FORM NO.F/CDD/004
Rev.00 Date 20.03.2020

FACULTY OF COMPUTER APPLICATIONS

LEARNING OUTCOME BASED CURRICULUM

Curriculum and Syllabus

BCA

REGULATION 2022
(for students admitted in the year 2023-24 onwards)

DEPARTMENT OF COMPUTER APPLICATIONS

FACULTY OF COMPUTER APPLICATIONS

VISION / MISSION / QUALITY POLICY

Vision

- To become a leading centre for computer applications, fostering an environment of constant learning and innovation.

Mission

M 1 :	To create and maintain an environment for the pursuit of academic excellence with the use of computing technology.
M 2 :	To develop intellectual strength of students and guiding them towards technical, professional and entrepreneurship excellence.
M 3 :	To nurture analytical skills, inter- personal skills and build higher level of attitude, ethics and confidence.
M 4 :	To identify areas of cooperation with Industries and Institutions and implement them well within time-frame to mutual advantage and satisfaction.
M 5 :	Collaborate with industry and other agencies for academic and research programs.

Quality Policy

- Imparting quality education and achieve academic excellence through planning, leadership, brilliance, inspiration and effectiveness.

FACULTY OF COMPUTER APPLICATIONS

PROGRAM EDUCATIONAL OBJECTIVE (PEO)

PEO 1:	To demonstrate a sound knowledge in key areas of Computer Sciences and Industrial Computing
PEO 2:	To demonstrate a substantial understanding of concepts in key areas of Computer Sciences
PEO 3:	To carry out the required analysis and synthesis involved in Computer Systems, Information systems and Computer Applications
PEO 4:	To demonstrate professional competence in developing software and in its design and implementation.
PEO 5:	To develop sound Practical Skills to enable them to addressing problems which arise from Computer systems and Applications

MAPPING PEO WITH MISSION

	M 1	M2	M3	M4	M5
PEO 1	3	3	2	3	3
PEO 2	3	3	1	3	3
PEO 3	2	3	2	3	3
PEO 4	2	3	3	3	3
PEO 5	3	3	2	3	3

FACULTY OF COMPUTER APPLICATIONS

PROGRAM OUTCOMES (PO)

PO1:Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Communication Skills: : Ability to understand and express thoughts and ideas effectively in writing and orally; and present complex information in a clear and concise manner to different groups.

PO3:Critical and Reflective thinking: Capability to apply analytic thought 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. Critical sensibility, with self awareness and reflexivity of both self and society.

PO4: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.

PO5: Team work and Leadership qualities : Function effectively as an individual, and as a team member or leader in diverse teams, and in multidisciplinary environment.

PO6: Information/digital literacy: Capability to use ICT 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.

PO7: Multicultural competence and knowledge of heritage: Possess knowledge of the values and beliefs of multiple cultures to effectively engage globally in a multicultural society and interact respectfully with diverse groups. Ability to understand and propagate heritage values.

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.

FACULTY OF COMPUTER APPLICATIONS

MAPPING PEO WITH PO

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
PEO 1	2	3	1	3	2	3	3	2	3
PEO 2	3	3	3	3	3	3	3	3	3
PEO 3	2	3	2	3	2	3	3	2	3
PEO 4	3	3	3	3	3	3	3	3	2
PEO 5	2	3	1	3	2	3	3	2	3

PROGRAM SPECIFIC OBJECTIVES

PSO 1 :	Logical and Problem Solving Skills : Ability to analyse the software problem and design, formulate and obtain solution to the problem through learning of Mathematical fundamentals to problem solving.
PSO 2 :	Project based learning : Ability to develop information and Computing skills through innovative techniques in modern IT environment to become an IT Professional or for higher studies.
PSO 3 :	Social Responsibility and Environment Awareness : An understanding of computational Professionalism through leadership and team building by means of environmental awareness and social responsibility.
PSO 4 :	Business, Entrepreneurial and Industrial Knowledge : Ability to cultivate industrial business through learning of entrepreneurship.

MAPPING PEO WITH PSO

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**
PEO 1	2	3	1	3
PEO 2	3	3	3	3
PEO 3	2	3	2	3
PEO 4	3	3	3	3
PEO 5	3	3	3	3

2023 Regulations

I SEMESTER							
S.NO	**SUB.CODE**	**TITLE OF THE SUBJECT**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
1	HBTA22001/ HBHI22001/ HBFR22001	Language : Tamil-I / Hindi-I / French –I	3	3	0/0	0/0	Ty
2	HBEN22001	Language: English – I	3	3	0/0	0/0	Ty
3	HBMA22ID1	Allied -1 : Mathematics I	**4**	**3**	**1/0**	0/0	Ty
4	CBCA22001	Programming In C	3	2	1/0	0/0	Ty
5	HBCC22001	Environmental Studies	3	3	0/0	0/0	Ty
PRACTICAL							
6	HBCC22L01	Computer Software Lab	2	0	0/0	4/0	Lb
7	CBCA22L01	Programming in C Laboratory	2	0	0/0	4/0	Lb
8	HBCC22I02	Soft Skill – I	1	0	0/0	2/0	IE
TOTAL			**21**				

II SEMESTER							
S.NO	**SUB.CODE**	**TITLE OF THE SUBJECT**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
1.	HBTA22002/ HBHI22002/ HBFR22002	Language : Tamil-II/ Hindi-II / French –II	3	3	0/0	0/0	Ty
2.	HBEN22002	Language : English – II	3	3	0/0	0/0	Ty
3.	HBMA22ID2	Allied –II : Mathematics II	**4**	**3**	1/0	0/0	Ty
4	**CBCA23001**	Object Oriented Paradigm and Programming in C++	**3**	**2**	1/0	0/0	Ty
5.	CBCA22003	Multimedia And Animation	4	3	1/0	0/0	Ty
PRACTICAL							
6.	CBCA22L02	Programming in C++ Laboratory	2	0	0/0	4/0	Lb
7.	CBCA22IL1	Allied – 1 Lab: Multimedia and Animation Lab Using Mathematical Applications	2	0	0/0	4/0	Lb
8.	HBCC22I05	Soft Skill – III(Qualitative and quantitative Techniques)	1	0	0/0	2/0	IE
TOTAL			**22**				

III SEMESTER							
S.NO	**SUB.CODE**	**TITLE OF THE SUBJECT**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
1.	MBFP22ID1	Allied - III :Financial Accounting	3	2	1/0	0/0	Ty
2.	CBCA22004	Programming in Java	4	3	1/0	0/0	Ty
3.	CBCA22005	Computer Networks	4	4	0/0	0/0	Ty
4.	CBCA22006	Data Structures	3	2	1/0	0/0	Ty
5.	CBCA22007	Software Engineering	3	2	1/0	0/0	Ty
PRACTICAL							
6.	CBCA22L03	Programming In Java Laboratory	2	0	0/0	4/0	Lb
7.	**CBCA22L07**	**Data Structures and Algorithm Laboratory**	**2**	**0**	0/0	4/0	Lb
		TOTAL	**21**				

IV SEMESTER							
S.NO	**SUB.CODE**	**TITLE OF THE SUBJECT**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
1.	CBCA22ID1	Allied - IV: Digital Fundamentals	3	2	1/0	0/0	Ty
2.	CBCA22008	Visual Programming	4	3	1/0	0/0	Ty
3.	CBCA22009	Database Management	4	3	1/0	0/0	Ty
4.	**CBCA22016**	**Distributed Computing**	**3**	**3**	0/0	0/0	Ty
5.	CBCA22EXX	Program Elective –I	3	3	0/0	0/0	Ty
PRACTICAL							
6.	**CBCA22L08**	**Visual Programming Laboratory**	**2**	**0**	0/0	4/0	Lb
7.	CBCA22L04	Database Management Laboratory	2	0	0/0	4/0	Lb
8.	HBFL22IXX	Foreign Language	1	0	0/0	2/0	IE
		TOTAL	**22**				

V SEMESTER							
S.NO	**SUB.CODE**	**TITLE OF THE SUBJECT**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
1	CBCA22010	Programming in Python	4	3	1/0	0/0	Ty
2	CBCA22EXX	Program Elective –II	3	3	0/0	0/0	Ty
3	CBCA22011	Operating Systems	3	3	0/0	0/0	Ty
4	**CBCA22017**	**Web Programming**	**4**	**3**	**1/0**	0/0	Ty
5	HBCC22002	Entrepreneurship Development	3	3	0/0	0/0	Ty
PRACTICAL							
6	CBCA22L05	Programming in Python Laboratory	2	0	0/0	4/0	Lb
7	**CBCA22L09**	**Web Programming Laboratory**	**2**	**0**	**0/0**	**4/0**	**IE**
8	CBCA22I01	Core Skill –I	1	0	0/0	2/0	IE
		TOTAL	**22**				

VI SEMESTER							
S.NO	**SUB.CODE**	**TITLE OF THE SUBJECT**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
1	CBCA22EXX	Program Elective –III	3	3	0/0	0/0	Ty
2	CBCA22012	Object Oriented Modeling and Design	4	3	1/0	0/0	Ty
3	CBCA22EXX	Program Elective –IV	3	3	0/0	0/0	Ty
4	HBCC22ET1	Universal Human Values	3	2	0/0	2/0	ETP
PRACTICAL							
4	CBCA22L06	Project Work	9	0	0/0	18/0	Lb
		TOTAL	**22**				

SUMMARY OF CREDITS :

SEMESTER	CREDIT
1st Semester	21
2nd Semester	22
3rd Semester	21
4 th Semester	22
5th Semester	22
6th Semester	22
TOTAL	**130**

Regulation 2022 -2023 (Optional for Honors Programme)

SEMESTER: 7

Theory:

Course Code	Course Title	C	L	T/SLR	P/R	Ty/Lb/E TP/IE
HBCC22003	Research Methodology	3	2	1/0	0/0	Ty
CBCA22013	Data Visualization	4	3	1/0	0/0	Ty
CBCA22014	Soft Computing	4	3	1/0	0/0	Ty
CBCA22015	Machine Learning	4	3	1/0	0/0	Ty

Practical:

CBCA22I03	Mini Project	2	0	0/0	4/0	IE
CBCA22I04	Internship	1	0	0/0	2/0	IE

Total credits:18

SEMESTER: 8

Theory:

Course Code	Course Title	C	L	T/SLR	P/R	Ty/Lb/E TP/IE
HBCC22004	Startup strategies	3	3	0/0	0/0	Ty
HBCC22005	Principles of Digital Marketing	3	3	0/0	0/0	Ty
HBCC22006	Intellectual Property rights and patents	3	3	0/0	0/0	Ty

Practical:

CBCA22L10	Major Project	6	0	0/0	12/0	Lb
CBCA22I05	Research Publication	2	0	0/0	4/0	IE

Total credits: 17

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

ELECTIVE LIST

PROGRAM ELECTIVE-I							
S.NO	**Sub.Code**	**Title of the Subject**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
1.	CBCA22E01	Data Mining and Ware Housing	3	3	0/0	0/0	Ty
2.	CBCA22E02	Information Security	3	3	0/0	0/0	Ty
3.	CBCA22E03	Professional Ethics	3	3	0/0	0/0	Ty
4.	CBCA22E04	Software Project Management	3	3	0/0	0/0	Ty
5.	CBCA22E05	Management Information System	3	3	0/0	0/0	Ty

PROGRAM ELECTIVE-II							
S.NO	**Sub.Code**	**Title of the Subject**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
6.	CBCA22E06	Mobile Computing	3	3	0/0	0/0	Ty
7.	CBCA22E07	Image Processing	3	3	0/0	0/0	Ty
8.	CBCA22E08	Cloud Computing	3	3	0/0	0/0	Ty
9.	CBCA22E09	Open Source Programming	3	3	0/0	0/0	Ty
10.	CBCA22E10	Software Testing	3	3	0/0	0/0	Ty

PROGRAM ELECTIVE-III							
S.NO	**Sub.Code**	**Title of the Subject**	**C**	**L**	**T/SLR**	**P/R**	**Ty/Lb/ETP/IE**
11.	CBCA22E11	Artificial Intelligence	3	3	0/0	0/0	Ty
12.	CBCA22E12	Design Thinking	3	3	0/0	0/0	Ty
13.	CBCA22E13	Block Chain Technology	3	3	0/0	0/0	Ty
14.	CBCA22E14	Internet of Things	3	3	0/0	0/0	Ty
15.	CBCA22E15	Data Analytics	3	3	0/0	0/0	Ty

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

LIST OF FOREIGN LANGUAGES-2022 REGULATIONS

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

Table 1: Credit Distribution

S. No	CATEGORY	Description	No.of Courses	Credits	Total	Credit Weightage	Contact hours
1	CORE COURSES	Core Theory	15	55	65	39%	825
		Core Lab	5	10			300
2	ELECTIVE COURSES	Department Core Electives/ Skill enhancement electives	3	10	10	6%	150
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	9%	180
		Lab	2	4			60
5	HUMANITIES & SOCIAL SCIENCES , LIFE SKILLS &SOFT SKILLS	Language 1 & 2	2	6	32	19%	90
		English 1 & 2	2	6			90
		Soft Skills	4	4			60
		Life Skill	--	--			--
		Foreign Language	1	1			15
		Environmental Studies	1	3			45
		Management Papers	3	9			135
		Entrepreneurship Development	1	3			45
6	PROJECTS/INTERNSHIP/ CORE SKILL	Project	3	17	21	13%	165
		Core Skills	2	2			30
		Internship / NSS / NCC	2	2			30
7	ENGINEERING SCIENCES						
8	ANY OTHER	Computer Software Lab	1	2	13	9%	195
		Statistical And Numerical Methods Lab	1	2			
		Critical Thinking Skill :	1	1			
		Universal Human Values	1	3			
		Research Methodology	1	3			
		Research Publications	1	2			
Total				**165**	**165**	**100%**	**2535**

Table 2:

Revision/modification done in syllabus content:

S.No	Course(Subject) Code	Course (Subject) Name	Concept/ topic if any, removed in current curriculum	Concept/topic added in the new curriculum	% of Revision/ Modification done
1	CBCA22001	Core I – Programming in C	-	Unit 2, 4, 5 Modified from HBCA17G04	40
2	CBCA22002	Core II – Object Oriented Paradigm and Programming in C++	-	Unit 1, 2, 5 Modified from HBCA17G08	40
3	CBCA22007	Core III – Software Engineering	-	Some of the Topics were reduced from all 5 Units.	50
4	CBCA22008	Core IV – Visual Programming	-	Unit 5 Modified from HBCA17G12	10

Table3:

List of New courses/ value added courses//life skills/Electives/interdisciplinary /courses focusing on Employability/entrepreneurship/skill development.

