims to equip the advanced learners with skills essential for work place and global environment to which they will move on from the university, once they complete the course. As such, it covers a range of indispensable soft skills and values such as, self-esteem, empathy, public relations, positivity, reliability, professionalism, leadership and intercultural communication, interview skills, etc.. Together with the effective English communication in global contexts, these skills, if cultivated and strengthened, can immensely help the students become employable in the multinational companies as good global citizens abiding the social and professional ethics in cross-cultural diversity.

Course Objective

The students will be facilitated to

1. Cultivate employability skills that they get employed even before they leave the university.
2. Build self-esteem and a sense of self-worth to be good team members
3. Cultivate empathy to think from others‘ point of view to be good team leaders.
4. Evolve as good global citizens with insights into social and professional ethics.

Develop lifelong learning skills to adapt in the multicultural context of workplaces.

Unit -I

Conversational skills, Self-esteem skills, empathy, public relations

Unit -II

Positivity, reliability, professionalism

Unit -III Leadership Problem solving

Unit -IV

Intercultural communication skills

Global Manthra: Go local, Cultural sensitivity, Group behaviour

Cultural intelligence : Low and High context, e mail and inter cultural communication

Unit -V

Group discussion & Interview skills

Course Outcome

On completion of the course the students will

1. Cultivate employability skills that they get employed even before they leave the university.
2. Build self-esteem and a sense of self-worth to be good team members
3. Cultivate empathy to think from others‘ point of view to be good team leaders.
4. Evolve as good global citizens with insights into social and professional ethics.
5. Develop lifelong learning skills to adapt in the multicultural context of workplaces.

Suggested reading

1. S.P. Dhanavel, English and Soft Skills, Vol.2 Orient Blackswan Pvt. Ltd. 2010

P.D. Chaturvedi and M. Chaturvedi, Communication Skills , Pearson, 2012

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Semester : 3

Subject Code:**HBPH22ID3**	Subject Name :**Allied III - Electronics – I**	L 3	T 0	P 0	C 3

OBJECTIVES (program outcome) -

- Identify the applications of semiconductor devices
- Gain information about the electronic devices
- Explore ideas about the working of optoelectronic devices
- Acquire knowledge about amplitude modulation
- Explore ideas about the microprocessor & microcontroller

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	The student will able identify the applications of Semiconductor devices
CO2	The students will gain information about Electronic devices
CO3	The students will **explore** ideas about the working of Optoelectronic devices
CO4	The students will acquire knowledge on Amplitude modulation
CO5	The students will explore ideas about the Microprocessor & Microcontroller

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	1	2	3	3	2	3	1	3
CO2	3	3	2	2	2	2	2	2	2
CO3	3	2	1	2	3	3	2	2	2
CO4	3	2	2	3	3	3	2	3	2
CO5	1	2	3	2	2	2	2	2	1

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	**2**	**3**	**3**
CO2	**2**	**2**	**2**
CO3	**2**	**3**	**1**
CO4	**3**	**3**	**1**
CO5	**2**	**2**	**3**

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
						√			

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ALLIED ELECTRONICS -I
For
Programme - B.Sc (Computer Science)

SUBJECT CODE : HBPH22ID3 **L T P C**
3 0 0 3

Course Objectives:

- Identify the applications of semiconductor devices
- Gain information about the electronic devices
- Explore ideas about the working of optoelectronic devices
- Acquire knowledge about amplitude modulation
- Explore ideas about the microprocessor

UNIT I SEMICONDUCTOR DIODES AND TRANSISTORS 9

Semiconductors - P-type and N-type semiconductors - Junction diode and Zener diode - Junction diode & Zener diode characteristics - Junction Diode as a rectifier - Zener diode as a voltage regulator - Transistor - characteristics - Transistor as an amplifier.

UNIT II ELECTRONIC DEVICES 9

Rectifiers Half wave and Full wave rectifier - efficiency - Capacitive filter - Ripple factor

Field effect transistor Types - Junction field effect transistor - Metal oxide semiconductor - Field effect transistor - characteristics - Silicon control rectifier- characteristics.

UNIT III OPTOELECTRONIC DEVICES 9

Optoelectronic devices principle - LED - construction , working - Laser diodes – principle, construction & working - Solar cells - principle , construction & working - Solar panels.

UNIT IV AMPLITUDE MODULATION 9

Modulation - types of modulation - amplitude modulation - modulation index - frequency and digital modulations - AM diode detector - AM and FM receivers - demodulation.

UNIT V MICROPROCESSOR AND MICROCONTROLLER 9

Introduction to microprocessor - 8086 microprocessor working - assembly language programming - peripherals & other microprocessors - microcontrollers.

Total no. of periods: 45

BOOKS FOR STUDY & REFERENCE

1. Allied Physics - Dr. K. Thangaraj and Dr.D.Jeyaraman, Popular Book Depot.
2. Principles of Electronics - K. Metha, S. Chand & Co.

3. Electronic Device And Circuit Theory - R. L. Boylestad, Louis Nashelsky, Pearson Education
5. Text book of Electronic Circuits - R S Sedha

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Subject Code: **HBCS22004**	Subject Name: **PROGRAMMING IN JAVA**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Object Oriented 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 and Lab

OBJECTIVES

- Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function.
- To understand the importance of Classes & objects along with constructors and Arrays.
- Discuss the principles of exception handling, multithreading, inheritance, interface and packages and abstract classes.
- To understand Java Swings for designing GUI applications, streams, AWT.
- To understand the importance of JDBC connections.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Comprehend building blocks of oops language.
CO2	Be familiar with the concepts of class and object.
CO3	Identify various concepts of oop and its concepts.
CO4	Design GUI using AWT and Swing
CO5	Develop JDBC connections

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	2	2	3	2	3	3	2	2	3
CO2	2	3	2	3	3	2	2	2	3
CO3	1	3	3	2	2	3	2	1	3
CO4	2	3	3	2	3	2	3	2	3
CO5	3	3	2	3	1	3	2	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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

HBCS22004	PROGRAMMING IN JAVA	3	1	0	4

UNIT -I **12**

Java Evolution

History – Features – Object Oriented Concepts - How Java differs from C and C++ – Overview of Java: simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine – Java environment JDK- API

UNIT-II **12**

Classes

Constants, Variables- Data Types – Typecasting- Arrays - Operators and Expressions – Decision Making and Branching - Decision Making and Looping– Classes–Objects –Overloading method – Constructors- Inheritance- Interfaces.

UNIT -III **12**

Packages

Built-in Packages, Creating User Defined Packages, Accessing a Package, Using a Package-Abstract classes – Exception Handling- Threading: Introduction, creating threads, Life cycle of thread, multithreading.

UNIT-IV **12**

Streams

I/OStreams-FileStreams-Applets-StringObjects-StringBuffer-Working with windows using AWT Classes-AWT Controls -Layout Managers -Frames-Menus-Dialogs-Mouse Events and their Listeners.

UNIT- V **12**

JDBC

Introduction to JDBC-Essential JDBC classes- Connecting to database- Inserting data in database- Retrieving data from database- deleting data in database- updating data in database- store image in the database- to retrieve image from database- to store file in database- retrieve file from database.

Total no. of periods: 60

TEXT BOOKS:

1. CayS.Horstmann, Gary Cornell-PaperJava2VolumeI-Fundamentals, 5 thEdition.PHI,2000.
2. P.NaughtonandH.Schildt-Java2 (The Complete Reference)-Third Edition TMH 1999.
3. K.ArnoldandJ. Gosling-The Java Programming Language-Second Edition AddisonWesley,1996.

REFERENCE BOOKS:

1. Programming With Java, A Primer – E..Baluguruswamy
2. Programming in Java – C.Muthu

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Subject Code: **HBCS22005**	Subject Name: **COMPUTER SYSTEM ARCHITECTURE**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : +2 Computer Science	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

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the different ways of communication with I/O devices

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the basics structure of computers, operations and instructions.
CO2	Design arithmetic and logic unit.
CO3	Understand pipelined execution and design control unit.
CO4	Understand the various memory systems and I/O communication.
CO5	Understand parallel processing architectures

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	1	3	3	1	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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

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HBCS22005	COMPUTER SYSTEM ARCHITECTURE	3	1	0	4

UNIT I **12**

BASIC STRUCTURE OF A COMPUTER SYSTEM Functional Units — Basic Operational Concepts — Performance — Instructions: Language of the Computer — Operations, Operands — Instruction representation — Logical operations — decision making — MIPS Addressing.

UNIT II **12**

ARITHMETIC FOR COMPUTERS Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal-- Addition and Subtraction — Multiplication — Division — Floating Point Representation — Floating Point Operations — Subword Parallelism

UNIT III **12**

PROCESSOR AND CONTROL UNIT A Basic MIPS implementation — Building a Datapath — Control Implementation Scheme ,Addressing Modes ,Pipelining — Pipelined datapath and control — Handling Data Hazards & Control Hazards — Exceptions.

UNIT IV **12**

MEMORY & I/O SYSTEMS Memory Hierarchy — memory technologies — cache memory — measuring and improving cache performance — virtual memory, TLB?s — Accessing I/O Devices — Interrupts — Direct Memory Access — Bus structure — Bus operation — Arbitration — Interface circuits — USB.

UNIT V **12**

PARALLELISIM Parallel processing challenges — Flynn?s classification — SISD, MIMD, SIMD, SPMD, and Vector Architectures — Hardware multithreading — Multi-core processors and other Shared Memory Multiprocessors

Total no. of periods: 60

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The hardware/Software Interface, Sixth Edition 2017.

2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.

2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.

3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

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Subject Code: **HBCS22006**	Subject Name: **COMPUTER NETWORKS**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : +2 Computer Science	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

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Enumerate the layers of the OSI model and TCP/IP, explain the function(s) of each layer.
- Gain core knowledge of Network layer routing protocols and IP addressing.
- Describe the Session layer design issues and Transport layer services.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	To understand basic computer network technology.
CO2	Understand and explain Data Communications System and its components.
CO3	Identify the different types of network topologies and protocols.
CO4	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO5	Understand and building the skills of sub netting and routing mechanisms.

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	2	3	2	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	1	3	2	3	2	3	3	1	2
CO4	2	2	3	3	3	2	2	3	3
CO5	3	3	2	3	2	3	3	2	3

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

HBCS22006	COMPUTER NETWORKS	3	0	0	3

UNIT I **9**

Introduction to Computer Networks and Networking Elements: Network Definition - Network Topologies - Network Classifications - Network Protocol - Layered Network Architecture - Overview of OSI Reference Model - Overview of TCP/IP Protocol Suite – Hub - Switch (Managed and Unmanaged) - Routers.

UNIT II **9**

Data Communication Fundamentals and Techniques: Analog and Digital Signal - Data-Rate Limits - Parallel and Serial Transmission - Digital to Analog Modulation - Multiplexing Techniques – FDM - TDM - Transmission Media – Guided Media – Unguided Media.

UNIT III **9**

Data Link Layer Functions and Protocol: Error Detection and Error Correction Techniques – Data - Link Control - Framing and Flow Control - Error Recovery Protocols - Stop and Wait ARQ - Go-Back-N ARQ - Point to Point Protocol on Internet.

UNIT IV **9**

Multiple Access Protocol Network Layer Design Issues: Routing algorithms - Congestion control algorithms - IP Protocol - Networks Switching Techniques - Circuit Switching - Packet Switching - Connectionless Datagram Switching - Connection- Oriented Virtual Circuit Switching.

UNIT V **9**

Transport Layer and Application Layer Functions and Protocols: Transport Services- Error and Flow Control - Connection Establishment and Release - Three Way Handshake - Overview of Application Layer Protocol - Overview of DNS Protocol - Overview of WWW & HTTP Protocol.

Total no. of periods: 45

TEXT BOOKS

1. A. S. Tanenbaum (2003), Computer Networks, 4th edition, Pearson Education/ PHI, New Delhi, India.

REFERENCE BOOKS

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM Publishing Company Ltd 2007.
2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

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Subject Code: **HBCS22007**	Subject Name: **OPERATING SYSTEM**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Data Structures	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

- I/O manager and methods used to implement the different parts of OS. To understand the main components of an OS & their functions.
- To study the process management and scheduling.
- Understand the process management policies and scheduling of processes by CPU.
- To understand the concepts and implementation Memory management policies and virtual memory.
- To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Be familiar with the concepts of Operating Systems.
CO2	Process management and Scheduling Algorithms.
CO3	Memory Management and Page scheduling Algorithm.
CO4	Information management with Disk scheduling.
CO5	Familiar with the basics of Linux system and Mobile OS like iOS and Android.

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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

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HBCS22007	OPERATING SYSTEM	3	0	0	3

UNIT I **9**

Operating System Overview: Objectives and functions - Evolution of Operating System – Types of OS – Multiprogramming system and Batch system – Time sharing system - Computer System Organization Operating System Structure and Operations- System Calls, System Programs.