S. No	New courses (Subjects)	Value added courses	Life skill	Electives	Inter Disciplinary	Focus on employability /entrepreneurship/skill development.
1	Multimedia And Animation	Open Source Programming	Professional Ethics	Data Mining And Ware Housing	Environmental Studies	Ncc/Nss/Internship
2	Allied – 1 Lab: Multimedia And Animation Lab Using Mathematical Applications	Block Chain Technology	Communication Skill Lab	Information Security	Financial Accounting	Project Work
3	Allied – II Lab : Accounting Laboratory Using Spreadsheet	Data Analytics	Soft Skill – I	Management Information System	Entrepreneurship Development	
4	Programming In Python		Soft Skill – II	Artificial Intelligence	Allied - Iv: Digital Fundamentals	
5	Open Source Technologies		Soft Skill – III	Design Thinking		
6	Programming In Python Laboratory		Critical Thinking Skill	Block Chain Technology		
7	Object Oriented Modeling And Design		Universal Human Values	Internet Of Things		
8	Data Visualization			Data Analytics		
9	Soft Computing					
10	Machine Learning					

Subject Code: **HBTA22001**	Subject Name: **TAMIL - l**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite :	**Ty**	**3**	**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

- 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**	**P07**	**PO8**	**P09**
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

Cos/PSOs	**PS01**	**PS02**	**PS03**	**PS04**
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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/Allied	Skill component	Practical Project/ Internship	others
	√								

Subject Code: **HBTA22001**	Subject Name: **TAMIL - l**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite :	**Ty**	**3**	**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						

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

45 மணி நேரம்

Subject Code: **HBHI22001**	Subject Name: **HINDI -1**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Knowledge of Language	**Ty**	3	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

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	To understand the basic concepts and Origin of Hindi
CO2	To know about the roots of Hindi Literature ands its perspective and methods.
CO3	. Elaborating and understanding philosophical methods of Hindi Literature.
CO4	Evaluating the concept of Hindi from past to present and to study the society closely through Literature
CO5	To make the students 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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/Allied	Skill component	Practical Project/ Internship	others
	□		□□		□□□	□			

Subject Code: **HBHI22001**	Subject Name: **HINDI -1**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Knowledge of Language	**Ty**	3	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						

UNIT - I **Prose –Understanding the secret of the culture and how to draft the letters in Government offices, technical terms** **9 Hrs**

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** **9 Hrs**

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 technical things used in memo** **9 Hrs**

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** **9 Hrs**

1. Paramanu Oorja evam Khadya PadarthSanrakshan
2. Transfer of anA/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** **9 Hrs**

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

Total:45 Hrs

BOOKS FOR REFERENCE:

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

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

Course /subject Code	HBFR22001	Semester	45 hrs			I
Category	All UG Programs		Ty/Lb/ETP/IE	L	T/SLr	P/R	C
Course Title	French I		Ty	3	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

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 events 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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/Allied	Skill component	Practical Project/ Internship	others
	√								

Course /subject Code	HBFR22001	Semester	45 hrs				I
Category	All UG Programs		Ty/Lb/ETP/IE	L	T/SLr	P/R	C
Course Title	French I		Ty	3	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

UNIT I **9 Hrs**

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 Hrs**

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 Hrs**

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 Hrs**

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 Hrs**

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:45 Hrs

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

HBEN22001	ENGLISH I (Common to all UG Courses under H&S	Ty/Lb/E TP/IE	L	T	P	C
	Total contact hours – 45	Ty	3	0	0	3
	Prerequisite – English Language					
	Course designed by – Department of English					

Course Objectives

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.

Course Outcomes (COs)

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.

Program Specific Outcomes (PSOs)

1. Demonstrating mastery of the components of English language and literature.
2. Explaining through literature in English, diverse historical cultural and social ethics
3. Applying literary critical perspectives to generate original analysis of literature in English
4. 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	PSO1	PSO2	PSO3	PSO4
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	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ Internship	Others
	√								

HBEN22001	ENGLISH I (Common to all UG Courses under H&S	Ty/Lb/ ETP/IE	L	T/S .Lr	P/ R	C
	Total contact hours – 45	Ty	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 **9 Hrs**

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 **9 Hrs**

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

Unit III: Short Story **9 Hrs**

1. Portrait of a Lady
2. The Connoisseur

Unit IV: Drama **9 Hrs**

1. The Never-Never Nest
2. Frederick Douglass

Unit V: Functional Grammar – Charts & LSRW Development **9 Hrs**

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.

Total:45 Hrs

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.

PrescribedText:

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

Subject Code: HBMA22ID1	Subject Name: ALLIED –I: MATHEMATICS-I	Ty/Lb/ETP/IE	L	T/S. Lr	P/R	C
	Prerequisite: Higher Secondary Mathematics	Ty	**3**	**1**	**0**	**4**

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

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 $\text{Sin}^n\theta$ and $\text{Cos}^n\theta$ 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	3	2
CO2	2	2	1
CO3	3	3	3
CO4	3	3	2
CO5	3	2	2

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

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

Subject Code: HBMA22ID1	Subject Name: ALLIED –I: MATHEMATICS-I	Ty/Lb/ETP/IE	L	T/S. Lr	P/R	C
	Prerequisite: Higher Secondary Mathematics	Ty	**3**	**1**	**0**	**4**

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 (12 hrs)

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

UNIT II TRIGONOMETRY (12 hrs)

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 (12 hrs) 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 (12 hrs)

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 (12 hrs)

Binomial – Poisson –Exponential –Normal distributions.

Total no. of hrs: 60

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).

Subject Code: **CBCA22001**	Subject Name: **PROGRAMMIMG IN C**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Rudimentary skill in Basic Programming**	**Ty**	**2**	**1**	**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

- To impart the basic concepts of programming in c.
- Explore the concepts on various I/O and control statements
- To demonstrate an understanding of functions, recursion and Storage Classes.
- To Understand and use the common data structures typically found in C programs — namely arrays, structures and pointers.
- To understand the concept of pointers and operations on files.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the fundamentals of c – keywords & identifiers, constants, variables, datatypes, expressions, operators and mathematical functions.
CO2	Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators
CO3	Understand how to write and use functions, how the stack is used to implement function calls, and parameter passing options. Also to explore on storage classes.
CO4	Able to define arrays and use them in simple data processing applications. also he/she must be able to use the concept of array of structures.
CO5	Ability to develop and interpret the concept of pointers and its declaration. Also knowing the tactics of i/o operations on files.

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	2	3	2	2
CO2	2	2	3	2	3	3	2	3	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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ Internship	Others
		√							

Subject Code: **CBCA22001**	Subject Name: **PROGRAMMIMG IN C**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Rudimentary skill in Basic Programming**	**Ty**	**2**	**1**	**0**	**3**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **9 Hrs**

C fundamentals: Character set - keywords and Identifiers - constants - Variables – Declarations of variables –Data types – Expressions - Operators: Arithmetic-Relational-logical- Assignment- Increment and Decrement- Conditional – Bitwise - Special operators - Mathematical functions.

UNIT II **9 Hrs**

I/O Statements, Control Statements : I/O Statements : Single Char, String, Formatted I/O Statements. Conditional Control Statements : Decision making : Simple if- if…else- nested if..else. Looping: while, do- while, for loop - Uncontrol Control Statements: goto, break, continue. Multiple Branching Statement : Switch - case

UNIT III **9 Hrs**

Functions: Definition –function declaration- function call - Passing arguments – Recursion - Storage Classes: Automatic, External, Static and Register Variables.

UNIT IV **9 Hrs**

Arrays, Structures and Pointers : Arrays : One dimensional array-two dimensional array - Character arrays – Strings - String handling functions. Structure : Defining and declaration of structures - Accessing structure members – Unions.

UNIT V **9 Hrs**

Pointers, Files : Pointers :Pointers - Declarations – Accessing a variable through its pointer-Pointer and Arrays. Files: Types of files - Opening and closing a file - Input/ Output operations on files.

Total No of Hrs: 45

TEXT BOOK:

1. Balaguruswamy, E(2012), *Programming in C(6th ed.)*, Tata McGraw-Hill Publishing Company Limited.

REFERENCES:

1. Byron Gottfried & Jitender Chhabra(2010), *Programming with C* (Schaum's Outlines Series), McGraw Hill Education.
2. K N King(2008), *C Programming(2nd ed..)*, W. Norton & Company

Subject Code : HBCC22001	**Subject Name : ENVIRONMENTAL STUDIES**	**Ty/Lb/ETP/IE**	**L**	**T**	**P**	**C**
	Prerequisite : None	**Ty**	**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 known 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	1	**3**	**2**	**1**	**1**	**3**
CO2	**2**	1	1	**1**	2	1	1	**3**	**2**	**1**	**1**	**3**
CO3	**2**	1	1	**1**	2	1	1	**3**	**2**	**1**	**1**	**3**

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

Subject Code : HBCC22001	Subject Name : ENVIRONMENTAL STUDIES	Ty/Lb/ETP/IE	L	T	P	C
	Prerequisite : None	Ty	3	0	0	3
L : Lecture T : Tutorial P : Project C: Credits						

UNIT I ENVIRONMENT AND ECOSYSTEMS **9 Hrs**

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 Hrs**

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 Hrs**

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 Hrs**

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 Hrs**

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 Hours: 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).

Subject Code: **HBCC22L01**	Subject Name : **COMPUTER SOFTWARE LAB**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0	4	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, Powerpoint, 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	To 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**	**2**	**1**
CO2	**3**	**3**	**2**
CO3	**2**	**2**	**1**
CO4	**3**	**1**	**1**
CO5	**3**	**1**	**1**

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

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

Subject Code: **HBCC22L01**	Subject Name : **COMPUTER SOFTWARE LAB**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: NIL	Lb	0	0	4	2
L : Lecture T : Tutorial S.Lr : Supervised Learning P : Project R : Research C: Credits Ty/Lb/ETL : Theory/Lab/Embedded Theory and 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-POWER POINT

UNIT 4: MICROSOFT PAINT EXERCISES - IV

UNIT 5: INTERNET & ITS APPLICATIONS- V

Total Hrs needed to complete the lab: 60

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 wordTo 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 advertisementPrepare a resume.

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 amount budgeted for – say, department office expenses.

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

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.

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.

OFFICE APPLICATIONS – V

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

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

3. 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 filesand video conferencing using Skype.

Subject Code: **CBCA22L01**	Subject Name: **PROGRAMMIMG IN C LABORATORY**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Rudimentary skill in Basic Programming Knowledge	**Lb**	**0**	**0**	**4**	**2**

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

OBJECTIVES

- Develop an in-depth understanding of functional, logic, and programming paradigms
- Identify the problem given and design the algorithm using various algorithm design techniques to check for palindrome and gcd
- Implement and characterize various data by sorting in rows and columns.
- Perceive to handle structures and the concept of repeating items in a self-similar way.
  Apply the professional ethics and appropriate data location of an address memory and learn about file processing.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Scrutinize the execution of Finding Biggest number among three numbers and also find weather the given number is prime or not .
CO2	Analyse and compare the sequence of characters which reads the same backward as forward(palindrome) and find Greatest common divisor of given two numbers.
CO3	Illustrate and implement the series of numbers in which each number (Fibonacci number) is the sum of the two preceding numbers series and various types of matrix operations
CO4	Construct and execute the programs to demonstrate the c features like recursion for factorial and student marksheet using structures.
CO5	Compile the codding for Swapping using pointers and file operations in various sectors.