UNIT II **9**

Process Management: Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Classic problems of synchronization, , Deadlock - Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III **9**

Storage Management: Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, Virtual Memory –Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV **9**

File Systems and I/O Systems: Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, File concept, Access methods, Directory Structure, Directory organization, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Recovery; I/O Systems – I/O Hardware.

UNIT V **9**

Case Study: Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Core OS Layer, File System.

Total no. of periods: 45

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, ―Operating System Concepts‖, 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES:

1. Ramaz Elmasri, A. Gil Carrick, David Levine, ―Operating Systems – A Spiral Approach‖,Tata McGraw Hill Edition, 2010.
2. Achyut S.Godbole, Atul Kahate, ―Operating Systems‖, McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, ―Modern Operating Systems‖, Second Edition, PearsonEducation, 2004.
4. Gary Nutt, ―Operating Systems‖, Third Edition, Pearson Education, 2004.

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Subject Code: **HBCS22L03**	Subject Name: **PROGRAMMING IN JAVA LAB**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Programming Methodology	Lb	0	0	3	2

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

OBJECTIVES

- This lab work provides hands-on for Java programs using Java language
- To implement various concepts related to language.
- Develop programs using java collection as well as java development toolkit.
- To implement the Swing components by using GUI.
- To implement exception handling concept.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Finding area and Perimeter by using Scanner class.
CO2	Method overloading and method overriding concept.
CO3	Application using synchronization such as Thread based, Class based and synchronized statements.
CO4	Implementing GUI based applications using swing component.
CO5	Application using exception handing concept.

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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

HBCS22L03	PROGRAMMING IN JAVA LAB	0	0	3	2

1. Write a java program to display multiplication table.
2. Write a java program to display number triangle.
3. Write a java program for method overloading.
4. Write a java program for method overriding.
5. Write a java program using constructor overloading concept.
6. Write a simple single inheritance java program.
7. Write a simple java program for abstract class and methods.
8. Write a java program to demonstrate thread in applet.
9. Write an applet program to draw a face.
10. Write a simple java program with exception handling concept.

Total no. of periods: 45

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Subject Code: HBPH22IL2	Subject Name: **Allied Lab- Electronics I Lab**	0	3	2

OBJECTIVES (program outcome) -

- Understand the characteristics of Transistor
- Understand the characteristics of Zener Diode
- Explore ideas about the Half Wave Rectifier
- Analysis the circuit of JFET
- Perform basic operations using 8085 Microprocessor

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	The student will understand the characteristics of Transistor
CO2	The students will understand the characteristics of Zener Diode
CO3	The students will explore ideas about the Half wave Rectifier
CO4	The students will analysis the circuit of JFET
CO5	The students will perform basic operations using 8085 Microprocessor

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	1	2	3	3	2	3	1	3
CO2	3	3	2	2	2	2	2	2	2
CO3	3	2	1	2	3	3	2	2	2
CO4	3	2	2	3	3	3	2	3	2
CO5	1	2	3	2	2	2	2	2	1

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3
CO2	2	2	2
CO3	2	3	1
CO4	3	3	1
CO5	2	2	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
						√			

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ALLIED Lab- ELECTRONICS I LAB
For
Programme - B.Sc (Computer Science)

L T P C

SUBJECT CODE : HBPH22IL2

0 0 3 2

Course Objectives:

- Understand the characteristics of Transistor
- Understand the characteristics of Zener diode
- Explore ideas about the Half Wave Rectifier
- Analysis the circuit of JFET
- Perform basic operations using 8085 Microprocessor

LIST OF EXPERIMENTS

1. Transistor Characteristics-Determine the input, output resistance and current gain
2. Zener Diode characteristics
3. Construction of Half Wave Rectifier and verify the ripple factor
4. JFET characteristics
5. Addition of two 8 bit numbers using 8085 Microprocessor
6. Subtraction of two 8 bit numbers using 8085 Microprocessor

Total no. of periods: 45

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Subject Code: **HBCC22I04**	Subject Name: **Statistical and Numerical Methods Lab (Analytical skill)**	**L**	**T**	**P**	**C**
	Prerequisite: Higher Secondary Mathematics	0	0	3	2

L : Lecture T : Tutorial C: Credits

OBJECTIVES

- To understand the Basic concepts in Measures of Central Tendency
- To understand the Basic concepts in Correlation and Regression
- To understand the methods of solving Algebraic and Transcendental equations
- To understand the basic concepts in R Programming language

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the basic concepts in Measures of Central Tendency
CO2	Understand the basic concepts in Correlation and Regression
CO3	Try to solve Algebraic equations
CO4	Try to solve system of Linear Equations
CO5	Learn how to apply R programming to solve Statistical and Numerical problems

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**			
CO1	3	2	3	3	2	2	1	2	3			
CO2	3	2	2	3	3	1	1	2	3			
CO3	2	2	3	2	3	2	2	1	2			
CO4	3	2	3	3	3	2	1	1	3			
CO5	2	2	3	3	2	1	1	2	2			

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
							✓		

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Subject Code: **HBCC22I04**	Subject Name: **Statistical and Numerical Methods Lab (Analytical skill)**	**L**	**T**	**P**	**C**
	Prerequisite: Higher Secondary Mathematics	0	0	3	2
L : Lecture T : Tutorial C: Credits					

Common to II yr / III Sem all H&S Programmes

UNIT I MEASURES OF CENTRAL TENDENCY & VARIABILITY
Mean, Median, Mode – Range, Quartile Deviation – Mean Deviation - Standard Deviation

UNIT II CORRELATION AND REGRESSION
Correlation Coefficient – Spearman's Rank Correlation – Linear Regression

UNIT III SOLUTION OF EQUATIONS
Solution of Algebraic equations – Method of false position – Iteration method – Newton-Raphson method

UNIT IV SOLUTION OF LINEAR SYSTEM OF EQUATIONS
Solution of Linear system of equations – Gauss Elimination method – Gauss-Jordan method .

UNIT V PROGRAMMING IN R
Algorithm to find Mean, Median, Mode and Standard Deviation Using R, Algorithm to find Correlation coefficient using R, Algorithm to solve System of Equations.

Total no. of periods: 45

REFERENCES

1) Veerarajan T., *Probability, Statistics and, Random Processes*, Tata McGraw Hill Publishing Co., (2008).
2) Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics*, S.Chand& Co., (2007).
3) Sastry S.S., *Introductory Methods of Numerical Analysis*, Prentice Hall of India, (2012).
4) Kandasamy P., Thilagavathy, Gunavathy K., *Numerical Methods (Vol.IV)*, S.Chand& Co., (2008).
5) Victor A. Bloomfield, Using R for Numerical Analysis in Science and Engineering, CRC Press, Taylor & Series Group(2014).

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Subject Code: **HBCC22I05**	Subject Name: Qualitative and Quantitative Techniques **(Soft Skill III)**	**Ty/ Lb/ ETL/ IE**	**L**	**T/ S. Lr**	**P/ R**	**C**
	Prerequisite: Higher Secondary Mathematics	IE	0	0	2	1

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

OBJECTIVES

- To understand the Basic concepts in Logical Reasoning
- To understand the Basic concepts in Arithmetical Reasoning
- To understand the Basic concepts in Data Interpretation

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the basic concepts of Logical Statements and Arguments
CO2	Understand the concept of Logical conclusions
CO3	Understand the Basic concepts in Number system
CO4	Understand the basic concepts of Permutations and Combinations
CO5	Learn how to analyze the data using Pictorial representation

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**			
CO1	3	2	3	3	3	2	1	2	3			
CO2	2	3	2	3	3	2	1	2	2			
CO3	3	2	3	2	3	1	2	1	3			
CO4	3	1	2	3	2	3	3	2	2			
CO5	3	2	3	2	3	2	1	2	3			

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2
CO2	2	2	3
CO3	3	1	2
CO4	2	3	1
CO5	3	2	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
							√		

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HBCC22I05 **Soft Skill III (Qualitative and Quantitative Techniques)**
Common to II yr / III sem(ALL H&S Programmes)

UNIT 1 Logical Reasoning I
Logical Statements – Arguments – Assumptions – Courses of Action.

UNIT 2 Logical Reasoning II
Logical conclusions – Deriving conclusions from passages – Theme detection.

UNIT 3 Arithmetical Reasoning I
Number system – H.C.F & L.C.M – Problem on ages – Percentage – Profit & Loss – Ratio & Proportion – Partnership.

UNIT 4 Arithmetical Reasoning II
Time & Work – Time & Distance – Clocks – Permutations & Combinations – Heights & Distances – Odd man out and Series.

UNIT 5 Data Interpretation
Tabulation – Bar graphs – Pie graphs – Line graphs.

Total no. of periods: 30

REFERENCE BOOK:

1. R.S.Agarwal, A modern approach to Logical Reasoning, S.Chand& Co., (2017).
2. R.S.Agarwal, A modern approach to Verbal and Non verbal Reasoning, S.Chand& Co., (2017).
3. R.S.Agarwal, Quantitative Aptitude for Competitive Examinations, S.Chand& Co., (2017).
4. A.K.Gupta, Logical and Analytical Reasoning, Ramesh Publishing House, (2014).
5. B.S.Sijwali, Indusijwali, A new approach to Reasoning (Verbal and Non verbal), Arihant Publishers, (2014).

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Semester: 4

Subject Code: HBPH22ID4	**Subject Name:** Allied IV- Electronics - II	L	T	P	C
		3	0	0	3

OBJECTIVES (program outcome) -

- Understand the fundamentals of number system
- Understand the working principles of logic gates
- Analysis the working principles of simple arithmetic circuits
- Explore ideas about sequential logic design
- Gain knowledge about memory elements

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	The students will understand the fundamentals of Number system
CO2	The students will understand the fundamentals of Logic gates
CO3	The students will able to analysis the working principles of Simple Arithmetic circuits
CO4	The student will explore ideas about Sequential logic design
CO5	The student will able to gain knowledge about memory elements

Mapping of Course Outcome with Program Outcome (POs)

COs /POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	1	2	3	3	2	3	1	3
CO2	3	3	2	2	2	2	2	2	2
CO3	3	2	1	2	3	3	2	2	2
CO4	3	2	2	3	3	3	2	3	2
CO5	1	2	3	2	2	2	2	2	1

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	3
CO2	2	2	2
CO3	2	3	1
CO4	3	3	1
CO5	2	2	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
						√			

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ALLIED IV - ELECTRONICS -II

For

Programme - B.Sc (Computer Science)

SUBJECT CODE: HBPH22ID4

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the fundamentals of number system
- Understand the working principles of logic gates
- Analysis the working principles of simple arithmetic circuits
- Explore ideas about sequential logic design
- Gain knowledge about memory elements

UNIT I NUMBER SYSTEMS **9**

Number systems - Decimal, Binary, Octal, Hexadecimal - conversion from one to another

. **Characters and codes:** ASCII code, Excess-3 code, gray code - binary addition, subtraction, multiplication and division - unsigned binary numbers - signed magnitude numbers - complements in number systems.

UNIT II LOGIC GATES **9**

Logic gates AND, OR, NOT, NOR & NAND gates, EX-OR gates.

Boolean Algebra and Boolean laws and theorems: De Morgan's theorems - Duality theorem - simplification of sum of product and product of sum expressions - Karnaugh map and simplifications.

UNIT III SIMPLE ARITHMETIC CIRCUITS **9**

Half and Full adders - Binary adder - subtracter - BCD adder

Data processing circuits: Multiplexers - Demultiplexers - Encoders and Decoders.

UNIT IV SEQUENTIAL LOGIC DESIGN **9**

Flip-flops - RS, JK, D & T Flip flops - Master/Slave Flip flop - Shift Registers - Counters - Asynchronous and Synchronous Counters - Digital to Analog Converters - Analog to Digital converters.

UNIT – V MEMORY ELEMENTS **9**

RAM - Static RAM - Dynamic RAM - ROM - Magnetic disk memories - magnetic tape - Cache memory - error detection & correction using parity & Hamming code.

Total no. of periods: 45

TEXTBOOKS:

1. Digital Logic and Computer Design - M. Morris Mano, 2nd Edition, Pearson Education
2. Digital Technology Principles and Practice - Virendra Kumar, New Age International, NewDelhi, 2015.
3. Digital Principles and Application - Donald P.Leach and Albert Paul Malvino, 7th Edition,Tata McGraw-Hill Publishing Company Ltd.,New Delhi.
4. Principles of Electronics - K. Metha, S. Chand & Co.

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Subject Code: **HBCS22008**	Subject Name: **SOFTWARE ENGINEERING**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Object Oriented 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 and Lab

OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development.
- Distinguish the various software process models such as waterfall model, evolutionary models, etc.
- Analyze, design and maintain software System.
- Define various software application domains and remember different process model used in software development.
- To show the ability to critically discuss the key concepts in component based development and influence of this topic to modern trends in business computing and software engineering.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the different Software Process Models
CO2	Classify the different Project related activities and estimate the effort and Risk factors
CO3	Able to collect and classify user requirements in to Functional and Non-functional, Understand different models for Baseline
CO4	Understand different design rules, Able to assess good software design
CO5	Understand various software testing techniques, Able to differentiate verification and validation activities.

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	2	2	3	2	2	3	3
CO2	2	2	3	3	2	2	3	2	3
CO3	1	3	2	2	2	3	3	1	2
CO4	2	2	3	3	3	2	2	2	3
CO5	3	3	1	3	1	3	3	2	3

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3
CO2	3	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	Program Core	Program Elective	Humanities And Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

HBCS22008	SOFTWARE ENGINEERING	3	1	0	4

UNIT I **12**

INTRODUCTION TO SOFTWARE ENGINEERING - Layered technology-processing framework - Waterfall model - Incremental model-Spiral model – Requirement Engineering task - Initial Requirement Engineering process - Analysis model - Introduction to Agility-Agile process-Extreme programming-XP Process.

UNIT II **12**

SOFTWARE REQUIREMENTS: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management- Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

UNIT III **12**

DESIGN PROCESS – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

UNIT IV **12**

SOFTWARE PROJECT MANAGEMENT: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

UNIT V **12**

SOFTWARE TESTING TECHNIQUES: Introduction - Software Testing Fundamental - Testing Principles - White Box Testing - Control Structure Testing - Black Box Testing - Boundary Value Analysis - Testing GUIs - Testing Documentation and Help Facilities - Software Testing Strategies – Introduction - Organizing for Software Testing - Software Testing Strategy - Unit Testing: Unit Test Considerations - Top-Down Integration - Bottom-Up Integration.

Total no. of periods: 60

TEXT BOOKS:

1. Roger S. Pressman, ‒Software Engineering – A Practitioner's Approach‖, Seventh Edition, Mc Graw-Hill International Edition, 2010.
2. Ian Sommerville, ―Software Engineering‖, 9th Edition, Pearson Education Asia, 2011.

REFERENCES:

1. Rajib Mall, ―Fundamentals of Software Engineering‖, Third Edition, PHI Learning PrivateLimited, 2009.
2. Pankaj Jalote, ‒Software Engineering, A Precise Approach‖, Wiley India, 2010.
3. Kelkar S.A., ―Software Engineering‖, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, ―Software Engineering‖, Tata McGraw-Hill Publishing Company Limited,2007.

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Subject Code: **HBCS22009**	Subject Name: **DATABASE MANAGEMENT SYSTEM**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Data Strcutures	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

- To describe the features of database management systems and Relational database.
- To introduce the concepts of basic SQL as a Database language.
- Create the constraints and keys, using SQL.
- Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the purpose of database
CO2	Classify the different SQL queries
CO3	Able to design Relational Data Base
CO4	Understand different Indexing and Hashing Techniques
CO5	Understand about XML Schemas

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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

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HBCS22009	DATABASE MANAGEMENT SYSTEM	3	1	0	4

UNIT: I **12**

Introduction to Databases and Transactions - What is database system - Purpose of database System - View of data – Mapping Constraints - Relational databases - Database architecture - Transaction management

UNIT: II **12**

Database design, ER Model and SQL: Overview - ER-Model - Constraints - ER-Diagrams - ERD Issues - Weak entity sets - **Structured Query Language** - Aggregate Functions - Null Values - Nested Sub queries - Modification of Databases - Joined Relations- DDL - Triggers

UNIT: III **12**

Relational Database design - Features of good relational database design - Normalization (1NF, 2NF, 3NF, BCNF) - **Relational Algebra**: Selection and projection - Set operations - Renaming - Joins -Division - Syntax - Semantics - Operators - Grouping and Ungrouping

UNIT: IV **12**

Transaction management and Concurrency control - ACID properties - Serializability and concurrency control - Lock based concurrency control (2PL, Deadlocks) - Time stamping methods - Optimistic methods - Database recovery management

UNIT: V **12**

Data Fragmentation - Replication - XML Databases - XML Schema - NOSQL Database: Characteristics - Types of NoSQL Datastores: Column Oriented, Document, Key-Value and Graph Types – Applications - Current Trends.

Total no. of periods: 60

TEXT BOOKS:

1. A Silberschatz, H Korth, S Sudarshan, ―Database System and Concepts‖, fifth Edition McGraw –Hill, Rob, Coronel, ―Database Systems‖, Seventh Edition, Cengage Learning

2. Singh-Database systems: Concepts, Design & applications, Pearson Education, 2nd Edition, 2011

REFERENCE BOOKS:

1. Gerald V.Post - DBMS-Designing and Business Applications - McGraw Hill Publications

2. Michael Abbey and Michael.J.Corey-Oracle- A Beginners guide TMH

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Subject Code: **HBCS22L04**	Subject Name: **DATABASE MANAGEMENT SYSTEM LAB**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Data Structures	Lb	0/ 0	0/0	3	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 explain basic database concepts, applications, data models, schemas and instances.
- To emphasize the importance of normalization in databases
- Use the basics of SQL and construct queries using SQL in database creation and interaction
- Students get practical Knowledge on Database
- Learn SQL basics for data definition and data manipulation

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Master the basics of SQL and construct queries using SQL.
CO2	Demonstrate their understanding of key notions of query evaluation
CO3	Design Database table to represent simple database application scenarios
CO4	Perform the Queries for Trigger operation
CO5	Implement the Relational Algebra 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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

HBCS22L04	**DATABASE MANAGEMENT SYSTEM LAB**	**0**	**0**	**3**	**2**

List of Experiments

1) Design a Database and create required tables. For e.g. Bank, College Database
2) Write a Sql statement for implementing ALTER, UPDATE and DELETE
3) Perform the Execution of DDL Commands
4) Write relational algebra queries for a given set of relations.
5) Perform the Modification of Database
6) Write the queries to implement the joins
7) Write the query for implementing the following functions: MAX (), MIN (), AVG (), COUNT ()
8) Perform the queries for triggers

Total no. of periods: 45

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Subject Code: **HBCC22I06**	Subject Name: **CRITICAL THINKING SKILL**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Basic Knowledge in computer	IE	0	0	2	1

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

OBJECTIVES

1. Promote Critical Thinking as a Valuable Process in the Workplace
2. Use Critical Thinking Skills When Making Business Decisions and Taking Action
3. Select Specific Tools to Use When Conducting Critical Thinking

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Explaining an Issue or Problem
CO2	Employing Evidence/Information Effectively
CO3	Analyzing Contexts
CO4	Describing Your and Others Perspectives
CO5	Drawing Logical Conclusions

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**P07**	**PO8**	**P09**
CO1	3	2	3	3	2	3	3	2	3
CO2	2	2	3	1	2	3	1	2	3
CO3	3	2	2	1	3	3	1	3	3
CO4	3	3	3	2	1	3	2	1	3
CO5	2	3	2	3	3	3	3	3	3

COs/PSOs	**PS01**	**PS02**	**PS03**	**PS04**
CO1	3	3	2	2
CO2	2	2	1	3
CO3	3	3	3	2
CO4	3	3	2	3
CO5	3	2	2	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
							√		

CRITICAL THINKING

1. Case Study Analysis of a specific Computer Applications Domain.
    1. System Requirements
    2. Analysis
    3. Design
    4. Test Cases
2. Debugging programs from Computer Applications languages
3. Prediction of Output for Minimum 10 Problems.

Total no. of periods: 30

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Subject Code: **HBCS22I01**	Subject Name: **CORE SKILL – I MULTIMEDIA LAB**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.L r**	**P/R**	**C**
	Prerequisite : Basic Knowledge of Design and Animation	IE	0	0/0	2/0	1

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 the basics and Fundamentals of Multimedia.
- To introduce Multimedia components and Tools.
- To Learn the various photo editing features and animation techniques
- To learn creative software like photoshop and video editing
- To demonstrate proficiency in developing the multimedia presentations.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand multimedia components using various tools and techniques.
CO2	Apply different effects on image using software like Photoshop.
CO3	*Understand the fundamentals of animation, virtual reality and its related technologies.*
CO4	Apply different types of animations like motion twinning, shape morphing etc by using animation software like Flash.
CO5	Analyze and comprehend multimedia information

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

HBCS22I01	**MULTIMEDIA LAB**	**0**	**0**	**2**	**1**

PHOTOSHOP

1. Cropping an object from an image.
2. Design a photo frame using custom shapes in Photoshop.
3. Enhancing portraits – Removing RED EYE.
4. Convert a given color photo into black and white.
5. Removing background of an image and turn into transparent image.
6. Explain the procedure to Creating a Cover Page for a text book

FLASH

1. Create an animation text breaking and adding.
2. Design a greeting card with animation.
3. Create an animation to represent the growing moon.
4. Create an animation to indicate a ball bouncing on steps.

Total no. of periods: 30

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Subject Code: **HBCS22010**	Subject Name: **INTERNET TECHNOLOGIES**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Programming Methodology	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

- To understand the basics of the internet and web terminologies.
- To provide basic knowledge of web design using HTML and CSS
- To introduce scripting language concepts for developing client-side applications.
- understand what is XML and how to parse and use XML data
- To practice server-side programming features – PHP.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Choose, understand, and analyze any suitable real time web application.
CO2	Understand the need and be able to develop HTML/XHTML and CSS pages with valid structure as well as content.
CO3	Understand and be able to develop JavaScript/jQuery code to access the DOM structure of web document and object properties.
CO4	Develop a well-formed / valid XML document.
CO5	Develop dynamic web pages with usage of server-side scripting PHP and MySQL.

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	3	3	1	2	2	3	3	2	2
CO4	2	2	3	3	3	1	2	2	3
CO5	3	3	2	3	2	2	3	2	3

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3
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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

HBCS22010	INTERNET TECHNOLOGIES	3	1	0	4

UNIT I **12**

Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols - Introduction to WWW: WWW and Web 2.0 - Web protocols and Web servers, Web Design Principles and Web site structure.

UNIT II **12**

Introduction to HTML: Basics of HTML, HTML Tags and attributes, Meta tags, Character entities, hyperlink, lists, tables, images, forms, divs, XHTML: Basic XHTML Syntax and Semantics, Relative URL-List-Tables-Frame- Form-XML HTML Document Case Study etc.

UNIT III **12**

JavaScript: Basics of JavaScript and Client-side scripting language - syntaxes for variables - Operators - Arrays - Control flow statements: if, if..Else, if..else..if, ternary operators, switch – Looping statements: for, while, Do..While - break, continue – functions – objects – classes.

UNIT IV **12**

XML: XML Introduction and Overview – Use of XML – Syntax - Namespaces - Document Type Definitions (DTDs) - XML Schemas- XSL and XSLT. Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT.

UNIT V **12**

PHP: Introduction to PHP – Syntax - combining PHP and HTML - understanding PHP: Arrays, Strings, Functions - looping and branching - file handling - processing forms on server side, cookies and sessions - Database: Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database.

Total no. of periods: 60

TEXT BOOK:

1. Uttam K. Roy, ‒Web Technologies‖, Oxford Higher Education, November 2010.

REFERENCES:

1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech
1. Steven Holzner,‖HTML Black Book‖ Dremtech press.
2. The Complete Reference PHP Steven Holzner, Tata McGraw-Hill.

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Subject Code: **HBCS22011**	Subject Name: **PYTHON PROGRAMMING**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Programming Methodology	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

- Develop the fundamentals of Python.
- Describe the core syntax and semantics of Python programming language.
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of NumPy, Packages and Dictionaries.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the basic concepts of Python Programming
CO2	Apply the flow control statements, lists and tuples in programming
CO3	Relate python Lists, Tuples and Dictionaries for representing compound data
CO4	Demonstrate NumPy packages
CO5	Analyze files using Pandas

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	2	3
CO2	2	2	3	1	2	2	3	2	3
CO3	3	3	2	2	2	3	3	1	2
CO4	2	2	3	2	3	2	2	2	2
CO5	3	3	1	3	2	3	3	2	3

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

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HBCS22011	PYTHON PROGRAMMING	3	0	0	3

UNIT I **9**

Introduction to Python – Python Installation – simple program, keywords, Identifiers – Variables- Executing Python from the Command Line - Editing Python Files -Basic Syntax-Comments - Standard Data Types – Relational Operators -Logical Operators - Bit Wise Operators - Simple Input and Output

UNIT II **9**

Control Flow and Syntax - Indenting - if Statement - statements and expressions - String operations- Boolean Expressions -while Loop - break and continue - for Loop. Lists: List-list slices - list methods - list loop– mutability–aliasing - cloning lists - list parameters. Tuples: Tuple assignment-tuple as return value -Sets– Dictionaries.