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

Subject Code: CBCA22L01	Subject Name: **PROGRAMMIMG IN C LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.L r**	**P/R**	**C**
	Prerequisite : Rudimentary skill in Basic Programming Knowledge	**Lb**	**0**	**0**	**4**	**2**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

Write a C program for the following:

1. Finding Biggest number among three numbers
2. Finding whether the given number is prime or not
3. Reverse a string and check for palindrome
4. GCD of two numbers
5. Fibonacci series
6. Matrix Operations
7. Factorial using Recursion
8. Prepare student mark sheet using structures
9. Swapping using Pointers
10. File Operations

Total Hrs needed to complete the lab: 60

Subject Code: **HBCC22I02**	Subject Name: **SOFT SKILL-I**	T/L/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : English Language	**IE**	0	0	2	1

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

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)

Students completing this course were able to

CO1	Become good listeners to get engaged in interactive communication for effective team building.
CO2	Develop assertive and adaptive behaviour to be leaders
CO3	Develop peer interaction for a successful lifelong learning.
CO4	Learn skills necessary for a cooperative living in academic and professional environments
CO5	Use soft skills for the purposes of research and follow ethics in society and profession

Mapping of Course Outcome with Program Outcome (POs)

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

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

Cos/PSOs	**PS01**	**PS02**	**PS03**	**PS04**
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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary /Allied	Skill component	Practical Project/ Internship	Others
							√		

Subject Code:	Subject Name: **SOFT SKILL-I**	T/L/ ETL	L	T / S.Lr	P/R	C
HBCC22I02	Prerequisite : English Language	**IE**	0	0	2	1
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

Prefatory Note

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

Subject Code: **HBTA22002**	Subject Name: **TAMIL - ll**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite :	**Ty**	**3**	**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

- 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.1
- 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**	**P07**	**PO8**	**P09**
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

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

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

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

Subject Code: **HBTA22002**	Subject Name: **TAMIL - ll**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite :	**Ty**	**3**	**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						

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

45மணிநேரம்

2.செய்வினை - செயப்பாட்டு வினை
3.மயங்கொலிப் பிழையைநீக்குக

Subject Code: **HBHI22002**	Subject Name: **HINDI -II**	T/L/ ETL	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,
T/L/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	To introduce students to the real world situation with the help of Plays and stories written by various poets and writers.
CO2	To make students understand the Literature in broader areas than merely confined to the subject
CO3	. Evaluating the concept of Hindi from past to present and to study the society closely through Literature.
CO4	.To 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 II	**Coursecode: HBHI22002**								
	ProgrammeOutcomes(Pos)								
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	**CO1**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**
CO2	**CO2**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**
CO3	**CO3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**
CO4	**CO4**	**2**	**3**	**3**	**3**	**3**	**2**	**2**	**3**
CO5	**CO5**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**

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

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

Subject Code: **HBHI22002**	Subject Name: **HINDI -II**	T/L/ ETL	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, T/L/ETL :Theory / Lab / Embedded Theory and Lab						

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

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

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

6. Auranzeb ki AakhiriRaat

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)**

7. Auranzeb ki AakhiriRaat

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)**

8. Auranzeb ki AakhiriRaat

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
   Book 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

Course /subject Code	HBFR22002	Semester	45 hrs		II	
Category	**All UG Programs**		**L**	**T/SLr**	**Category**	**All UG Programs**
Course Title	**French -II**		**3**	**0**	**Course Title**	**French II (THEORY)**

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

OBJECTIVES

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

FRENCH-II(THEORY) LANGUAGE-II
New subject code

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	3	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

APPING OF Cos WITH POs

H/M/L indicates strength of correlation H- High M- Medium L- Low

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

Course /subject Code	HBFR22002	Semester	45 hrs		II	
Category	All UG Programs		L	T/SLr	Category	All UG Programs
Course Title	French -II		3	0	Course Title	French II (THEORY)

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

UNIT I 9hrs

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 9hrs

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 9hrs

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 9hrs

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 9hrs

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).

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 Le Ninan
4. **Latidudes**-1 by Régine Mérieux & Yves l'oiseau, Didier 2017
5. **Alter Ego 1** - Catherine Dolez, Sylvie Pons : (2014) Hachette, Paris

HBEN22002	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	PSO1	PSO2	PSO3	PSO4
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	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ Internship	others
	√								

HBEN22002	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 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
5. 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.RichardswithJ.Hull&S.Proctor,Interchange,Level3,CambridgeUniversityPress,2021.
- MarkHancock,EnglishPronunciation inUse,CUP,2016.
- M.ChandrasenaRajeswaran&R.Pushkala,CommunicationLabWorkbook2022.
- M.ChandrasenaRajeswaran,R.Pushkala & S.BhuvaneswariPinnacle: ASkillsIntegratedText,2022
- Dutt,K,Rajeevan,G&Prakash,,*ACourseonCommunicationSkills*,1stedn,CUP,Chennai,2008

Suggested Links:

- https://www.poetrybyheart.org.uk/poems/the-spider-and-the-fly/Reference.
- https://poets.org/poem/unknown-citizen

Subject Code:	Subject Name **ALLIED –II:MATHEMATICS-II**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
HBMA22ID2	Prerequisite : Higher Secondary Mathematics	**Ty**	**3**	**1**	**0**	**4**

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

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**	**P07**	**PO8**	**P09**
CO1	3	2	3	3	2	2	3	2	2
CO2	3	3	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	3	3	2	3	2	3	3	2	3

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

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

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

Subject Code: **HBMA22ID2**	Subject Name **ALLIED –II:MATHEMATICS-II**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : Higher Secondary Mathematics	**Ty**	**3**	**1**	**0**	**4**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

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 (12 hrs)

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 II PARTIAL DIFFERENTIATION (12 hrs)

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

UNIT III MULTIPLE INTEGRALS (12hrs)

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 (12 hrs)

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

UNIT V TRANSPORTATION AND ASSIGNMENT (12 hrs)

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 hrs: 60

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).

Subject Code: **CBCA23001**	Subject Name: **OBJECT ORIENTED PARADIGM AND PROGRAMMING IN C++**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in C Programming**	**Ty**	**2**	**1**	**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

- To impart the basic concepts of object oriented programming
- To introduce the concepts of C++, Function and Exception Handling
- To provide knowledge about Class and Object, Constructor and destructor and usage of Operator Overloading
- To understand the concepts inheritance, polymorphism and virtual function.
- To familiarize the advance concepts like Template and Streams and to inculcate the usage of handling files.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the basic concepts of OOP like Class, Object, Encapsulation, Inheritance and Polymorphism
CO2	Evaluate the C++ Program to save memory, Consistency and readability after implementing Function Overloading. Handling Exception in real world problem.
CO3	Applying Class and Object that leads to implementing OOPs concept in Programming. Analyze the reducing execution time after implementation of automatic initialization of objects and Operator overloading in C++ Programming.
CO4	Implement the usage of Inheritance in real time problem that helps us to reduce development time because of Code Reusability. Achieve run time polymorphism using virtual function.
CO5	Create Templates to implement Generic Programming. Apply file concepts and solve problems related to data files.

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	2	3	2	2
CO2	3	3	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	3	3	2	3	2	3	3	2	3

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

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

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

Subject Code: **CBCA23001**	Subject Name: **OBJECT ORIENTED PARADIGM AND PROGRAMMING IN C++**	**Ty/Lb /ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in C Programming**	**Ty**	**2**	**1**	**0**	**3**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **09 Hrs**

Introduction to OOPs : Object Oriented Programming, Basic concepts of OOPs, Benefits of OOPs.
Introduction to C ++ : Tokens - Keywords, -Identifiers - Data types – Constants – Operators - I/O statements, Manipulators.

UNIT II **09 Hrs**

Introduction to C ++ : Structure of C++ program - Control structures – Arrays – Pointers - Functions: Function Prototype, Inline function, Function Overloading.- Exception Handling.

UNIT III **09 Hrs**

Class & Objects : Class Members - Objects - Visibility modes - Friend functions - Static members - Constructors & Destructors -Operator Overloading - Rules for Overloading, Unary and Binary operator overloading.

UNIT IV **09 Hrs**

Inheritance & Polymorphism : Concept of Inheritance : Types of Inheritance – Polymorphism - Virtual Classes - Pointer to Derived class - Virtual functions : Rules for Virtual function , Pure Virtual functions.

UNIT V **09 Hrs**

Streams, Files, Templates: Streams : C++Streams, Stream classes. Files : Classes for file stream operations, opening and closing a file, Detecting End of File. Templates : Function and Class Templates.

Total No of Hrs : 45

TEXT BOOK:

1. Balguruswamy, E (2008) *Object Oriented Programming With C++*, (4th ed.) Tata McGraw-Hill .

REFERENCES:

1. Richard Johnson Baugh & Martin Kalin (1998) *Object Oriented Programming In C++*(1st ed.) , Prentice Hall
2. Sheild,H (2002) *C++ Complete Reference*(4th ed.) , McGraw-Hill Osborne Media

Subject Code: **CBCA22003**	Subject Name: **MULTIMEDIA AND ANIMATION**	**Ty/Lb/ ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Computers**	**Ty**	**3**	**1**	**0**	**4**

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

OBJECTIVES

- To understand the characteristics, requirements, uses of Multimedia presentations with different platforms.
- To determine various tools and its types of multimedia system
- To discuss fundamentals, types of file formats, media and data streams and text media.
- To demonstrate the use of digitized audio, video control, and scanned images.
  To gain knowledge in Animation, Key frames, Tweening, Media Technologies.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Create a multimedia presentation with different platforms and promoting the hardware and software of multimedia.
CO2	Expose the different Tools available in 3-D Modeling and Animation at par with various industries like film, animation and gaming, interior design and architecture.
CO3	Demonstrate the purpose of using audio in multimedia, identify sources of audio, identify different types of file format. Developed various Multimedia Systems applicable in real time.
CO4	Illustrate various file formats for text media, as the characters that are used to create words, sentences and paragraphs. Source of information as open source Image Processing viz.,Digital Cameras and Scanners.
CO5	Designed interactive multimedia software by applying various networking protocols for multimedia applications and evaluate for its optimum performance

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

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

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

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

Subject Code: **CBCA22003**	Subject Name: **MULTIMEDIA AND ANIMATION**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Computers**	**Ty**	**3**	**1**	**0**	**4**

UNIT I **12 Hrs**

Introduction to Multimedia, characteristics of a Multimedia, Hardware and software requirements, Uses of multimedia, Promotion of multimedia based content, steps for creating Multimedia presentation. Platforms: Macintosh Versus PC - The Macintosh Platform - The Windows Multimedia PC platform- Input Devices - Output Hardware - Communication Devices.

UNIT II **12 Hrs**

Basic Tools:Text Editing and Word Processing Tools - OCR Software - Painting and Drawing Tools - 3-D Modeling and Animtion Tools - Image - Editing Tools - Sound Editing Tools - Animation, Video and Digital Movies Tools - Multimedia Authoring Tools: Types of Authoring Tools - Card and page Based Authoring Tools - Icon - Based Authorised Tools - Time Based Authoring Tools - Object - Oriented Authoring Tools - Cross - Platform Authoring Notes.

UNIT III: **12 Hrs**

Text: Introduction, Types of Text, Unicode Standard, Font, Insertion of Text, Text compression, File Formats- Hypermedia and Hypertext. Image: Introduction, Image Types, Seeing color, color models, Basic steps for Image Processing, Scanner, Digital Camera, Interface Standards, Image Processing software, File formats, Image output on monitor, Image output on printer.

UNIT IV: **12 Hrs**

Audio: Introduction, Fundamentals Characteristics of sound, Elements of Audio systems, Microphone, Amplifier, Loudspeaker, Audio mixer, Musical Instrument Digital Interface(MIDI), MIDI messages, MIDI connections,Sound card, Audio File Format and CODECs, Software Audio Players, Audio Recording Systems, Audio and multimedia, Audio Processing software.
Video: Introduction, Analog video camera, Transmission of video signals, Video signal format, Digital video, Digital Video Standards, PC Video, Video File Format and CODECs, Video editing, Video editing software.

UNIT V: **12 Hrs**

Animation: Introduction, Uses of animation, Key frames and Tweening, Types of animation, Computer Assisted Animation, Creating movements, Principles of animation :Special Effects - Survey Of Animation Tools- Video Technologies: Analog Video - Ccd Camera, Broadcasting - Recording Formats - Storage Principle and Retrival Technologies - Magnetic Media Technologies and Storage Devices

Total No of Hrs : 60

Text Book:

Principles of Multimedia By Ranjan Parekh- The Tata McGraw Hill companies. -Sixth Reprint 2008

SUBJECT CODE: **CBCA22L02**	Subject Name: **PROGRAMMING IN C++ LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in C Programming**	**Lb**	**0**	**0**	**4**	**2**

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

OBJECTIVES

- To introduce the basic concepts of object oriented programming like Class, Object, and Constructor.
- To understand the concepts Inheritance, Function Overloading.
- To impart the concepts of C++,Virtual Function, Friend Function.
- To provide knowledge about Operator Overloading and Inline Function.
- To develop the knowledge in the advance concepts like Template and Streams and to inculcate the usage of handling files.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Implement the basic concepts of OOP like Class, Object. Implement the concept Constructor used to reduce execution time after implementation of automatic initialization of objects.
CO2	Employ the concept Inheritance in real time problem that helps us to reduce development time because of Code Reusability and examine Function Overloading used to save memory, Consistency and readability.
CO3	Explore the concept Virtual function to achieve run time polymorphism and introduce Friend function to access Private data outside the class.
CO4	Applying the concept Operator Overloading to achieve Compile Time Polymorphism and examine Inline function to reduce execution time.
CO5	Create Templates to implements Generic Programming. Apply file concepts and solve problems related to data files.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

SUBJECT CODE: **CBCA22L02**	Subject Name: **PROGRAMMING IN C++ LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in C Programming**	**Lb**	**0**	**0**	**4**	**2**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

Write a C++ program

1. To implement Class
2. To implement Constructor
3. To demonstrate Inheritance
4. To implement Function Overloading
5. To implement Virtual Function
6. To implement Friend Function
7. To implement inline function
8. To implement overloading Unary operator
9. To Prepare bio data using file Operations
10. To implement Template

Total no. of Hrs needed to complete the Lab: 60

Subject Code: **CBCA22IL1**	Subject Name: ALLIED-I LAB:**MULTIMEDIA AND ANIMATION LAB USING MATHEMATICAL APPLICATIONS**	**Ty/Lb /ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic theoretical knowledge in Multimedia and Animation**	**Lb**	**0**	**0**	**4**	**2**

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

OBJECTIVES

- To understand the different components, different file formats.
- To determine various tools of multimedia system
- To provide knowledge about multimedia media and data streams and text media in Photoshop.
- To demonstrate the use of digitized video control, and scanned images in Flash
- To gain knowledge in animation and images using Flash.

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

CO1	Identify the various tools, components, file formats that enables to handle and complete a multimedia project.
CO2	Apply basic elements and principles of Photoshop to achieve a great photo effect by applying effects like colour, shadows, background, cropping and collage making.
CO3	Create simple shapes using animation by streaming the data in various dimensions that creates a dynamic effect on the object as expected.
CO4	Apply 3D models in an enhanced format with digitized video control by using Flash by giving advanced animation effect.
CO5	Prepare different web applications through flash with audio and floating text to make the website more interactive and expressive that ensures efficient problem solving skills.

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

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

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

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

Subject Code: **CBCA22IL1**	Subject Name: ALLIED-I LAB:**MULTIMEDIA AND ANIMATION LAB USING MATHEMATICAL APPLICATIONS**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic theoretical knowledge in Multimedia and Animation**	**Lb**	**0**	**0**	**4**	**2**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

LIST OF EXPERIMENTS

Photoshop:

1. Create an image using different properties.
2. Picture manipulation using filter.
3. Design pictures using layers.
4. Design our college ID Card
5. Design Marriage Invitation.

Flash:

6. Display real time clock.
7. Show India map with responsive screen to display state name.
8. Animate the staging concept with one example(chicken to hen).
9. Solving quadratic equation.
10. Matching animal voice with animal

Total no. of Hrs needed to complete the Lab: 60

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

L : Lecture T : Tutorial C: Credits

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

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

Category	Basic Sciences	Engg.Science	Humanities & social Science	Program Core	Program Elective	Open Elective	Practical/ Project	Internships/ Skills component	Inter disciplinary
								√	

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

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 Hrs: 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).

Subject Code: **MBFP22ID1**	Subject Name: ALLIED III:**FINANCIAL ACCOUNTING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Accounting Practices**	**Ty**	**2**	**1**	**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

- To introduce the basic financial terms used in daily life as well as in business units
- To make them understand the accounting principles and it's importance
- To impart the knowledge on effective ways to handle cash flow in organization
- To understand the steps involved in preparing various financial statements
  To have insight on how financial data can be interpreted.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Enable to know about the basic financial transaction by recording and classifying the same according to it's nature and checking its arithmetic accuracy.
CO2	Imparting the knowledge on ascertaining the profit or loss of the business and arriving to it's financial position, by which students can make effective financial decisions also can mange the cash flows in the organization.
CO3	Emphasizing on error identification along with rectification also giving bird view on Partnership Accounting practices.
CO4	Broad view on how income generating assets are valued to find out the true and fair Financial position of the companies.
CO5	Insight knowledge on how capital and Profit/Loss are derived from the Incomplete records of particular business form.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **MBFP22ID1**	Subject Name: ALLIED III:**FINANCIAL ACCOUNTING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Accounting Practices**	**Ty**	**2**	**1**	**0**	**3**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **09 Hrs**

Meaning and Scope of Accounting : Basic Accounting Concepts and Conventions - Objectives of Accounting – Accounting Transactions – Double Entry Book Keeping – Journal, Ledger, Preparation of Trial Balance.

UNIT II **09 Hrs**

Preparation of Final Accounts of Sole Trading Concern – Adjustments – Closing Stock – Outstanding and Prepaid items, Depreciation, Provision of Bad Depts., Provision for Discount on Debtors, Interest on Capital and Drawings – Preparation of Cash Book – Types of Cash Book

UNIT III **09 Hrs**

Classification of errors : Rectification of errors – Partnership Accounts-types of partners – Partnership Deed and content – Methods to calculate interest on Drawings – Partners salary or commission – Interest on partners loan – Profit and Loss Appropriation Account.

UNIT IV **09 Hrs**

Depreciation : Meaning, Causes, Types – Straight Line Method – Written Down Value Method (Change in Method excluded) - Insurance Claims – Average Clause (loss of stock only)

UNIT V **09 Hrs**

Single entry : Meaning – Features – Defects - Difference between Single Entry and Double Entry System-Statement of Affairs Method – Conversion Method (only simple problems)

Total No of Hrs: 45

TEXT BOOKS:

1. Gupta R.L(2010) *Advanced Accountancy(*14th ed.),S.Chand, Delhi.
2. T.S Reddy and A.Murthy – Financial accounting.

REFERENCES:

1. Agarwala A. N. *Higher Science of Accountancy*(1st ed.) KitabMahal,Allahabad.
2. Jam,S,P&Narang,K,L(2012)*Financial Accounting*(2nd ed.)Kalyani Publisher
3. Shukla, M, C &Grawel,T,S*(2010) Adavnced Accounts(voL 1)*(7th ed.), S.ChandPublishing

Subject Code: **CBCA22004**	Subject Name: **PROGRAMMING IN JAVA**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in C++ Programming**	**Ty**	**3**	**1**	**0**	**4**

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

OBJECTIVES

- To understand the basic concepts of OOP's programming.
- To provide knowledge about Constructor, Inheritance and usage of Operator Overloading
- To introduce the Java Programming concepts Package, Interface and Exception Handling
- To develop the knowledge in the advance concepts Applets and AWT.
  To familiarize the concepts Socket Programming, Proxy servers, TCP/IP

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Applying Class and Object that leads to implementing OOPs concept in Programming. Understand the fundamentals concept of Java.
CO2	Analyze the reducing execution time after implementation of automatic initialization of objects and Programming. The usage of Inheritance in real time problem that helps us to reduce development time because of Code Reusability.
CO3	Achieve Abstraction and multiple Inheritance in Java using Interface. To encapsulate a group of classes, interfaces and sub packages using a mechanism Package. Handling un expected problem using Exception handling mechanism.
CO4	To provide interactive features to Web Applications using Applet. To provide Graphical User Interface for a Java Program using AWT.
CO5	Implement Socket Programming used to connecting two nodes in a network to communicate with each other. Retrieve remote files from remote server using Proxy server.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22004**	Subject Name: **PROGRAMMING IN JAVA**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in C++ Programming**	**Ty**	**3**	**1**	**0**	**4**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **12 Hrs**

Introduction to Java : Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements.

UNIT II **12 Hrs**

Classes & Objects :Class – Objects-Methods- Constructors - Overloading methods - Access Control- Understanding Static - String Class – Objects – String Buffer - Char Array- Inheritance - Overriding methods - Using super- Abstract class - Java Utilities.

UNIT III **12 Hrs**

Packages & Interfaces : Access Protection - Importing Packages - interfaces - Exception Handling - Multithreading - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication – Deadlock - Suspending, Resuming and stopping threads.

UNIT IV **12 Hrs**

I/O Streams : File Streams - Applets - Working with windows using AWT Classes - AWT Controls - Layout Managers and Menus.

UNIT V **12 Hrs**

Network Basics : Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL – Datagrams

Total No of Hrs : 60

TEXT BOOK:

1. Naughton, P & Schildt, H(1999) *Java2 The Complete Reference* (3rd ed.),TMH.

REFERENCES:

1. Cay S.Horstmann, Gary Cornell (2000) *Core Java 2 Volume I Fundamentals* (,5th ed.), PHI.
2. Arnold, K & Gosling, J(1996) *The Java Programming Language*(2nd ed.), Addison Wesley.

Subject Code: **CBCA22005**	Subject Name: **COMPUTER NETWORKS**	**Ty/Lb/ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Networking**	**Ty**	**4**	**0**	**0**	**4**

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

OBJECTIVES

- To introduce the basic concept of Computer Networks and OSI layers.
- To learn about Media transmission and Perform with errors.
- To provide the knowledge about Multiplexing techniques, Ethernet and Token Ring and Bus.
- To understand the concepts of Switching techniques, FDDI and IEEE802.6.
- To impart the topics ISDN, TCP/IP Network and WWW.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the fundamental concept of Networking and Characterizes and standardizes the communication functions of a telecommunication system using OSI Model.
CO2	Explore knowledge about Transmission media which act as a Physical interface for communication networks and its types Guided and Unguided. Able to study in Error detection and correction.
CO3	Expose a method by which multiple analog or digital signals are combined into one signal over a shared medium using Multiplexing. Study on a system for connecting a number of computer systems to form a LAN using Ethernet. Learn Network Protocol Token bus used to transmit data and token ring works around physical ring.
CO4	Directing a signal or data element toward a particular hardware destination using Switching. Provide a standard governed by the ANSI for MAN using IEEE8062.6an for LAN using FDDI.
CO5	Develop to get Better voice quality ISDN provides access to packet switched networks, designed to allow digital transmission of voice and data over ordinary telephone wires. Provide knowledge in TCP/IP Networks and World Wide Web.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22005**	Subject Name: **COMPUTER NETWORKS**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Networking**	**Ty**	**4**	**0**	**0**	**4**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

OBJECTIVES:

- To introduce the basic concept of Computer Networks and OSI layers.
- To learn about Media transmission and Perform with errors.
- To provide the knowledge about Multiplexing techniques, Ethernet and Token Ring and Bus.
- To understand the concepts of Switching techniques, FDDI and IEEE802.6.
- To impart the topics ISDN, TCP/IP Network and WWW.

UNIT I **12 Hrs**

Introduction to Computer Network - Protocols and standards - standards organizations - Topology - Transmission mode -Classification of Network - OSI Model - Layers of OSI Model.

UNIT II **12 Hrs**

Media of Transmission - Guided Media - Unguided Media - Performance Types of Error - Error Detection - Error Corrections.

UNIT III **12 Hrs**

Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone system - Project 802 - Ethernet Token Bus - Token Ring.

UNIT IV **12 Hrs**

FDDI- IEEE 802.6-Circuit Switching - Packet Switching - Message switching - Connection Oriented and Connectionless services.

UNIT V **12 Hrs**

Analog and Digital Network-Access to ISDN – ISDN layers – TCP/IP Network- Transport and Application layers of TCP/IP-WWW.

Total No of Hrs : 60

TEXT BOOK :

1. Behrouz and Forouzan(2001), " Data Communication and Networks", (2nd ed), TMH.
2. Tanenbaum A.S (2003), "Computer Networks",(4th ed),PHI.

REFERENCES:

1. Jean Wairand (1998), " *Communication Networks (A first Course)* " , (2nd ed.), WCB/ McGraw Hill8.
2. Olivier Bonaventure(2011), "*Computer Networking : Principles, Protocols and Practice*", The Saylor Foundation .
3. Iresh A. Dhotre, Vilas S. Bagad (2013), "*Computer Networks An Illustrated Guide to Computer Networking*", Technical Publications.

Subject Code: **CBCA22006**	Subject Name: **DATA STRUCTURES**	**Ty/Lb /ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Arrays, Structures & Pointers**	**Ty**	**2**	**1**	**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

- To impart the basic concepts of elementary data organization and Mathematical Notations and Functions.
- To introduce the concepts of array, Records and Pointers, Sorting and Searching methods.
- To provide knowledge about Representation of Linked list in memory, Traversing and Searching a linked list.
- To understand the concepts Array representation of stacks & queues and illustrate recursion.
  To familiarize the concepts like Binary Tree and its Traversing and learn more about Binary Search Tree.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Able to organize data with relations and incorporate functions to establish a comprehensive model using Data structures.
CO2	Solve the real time problem using different search techniques, concepts of pointers, arrays there by giving appropriate solutions.
CO3	Applying the concepts of Memory allocation and Garbage collection by effectively utilizing the available memory space and knowledge of instances of Structures and Classes that can be incorporated using programs enables students high programming skill.
CO4	To handle a complex problem efficiently by using the concept of arrays, stacks and queues, linked list representation, recursion that could be used ultimately by dividing a complex problem into pieces , storing it in stack and then merging the solutions to arrive at a final solution.
CO5	Requisite knowledge to give an overall solution using Data structure techniques .

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22006**	Subject Name: **DATA STRUCTURES**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Arrays, Structures & Pointers**	**Ty**	**2**	**1**	**0**	**3**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **9 Hrs**

Introductions and Overview: Basic terminology- Elementary data organization - Data structures- Data structure operations – ADT – Mathematical Notations and Functions

UNIT II **9 Hrs**

Array, Records And Pointers: Linear array , Representation of linear arraysin memory - Traversing linear arrays - Inserting and Deleting - Sorting methods(Selection, bubble, insertion) -Searching methods (Binary and linear search) – Multidimensional Arrays – Pointers – Pointer Arrays – Recod Structures – Representation of Records in memory.

UNIT III **9 Hrs**

Linked List: Representation of Linked list in memory – Traversing and Searching a linked list - Memory allocation - Garbage collection - Insertion and deletion in linked list

UNIT IV **9 Hrs**

Stacks, Queues, Recursion: Stacks - Array representation of stacks – Linked List Representation of Stacks - Arithmetic expression – Recursion – Queues – Linked Representation of Queues

UNIT V **9 Hrs**

Trees: Binary Trees – Representing Binary Tree in Memory - Traversing of binary trees - Header Nodes – Threaded Binary Tree – Binary Search Tree – Searching, Inserting and Deleting in a Binary Search Tree

Total No of Hrs: 45

TEXT BOOK:

1. Seymour Lipschutz (2011) *Data Structures with C,* Schaum's Oulines, Mcgraw Hill

REFERENCE:

1. Jeanpaul, Tremblay Paul & Sorenson, G(2007) *An Introduction To Data Structure With Application*(2nd ed.), Tata Mcgraw Hill.