UNIT II **9**

Functions – Defining Functions – Built in Functions - Scope of the Variables in a Function- Global and Local Variables. – Type Conversion- Type Coercion – Date and time – dir(), help() - Parameters & arguments - Function calls – The return statement – Python recursive function. Strings: Compound data type – len() function – String slices – String traversal – Escape characters – String formatting Operators.

UNIT IV **9**

Introduction to NumPy- NumPy Datatypes – N Dimensional data structures: Creating Numpy arrays – Arrays from existing Data – Array manipulation: Transpose operations – Joining arrays – Splitting arrays – NumPy operations: Indexing and Slicing.

UNIT V **9**

Python packages - Installing Packages via PIP, Using Python Packages. Pandas: The Python Data Analysis Library – Pandas Data Structures – Other Functionalities on Indexes – Operations between Data Structures – Function Application and Mapping – Sorting and Ranking – ―Not a Number‖ Data.

Total no. of periods: 45

TEXT BOOKS:

1. E. Balagurusamy, 2016, ―Introduction to Computing and Problem-Solving Using Python‖, McGrawHillpublications.
2. Allen B. Downey, (2016), "Think Python: How to Think Like a Computer Scientist Updated for Python 3‖, (2nd Edn.), O'Reilly Publishers.

REFERENCES:

1. Mark Summerfield. ―Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009
2. Ashok Namdev Kamthane, Amit Ashok Kamthane, 2018, ―Programming and Problem Solving with Python‖, 2nd Edition, McGraw Hill Education.
3. Charles Dierbach, ―Introduction to Computer Science using Python - A computational Problem solving Focus‖, Wiley India Edition, 2015.

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Subject Code: **HBCC22002**	Subject Name: **ENTREPRENURSHIP DEVELOPMENT**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.L r**	**P/R**	**C**
	Prerequisite : Basic knowledge in entrepreneurship development	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

OBJECTIVES

1. To enrich the students towards the knowledge of entrepreneurial skills and to make the students understand the approaches to attain the goals of the business.
2. To recognize the value of problem solving, effective business management and entrepreneurial thinking to business development.
3. To identify the key factors and be able to apply the key entrepreneurial process – command and control, calculated risk-taking and opportunity recognition to business development

COURSE OUTCOMES (COs)

Students completing this course Will be able to

CO1	Provide information related to entrepreneurship
CO2	Make students state the importance of entrepreneurial development
CO3	State the importance of business idea generations
CO4	Gain knowledge on various EDP organized by Government Sectors
CO5	Provide them the nature of economic development and entrepreneurial growth.

Mapping of Course Outcome with Program Outcome (POs)

Sem			**Course code:**						
VI			**Programme Outcomes(Pos)**						
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	2	3	2	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3
CO3	3	2	3	3	2	3	3	3	2
CO4	2	3	2	3	3	3	3	2	3
CO5	3	3	3	3	2	3	2	3	3

Sem -VI	**Programme Specific Outcomes(PSOs)**		
Cos	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2
CO2	2	2	3
CO3	3	3	2
CO4	3	3	3
CO5	3	2	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
							√		

HBCC22002	**ENTREPRENURSHIP DEVELOPMENT**	**3**	**0**	**0**	**3**

UNIT I: Concept of Entrepreneurship **9**

Entrepreneurship - Meaning - Types - Qualities of an Entrepreneur - Classification of Entrepreneurs - Factors influencing Entrepreneurship - Functions of Entrepreneurs.

UNIT II: Entrepreneurial Development Agencies. **9**

Commercial Banks - District Industries Centre - National Small Industries Corporation
Small Industries Development Organisation - Small Industries Service Institute.All India Financial Institutions.SIPCOT and its objectives.MSME Sector and its coverage Objectives of Ministry of MSME.Role and Functions of MICRO Small and Medium Enterprises - Development Organisation (MSME - DO) - Objectives of SIDCO - Functions of Tamil Nadu SIDCO - IRBI and its Role. NABARD and its role in the Rural Development of India - Introduction to Micro Units Development Refinance Agency (MUDRA)

UNIT III: Project Management **9**

Business idea generation techniques - Identification of Business opportunities – Feasibility study - Marketing, Finance, Technology & Legal Formalities - Preparation of Project Report- Tools of Appraisal.

UNIT IV - Entrepreneurial Development Programmes **9**

Entrepreneurial Development Programmes (EDP) - Role, relevance and achievements – Role of Governmentin organizing EDPs- Critical evaluation

UNIT V - Economic Development and Entrepreneurial growth **9**

Role of Entrepreneur in Economic growth - Strategic approaches in the changing Economic scenario for small scale Entrepreneurs - Networking, Niche play, Geographic Concentration, Franchising / Dealership - Development of Women Entrepreneurship. Self-help groups and empowerment of Women in India - Financing SHG and their role in Micro-financing.Financial inclusion and its penetration in India, Challenges and Government role in Financialinclusion–PradhanMantri Jan-DhanYojana - Six Pillars of Its Mission objectives

Total no. of periods: 45

Books for Study :

1. Saravanavel, P. Entrepreneurial Development, Principles, Policies and Programmes, EssPee Kay Publishing House - 1997, Chennai.
2. Tulsian, P.C & Vishal Pandey, Business Organization and Management, PearsonEducation India, 2002, Delhi.

Books for Reference :

1. Janakiram, B, and Rizwana, M, Entrepreneurship Development, Text and Cases, ExcelBooks India, 2011, Delhi.
2. Arun Mittal & Gupta, S.L - Entrepreneurship Development, International Book HousePvt. Ltd, 2011, Mumbai.
3. Anil Kumar, S, Poornima, S, Abraham, K, Jayashree, K - Entrepreneurship Development, Newage International (P) Ltd, 2012, Delhi
4. Gupta C B and Srinivasan NP, Entrepreneurial Development, Sul

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Subject Code: HBCS22L05	Subject Name: **INTERNET TECHNOLOGIES LAB**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite **:** Programming Methodology	LB	0	0	3	2

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

OBJECTIVES

- Apply the knowledge of mathematics, science, engineering fundamentals
- Create and Link web page documents.
- Learn and understand the different CSS.
- Implement decision statements in Javascript.
- Create PHP programs

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Students are able to develop a dynamic webpage by the use of java script and DHTML.
CO2	Students will be able to write a well formed / valid XML document.
CO3	Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
CO4	Students will be able to write PHP programs

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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

HBCS22L05	INTERNET TECHNOLOGIES LAB	0	0	3	2

1. Design a timetable and display it in tabular format
2. Create your profile page i.e. educational details, Hobbies, Achievement, My Ideals etc.
3. Create Style sheet to set formatting for text tags and embed that style sheet on web pages created for your site.
4. Design a web page and embed various multimedia features in the page.Java script Simple Calculator
5. XML design with CSS
6. Text growing and shrinking in Java script
7. Tracking number of visitors using PHP
8. Digital clock using PHP
9. Illustrating numerical operations using PHP

Total no. of periods: 45

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Subject Code: **HBCS22I02**	Subject Name: CORE SKILL -II **PYTHON PROGRAMMING LAB**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Basic Knowledge of Programming	IE	0	0/0	2/0	1

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

OBJECTIVES

- Develop the fundamentals of Python.
  Design function-oriented programming paradigm through python.
- Programs working with the strings and functions.
- Understand the usage of NumPy, Packages and Dictionaries.
- The implementation of various applications using python.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Enable the students with basic concepts of Python Programming
CO2	Programs developed with control statements, lists and tuples.
CO3	Relate python Lists, Tuples and Dictionaries for representing compound data
CO4	Developing programs using NumPy packages concepts.
CO5	Implementation of packages using Pandas

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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

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HBCS22I02	**PYTHON PROGRAMMING LAB**	**0**	**0**	**2**	**1**

Total no. of periods: 30

S. No	List of Experiments
1	Create a python program to implement the different operators.
2	Write a python program to implement branching and looping constructs.
3	Python program to implement String Operations and functions.
4	Create a python program to implement various operations on tuple.
5	Program to implement Dictionary and Sets in python.
6	Program for operations on NumPy arrays.
7	Program to test math functions using NumPy.
8	Program to perform stacking and splitting operations using NumPy.
9	Program to implement Packages.
10	Read a set of array values and create series and data frame using Pandas.
11	Program to find the missing values using Pandas.
12	Program to apply reading operation in CSV file.

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Subject Code: **HBCS22012**	Subject Name: **CLOUD COMPUTING**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite :Computer Networks	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

- To provide concepts of cloud Architecture and its services
- To gain expertise in server, network and storage virtualization.
- To classify the various Cloud Computing applications
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To study the various security issues in cloud computing.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
CO2	Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
CO3	Learn the key and enabling technologies that help in the development of cloud.
CO4	Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
CO5	Explain the core issues of cloud computing such as resource management and security.

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	1	2	2	3
CO2	2	3	3	2	2	2	3	2	2
CO3	3	3	2	2	3	3	2	1	2
CO4	2	2	3	3	3	3	2	2	3
CO5	3	3	2	3	2	3	3	2	3

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3
CO2	3	2	1
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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

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HBCS22012	CLOUD COMPUTING	3	1	0	4

UNIT I **12**

Introduction to Cloud Architecture and its Types– Definition of Cloud – Evolution of Cloud Computing – Environment for Cloud Computing: Components, Cloud provider, Service-Oriented Architecture (SOA) - Cloud Types, Characteristics of Cloud Computing - NIST Cloud Computing Reference Architecture.

UNIT II **12**

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service - Communication as services - Service providers- Google App Engine, Amazon EC2 - Introduction to MapReduce - GFS - HDFS - Hadoop Framework

UNIT III **12**

Virtualization: Basics of Virtualization - Components of virtualization , Types of Virtualization - Storage Virtualization - Network Virtualization - Memory Virtualization - Application Virtualization Implementation, Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Advantages of virtualization

UNIT IV **12**

Standards, And Applications: Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Microsoft Cloud Services, Google Cloud Applications, Amazon Cloud Services, Cloud Applications.

UNIT V **12**

Cloud Security : Security Overview – Cloud Security Challenges – Software-as-a-Service, Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security, - Identity Management and Access Control, Disaster Recovery in Clouds.

Total no. of periods: 60

TEXTBOOKS:

1. Dr.Anand Nayyar, (2019), ‑Handbook of Cloud Computing‖, BPB
2. K.Chandrasekharan, Essentials of Cloud Computing, CRC press, 2014

REFERENCES:

1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
2. Bloor R., Kanfman M., Halper F. Judith Hurwitz ―Cloud Computing ‖ Wiley India Edition,2010
3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, ―Mastering Cloud Computing: Foundations and Applications Programming‖, McGraw Hill, ISBN:978 1259029950,1259029956

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Subject Code :	**Subject Name UNIVERSAL HUMAN VALUES**	**Ty/Lb/ ETP**	**L**	**T/ SLr**	**P/R**	**C**
HBCC22ET1	**Prerequisite :** None	ETP	2	0	2/0	3

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

OBJECTIVES :

- Describe meaning, purpose, and relevance of universal human values.
- Understand the importance of values in individual, social, career, and national life.
- Learn from lives of great and successful people who followed and practiced human values and achieved self-actualization.
- Understand and practice professional ethics with the goal for the universal wellness

COURSE OUTCOMES (COs) :
Students completing the course were able to

CO1	Become conscious practitioners of values
CO2	Realize their potential as human beings and conduct themselves properly in the ways of the world.
CO3	Develop integral life skills with values
CO4	Inculcate and practice them consciously to be good human beings.
CO5	Practice professional ethics with the goal for the universal wellness

Mapping of Course Outcomes with Program Outcomes (POs)

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

COs/PSOs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
							√		

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Subject Code : HBCC22ET1	Subject Name UNIVERSAL HUMAN VALUES	Ty/Lb/ ETL	L	T/ SLr	P/R	C
	Prerequisite : None	ETP	2	0	2/0	3

COURSE NAME: UNIVERSAL HUMAN VALUES

Unit 1 Love and Compassion:

Love and its forms: love for self, parents, family, friend, spouse, community, nation, humanity, nature and other beings—living and non-living. Love and compassion and inter-relatedness, Individuals who are remembered in history for love and compassion and what will learners gain if they practice love and compassion

Related activities: Sharing learner‘s individual and/or group experience(s), community outreach program to manifest love and compassion toward people and nature, Simulated Situations, Case studies

UNIT 2:

Truth and Righteousness: Universal truth, truth as value (artha), truth as fact (satya), veracity, sincerity, honesty among others. Understanding righteousness, Righteousness and dharma, righteousness and propriety, Individuals who are remembered in history for practicing truth and righteousness and what will learners gain if they practice Truth and Righteousness

Sharing learner‘s individual and/or group experience(s), exercises on ease with truth can be recalled consistently, Simulated Situations, Case studies

Unit 3:

Non-Violence and Peace; pre-requisites for non-violence- Love, compassion, empathy, and sympathy, Ahimsa as non-violence and non-killing, the impact of practicing non-violence-Peace, harmony and balance, Individuals and organizations that are known for their commitment to non- violence and peace, and what will learners gain if they practice non-violence and work towards peace

Sharing learner‘s individual and/or group experience(s), Simulated Situations, Case studies

Unit 4:

Renunciation (Sacrifice) Tyaga: Renunciation and sacrifice, developing a balance between enjoyment and sacrifice, Bhoga(enjoyment) with tyagabhava and tyaga (Sacrifice) with bhogabhava is the root of all human and literary values, enjoying life and freedom with responsibility and What will learners learn/gain if they practice renunciation and sacrifice

Social outreach programs for sharing and caring experience, expressing gratitude, Sharing learner‘s individual and/or group experience(s), Simulated Situations , Case studies

Unit 5:

Professional Ethics: Understanding Acceptance of human values and Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Developing Competence in professional ethics and practicing it, to utilize the professional competence for augmenting universal human order and create people friendly eco-friendly identify the scope and characteristics of people friendly and eco-friendly systems for the wellness of the universe as a whole.