Subject Code: **CBCA22007**	Subject Name: **SOFTWARE ENGINEERING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: **Basic knowledge in Computer Science and Creative thinking.**	**Ty**	2	1/0	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

- It's the application of theories, methods, Planning a software project and Development process and tools to design build a software.
- To emphasis notation used to specify the external characteristic , architectural structure and design.
- To access the current status of a test process, and strategies to work on testing propose step-wise improvements and show how these are linked to achieving.
- **To apply software dynamic testing to verify and validate behavior of the code is analyzed.**
- Software functional quality reflects how well it complies with or conforms to a given design.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Deliver basic and advanced concepts of Software Engineering, designed to help beginners and professionals
CO2	Design notations are used when planning and design concepts should be able to communicate the purpose of a program.
CO3	Test as the process of **validating that a piece of software meets its business and technical requirements**.
CO4	Provide Dynamic Testing can reveal the uncovered defects that are considered to be too difficult or complicated and which cannot be covered through static Analysis increases the quality of a product and project
CO5	Learn Functional requirements could be calculations, technical details, data manipulation and processing. The strategy to confess the software quality assurance.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22007**	Subject Name: **SOFTWARE ENGINEERING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: **Basic knowledge in Computer Science and Creative thinking.**	**Ty**	2	1/0	0/0	3

UNIT I **9 Hrs**

Introduction to Software Engineering: Definition- size factor – quality and productivity factors. Planning a software project: Development process – Organizational structure. Software cost factors: Estimation techniques – Staffing level estimation – Estimating software estimation costs.

UNIT II **9 Hrs**

Design Notations & Techniques: Software Requirements Definition: specification – Formal Specification. Software Design: Design Concepts – Modules and Modularization Criteria - Notation – Techniques. Implementation issues: Concepts – coding.

UNIT III **9 Hrs**

Testing and Processes: Software Testing – Test case design – White Box testing – Block box testing – Software testing strategies – Software life cycle.

UNIT IV **9 Hrs**

Dynamic Testing : Verification and validation analyzing and reporting templates – Post implementation analysis – Functionality testing – Performance testing – Compatibility testing – Case study.

UNIT V **9 Hrs**

Software Quality Assurance: Concepts - Movement – Back ground- SQA activities – Software Review – Formal technical reviews. Statistical software quality assurance – Reliability.

Total No of Hrs : 45

TEXT BOOK:

1. Roger S. Pressman (Fifth Edition) Software Engineering, Mc Graw Hill.

REFERENCES:

1. Fairley,R(1997) *Software Engineering Concepts*, Tata McGraw-Hill.
2. 2., Jeff Tian, *Software Quality Engineering*, Student Edition, 2006, Wiley India

Subject Code: **CBCA22L03**	Subject Name: **PROGRAMMING IN JAVA LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Object Oriented Programming**	**Lb**	0	0	4	2

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

OBJECTIVES

- To use an integrated development environment to write, compile, run, & test simple object oriented Java programs.
- To implement the principles of packages and string handling functions.
- To demonstrate the concepts of Multithreading.
- To develop programs for file handling.
- To design and develop applet programs using AWT controls.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Implement basic concepts of Java using the programs for finding area, perimeter, prime , display months and sorting given numbers
CO2	Explore Java programs to implement string handling functions like reverse, replace, concat and compare strings.
CO3	Demonstrate the concepts of Multithreading using Runnable Interface.
CO4	Develop programs for file handling like create a file and process a file using BufferInputStream class.
CO5	Design and develop applet programs using AWT controls – Draw the shapes Oval, Circle, Rectangle and Square. Develop code using Form layout.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22L03**	Subject Name: **PROGRAMMING IN JAVA LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Object Oriented Programming**	**Lb**	0	0	4	2
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

1. Write a Java program to calculate Area and perimeter of a circle
2. Write a Java Program to Check if the given number is Prime or not
3. Write a simple Java program to Display Month of year using Calendar class
4. Write a java program to sort a given set of numbers.
5. Write a java program for handling string Functions a) Reverse b) Replace c) Concat d) Compare
6. Create New Thread Using Runnable interface in java.
7. Read File Using Java Buffered InputStream class
8. Draw Oval, Circle, Rectangle & Square using Applets
9. Write an applet Program for flowlayout
10. Create AWT controls for button, combobox, checkbox, Textfield using Java Applet.

Total no. of Hrs needed to complete the Lab: 60

Subject Code: **CBCA22L07**	Subject Name: **DATA STRUCTURES AND ALGORITHM LABORATORY**	T/L/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : **Knowledge in C++ Programming**	**Lb**	**0**	**0/0**	**4/0**	**2**

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

OBJECTIVES

- To introduce the basic concepts of Linear and Binary search.
- To understand Selection, Bubble and Insertion Sorting Methods
- To impart the concepts of Stack and Arrays
- To provide knowledge about Queues and Pointers
- To develop the knowledge in the Binary tree operations.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Capable of implementing the search techniques so as to render a faster solution.
CO2	To utilize the different methods for various sorting applications appropriately and arrange the data in order.
CO3	Explore the concept of Arrays, Push and Pop operations in order to synchronize the different instructions executed by the microprocessor with effective usage of memory.
CO4	To apply the concept of Pointers by proper referencing that enable faster access of data or information from the memory that ultimately leads to faster execution.
CO5	Able to solve any problem in Data structure using object oriented programming concepts.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22L07**	Subject Name: **DATA STRUCTURES AND ALGORITHM LABORATORY**	T/L/ ETL	L	T / S.Lr	P/R	C
		Lb	**0**	**0/0**	**4/0**	**2**

1. Implementation of Linear Search.
2. Implementation of Binary Search.
3. Implementation of Selection sorting method.
4. Implementation of Bubble sorting method.
5. Implementation of Insertion sorting method.
6. Implementation of PUSH and POP operations of a STACK using ARRAYS.
7. Implementation of INSERT and DELETE operations of a QUEUE using POINTERS.
8. Implementation of Binary Tree Traversals.
9. Implementation of Binary Search Tree (BST)
10. Implementation of INSERTING and DELETING nodes in Binary Tree.

Total No of Hrs needed to complete the Lab: 60

Subject Code: **CBCA22ID1**	Subject Name: **Allied IV: DIGITAL FUNDAMENTALS**	**Ty/Lb/E TP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Knowledge of Basic Electronics**	**Ty**	2	1	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

- To Introduce different Number System and codes
- To impart a great deal of Knowledge in minimization Boolean functions
- Ability to understand, analyze and design various combinational circuits
- To Understand the sequential digital circuits like flip-flops, register
- To determine the characteristics of memory and their classification &different types of Counters

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand number representation and conversion between different representations in digital electronic circuits.
CO2	Apply the Boolean minimization techniques like K-map method, Don't care conditions & different logic gates
CO3	Implement the Boolean functions techniques for combinational circuits such as Adder, Subtractor, Multiplexer , Decoder & Encoder etc.
CO4	Analyze logic processes and implement logical operations using sequential logic circuits such as RS, JK, Master-Slave ,D and T flipflops & Shift registers
CO5	Ability to identify basic requirements for a design application such as Counters, Ripple Counters, Synchronous Counter, Cascade counters & Classify different semiconductor memories.

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

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

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

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

Subject Code: **CBCA22ID1**	Subject Name: **Allied IV: DIGITAL FUNDAMENTALS**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Knowledge of Basic Electronics**	**Ty**	2	1	0	3
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **9 Hrs**

Binary Systems : Digital Computers and Digital Systems – Binary Numbers – Number Based Conversions – Octal and Hexadeciamal Numbers - Complements - Binary codes - Binary logic

UNIT II **9 Hrs**

Logic Gates and Simplification of Boolean Functions : Digital Logic Gates - Truth tables. K- map method (upto 5 Variables) – Product of Sums Simplifications – Don't Care Conditions - Mc-Clausky Tabulation method.

UNIT III **9 Hrs**

Combinational Logic : Adders - Subtractors - Decoders - Encoders - Multiplexer - Demultiplexer - Design of Circuits using decoders/Multiplexers - ROM - PLA (Programmable Logic Array)– PAL(Programmable Array Logic).

UNIT IV **9 Hrs**

Sequential logic : Flip flops : RS, JK,Master-Slave flipflop, D and T Flip flops - Registers – Shift Registers – Types of shift registers : SIPO, SISO,PISO,PIPO.

UNIT V **9 Hrs**

Couters and Memory : Counters - Ripple Counters - Synchronous Counter-asynchronous counter, Up/down synchronous counters, Cascaded counters –Basics of Memory- RAM-ROM-PROM-EPROM

Total No of Hrs: 45

TEXT BOOKS:

1. Morris Mano,M(1984), *Digital Logic and Computer Design*(2nd ed.), Prentice Hall of India
2. Thomas L.Floyd & R.P. Jain,(2009), Digital Fundamentals(8th ed.), Pearson Education

REFERENCE :

1. Bartee,T,C(1991) *Computer Architecture and logical Design* McGraw Hill,

Subject Code: CBCA22008	Subject Name: **VISUAL PROGRAMMING**	**Ty/Lb/ ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Programming & MS Access**	**Ty**	3	1	0	4

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

OBJECTIVES

- To introduce VB controls, Data types and to create simple VB form.
- To impart the basic concepts of loops and functions.
- To provide knowledge about Control Arrays, Combo Boxes, Grid Control, Projects with Multiple forms, Do Events and Sub Main, Error Trapping
- To illustrate the concepts VB Forms, MDI forms and testing in VB.
- To familiarize the concepts of Database connectivity and to inculcate the usage of handling files.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Develop knowledge of creating a simple VB form and making use of VB controls.
CO2	Evaluate the VB Program to save time to execute same set of coding for many times using Functions and Procedures also Displaying Information and execute Looping Structures.
CO3	Applying projects with multiple forms. Analyze the Do Events and Sub main concepts and Error Trapping. Apply these concepts in the VB program.
CO4	Implement the usage of Menus, MDI forms. Achieve the knowledge of Testing, Debugging and optimizationDemonstrate the testing problems as early as possible using Integration testing.
CO5	Create Database connectivity to implements this in VB forms. Using Connectivity coding ODBC will connected with front end VB form and back end oracle.

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

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

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

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

Subject Code: **CBCA22008**	Subject Name: **VISUAL PROGRAMMING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Programming & MS Access**	**Ty**	3	1	0	4
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **12 Hrs**

Customizing a Form : Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers.

UNIT II **12 Hrs**

Loops and Functions: Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures .

UNIT III **12 Hrs**

Arrays: Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms - Do Events and Sub Main - Error Trapping.

UNIT IV **12 Hrs**

VB Objects: Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization - Working with Graphics.

UNIT V **12 Hrs**

Database programming with VB: Record set – Data control-Using the visual data manager – Entering data – Validating data – Accessing fields and record sets -Monitoring Mouse activity - File Handling - File System Controls - File System Objects.

Total No of Hrs : 60

TEXT BOOKS:

1. Gary Cornell(1999) *Visual Basic 6 from the Ground up* , Tata McGraw Hill.(I – IV Units)
2. Gary Bronson, Introduction to programming Using Visual Basic 6, Dreamtech publications, II Edition(V^{th} Unit)

REFERENCES:

1. Noel Jerke (1999) Visual Basic 6 The Complete Reference Tata McGraw Hill .

Subject Code: CBCA22009	Subject Name: **DATABASE MANAGEMENT**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Database Management System and Operating System**	**Ty**	3	1	0	4

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

OBJECTIVES

- To introduce the basic concepts of DBMS and its Principles.
- To discuss about the SQL Language then commands and then the operators.
- To ensure the Data Integrity in Oracle that indicates the Built-in-Function.
- To define the Indexes and privileges of view and its sequences.
- To describe PL/SQL Block is control the structure of database and then the Triggers.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the Basic concepts of DBMS, Relational Data base and Relational algebra.
CO2	Familiarize to create table, and doing update, insert, delete, drop and select commands using DDL,DML and DRL in SQL.
CO3	Implement Integrity Constraints ie set of rules in SQL like Unique, NotNull, Combine two or more select statements using Set Operations in SQL and explore some Built in functions.
CO4	Provide knowledge in Index, Views, Sequence and Synonyms in SQL.
CO5	Combine SQL with Procedural features of Programming Languages using PL/SQL programming and perform execution PL/SQL with Triggers and Cursor.

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

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

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

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

Subject Code: CBCA22009	Subject Name: **DATABASE MANAGEMENT**	**Ty/Lb /ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Database Management System and Operating System**	**Ty**	3	1	0	4
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **12 Hrs**

Introduction and Basic Concepts: Structure of DBMS - Advantages and Disadvantages of DBMS - Relational Database: attributes & domains, tuples, relations and their schemes - Integrity rules - Relational Algebra: basic operations.

UNIT II **12 Hrs**

SQL Language Basics : Oracle & Client-Server Technology - types of SQL Declarations – DDL - DML - SELECT command - data types - Expressions and Operators- Types of Operators - Precedence of Operators-.