Exercises to propagate people friendly eco-friendly activities both creative and functional, Brain storming, Sharing learner‘s individual and/or group experience(s), Simulated Situations , Case studies

References and Suggested Readings:

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books,New Delhi, 2010

The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

Basham, A.L. 1954. The Wonder That Was India. London: Picador Press.

Basu, D.D. 2015. Workbook on the Constitution of India, Paperback Edition. Nagpur: Lexisnexis.

Ghosh, Sri Aurobindo. 1998. The Foundations of Indian Culture. Pondicherry: Sri Aurobindo Ashram.

Joshi, Kireet. 1997. Education for Character Development. Delhi: Dharam Hinduja Centre of Indic Studies.

Milton, Rokeach. 1973. The Nature of Human Values. New York: The Free Press.

Mookerji, Radha K. 1989. Ancient Indian Education. Delhi: Motilal Banarasidass

Saraswati, Swami Satyananda .2008. Asana Pranayama Mudra Bandha. Munger, India: Bihar School of Yoga.

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Subject Code: **HBCS22L06**	Subject Name: **PROJECT WORK**	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : : Programming Methodology, Software Engineering	**Lb**	**0**	**0**	**18**	**9**

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

OBJECTIVES

- To investigate the ability on ideas and transformations.
- To implement the technologies or its combinations.
- To analyze on modeling the concepts to bring it to real time.
- To create a database models that is going to be the store house of information.
- To develop an executable application.
- To prepare project report that is going to be the referral document for the complete project.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the concepts , use them in ideas and transform it to applications.
CO2	Implement the technology to bring a new product.
CO3	Apply different algorithms and derive coding modules for execution.
CO4	Complete knowledge of database concepts pertaining to product developed.
CO5	Illustrate the completed project as document that stands as the source of reference.

Mapping of Course Outcome with Program Outcome (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**P07**	**PO8**	**P09**
CO1	3	2	2	2	3	2	2	3	2
CO2	3	3	3	1	2	3	1	2	3
CO3	3	2	3	3	1	3	3	1	3
CO4	3	3	3	1	2	3	1	2	3
CO5	3	3	2	2	3	3	2	3	3

COs/PSOs	**PS01**	**PS02**	**PS03**	**PS04**
CO1	3	3	3	3
CO2	3	3	2	2
CO3	2	3	1	3
CO4	3	2	3	3
CO5	3	3	2	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
								√	

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PROJECT WORK **0 0 18 9**

Students will be able to develop an application in specific domains. Students are expected to carry out the following:

i. Implementing the technologies or its combinations

ii. Analysing and modeling the concepts of system engineering

iii. Generate Database Models

iv. Develop an executable application

v. Prepare project report

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Subject Code : HBCC2203	Subject Name : Research Methodology (UG)	Ty/Lb/ETP/IE	L	T/ SLr	P/ R	C
	Prerequisite : None	Ty	3	0/0	0/0	3

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

OBJECTIVES :

- Design and formulation of research problem.
- Analyze research related information and statistical methods in research.
- Carry out research problem individually in a perfect scientific method
- Understand the filing patent applications processes, Patent search, and various tools of IPR, Copyright, and Trademarks.

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1	Design and Formulation of research problem.
CO2	Analyze research related information and statistical methods in research.
CO3	Carry out research problem individually in a perfect scientific method
CO4	Understand Patent Filing application Process.
CO5	Patent Search and various tools used.

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	3	3	2	2	3	3	3	3	3	3
CO2	3	2	1	3	3	1	1	1	1	1	1	3
CO3	3	3	2	1	2	2	3	3	3	3	3	1
CO4	3	3	2	2	1	2	2	2	2	3	2	2
CO5	3	3	3	3	3	2	3	3	3	2	3	3

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
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Subject Code : HBCC22003	Subject Name : ResearchMethodology (UG)	Ty/Lb/ ETP/I E	L	T/ SLr	P/R	C
	Prerequisite : None	Ty	3	0/0	0/0	3
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

Course objective:

- Learn the meaning of interpretation, techniques of interpretation, precautions is to be taken in interpretation for research process,
- Application of statistical methods in research.
- Learn intellectual property rights and its constituents.

Unit 1

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 2

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

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 4

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 5

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.

Text Book:

1. K. S. Bordens, and B. B.Abbott, , ―Research Design and Methods – A Process Approach‖, 8th Edition, McGraw Hill, 2011.
2. C. R. Kothari, ―Research Methodology – Methods and Techniques‖, 2nd Edition, New AgeInternational Publishers

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Subject Code: **HBCS22013**	Subject Name **COMPUTER GRAPHICS**	**Ty/ Lb/ ETP /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Basic Knowledge of Multimedia	Ty	3	1	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

- 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 color models..
- 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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

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HBCS22013	**COMPUTER GRAPHICS**	**3**	**1**	**0**	**4**

UNIT I **12**

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 **12**

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 **12**

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;Visiblesurfacedetectionmethods.

UNIT IV **12**

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 colourmodel; Colour selection.

UNIT V **12**

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 no. of periods: 60

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, Pearson Education, 2010.
2. Jeffrey McConnell, ―Computer Graphics: Theory into Practice‖, Jones and Bartlett Publishers, 2006.
3. Hill F S Jr., ―Computer Graphics‖, Maxwell Macmillan‖ , 1990.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, and AK Peters, Fundamental of Computer Graphics, CRC Press, 2010.
5. William M. Newman and Robert F.Sproull, ―Principles of Interactive Computer Graphics‖, Mc GrawHill 1978.

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Subject Code: **HBCS22014**	Subject Name: **MOBILE AND WIRELESS NETWORKS**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Computer Networks	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

Objectives

- To provide an overview of Wireless Communication networks area and its applications in communication.
- Emphasizing on OSI models and MAC.
- Demonstrate basic skills of wireless standards.
- Handling mobile network issues.
- Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.

COURSE OUTCOMES (COs)

Students completing this course were able to

CO1	To understand basic computer network technology.
CO2	Understand and explain OSI models and its components.
CO3	Identify the different types of wireless standards.
CO4	Analyze the different network issues.
CO5	Understand the different mobile applications.

Mapping of Course Outcome with Program Outcome (POs)

COs /POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	2	3	2	2	2	3	3
CO2	2	2	2	3	3	3	3	2	3
CO3	1	3	2	3	2	2	3	2	2
CO4	2	2	3	3	3	2	2	3	3
CO5	3	3	3	3	2	3	3	2	3

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

HBCS22014	MOBILE AND WIRELESS NETWORKS	3	1	0	4

UNIT: I **12**

WIRELESS LAN - Introduction-WLAN technologies: Infrared, UHF narrowband, protocol architecture, physical layer, Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, MAC, Spectrum allocation for WIMAX

UNIT: II **12**

MOBILE NETWORK LAYER Introduction – Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, Mobile IP session initiation protocol – mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing.

UNIT III **12**

MAC AND COMMUNICATION SYSTEMS **:**OSI Model - Functions , Medium access control - FDMA-TDMA-CDMA. Telecommunication systems -GSM-UMTS and IMT-2000, Satellite systems - Broadcast systems - Data Digital Audio Broadcasting - Digital Video Broadcasting.

.

Unit IV **12**

MOBILE INTERNET Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile -IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service –Wireless Application Protocol.

UNIT V **12**

MOBILE NETWORK ISSUES **:**Mobile network layer - Mobile IP - Dynamic host configuration protocol - Ad hoc networks-Routing Algorithm-Mobile transport layer - Traditional TCP - Indirect TCP - Snooping TCP, Mobile TCP - Selective Retransmission - Transaction Oriented TCP.

Total no. of periods: 60

TEXT BOOKS:

1. Jochen Schiller, Mobile Communications (2nd ed.), Pearson Education.
2. Blake Wireless Communication Technology,Thomson Learning .

REFERENCE BOOK:

1. Theodore S.Rappaport (2010) Wireless Communication: Principles and practice, Prentice Hall

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Subject Code: **HBCS22015**	Subject Name: **IMAGE PROCESSING**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Programming Methodology	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

1. Learn the fundamentals of image processing.
2. Acquire skills in image enhancement techniques.
3. Learn concepts of degradation function and restoration techniques.
4. To study the image segmentation and representation techniques.
5. To become familiar with image compression and recognition methods.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understanding the basic concepts such as digitization, sampling, quantization.
CO2	Operates on image smoothing, sharpening and enhancement.
CO3	Apply the restoration concepts and filtering techniques.
CO4	Learn the basic segmentation, compression and recognition methods for color models.
CO5	Applications of image processing.

Mapping of Course Outcome with Program Outcome (POs)

COs /POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	3	3	2	2	3	3	3
CO2	2	2	3	3	3	2	3	2	3
CO3	2	3	3	2	2	3	3	1	2
CO4	3	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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
	√								

HBCS22015	IMAGE PROCESSING	3	1	0	4

UNIT: I **12**

DIGITAL IMAGE FUNDAMENTALS: 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 **12**

IMAGE ENHANCEMENT: 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 **12**

IMAGE RESTORATION: 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 **12**

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 **12**

IMAGE COMPRESSION AND RECOGNITION: 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 no. of periods: 60

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.

REFERENCE BOOKS:

1. Kenneth R. Castleman, Digital Image Processing Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB Pearson Education, Inc., 2011.
3. D, E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.

HBCS22I03	**MINI PROJECT**	**0**	**0**	**3**	**2**

Students will have an opportunity to expose their knowledge and talent to make an innovative project. Students are supposed to do innovative projects useful to industries/society in the area of relevant field, inter and multi-disciplinary areas, under the guidance of a staff member. They have to prepare a project report and submit to the department. At the end of the semester Viva-Voce examination will be conducted by the internal Examiner duly appointed by the Head of the department and the students will be evaluated.

HBCS22I04	**INTERNSHIP**	**0**	**0**	**2**	**1**

Students are supposed to undergo internship in related Industries for a minimum period of 15days 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.

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Subject Code:	**Subject Name: START UP STRATAGIES**	**Ty/Lb/ETP/IE**	**L**	**T/SLR**	**P/R**	**C**
HBCC22004	Prerequisite: Nil	Ty	3	0	0	3

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

OBJECTIVE: .
To understand new venture creation opportunities, its resources and requirements for Enterprise Start-up.

COURSE OUTCOMES(COs):The students will be able to

CO1	Develop a start-up Enterprise with Big Idea Generation.
CO2	Analyze start-up capital requirement by analyzing legal factors.
CO3	Interpret feasibility Analysis towards funding issues.
CO4	Access growth stages in new venture and reasons for scaling ventures.
CO5	Evaluate financial stability and decide on expansion possibilities.

Mapping of Course Outcomes with Program Outcomes (POs)

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

1/2/3indicatesStrength ofCorrelation1-High,2-Medium,3-Low

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
									√

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Subject Code: **HBCC22004**	Subject Name: **START UP STRATAGIES**	**Ty/Lb/ ETP/IE**	**L**	**T/S LR**	**P / R**	**C**
	Prerequisite: Nil	Ty	3	0	0	3
T/L/:Theory/Lab L:Lecture T:Tutorial P:Practical/Project R:Research C:Credits						

Unit I: Start-up opportunities: 9

The New Industrial Revolution - The Big Idea -Generate Ideas with Brainstorming- Business Start-up - Ideation- Venture Choices - The Rise of the startup Economy- The Six Forces of Change - The Start-up Equation- The Entrepreneurial Ecosystem- Entrepreneurship in India. Government Initiatives.

Unit II: Startup Capital Requirements and Legal Environment: 9

Identifying Startup capital Resources requirements- Estimating startup cash requirements- Develop financial assumptions- Constructing a Process Map- Positioning the venture in the value chain- Launch strategy to reduce risks- Startup financing metrics- The Legal Environment- Approval for New Ventures- Taxes or duties payable for new ventures.

Unit III: Startup Financial Issues: Feasibility Analysis- 9

The cost and process of raising capital- Unique funding issues of a high- tech ventures – Funding with Equity- Financing with Debt- Funding Startup with bootstrapping- crowd funding- strategic alliances.

Unit IV: Startup survival and Growth: 9

Stages of growth in a new venture- Growing with the market- Growth within the industry- Venture life patterns- Reasons for new venture failures- preparing for change- Leadership succession. Support for the growth and sustainability of the venture.

Unit V: Planning for Harvest and Exit: 9

Dealing with Failure: Bankruptcy, Exit Strategies- Selling the Business- Cashing out but staying in being- Going Public (IPO)- Liquidation.

Total no. of periods: 45

Reference Books:

1. Kathleen R Allen, Launching New Ventures, An Entrepreneurial Approach, Cengage Learning 2016.
2. Anjan Raichaudhuri, Managing New Venture Concepts and Cases, Prentice Hall International 2010.
3. S. R. Bhowmika& M. Bhowmik, Entrepreneurship, New Age International, 2007.
4. Steven Fisher, Ja-nae Duane, The Startup Equation- A Visual Guidebook for Building your Startup, Indian Edition, Mc Graw Hill Education India Pvt. Ltd, 2016.
5. Donald F Kuratko, Jeffrey S. Hornsby, New Venture Management: The Entrepreneur‘s Road Map, 2e, Routledge,2017.
6. Vijay Sathe, Corporate Entrepreneurship, le, Cambridge, 2009

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Subject Code: **HBCC22005**	Subject Name : **PRINCIPLES OF DIGITAL MARKETING**	**Ty/ Lb/ ETL/IE**	**L**	**T/ S.Lr**	**P/R**	**C**
	Prerequisite: Nil	Ty	3	0/0	0/0	3

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

OBJECTIVES :

- This course helps the students to understand the fundamental principles of Digital marketing, the past, present and future potential of Digital marketing.
- At the end of the course students will be able to identify the role of e-marketing in the present context and develop an e-marketing plan with appropriate e-marketing strategies.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Understand the concepts and uses of Digital Marketing
CO2	Develop Strategic Planning for the Market
CO3	Evaluate the Ethical and Legal Values
CO4	Predict the Marketing Trends

Mapping of Course Outcomes with Program Outcomes (POs)

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
									√

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Course Code: HBCC22005	Course Title	Ty/ Lb/ ETP/IE	L	T/ S.Lr	P/R	C
	PRINCIPLES OF DIGITAL MARKETING	Ty	3	0/0	0/0	3

OBJECTIVES:

- This course helps the students to understand the fundamental principles of Digital marketing, the past, present and future potential of Digital marketing.
- At the end of the course students will be able to identify the role of e-marketing in the present context and develop an e-marketing plan with appropriate e-marketing strategies.

UNIT I: INTRODUCTION **9**

Digital-Marketing Past, Present & Future – Digital-Marketing Landscape, Digital-marketing's Past - Web 1.0, Digital Marketing Present - Web 2.0, Future -Web 3.0, Strategic Digital-Marketing, and Digital -Business Models – Online Revenue Models, Value Models, and Strategic Digital-Business Models.

UNIT II: DIGITAL MARKETING PLAN **9**

Process, Creating a Digital-Marketing Plan, Seven Steps –Situation Analysis, Strategic Planning, Objectives, Digital-Marketing Strategies – Product, Price, Distribution, Communication, Relationship Management; Implementation plan, Budget, Evaluation.

UNIT III: DIGITAL -MARKETING ENVIRON MENT **9**

Overview of Digital-Marketing Environment, Global Digital -Markets, Wireless Internet Access, Digital divide, Building inclusive Digital markets, social networking, Ethical and Legal Issues – Overview, Digital Property, Emerging issues.

UNIT IV: DIGITAL-MARKETING MANAGEMENT **9**

Online offer – Creating customer value online, Product Benefits, Digital Marketing enhanced product development, Payment options, Pricing Strategies; Internet as distribution, Digital Marketing Communication – Owned Media, Paid media, Earned Media.

UNIT V: EMERGING TRENDS **9**

Emerging trends in Digital-marketing, Content Marketing, Social Media Marketing, Email Marketing, Affiliate Marketing, Video Marketing, Mobile Marketing, Interactive advertising, International Online Marketing, Search Engine Marketing, Online Partnership, Viral Marketing, E-CRM, E-Business, E-Tailing.

Total no. of periods: 45

TEXT BOOK:

1. Strauss Judy, Frost Raymond (2013), E-Marketing, 7/e; New Delhi: Prentice Hall.

REFERENCE BOOKS:

1. Chaffey Dave and Smith PR (2013), Emarketing Excellence: Planning and Optimizing your Digital Marketing; 4/e; Routledge.
2. Ryan Damian, (2014), Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, 3/e; Kogan Page Limited.

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SubjectCode: HBCC22006	**SubjectName: INTELLECTUAL PROPERTY RIGHTS AND PATENT**	**Ty/Lb/ ETP/IE**	**L**	**T/SLR**	**P/R**	**C**
	Prerequisite: Nil	Ty	3	0	0	3
T/L/:Theory/Lab L:Lecture T:Tutorial P:Practical/ProjectR:Research C:Credits						

OBJECTIVE: .
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.

COURSEOUTCOMES(COs):The students will be able to	
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 Copyright 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**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	2	2	3	3	2	2			
CO2	3	3	1	2	3	2	2	2	3			
CO3	3	3	2	2	3	3	2	3	2			
CO4	3	3	2	3	2	2	2	1	2			
CO5	3	2	1	2	2	2	3	2	2			

1/2/3indicatesStrength ofCorrelation1-High,2-Medium,3-Low

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
									√

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Subject Code: HBCC22006	**Subject Name: INTELLECTUAL PROPERTY RIGHTS AND PATENT**	**Ty/Lb/ ETP/IE**	**L**	**T/S Lr**	**P/R**	**C**
	Prerequisite: Nil	Ty	3	0	0	3
T/L/:Theory/Lab L:Lecture T:Tutorial P:Practical/ProjectR:Research C:Credits						

UNIT – I: 9

Introduction to IPRs, Basic concepts and need for Intellectual Property – Meaning and practical aspects of Patents, Copyrights, 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, biopiracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IP Laws, 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 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 copy rights, intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies .

Total no. of periods: 45

Text book:

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 Mc Graw Hill, 2001. Steve Smith, The Quality Revolution.1st ed., Jaico Publishing House, 2002.
2. Kompal Bansal and Praishit Bansal. Fundamentals of IPR for Engineers, 1st Edition, BS Publications, 2012.
3.Prabhuddha Ganguli. Intellectual Property Rights. 1st Edition, TMH, 2012.
4.R Radha Krishnan & S Balasubramanian. Intellectual Property Rights. 1st Edition, Excel Books, 2012.
5. M Ashok Kumar & Mohd. Iqbal Ali. Intellectual Property Rights. 2nd Edition, Serial Publications, 2011. VinodV. Scople, Managing Intellectual Property. Prentice Hall of India PvtLtd, 2012.
6.Deborah E. Bouchoux. Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets. Cengage Learning, 3rd ed. Edition, 2012.
7. Prabuddha Ganguli. Intellectual Property Rights: Unleashing the Knowledge Economy. McGraw Hill Education, 2011. Edited by Derek Bosworth and Elizabeth Webster.The Management of Intellectual Property. Edward Elgar Publishing Ltd., 2013.
8.Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
9.Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House

E-resources:

1. Subramanian, N., & 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 Organisation. (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 Organisation (https://www.wipo.int/about-ip/en/)
3. Office of the Controller General of Patents, Designs & Trademarks (http://www.ipindia.nic.in/)

HBCS22L07	**MAJOR PROJECT**	**0**	**0**	**12**	**6**

To make the students to make use of the knowledge and skill developed during their four 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 bonafide certificate.

HBCS22I05	**RESEARCH PUBLICATION**	**0**	**0**	**3**	**2**

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: **HBCS22E01**	Subject Name: **MOBILE APPLICATION DEVELOPMENT**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Programming Methodology	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

- Interpret features of mobile operating system.
- Configure Android environment and development tools.
- Study on User Interface by using Menus and Layouts.
- Knowledge on Adaptor, Views and services.
- Develop and publish Android Applications.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Knowledge on platform to develop application
CO2	Familiarize on fundamental concepts of Android.
CO3	Learn the concepts of UI Widgets.
CO4	Apply the concepts of Activity, Menu and Layout.
CO5	Demonstrate on Adaptor and Android Service.

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	3	2	3	2	2	2	3	2	3
CO3	2	3	2	2	2	3	3	1	2
CO4	2	2	3	1	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	2
CO3	2	2	3
CO4	3	3	2
CO5	3	3	3

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E01	MOBILE APPLICATION DEVELOPMENT	3	0	0	3

UNIT I **9**

Introduction to Mac, XCode, Objective C- Mobile Devices Profiles - Mobile Software - Options for Development - Operating System- Windows - IOS- Android. Service Oriented Computing- SOC Architecture - Examples- Google Maps- Amazon Web Services.

UNIT II **9**

Android – History and Version – Installation – Setup Eclipse – Sample Program – Internal Details – Software stack – Android Core Building Blocks – Android Emulator – Android Manifest.xml – R.java file – Screen Orientation.

UNIT III **9**

Working with Button – Toast – Custom Toast – Button – Toggle Button – Switch Button – Image Button – Check Box – Alert Dialog – Spinner – Auto Complete Text View – Rating Bar – Date & Time Picker – Progress Bar – File Download.

UNIT IV **9**

Activity Lifecycle – Activity Example – Implicit Intent – Explicit Intent – Fragment Lifecycle – Fragment Example – Dynamic Fragment. Android Menu: Option Menu – Context Menu – Popup Menu.

UNIT V **9**

Layout Manager: Relative Layout – Linear Layout – Table Layout – Grid Layout. Adaptor: Array Adaptor – Array List Adaptor – Base Adaptor. View: Grid View – Web View – Search View – Dynamic List View – Expanded List View. Android Service Life Cycle – Android Service Example.

Total no. of periods: 45

TEXT BOOKS:

1. Ed Burnette (2009) Hello, Android: Introducing Google's Mobile Development Platform, Pragmatic Bookshelf 2. Marko Gargenta (2011) Learning Android, O'Reilly Media.
2. Rick Boyer, 2018, ―Android 9 Development CookBook‖, Third Edition, Pact Publishing Ltd.

REFERENCES:

1. John Horton, 2018, ―Android Programming for Beginners‖, Second Edition, Packet Publication.
2. Richard Rodger (2012) Beginning Mobile application development in the cloud, Wrox Publication.
3. Erik Hellmen, 2013, ―Android Programming: Pushing the Limits‖, First Edition, John Wiley & Sons Publication.

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Subject Code: **HBCS22E02**	Subject Name: **MOBILE COMPUTING**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Computer Networks	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 understand the concepts of mobile computing and familiar with the network protocol stack
- To be exposed to Ad-Hoc networks Gain knowledge about different mobile platforms and application development.
- Exploring the task list required to configure mobile IP and getting familiar with the networking operating system commands required to configure mobile IP
- Developing mobile apps using Android web APIs, location based services APIs.
- To study about various application languages and mobile application development platforms

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	To explain the basics of mobile telecommunication system.
CO2	To choose the required functionality at each layer for given application.
CO3	To Use simulator tools and design Ad hoc networks and develop a mobile application.
CO4	To Analyze various protocols of all layers for mobile and ad-hoc wireless communication networks
CO5	To understand IP and TCP layers of Mobile Communication.

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	1	2	2	3
CO2	2	3	3	2	2	2	3	2	2
CO3	3	3	2	2	3	3	2	1	2
CO4	2	2	3	3	3	3	2	2	3
CO5	3	3	2	2	2	3	2	2	3

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	3
CO2	2	2	2
CO3	3	2	2
CO4	3	3	3
CO5	3	2	1

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E02	MOBILE COMPUTING	3	0	0	3

UNIT I **9**

Introduction- Mobile Computing Vs wireless Networking –- Mobile System Networks - Mobile Computing Architecture, Mobile Devices ,–Characteristics of Mobile computing – Structure of Mobile Computing Application. Data Dissemination - Mobility Management -MAC Protocols

UNIT II **9**

Mobile Internet Protocol and Transport Layer-Overview of Mobile IP – Features – Key Mechanism – route Optimization- Overview of TCP/IP-Architecture - Adaptation of TCP Window – Improvement in TCP Performance- Tunneling and Encapsulation - Route Optimization - Mobile TCP

UNIT III **9**

GSM and Similar Architectures : GSM Services and System Architecture - Radio Interfaces - Protocols - Localization - Calling - Handover - Security - New Data Devices - General Packet Radio Service - High Speed Circuit Switched Data— Universal Mobile Tele communication System (UMTS),Introduction to CDMA –based Systems – Spread spectrum in CDMA Systems – coding methods in CDMA .