UNIT III **12 Hrs**

More on SQL: Data Integrity : types of integrity , integrity constaints , NOT NULL, UNIQUE, Primary KEY, CHECK Constraints - Oracle Dual Table - Oracle Built in Function - Union, Intersect, Minus,

UNIT IV **12 Hrs**

SQL Performance Tuning: Indexes : creating indexes, changing an index, eliminating an Index –Views : properties and privileges of view, creating view, deleting a view – Sequences : creating, changing, deleting sequence, synonyms : creating, renaming, removing a synonyms

UNIT V **12 Hrs**

Introduction to PL/SQL:Introduction -The Generic PL/SQL Block - How PL/SQL works-control structures, Stored Procedures and Functions - Database Triggers- types of triggers - creating, modifying and deleting a trigger - Introduction to Cursor

Total No of Hrs : 60

TEXT BOOK:

1. Jose A Ramalho(2000), *Oracle 8i,* BPB Publications

REFERENCES:

1. Bipin C. Desai (1997), *An Introduction To Database Systems*, West Publishing Company.
Ivan Bayross Sql, *Pl/Sql The Programming Language Of Oracle*(2nd ed.) , Bpb Publications

Subject Code: CBCA22016	Subject Name : Distributed Computing	Ty/Lb/ ETL/IE	L	T / S.Lr	P/ R	C
	Prerequisite : NIL	Ty	3	0	0	3

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

OBJECTIVE :

- To expose students to both the abstraction and details of file systems.
- To introduce concepts related to distributed computing systems.
- To focus on performance and flexibility issues related to systems

COURSE OUTCOMES (COs) : (3- 5)

CO1	To expose students to both the abstraction and details of file systems.
CO2	To introduce concepts related to distributed computing systems
CO3	To focus on performance and flexibility issues related to systems

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	3	1	2	1	1	1	1	1	1
CO2	3	2	2	3	1	3	1	1	1	1	1	1
CO3	3	3	1	3	2	2	1	1	1	1	1	1

COs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5			
CO1	3	2	3	1	2			
CO2	3	3	2	1	3			
CO3	3	2	2	1	3			

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

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

Subject Code: CBCA22016	Subject Name : Distributed Computing	Ty/Lb/ ETL/IE	L	T / S.Lr	P/ R	C
	Prerequisite : NIL	Ty	3	0	0	3

UNIT I Distributed Computing Fundamentals 9 Hrs

Introduction to distributed computing system, Evolution, Different models, Definition, Issues in design, DCE, Message passing-Introduction, Desirable features of a good message passing system, Issues in IPC, Synchronization, Buffering, Multidatagram, Process addressing, Failure handling.

UNIT II Remote Procedure Call 9 Hrs

Introduction, RPC model, transparency of RPC, Implementing RPC mechanism, Stub generation, RPC messages, Marshalling arguments and results, Sever management, parameter-passing semantics, Call semantics, Communication protocols for RPCs, Complicated RPC, Client-server binding, exceptional handling.

UNIT III Distributed Shared Memory and Synchronization 9 Hrs

Introduction, General architecture of DSM systems, Design and implementation issues of DSM, Granularity, Structure of shared memory space, Consistency model, Replacement strategy, Thrashing, Different approaches to DSM, Advantages of DSM, Clock synchronization, Event ordering, Mutual exclusion, Deadlock, Election algorithm.

UNIT IV Resource and Process Management 9 Hrs

Introduction, Desirable features of a good global scheduling algorithm, Task assignment approach, Load balancing approach, Load sharing approach, Process migration, Threads.

UNIT V Distributed File Systems and Naming 9 Hrs

Desirable features of good DFS, File models, File accessing, models, File sharing semantics, File caching schemes, File replication, Fault tolerance, Naming - Desirable Features of a Good Naming System, Fundamental Terminologies and Concepts, Systems-Oriented Names, Name caches, Naming & security.

Total Hours: 45

TEXT BOOK:

1. Pradeep K. Sinha (2012 Reprint) , Distributed Operating System Concepts and Design PHI

REFERENCE BOOKS:

1. Andrew S. Tenenbaum (2012), Modern Operating System (3rd ed.) PHI
2. Ajay D. Kshemkalyani , Mukesh Singhal (2008), Distributed computing : principles, algorithms and systems – Cambridge University Press
3. Andrew S. Tenenbaum &Maatren Vansteen (2012) Distributed systems: Principles & Paradigms (2nd ed.),PHI
4. Hagit Attiya And Jennifer Welch (2004) Distributed computing fundamentals, simulations and Advanced Topics (Digitized in 2007) (2nd ed.), Wiley
5. Jean Dollimore, Tim Kindberg, And George Coulouris (2005) Distributed Systems: Concepts and Design (4th ed.) Pearson Education

Subject Code: **CBCA22L08**	Subject Name: **VISUAL PROGRAMMING LABORATORY**	T/L/ ETL	L	T / SLr	P/R	C
	Prerequisite : **Theoretical Knowledge in Visual Basic**	**L**	**0**	**0/0**	**4/0**	**2**

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

OBJECTIVES

- To introduce VB controls, Data types to create simple VB form.
- To impart the basic concepts of loops and functions.
- To provide knowledge about Control Arrays, Combo Boxes, Grid Control, Projects with Multiple forms, Do Events and Sub Main, Error Trapping.
- To understand the concepts MDI forms and implement to do testing in VB.
- To familiarize Database connectivity with VB forms and to inculcate the usage of handling files.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	To develop knowledge of creating a simple VB form using VB controls in Payroll and Saving Bank account.
CO2	Evaluate the VB Program in the project Inventory and Invoice to with Functions and Procedures, Displaying Information and Looping Structures. These concepts will give the standardized form of a coding
CO3	Applying projects with multiple forms. Analyze the Do Events and Sub main concepts and Error Trapping. Apply these concepts in the VB program to get the in the forms of Library information system and Student information system.
CO4	Implement the usage of Menus, MDI forms. Achieve the knowledge of Testing, Debugging and optimization. Using the following stages – planning, defining, designing, building, testing and deployment entire project has been created concepts in Income tax processing system, Electricity bill preparation system and Telephone directory maintenance.
CO5	Create Database connectivity to implements this in VB forms. In which data using in the project Mark sheet Processing and view the saved data in future

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22L08**	Subject Name: **VISUAL PROGRAMMING LABORATORY**	T/L/ ETL	L	T / SLr	P/R	C
	Prerequisite : **Theoretical Knowledge in Visual Basic**	**L**	**0**	**0/0**	**4/0**	**2**

Creation of a Database and performing the operations given below using a Menu Driven Program.

a) Insertion b) Deletion c) Modification d) Generating a Simple report for the following:

1. Payroll.
2. Saving Bank account for banking.
3. Inventory System.
4. Invoice system.
5. Library information system
6. Student information system
7. Income tax processing system.
8. Electricity bill preparation system.
9. Telephone directory maintenance
10. Mark sheet Processing. With Connectivity

Total no. of Hrs. needed to complete the Lab: 60

Subject Code: **CBCA22L04**	Subject Name**: DATABASE MANAGEMENT LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Should be comfortable with the relational model, SQL, and the basic functions of database systems.**	**Lb**	0	0	4	2

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

OBJECTIVES

- To use RDBMS to store store, manage, query, and retrieve data.
- To Provide data integrity.
- To demonstrate the concept of the data from physical harm and unauthorized access.
- To merge the fact retrieval and file management fields in preparation for the addition at a later time of inferential services in the commercial world.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Identify the basic concepts and various data model used in database design ER modelling concepts and architecture use and design queries using SQL
CO2	recognize/ identify the purpose of query processing and optimization and also demonstrate the basic of query evaluation.
CO3	apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression fro queries.
CO4	apply and relate the concept of transaction, concurrency control and recovery in database.
CO5	Formulate query, using SQL, solutions to a broad range of query and data update problems.

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

Subject Code: **CBCA22L04**	Subject Name**: DATABASE MANAGEMENT LABORATORY**	**Ty/Lb /ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Should be comfortable with the relational model, SQL, and the basic functions of database systems.**	**Lb**	0	0	4	2
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

1. SQL BASICS:

1. DDL – Create,Alter,Drop.
2. DML-Update ,Insert,Delete.
3. DRL-Select.

2. VIEWS

3. INTEGRITY CONSTRAINTS- Naming Constraints.

4. SUB QUERIES- Nested, Complex.

5. SQL FUNCTIONS-Built in functions.

6. SET OPERATIONS

7. PL/SQL-Factorial, Fibonacci Series.

Total no. of Hrs needed to complete the Lab : 60

Subject Code: **HBFL22IXX**	Subject Name: **FOREIGN LANGUAGE**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **NIL**	**Lb**	**0**	**0**	**2**	**1**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

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	JAPANESH
4	EBFL22I04/ HBFL22I04	ARABIC
5	EBFL22I05/ HBFL22I05	CHINESE
6	EBFL22I06/HBFL22I06	RUSSIAN
7	EBFL22I07/HBFL22I07	SPANISH

Subject Code: **CBCA22010**	Subject Name: **PROGRAMMING IN PYTHON**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic Knowledge in C and C++ Programming**	**Ty**	**3**	**1**	**0**	**4**

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

OBJECTIVES

- To understand the basic concept of Python Programming and to learn how to write loops and decision statements in Python.
- To introduce the concepts of functions and pass arguments in Python.
- To provide knowledge about lists, tuples, indexing and slicing to access data and dictionaries in Python programs.
- To understand the file concepts in Python.
- To familiarize object-oriented concepts such as encapsulation, polymorphism, inheritance in Python.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the basic concepts of python programming such as data types, variables, operators, keywords, looping statements, conditional statements.
CO2	Capable of understand the functions, built-in function, scope and lifetime of variable, built in functions used in strings and lists..
CO3	Develop to access and modify key:value Pairs in Dictionaries, Built-In Functions -dictionaries, lists and tuples ,methods-dictionaries, tuples and sets, operations on tuples.
CO4	Implement the use of Files, Creating, reading and writing Text, Binary data files and csv files.os and os.path Modules, Regular Expression Methods.n.
CO5	Determine the different Object oriented concepts in real time problem that helps us to reduce development time because of Code Reusability, encapsulation, polymorphism etc.

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

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

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

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

Subject Code: **CBCA22010**	Subject Name: **PROGRAMMING IN PYTHON**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic Knowledge in C and C++ Programming**	**Ty**	**3**	**1**	**0**	**4**

UNIT I **12 Hrs**

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language. **Control Flow Statements:** The if statement, The if…else Statement, The if…elif…else Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement,

UNIT II **12 Hrs**

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.

UNIT III **12 Hrs**

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets:** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.

UNIT IV **12 Hrs**

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression Operations:** Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.

UNIT V **12 Hrs**

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism

Total No of Hrs : 60

TEXT BOOK

1. Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS / WEBLINKS:

1. Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data",** 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2. AurelienGeron, **Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299

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Subject Code: **CBCA2 2011**	Subject Name: **OPERATING SYSTEMS**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Familiar **with, basic hardware and software aspects of computer systems organization.**	**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 andLab

OBJECTIVES

- To make the computer system convenient to use in an efficient manner.
- To hide the details of the hardware resources from the users.
- To provide users a convenient interface to use the computer system.
- To act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources..
- To keep track of who is using which resource, granting resource requests, and mediating conflicting requests from different programs and users.
- To provide efficient and fair sharing of resources among users and programs

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Analyse the structure of OS and basic architectural components involved in OS design.
CO2	Analyse the various device and resource management techniques for times sharing and distributed systems
CO3	Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system.
CO4	Ability to describe linked list and tree operations
CO5	Determine and analyse the complexity of given Algorithms Ability to summarize searching and sorting techniques.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22011**	Subject Name: **OPERATING SYSTEMS**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite: Familiar **with, basic hardware and software aspects of computer systems organization.**	**Ty**	3	0/0	0/0	3

OBJECTIVES:

- Student will learn the functioning of modern computers
- Student will learn the purpose, structure and functions of operating systems
- Student will learn the illustration of key OS aspects by example

UNIT I **09 Hrs**

Introduction: What is an operating system? - Mainframe, desktop, multiprocessor, distributed, clustered, real - time and handheld systems - Operating System Structures - System components - operating system services - system calls - systems programs - system structure - virtual machines.

UNIT II **09 Hrs**

Process: Process concept - process scheduling - operations on processes - cooperating processes - Inter process communication - CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms.

UNIT III **09 Hrs**

Process Synchronization: The critical section problem – semaphores - classical problems of synchronization - Deadlocks: Deadlock characterization, methods for handling deadlocks, Deadlock prevention, avoidance and detection, Recovery from deadlocks.

UNIT IV **09 Hrs**

Memory Management: Swapping - contiguous memory allocation – paging – segmentation - segmentation with paging - Virtual Memory - Demand paging - page replacement - location of frames - thrashing.

UNIT V **09 Hrs**

Storage Management: Introduction- File Concept – File Attributes- File Operations - File Types – Access Methods: Sequential and Direct - Directory Structure: Storage Structure , Directory Overview

Total No of Hrs: 45

TEXTBOOK :

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne(2006), *Operating System Principles(7th ed.)* , John Wiley & Sons(Asia) Pte Ltd.

REFERENCES:

1. Thomas Anderson & MichaelDahlin (2014) , *Operating Systems: Principles and Practice* (2nd ed.)
2. H.M. Deitel(1990), *An Introduction to Operating System*, 2nd ed. Addison Wesley.
3. Andrew S. Tanenbaum ,*Modern Operating Systems* (4th ed.)
4. Stallings,*Operating systems*(6thed)., Prentice Hall.

Subject Code: **CBCA22017**	Subject Name: **WEB PROGRAMMING**	T/L/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : **Basics knowledge in Computer Fundamentals**	**T**	**3**	**0/0**	**0/0**	**4**

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

OBJECTIVES

- To learn the basic concepts of Web Publishing.
- To introduce Basic HTML tags, Text formatting tags and study of adding & linking documents in HTML.
- To provide knowledge about Table, Frame, Frameset and Forms.
- To understand the concepts Style sheet and its types.
- To familiarize DHTML and Rollover Button

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the fundamental concept of Web Technology like Types of Web browser, www and steps involved in maintaining website.
CO2	Demonstrate Formatting text for better look and feel of a document using Text formatting tags. Adding graphics in HTML document and linking with other documents.
CO3	Implement Frame tag to divide the browser window into multiple sections when each section load separate HTML document, Form tag used to accept user Input and Table tag used to arrange data into row and columns.
CO4	Expose to provide knowledge in collection of Style rules that tells the browser how the various styles are to be applied to the HTML tags to present in the document using Internal and External Style sheets.
CO5	Create dynamic web pages using DHTML. Provide interactively between the user and the web page using Roll over button.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22017**	Subject Name: **WEB PROGRAMMING**	T/L/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : **Basics knowledge in Computer Fundamentals**	**T**	**3**	**0/0**	**0/0**	**4**

UNIT I **12 Hrs**

Web Publishing: Web browser – WWW - Web design process: Implementation, Maintenance Phases of Website - Web Publishing - HTML Documents: Overview, rules guidelines, structure of HTML documents, document types.