UNIT IV **9**

Mobile Ad-Hoc Networks:-Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET –Mobile Agent - Application Server - Gateways - Portals - Service Discovery - Device Management - Mobile File Systems - Security

UNIT V **9**

Mobile Operating Systems : Operating System - Palm OS - Windows CE - Symbian OS - Linux for Mobile Devices. Mobile Platforms and Applications – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure– Pros & Cons – Mobile Payment System – Security Issues.

Total no. of periods: 45

TEXTBOOKS:

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.

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.

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Subject Code: **HBCS22E03**	**Subject Name: DESIGN AND ANALYSIS OF ALGORITHMS**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Programming Methodology	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 understand and apply the algorithm analysis techniques.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To understand different algorithm design techniques.
- To understand the limitations of Algorithmic power.
- To gain knowledge of Backtracking problems.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Design algorithms for various computing problems.
CO2	Analyze the time and space complexity of algorithms.
CO3	Critically analyze the different algorithm design techniques for a given problem.
CO4	Modify existing algorithms to improve efficiency.
CO5	Understanding the subsets problems.

Mapping of Course Outcome with Program Outcome (POs)

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

COs / PSOs	PSO1	PSO2	PSO3
CO1	3	2	3
CO2	2	3	2
CO3	2	2	3
CO4	3	1	2
CO5	2	2	2

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E03	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3

UNIT I **9**

Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity-Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap - Heapsort- Graph.

UNIT II **9**

Basic Traversal and Search Techniques: Techniques for Binary Trees-Techniques for Graphs -Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort - Bubble sort.

UNIT III **9**

The Greedy Method: - General Method – Knapsack Problem – Minimum Cost Spanning Tree – Single Source Shortest Path- Optimal Merge pattern - Huffman Trees.

UNIT IV: **9**

Dynamic Programming - General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.

UNIT V **9**

Backtracking: - General Method – 8-Queens Problem – Sum Of Subsets – Graph Coloring – Hamiltonian Cycles – Branch and Bound: - The Method – Traveling Salesperson.

Total no. of periods: 45

TEXT BOOKS:

1. Ellis Horowitz, ―Computer Algorithms‖, Galgotia Publications.
2. Alfred V.Aho,John E.Hopcroft,Jeffrey D.Ullman, "Data Structures and Algorithms".

REFERENCE BOOK:

1. Goodrich, ―Data Structures & Algorithms in Java‖, Wiley 3rd edition.
2. Skiena,‖The Algorithm Design Manual‖,Second Edition,Springer , 2008

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PROGRAMME ELECTIVE II

Subject Code: **HBCS22E04**	Subject Name: **SOFTWARE TESTING AND QUALITY ASSURANCE**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Software Engineering	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

- Understand the basic tenets of software quality and quality factors.
- Be exposed to the Software Quality Assurance (SQA) architecture and the details of SQA Components.
- Understand of how the SQA components can be integrated into the project life cycle.
- Be familiar with the software quality infrastructure.
- Be exposed to the management components of software quality

COURSE OUTCOMES (COs)

Students completing this course were able to

CO1	Utilize the concepts in software development life cycle.
CO2	Demonstrate their capability to adopt quality standards.
CO3	Assess the quality of software product.
CO4	Apply the concepts in preparing the quality plan & documents.
CO5	Demonstrate the quality management, assurance, and quality standard to software system.

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	3	2	3	3
CO2	2	2	3	3	2	3	2	3	3
CO3	3	3	2	2	3	2	3	2	2
CO4	2	2	3	3	2	3	2	3	3
CO5	3	3	2	2	3	2	3	2	2

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E04	SOFTWARE TESTING AND QUALITY ASSURANCE	3	0	0	3

UNIT I **9**

Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall's quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans.

UNIT II **9**

Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management.

UNIT III **9**

Procedures and work instructions - Templates - Checklists – 3S development - Staff training and certification Corrective and preventive actions – Configuration management – Software change control
– Configuration management audit -Documentation control – Storage and retrieval.

UNIT IV **9**

Project process control – Computerized tools - Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.

UNIT V **9**

Quality management standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies - Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities – SQA units and other actors in SQA systems.

Total no. of periods: 45

TEXT BOOK:

1. Daniel Galin, ―Software Quality Assurance‖, Pearson Publication, 2009.

REFERENCES:

1. Alan C. Gillies, ―Software Quality: Theory and Management‖, International Thomson Computer Press, 1997.
2. Mordechai Ben-Menachem ―Software Quality: Producing Practical Consistent Software‖, International Thompson Computer Press, 1997.

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Subject Code: **HBCS22E05**	Subject Name: **CRYPTOGRAPHY & NETWORK SECURITY**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Computer Networks	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 understand basics of Cryptography and Network Security.
- To know about various encryption techniques.
- To understand the concept of public key cryptography.
- To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
- To understand various protocols for network security to protect against the threats in the networks.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Understand the fundamentals of networks security and cryptography concepts.
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms.
CO3	Apply the different cryptographic operations of public key cryptography.
CO4	Apply the various Authentication schemes to simulate different applications.
CO5	Understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

Mapping of Course Outcome with Program Outcome (POs)

COs /POs	**PO 1**	**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	2	2
CO4	2	2	3	3	3	1	2	2	3
CO5	3	3	2	3	2	1	3	2	3

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E05	CRYPTOGRAPHY & NETWORK SECURITY	3	0	0	3

UNIT I **9**

Security Concepts: Introduction, The need for security, Security approaches, services and mechanism- Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key, stenography.

UNIT II **9**

SYMMETRIC CRYPTOGRAPHY-How Does Symmetric Encryption Work? Stream ciphers, Block ciphers, **Encryption Algorithms-** AES, DES, IDEA, Blowfish, RC4, RC5-Advantages and Disadvantages.

UNIT III **9**

ASSYMMETRIC CRYPTOGRAPHY- Principles of public key crypto systems - RSA algorithm- RSA Security - Key management- Diffie Hellman key exchange algorithm- Knapsack Algorithm– Advantages and Disadvantages - Difference between Symmetric and Asymmetric Encryption.

UNIT IV **9**

MESSAGE AUTHENTICATION AND INTEGRITY- Authentication requirements, Functions, Message authentication codes - MAC – Hash function – Security of hash function and MAC – Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm.

UNIT V **9**

Web and System Security – Web security: Electronic Mail security – PGP, S/MIME – IP security, Secure socket layer and transport layer security – System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.

Total no. of periods: 45

TEXT BOOKS :

1. Stallings William, ―Cryptography and Network Security‖ - Principles and Practice | Seventh Edition | By Pearson, June 2017

2. William Stallings, ―Crpyptography and Network security Principles and Practices‖, Pearson/PHI.

REFERENCES:

1. Wade Trappe, Lawrence C Washington, ―Introduction to Cryptography with coding theory‖, Pearson.
2. W. Mao, ―Modern Cryptography – Theory and Practice‖, Pearson Education.

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Subject Code: **HBCS22E06**	Subject Name: **BIG DATA ANALYTICS**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.L r**	**P/R**	**C**
	Prerequisite : Database Management 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

To know the fundamental concepts of big data and analytics.
• To explore tools and practices for working with big data
• To learn about stream computing.
• To know about the research that requires the integration of large amounts of data.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Work with big data tools and its analysis techniques.
CO2	Analyze data by utilizing clustering and classification algorithms
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data
CO4	Perform analytics on data streams.
CO5	Learn NoSQL databases and management.

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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E06	BIG DATA ANALYTICS	3	0	0	3

UNIT I **9**

INTRODUCTION TO BIG DATA Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - Big Data Use Cases- Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High-Performance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model

UNIT II **9**

CLUSTERING AND CLASSIFICATION Overview of Clustering - K-means - Use Cases - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Algorithms - Evaluation - Decision Trees in R - Naïve Bayes - Bayes_ Theorem - Naïve Bayes Classifier.

UNIT III **9**

ASSOCIATION AND RECOMMENDATION SYSTEM Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Recommendation System: Collaborative - Content Based - Knowledge Based - Hybrid Recommendation Approaches.

UNIT IV **9**

STREAM MEMORY Introduction - Stream Data Model and Architecture - Stream Computing, Sampling Data – Filtering – Counting Distinct Elements – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies.

UNIT V **9**

NO SQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION No SQL Databases : Schema-less Models‖: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding –- Hbase –case studies.

Total no. of periods: 45

TEXT BOOKS:

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2018.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

REFERENCES:

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.

PROGRAMME ELECTIVE III

Subject Code: **HBCS22E07**	Subject Name: **MACHINE LEARNING**	**TY/ LB/ ETP /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite :Basic Knowledge of Electronics	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 understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
- To understand the latest trends in machine learning
- To design appropriate machine learning algorithms for problem solving

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Differentiate between supervised, unsupervised, semi-supervised machine learning approaches
CO2	Discuss the decision tree algorithm and indentity and overcome the problem of overfitting
CO3	Discuss and apply the back propagation algorithm and genetic algorithms to various problems
CO4	Apply the Bayesian concepts to machine learning
CO5	Analyse and suggest appropriate machine learning approaches for various types of problems

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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E07	MACHINE LEARNING	3	0	0	3

UNIT I
INTRODUCTION **9**
Introduction to ML- Reinforcement Learning- Unsupervised Learning- Supervised Learning- Linear Regression- Multivariate Regression- Partial Least Squares- Linear Discriminant Analysis

UNIT II **9**
NEURAL NETWORKS AND GENETIC ALGORITHMS : What is Neural Networks? Human Brain- Models of a Neuron -Neural Networks viewed as Directed Graphs- Network Architectures- Learning Processes - Reinforcement Learning and Unsupervised Learning- Learning Tasks

UNIT III **9**
BAYESIAN AND COMPUTATIONAL LEARNING
Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV **9**
INSTANT BASED LEARNING
K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning. Decision Trees – Univariate Trees, Classification Tree, Regression Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data, Multivariate Trees

UNIT V **9**
SUPPORT VECTOR MACHINES
Introduction, Optimal Hyper-plane for Linearly Separable Patterns and Non-separable Patterns- SVM viewed as a Kernel Machine- Design of SVMs-XOR problem-Linear Classifiers: Introduction- Linear Discriminant Functions and Decisions -Hyper-planes- The Perceptron algorithm- Least Square Methods- Nonlinear Classifiers.

Total no. of periods: 45

TEXT BOOK :

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES :

1. Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009. Edition, Pearson Education, 2004.

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Subject Code: **HBCS22E08**	Subject Name: **INTERNET OF THINGS**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Basic Knowledge of Electronics	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

- About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain.
- Enable students to learn the Architecture of IoT and IoT Technologies
- To learn how to analysis the data in IoT.
- Developing IoT applications and Security in IoT, Basic Electronics for IoT, Sensors and Actuators

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	To understand the fundamentals of Internet of Things.
CO2	Understand basic electronics used in IoT & its role
CO3	Analyzing and evaluate the data received through sensors in IOT
CO4	To know the basics of communication protocols and the designing principles of Web connectivity.
CO5	To gain the knowledge of Internet connectivity principles

Mapping of Course Outcome with Program Outcome (POs)

COs /PSOs	**PO 1**	**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	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

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HBCS22E08	**INTERNET OF THINGS**	**3**	**0**	**0**	**3**

UNIT I **9**

FUNDAMENTALS OF IOT - Introduction : Definition & Characteristics - physical design - logical design- Architecture – IoT levels & Deployment templates - Technologies – Applications of IoT – Industrial IoT – Security in IoT

UNIT II **9**

BASIC ELECTRONICS – IOT AND M2M - Current and Voltage – Binary Calculations – Logic Chips – Microcontrollers – Multipurpose Computers – Electronic Signals – A/D and D/A Conversion IoT and M2M - Difference between Iot and M2M - SDN and NFV for lot - IoT systems management

UNIT III **9**

IOT SPECIFICATION - purpose and specification - Process - Domain model - Information model - Service - IoT level - Functional view - Operational view - Device and component Integrators - Application Development.

UNIT IV **9**

SENSORS AND ACTUATORS - Analog and Digital Sensors – Interfacing temperature sensor - Ultrasound - Sensor and Infrared (IR) Sensor with Arduino – Interfacing LED and Buzzer with Arduino - Understanding the Outputs through Actuators - Activating LED Lights - Activating Relays - Running DC Motors

UNIT V **9**

IOT AND CLOUD COMPUTING - IOT physical servers & cloud computing - WAMP - Comparison of Internet of Things and Cloud Computing - Xively cloud for IoT - python Web application frame work - Amazon web services for IoT.