UNIT II **12 Hrs**

HTML Tags: <HTML> - <HEAD> - <TITLE> , <BODY>,<Marquee> - Paragraphs - Lists - Text Formatting, <Font>, Text Styles - Adding Graphics to HTML Docuements - Linking Documents

UNIT III **12 Hrs**

Tables, Frame and Forms: Table tag and its Attributes - Frame: Overview of frame, Frameset - Simple frame, Frame targeting - Forms: Form objects and Methods.

UNIT IV **12 Hrs**

Style Sheets: Style Sheet Basics - Style Sheet Properties (Font Properties, Color and Background Properties, Text Properties, Box Properties)- Positioning with Style Sheets

UNIT V **12 Hrs**

DHTML: Introduction to Dynamic HTML and the Document Object Model– HTML and Scripting Access-Rollover Buttons-Moving Objects with DHTML-Ramifications of DHTML

Total No of Hrs: 60

TEXT BOOK:

1.Thomas A. Powell(1999), *HTML: The Complete Reference*(2nd. ed.), Bpb Publication.

REFERENCES:

1. Ed. Wilson (2006*), Microsoft VBScript: Step by Step*, Microsoft Press
2. Sterling Hughes(2001) *PHP:Developers's Cook book*,BPB publications
3. Ivan N Bayross(2000), Web Enabled Commercial Applications Development Using, HTML, DHTML, Java Script, Perl CGI(2nd ed.), BPB Publications

Subject Code: **HBCC22002**	Subject Name: **ENTREPRENEURSHIP DEVELOPMENT**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**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, T/L/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 VI	**Coursecode: 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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/Allied	Skill component	Practical Project/ Internship	others
	□								

Subject Code: **HBCC22002**	Subject Name: **ENTREPRENEURSHIP DEVELOPMENT**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**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, T/L/ETL :Theory / Lab / Embedded Theory and Lab						

UNIT I: Concept of Entrepreneurship **9 Periods**

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

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

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 Periods**

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 Periods**

Entrepreneurial Development Programmes (EDP) - Role, relevance and achievements – Roleof Government in organizing EDPs- Critical evaluation

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

Role of Entrepreneur in Economic growth - Strategic approaches in the changing Economicscenario for small scale Entrepreneurs - Networking, Niche play, Geographic Concentration,Franchising / Dealership - Development of Women Entrepreneurship. Self-help groups andempowerment 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 Hours :	**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

Subject Code: **CBCA22L05**	Subject Name: **PROGRAMMING IN PYTHON LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basics of C++, JAVA Programming.**	**Lb**	**0**	**0**	**4**	**2**

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

OBJECTIVES

- Interpret the use of procedural statements like assignments, conditional statements, loops and function calls in Python Programming.
- Infer the supported data structures like lists, dictionaries and tuples in Python Programming.
- Illustrate the application of matrices in building the Python programs.
- Examine the use of creating Files and processing Files.
- Implement to develop video games using Pygame in Python.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Implement the Python language control statements, loops and functions to write programs for a wide variety problem like GCD, Finding Exponential, Prime Numbers and Maximum Numbers
CO2	Examine the core data structures like lists, dictionaries, tuples and sets in Python to process and sort the data and Searching data using Python programs.
CO3	Interpret to multiply two matrices using list comprehension in Python.
CO4	Discover to find the most frequent words in a text read and process from files using Python programs.
CO5	Develop Video game code and Simulate elliptical orbits and bouncing ball game using Pygame in Python.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22L05**	Subject Name: **PROGRAMMING IN PYTHON LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basics of C++, JAVA Programming.**	**Lb**	**0**	**0**	**4**	**2**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

1. Compute the GCD of numbers
2. Exponentiation (power of a number)
3. Find the maximum of a list of numbers
4. Linear search
5. Selection sort
6. Find N Prime Numbers
7. Multiply matrices
8. Find the most frequent words in a text read from a file
9. Simulate elliptical orbits in Pygame
10. Simulate bouncing ball in Pygame

Total no. of Hrs needed to complete the Lab : 60

Subject Code: **CBCA22L09**	Subject Name: **WEB PROGRAMMING LABORATORY**	T/L/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : **Basic knowledge in Computer Programming**	**L**	**0**	**0/0**	**4/0**	**2**

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

OBJECTIVES

- To introduce Text formatting and List in HTML
- To understand the concepts of <A> Tag and implementation Table in HTML
- To understand the concept of Frame, Img and Form Tag in HTML
- To provide knowledge in Style Sheet and its types in HTML
- To develop Roll Over Button.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Demonstrate Formatting text for better look and feel of a document using Text formatting tags. Adding List tags in HTML document to produce Bullets and Numbering formats in a document.
CO2	Define Hyperlink <A> tag used to link one page from another. Table tag used to arrange data into row and columns.
CO3	Implement Frame tag to divide the browser window into multiple sections when each section load separate HTML document, Form tag used to accept user Input.
CO4	Expose to provide knowledge in collection of Style rules that tells the browser how the various styles are to be applied to the HTML tags to present in the document using Internal and External Style sheets.
CO5	Provide interactively between the user and the web page using Roll over button.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22L09**	Subject Name: **WEB PROGRAMMING LABORATORY**	T/L/ ETL	L	T / S.Lr	P/R	C
	Prerequisite : **Basic knowledge in Computer Programming**	**L**	**0**	**0/0**	**4/0**	**2**

1. Program to illustrate Text Formatting tags
2. Create a web page using ordered list and unordered list
3. A program to illustrate Hyperlink tag(Anchor tag)
4. Create a webpage which contains table with its Attributes
5. Create a Web Page using frame tag with its attributes
6. Create a webpage using img tag.
7. Create a web page using form tag
8. Use Cascading Style Sheet to create web page – Use Internal style sheet
9. Create a web page using External Style Sheet - Properties (Font, Color, Background, Text, and Box)
10. Program to illustrate roll over button

Total No of Hrs needed to complete the Lab : 60

Subject Code: **CBCA22012**	Subject Name: **OBJECT ORIENTED MODELING AND DESIGN**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Programming fundamentals with C++**	**Ty**	**3**	**1**	**0**	**4**

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

OBJECTIVES

- Develop a working understanding of formal object-oriented analysis and design processes.
- Develop an appreciation for and understanding of the risks inherent to large-scale software development-
- Develop the skills to determine which processes and OOAD techniques should be applied to a given project.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	To understand the Basic concepts of object oriented system development.
CO2	To understand the methodology and UML.
CO3	To understand the concept of object oriented analysis identifying use case.
CO4	To understand the concept of object oriented design.
CO5	To understand the concept of software quality assurance.

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	2	3	2	2
CO2	2	2	3	2	3	3	2	3	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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary /Allied	Skill component	Practical Project/ Internship	others
		√							

Subject Code: **CBCA22012**	Subject Name: **OBJECT ORIENTED MODELING AND DESIGN**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Programming fundamentals with C++**	**Ty**	**3**	**1**	**0**	**4**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

OBJECTIVES:

- Develop a working understanding of formal object-oriented analysis and design processes.
- Develop an application and understanding of the risks inherent to large-scale software development.
- Develop the skills to determine which processes and OOAD techniques should be applied to a given project.

UNIT I **12 Hrs**

Introduction OOSD Methodology - Unified approach – Object basics – Object state and properties – Behavior – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle – S/W device process- High quality Software Object Oriented System Development- Reusability.

UNIT II **12 Hrs**

Methodology and UML Introduction – Survey – Rumbugh- Booch- Jacobson methods – Patterns – Frameworks – Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams – Dynamic modeling diagrams – Interaction Diagrams- sequence diagrams.

UNIT III **12 Hrs**

Object Oriented Analysis Identifying Usecase – Business object analysis – Usecase driven object oriented analysis – Usecase model – Documentation – Introduction- classification theory- Approaches for Identifying classes – Identifying object- relationships- attributes- methods – Super-sub class – Aggregation Class Responsibility – Object responsibility.

UNIT IV **12 Hrs**

Object Oriented Design -Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – DBMS – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface

UNIT V **12 Hrs**

Software Quality assurance – Testing strategies – Object orientation testing – Test cases – Test Plan – Debugging principles – Usability – Satisfaction – Usability testing – Satisfaction testing.

Total no. of Hrs : 60

REFERENCES:

1. Ali Bahrami(2003), *Object Oriented System Development*, McGraw Hill International Edition.
2. Craig Larman(2002) *Applying UML and Patterns*(2nd ed.) Pearson.
3. James Rumbaugh(2004) *Object Oriented Modeling Language* (2nd ed.), PHI.

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

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/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	3	2	3	3	2	2	3	2	2
CO2	2	2	3	2	3	3	2	3	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

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

COs/PSOs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	2	2	3	3	2
CO2	2	2	1	3	2	2	1
CO3	3	3	3	2	3	3	3
CO4	3	3	2	3	3	3	2
CO5	3	2	2	3	3	2	2
	3	3	2	2	3	3	2

Subject Code : HBCC22ET1	Subject Name UNIVERSAL HUMAN VALUES	Ty/Lb/ ETL	L	T/ SLr	P/R	C
	Prerequisite : None	ETP	2	0	2	3
L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

Unit 1 Love and Compassion: **9 Hrs**

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: **9 Hrs**

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: **9 Hrs**

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: **9 Hrs**

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: **9 Hrs**

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

Total no. of Hrs :45

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.

Subject Code: **CBCA22L06**	Subject Name: **PROJECT WORK**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **Basic knowledge in Programming ,Computer Applications and its Concepts**	**Lb**	**0**	**0**	**18**	**9**

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits
T/L/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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ Internship	others
								√	

Subject Code: **CBCA22L06**	Subject Name: **PROJECT WORK**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **Basic knowledge in Programming ,Computer Applications and its Concepts**	**Lb**	**0**	**0**	**18**	**9**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

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

Subject Code: **CBCA22E01**	Subject Name: **Data Mining and Ware Housing**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Familiarity with data analysis tools, especially SQL, NoSQL, SAS, and Hadoop.**	**Ty**	**3**	**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

- Be familiar with mathematical foundations of data mining tools.
- To Understand and implement classical models and algorithms in data warehouses and data mining.
- To Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- To Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the functionality of the various data mining and data warehousing component
CO2	Appreciate the strengths and limitations of various data mining and data warehousing models.
CO3	Explain the analyzing techniques of various data
CO4	Describe different methodologies used in data mining and data ware housing.
CO5	Compare different approaches of data ware housing and data mining with various technologies.

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	2	3	2	2
CO2	3	3	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	3	3	2	3	2	3	3	2	3

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

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

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

Subject Code: **CBCA22E01**	Subject Name: **Data Mining and Ware Housing**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Familiarity with data analysis tools, especially SQL, NoSQL, SAS, and Hadoop.**	**Ty**	**3**	**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						

UNIT – I **9 Hrs**

Introduction: Data mining application – data mining techniques – data mining case studies- the future of data mining – data mining software - **Association rules mining: Introduction**- basics- task and a naïve algorithm- apriori algorithm – improve the efficient of the apriori algorithm – mining frequent pattern without candidate generation (FP-growth) – performance evaluation of algorithms.

UNIT – II **9 Hrs**

Classification : Introduction – decision tree – over fitting and pruning - DT rules-- naïve bayes method- estimation predictive accuracy of classification methods - other evaluation criteria for classification method – classification software

UNIT – III **9 Hrs**

Cluster analysis: cluster analysis – types of data – computing distances-types of cluster analysis methods - partitioned methods – hierarchical methods – density based methods – dealing with large databases – quality and validity of cluster analysis methods - cluster analysis software.

UNIT – IV **9 Hrs**

Web data mining: Introduction- web terminology and characteristics- locality and hierarchy in the web- web content mining-web usage mining- web structure mining – web mining software - **Search engines:** Search engines functionality- search engines architecture – ranking of web pages.

UNIT – V **9 Hrs**

Data warehousing: Introduction – Operational data sources- data warehousing - Data warehousing design – Guidelines for data warehousing implementation - Data warehousing metadata - **Online analytical processing (OLAP):** Introduction – OLAP characteristics of OLAP system – Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines

Total:45 Hrs

BOOK FOR STUDY: —Introduction to Data mining with case studies‖, G.K. Gupta, PHI Private limited, New Delhi, 2008**.** 2nd Edition, PHI , 2011

BOOK FOR REFERENCE

Data Mining Techniques, Arun K Pujari , University Press

Subject Code: **CBCA22E02**	Subject Name: **INFORMATION SECURITY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **Concept of Information handling**	**Ty**	**3**	**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

- To introduce the concepts of Information Security, and its Characteristics.
- To impart the basic concepts of Security Investigation and its Ethical and Professional Issues.
- To familiarize the concepts of Security Analysis and Risk Management.
- To provide knowledge about Information Security Policy Standards and NIST framework
- To understand the Physical design and cryptography and its technology.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the basic concepts of Information Security.
CO2	Applying the concepts of security investigation in Business needs, Legal and professional ethics.
CO3	Expose the ongoing process of identifying security risks and implementing plans to address them.
CO4	Implement ISO17799 (Indian Standard) and BS 7799 (British Standard) Information Security Policy standards establish guidelines and general principles for maintaining and improving Information Security Management. Protect Industrial assets from Cyber threats using NIST frame work.
CO5	Detecting vulnerability exploits against a target Computer by Intrusion Detection System.