Total no. of periods: 45

TEXT BOOKS:

1) Internet of Things - Srinivasa K.G., Siddesh G.M. Hanumantha Raju R. Publisher: Cengage Learning India pvt. Ltd (2018)

2) Internet of Things - A hands on Approach Authors: Arshdeep Bahga, Vijay Madisetti Publisher: Universities press

REFERENCE BOOKS:

1) Boris Adryan, Dominik Obermaier, Paul Fremantle, ―The Technical Foundations of IoT‖, Artech Houser Publishers, 2017.

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Subject Code: **HBCS22E09**	Subject Name: **ARTIFICIAL INTELLIGENCE**	**Ty/ Lb/ ETL /IE**	**L**	**T / S.Lr**	**P/ R**	**C**
	Prerequisite : Basic Knowledge of Electronics	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 learn the overview of artificial intelligence principles and approaches.
- To understand about fundamental areas of Local Search Algorithms, Adversarial Searching and Neural Networks.
- Represent knowledge using logic and infer new facts from that Knowledge.
- To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents.
- To understand the various Artificial Intelligence application.

COURSE OUTCOMES (COs)
Students completing this course were able to

CO1	Artificial intelligence principle and approaches.
CO2	Be familiar with various algorithms and searching techniques.
CO3	Knowledge representation.
CO4	Dealing with uncertainties and inconsistencies.
CO5	AI application.

Mapping of Course Outcome with Program Outcome (POs)

COs /POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	3	2	3	2	2	3	3	2	3
CO2	2	2	2	3	2	3	2	2	3
CO3	1	3	3	2	2	3	3	1	3
CO4	2	3	2	2	3	2	3	2	3
CO5	3	2	2	2	1	3	2	3	3

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

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

Category	Program Core	Program Elective	Humanities and Social Science	Open Elective	Skill Enhancing Elective	Inter Disciplinary/ Allied	Skill Component	Practical / Project / Internship	Others
		√							

HBCS22E09	ARTIFICIAL INTELLIGENCE	3	0	0	3

UNIT-I **9**

Introduction to Artificial Intelligence - Definition – Future of Artificial Intelligence -Background and Applications-Turing Test and Rational Agent approaches to AI - Introduction to Intelligent Agents- their structure, behaviour and environment.

UNIT – II **9**

Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – hill climbing algorithm– means end analysis – Adversarial search– Alpha – Beta Pruning.

UNIT-III **9**

Introduction to First Order Predicate Logic- Prolog Programming – Unification- Resolution Principle-forward and backward chaining- Semantic Nets- Conceptual Dependencies- Frames – Scripts- Production Rules.

UNIT- IV **9**

Truth Maintenance System -Default Reasoning- Probabilistic Reasoning- Bayesian Probabilistic Inference- Possible World Representations- Software Agents – Architecture for Intelligent Agents – Agent Communication.

UNIT – V **9**

AI Applications – Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot : Hardware – Perception – Planning – Moving.

Total no. of periods: 45

TEXT BOOKS:

1. Deepak Khemani ―Artificial Intelligence‖, Tata Mc Graw Hill Education 2013.
2. Bratko, ―Prolog: Programming for Artificial Intelligence‖, Fourth edition, AddisonWesley Educational Publishers Inc., 2011.

REFERENCE BOOKS:

1. S. Russell and P. Norvig, ―Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition 2009.
2. M. Tim Jones, ―Artificial Intelligence: A Systems Approach (Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008

Foreign Language

Foreign language is introduced in the curriculum to make the students globally employable.
Students should select and register for any one of the foreign languages from the given list.
At the end of the course students should be able to read, write and converse the language in the basic level.
At the end of the semester the assessment will be done through internal examination by the examiner duly appointed by the head of the department.

S.NO	COURSE CODE	COURSE NAME
1	EBFL22I01/HBFL22I01	FRENCH
2	EBFL22I02/ HBFL22I02	GERMAN
3	EBFL22I03/ HBFL22I03	JAPANESE
4	EBFL22I04/ HBFL22I04	ARABIC
5	EBFL22I05/ HBFL22I05	CHINESE
6	EBFL22I06/HBFL22I06	RUSSIAN
7	EBFL22I07/HBFL22I07	SPANISH

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OPEN ELECTIVES

Subject Code: **HBCS22OE1**	Subject Name: **OFFICE AUTOMATION**	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite :**Nil**	**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 train them to work on the comment based activities in MS-office system.
- To perform documentation.
- To perform accounting operations.
- To perform presentation skills.
- Students will be able to create various documents newsletters, brochures, making document using photographs, charts, presentation, documents, drawings and other graphic images.

COURSE OUTCOMES (Cos)
Students completing this course were able to

CO1	Know the basics of computers and prepare documents, spreadsheets, make small presentations with audio, video and graphs and would be acquainted with internet.
CO2	Create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker.
CO3	Attain the knowledge about spreadsheet with formula, macros spell checker etc.
CO4	Construct formulas, including the use of built-in functions, and relative and absolute references.
CO5	Work with the basic features of PowerPoint.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

Category	Program Core	Program elective	Humanities and social Science	Open Elective	Skill enhancing elective	Inter Disciplinary/Allied	Skill Component	Practical /Project/internship	Others
				√					

Subject Code: **HBCS22OE1**	Subject Name: **OFFICE AUTOMATION**	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
		Ty	**3**	**0/0**	**0/0**	**3**

UNIT: I

Introduction to MS-Word: **9**

Starting Word, Typing and saving your Masterpiece, printing Title Bar, Toolbars, The Ruler, Insertion point, Scroll Bars, The Menu bar, The status bar. Dialog Boxes: Command buttons, check boxes, drop-down lists, tabs, radio buttons, Increment buttons, Wizards and Templates. Basic Text Editing: Moving around in a document, Adding Text, Cut, Copy, Paste, Undo, Redo and Delete.

UNIT: II **9**

Formatting: Character formatting, Font dialog box paragraph Formatting, Keeping text together, Adding borders and shading, Using tabs, page and section formatting, setting page margins, numbering pages. Searching and Proofreading Tools: Find and replace, Searching for special character, Proofreading tools, Choosing custom dictionary, Checking Grammar, Choosing a writing style, Using the Thesaurus

UNIT: III **9**

Working with Tables and Columns: Anatomy of a Table, creating a table, entering text in a table, Using table tools, Changing columns widths with Auto fit, Gridlines, Merging Cells, Formatting Sorting tables, copying tables, deleting tables, Printing of Documents, Mail merge.

UNIT: IV **9**

Introduction to Ms-Excel: Spreadsheet overview, Excel highlights, starting excel, creating spreadsheet excel menu , Working with Formulas and Functions, Introduction, Using basic formulas, advance formulas, designing formulas. Using basic and advance functions, Formatting: Types of formatting Using borders, color and patterns, Conditional format, Creating and Formatting Charts: Introduction to charts. Creating charts, formatting charts, exploring charts.

UNIT: V **9**

Introduction to Power point - Creating a Presentation with Microsoft PowerPoint, Modifying a Presentation, Inserting Objects into a Presentation, Finishing a Presentation, Working with Advanced Tools and Masters, Enhancing Charts, Inserting Illustrations, Objects and Media Clips, Using Advanced Features. **Introduction to Access**: Introduction to database, Database basics, Creating and working with the database, Finding, filtering and formatting data.

Total No of Periods : 45

Reference Books:

1. TEACH YOURSELF OFFICE 97/2000 FOR WINDOWS BY COREY SANDLER, TAM BADGETT, JAN WEINGARTEN (BPB)
2. MICROSOFT OFFICE 2000 BY COMPLETE (BPB)
3. MASTERING WORD 2000 BY MANSFIELD (BPB)
4. ESSENTIAL MS-WORD 2000 B MARMEL (BPB)
5. TEACH YOURSELF MS-EXCEL 2000 IN 24 HOURS (BPB)
6. TEACH YOURSELF MS-EXCEL 2000 PROGRAMMING IN 21 DAYS (BPB)

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Subject Code: **HBCS22OE2**	Subject Name: **FUNDAMENTALS OF COMPUTER AND INTERNET**	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
	Prerequisite: Nil	**Ty**	**3**	**0/0**	**0/0**	**3**

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C: Credits

TY/LB/E

TL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To understand the general scope of the computer system fundamentally.
- To interact effectively with the computer.
- To know the uses of the basic components of the computer.
- To learn the fundamentals of Computer Networks and Internet.
- To have knowledge about computer applications and security.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the basic concept of computers and their classifications
CO2	Identify and analyze computer hardware components
CO3	Identify and analyze computer software and retrieve information and create reports from databases.
CO4	Use network components and design basic business web pages using current HTML/CSS coding standards.
CO5	Analyze techniques and applications to determine effective ways of securing, managing and transferring data.

Mapping of Course Outcome with Program Outcome (POs)

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

COs /PSOs	**PSO1**	**PSO2**	**PSO3**
CO1	3	1	3
CO2	2	3	1
CO3	3	2	1
CO4	2	3	2
CO5	3	2	3

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

Category	Program Core	Program elective	Humanities and social Science	Open Elective	Skill enhancing elective	Inter Disciplinary/Allied	Skill Component	Practical /Project/internship	Others
				√					

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Subject Code: **HBCS22OE2**	Subject Name: **FUNDAMENTALS OF COMPUTER AND INTERNET**	Ty/ Lb/ ETL	L	T / S.Lr	P/R	C
		Ty	**3**	**0/0**	**0/0**	**3**

UNIT: I **9**

Introduction to Computers – Basic Computer Architecture - Generation of Computers - Classification of Digital Computer - Anatomy of Digital Computer - Computer types - Basic Applications of Computer - Components of Computer System.

UNIT: II **9**

Introduction to Computer Hardware: Mother board – Processor - Main Memory - Cache Memory - Secondary Storage Devices - Input Devices - Output Devices – Registers – Types of Registers - Instruction and Instruction Sequencing – Instruction Sets.

UNIT: III **9**

Introduction to Computer Software: Programming Languages: Low-Level Language - Assembly Language - Middle Level Language and High Level Language – Compiler – Interpreter – Assembler - Difference between Compiler & Interpreter - Operating Systems - Introduction to Database Management System.

UNIT: IV **9**

Introduction to Computer Networks and Internets: Basic of Computer Networks - WWW and Internet - Search Engines - Understanding URL - Basics of E-Mail - Using E-Mails - Web Design.

UNIT: V **9**

Introduction to Computer applications and Security: Computers at Home, Education, Entertainment, Science, Medicine and Engineering - Introduction to Computer Security - Computer Viruses, Bombs, Worms.

Total No of Periods : 45

TEXT BOOK:

1. Fundamentals of Information Technology, Alexis Leon And Mathews Leon, Vikas Publishing House Pvt. Ltd, 2nd Edition, 2009

REFERENCE BOOKS:

1. Fundamentals of Computers and Information Technology, M.N Doja, 2005.

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Subject Code:	Subject Name: **MULTIMEDIA LAB**	Ty/Lb / ETL	L	T / S.Lr	P/R	C
HBCS22OL1	Prerequisite :**Nil**	**Lb**	**0**	**0/0**	**3/0**	**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 the basics and Fundamentals of Multimedia.
- To introduce Multimedia components and Tools.
- To Learn the various photo editing features and animation techniques
- To learn creative software like photoshop and animation

COURSE OUTCOMES (COs) Students completing this course were able to

CO1	Understand multimedia components using various tools and techniques.
CO2	Apply different effects on image using software like Photoshop.
CO3	*Understand the fundamentals of animation, virtual reality and its related technologies.*
CO4	Apply different types of animations like motion twinning, shape morphing etc by using animation software like Flash.
CO5	Analyze and comprehend multimedia information

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

Category	Program Core	Program elective	Humanities and social Science	Open Elective	Skill enhancing elective	Inter Disciplinary/ Allied	Skill Component	Practical /Project/internship	Others
				√					

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Subject Code:	Subject Name: **MULTIMEDIA LAB**	Ty/Lb / ETL	L	T / S.Lr	P/R	C
HBCS22OL1		**Lb**	**0**	**0/0**	**3/0**	**2**

PHOTOSHOP

1. Cropping an object from an image.
2. Design a photo frame using custom shapes in Photoshop.
3. Enhancing portraits – Removing RED EYE.
4. Convert a given color photo into black and white.
5. Removing background of an image and turn into transparent image.
6. Explain the procedure to Creating a Cover Page for a text book

FLASH

1. Create an animation text breaking and adding.
2. Design a greeting card with animation.
3. Create an animation to represent the growing moon.
4. Create an animation to indicate a ball bouncing on steps.

Total No. of periods:45