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

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

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

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

Subject Code: **CBCA22E02**	Subject Name: **INFORMATION SECURITY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **Concept of Information handling**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

Introduction: History, What is Information Security? Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing the Components - Balancing Security and Access - The SDLC - The Security SDLC

UNIT II **9 Hrs**

Security Investigation: Need for Security - Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III **9 Hrs**

Security Analysis : Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV **9 Hrs**

Logical Design: Blueprint for Security - Information Security Poicy - Standards and Practices - ISO 17799/BS 7799 - NIST Models - VISA International Security Model - Design of Security Architecture - Planning for Continuity

UNIT V **9 Hrs**

Physical Design : Security Technology – IDS - Scanning and Analysis Tools – Cryptography - Access Control Devices - Physical Security - Security and Personnel

Total No of Hrs : 45

TEXT BOOK:

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

REFERENCES:

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

Subject Code: **CBCA22E03**	Subject Name: **PROFESSIONAL ETHICS**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **A Glance in Commercial awareness and Communication**	**Ty**	**3**	**0**	**0**	**3**

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

OBJECTIVES

- It is the field of system in moral principles that applies in practice of engineering.
- It is the process which lets you to go through the social and engineering experiments to balance the outlook of law.To enhance engineering calculation, assessment of safety and risk, in technical process.
- To develop ethical values, honestly applied and recognized as the part of corporate dialogue.
- In an international business it involves employment practice, human rights and moral obligation

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Learn the purpose of engineering ethics is to identify specific ethical issues, technical issues can help engineers to learn from both previous failures and successes. professional ideals, theories about right action
CO2	Process of developing a product, an engineer generally learns through experimentation. To simply put, a trial and error method is the mostly used one to obtain results
CO3	Meet the organizational goals, safety the professionals should possess respect for authority. The levels of authority maintained by the organization provides a means for identifying areas of personal responsibility and accountability without any risk
CO4	Understand Engineering codes of ethics mention collegiality, they generally cite acts that constitute disloyalty. The disloyalty of professionals towards an organization.
CO5	Know Conflicts that occur over technical, economic, and time factors such as cost, time, logistics required to make it in a possible way of coding in international commercial market.

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

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

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

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

Subject Code: **CBCA22E03**	Subject Name: **PROFESSIONAL ETHICS**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **A Glance in Commercial awareness and Communication**	**Ty**	**3**	**0**	**0**	**3**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab						

UNIT I **9 Hrs**

ENGINEERING ETHICS : Senses of 'engineering ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – kohlberg's theory – gilligan's theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self-interest – customs and religion – uses of ethical theories.

UNIT II **9 Hrs**

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the challenger case study.

UNIT III **9 Hrs**

ENGINEER'S RESPONSIBILITY FOR SAFETY: Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk – the three mile island and chernobyl case studies.

UNIT IV **9 Hrs**

RESPONSIBILITIES AND RIGHTS : Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights (ipr) – discrimination

UNIT V **9 Hrs**

GLOBAL ISSUES : Multinational corporations – environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct

Total No of Hrs : 45

TEXT BOOK:

1. Mike Martin and Roland SchinzingeR(1996), "*Ethics in Engineering*", McGraw Hill, New York.

REFERENCES:

1. Charles D Fleddermann(1999), *"Engineering Ethics*", prentice Hall, New Mexico.
2. Laura Schlesinger(1996), "*How Could You Do That: The Abdication of Character, Courage, and Conscience*", Harper Collins, New York.
3. Stephen Carter(1996), "*Integrity", Basic Books*, New York.
4. Tom Rusk(1993), "*The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life*", Viking, New York.

Subject Code: **CBCA22E04**	Subject Name: **SOFTWARE PROJECT MANAGEMENT**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Software Engineering.**	**Ty**	**3**	**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

- To impart the basic concepts of Project Management Framework.
- To provide project planning and scheduling project monitoring and selection of appropriate project approach.
- To Learn about the Project Management Knowledge to discuss the notion of risks and the risk management and to study Resource allocation.
- To follow International standards for Software Quality& To examine case study for the Project.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Develop the model from the conventional software product to the modern framework, function of project management is to ensure that all the activities in a project are scheduled and achieved efficiently.
CO2	Apply schedule and cost control techniques for project monitoring and design the software architecture have an exposure for organizing, selecting and managing a software project.
CO3	Explore the knowledge in Risk Management that comprises Risk Identification, Analysis and Risk Planning and to study Resource allocation that comprises a process of assigning and scheduling available resources in the most effective and economic manner.
CO4	Implement the Quality Standards ISO:9000 which is used to effective QA system and to expose CMM model which is a methodology used to develop and refine an organization software process.
CO5	Examine the case study for the Project Prince Project Management is a Process based approach that focus on organization and control througWhout the project from start to end and to illustrate British standard BS:6079 helps the organization to get project management consistently right,

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

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

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

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

Subject Code: **CBCA22E04**	Subject Name: **SOFTWARE PROJECT MANAGEMENT**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Software Engineering.**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

Introduction to Software Projects : An Overview of Project Planning – Project Management and Evaluation .

UNIT II **9 Hrs**

Selection of an appropriate Project approach : Software effort Estimation -Activity Planning :- Project Schedules – Sequencing and Scheduling Projects – Network Planning Model – forward and backward pass-Identifying the Critical path-Activity float-Shortening Project Duration – Identifying Critical Activities-precedence networks.

UNIT III **9 Hrs**

Software quality assurance plan & Risk Management : Resource Allocation – Monitoring and Control, Reviews and Audits – Management.

UNIT IV **9 Hrs**

Models : ISO 9000 model, CMM model – Comparisons - ISO 9000 weaknesses - Managing People and Organizing Teams – Software Quality -Planning for Small Projects.

UNIT V **9 Hrs**

Case Study – PRINCE Project Management, BS 6079:1996

Total No of Hrs : 45

TEXT BOOK:

1. Mike Cotterell, Bob Hughes , “Software Project Management”, Inclination/Thomas Computer Press, 4th Edition, 2004. Chapters : 1-13

REFERENCES:

1. Darrel Ince, H.Sharp and M.Woodman,” Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 1995.

Philip.B.Crosby, Quality is Free: The Art of Making Quality Certain, Mass Market, 1992.

Subject Code: **CBCA22E05**	Subject Name: **MANAGEMENT INFORMATION SYSTEM**	**Ty/Lb /ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic Knowledge in Information System**	**Ty**	**3**	**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

- Enables to know the basic purpose of studying MIS and how it is important in the field of computer applications.
- Briefing about how MIS plays key role in communicating the information in efficient manner.
- To identify the challenges and enabling to choose the best course of action.
- Enabling MIS to bring out the strength of the management & making it as opportunity for overall growth of the organization.
- Imparting knowledge on how MIS is making decision as effective, quick & timely manner.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO 1	To know how MIS using its scientific way of collecting, processing, storing and communicating information relating to the different activities to the various levels of management.
CO 2	To understand how Information Technology and Information system is interdependent, and how IT helps Information system to reach its goal by using various tools in database management system.
CO 3	A bird view on how conceptual design framework is useful in identifying the problems, setting objectives, finding best alternatives for the effective operations.
CO 4	Emphasizing on how to prepare a blue print of a system that meets the goals of the conceptual system design requirements by involving various phases like Project planning and control, Involve the user, define the detailed sub-system, I /O design, obtaining feedback, database design, procedure design, documentation etc,.
CO 5	A detailed view of how MIS is implemented, evaluated, & maintained by means of various steps like planning the implementation, allotting tasks, acquiring layout facility, organizing & training personnel, Acquiring software & hardware, generating files, testing, documenting & evaluating.

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

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

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

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

Subject Code: **CBCA22E05**	Subject Name: **MANAGEMENT INFORMATION SYSTEM**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic Knowledge in Information System**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

Foundation of Information System : Introduction to Information System and MIS – Decision support and decision making systems - systems approach - the systems view of business - MIS organization within company - Management information and the systems approach

UNIT II **9 Hrs**

Information Technology : A manager's overview - managerial overviews - computer hardware and software - DBMS - RDBMS - Telecommunication

UNIT III **9 Hrs**

Conceptual system design: Define the problems - set systems objective - establish system – constraints - determine information needs determine information sources - develop alternative conceptual design and select one document the system concept - prepare the conceptual design report

UNIT IV **9 Hrs**

Detailed system design : Inform and involve the organization - aim of detailed design - project management of MIS detailed design - identify dominant and trade of criteria - define the sub systems - sketch the detailed operating sub systems and information flow - determine the degree of automation of each operation - inform and involve the organization again - inputs outputs and processing - early system testing – software - hardware and tools propose an organization to operate the system - document the detailed design - revisit the manager user

UNIT V **9 Hrs**

Implementation evaluation and maintenance of the MIS : Plan the implementation - acquire floor space and plan space layouts - organize for implementation - develop procedures for implementation - train the operating personnel - computer related acquisitions - develop forms for data collection and information dissemination - develop the files test the system - cut-over - document the system - evaluate the MIS control and maintain the system - Pitfalls in MIS development

Total no. of Hrs : 45

TEXT BOOK:

1. W. S. Jawadekar(2002), *Management Information System*, Tata McGraw Hill.

REFERENCES:

1. Robert G. Murdick, Loel E. Ross &James R. Claggett, *Information System for Modern Management* (3rd Ed), PHI.
2. Brian,O, *Management Information System*, TMH.
3. Davis Olson, *Management Information System*, McGraw Hill.

Subject Code: **CBCA22E06**	Subject Name: **MOBILE COMPUTING**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Mobile Communication and Network Security**	**Ty**	**3**	**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

- To introduce the concepts of Mobile Computing and its Principle.
- To impart the basic concepts of Radio Frequency and the Transmission of Radio Signals.
- To familiarize the concepts of Telecommunication and its Networks.
- To provide the knowledge of Wireless LAN and its architecture.
- To understand the Mobile Network and Transport Layer and its technology.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the basic concepts of Mobile Computing.
CO2	Applying the radio frequency in mobile computing are used in communication devices such as transmitters, receiver, etc. waves are a form of electromagnetic radiation with identified radio frequencies**.**
CO3	Implement the basic concept of Medium access or multiplexing methods are FDMA, CDMA, TDMA and SDMA the mechanism.
CO4	Evaluate the Wireless LAN-Design goals-Wireless transmission technology, Settings for wireless LAN-IEEE 802.11- Architecture. Simultaneously use of equipment and reduce the wiring expense.
CO5	Create Physical design, Technology, Alter the Transmission and physical security. A conceptual division of methods in the layered architecture of protocols in the network stack in the Internet protocol.

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	2	3	2	2
CO2	3	3	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	1	3	2	3	3	2	3

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

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

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

Subject Code: **CBCA22E06**	Subject Name: **MOBILE COMPUTING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Mobile Communication and Network Security**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

Fundamentals of Wireless Transmission: Wireless-Wireless networks in comparison to fixed networks-Mobile communication: Development – Principles of mobile communication – Overview of mobility and portability- Issues for portability- Effects of device portability – Applications-Reference model

UNIT II **9 Hrs**

Radio Transmission: Frequency – Signals – antennas –Signal propagation- Multiplexing – Modulation-Spread Spectrum(DSSS,FHSS).

UNIT III **9 Hrs**

Medium access control: Motivation for specialized MAC, SDMA, FDMA, TDMA, CDMA, Comparison of the Medium access mechanism-Telecommunication Networks –GSM, Satellite communication.

UNIT IV **9 Hrs**

Wireless LAN: Advantages of Wireless LAN-Design goals-Wireless transmission technology-Settings for wireless LAN-IEEE 802.11: System architecture-Bluetooth

UNIT V **9 Hrs**

Mobile Network Layer and Transport Layer :Mobile IP-DHCP-Traditional TCP-Congestion control – mechanism to alter the transmission - Classical TCP Improvements

Total No of Hrs : 45

TEXT BOOK:

1. Jochen Schiller (2014) *Mobile Communications*(2nd ed.), Pearson Education
2. Nithyanandam .S,Ambika.M,Gayathri K.S., “Mobile Computing”, Dhanpat Rai &co.(P)Ltd

REFERENCE:

1. William C.Y.Lee(1995) *Mobile Cellular Telecommunications*(2nd ed.) , Mc-Graw- Hill.

Subject Code: **CBCA22E07**	Subject Name: **IMAGE PROCESSING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Computer Graphics**	**Ty**	**3**	**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

- To introduce the basic principles of Image Processing
- To discuss different techniques employed for the enhancement of Images.
- To describe different causes of for Image degradation and Image restoration techniques.
- To know the need for Image Compression and to learn different techniques for Image Compression.
- To gain knowledge in various methods of Image Segmentation and Representation

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Review the fundamentals concepts of an Image processing system and to transform 2D special domain image into 2D frequency domain Image which is used for processing.
CO2	Implement direct manipulation of pixels in an image using different Spatial domain methods for Image Enhancement.
CO3	Operating a noisy Image and estimating the clean, original image by using Least mean square filtering and Blind Image Restoration techniques.
CO4	Examine to retain the image quality remains the same after compression using Lossless Compression and to eliminate redundant information of an image using Lossy Compression.
CO5	Locate objects and boundaries in images using Edge detection and Region Based Segmentation

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22E07**	Subject Name: **IMAGE PROCESSING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Basic knowledge in Computer Graphics**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS: Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT

UNIT II **9 Hrs**

IMAGE ENHANCEMENT TECHNIQUES: Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters.

UNIT III **9 Hrs**

IMAGE RESTORATION: Model of Image Degradation/restoration process – Noise models – Inverse filtering - Least mean square filtering – Constrained least mean square filtering – Blind image restoration –

UNIT IV **9 Hrs**

IMAGE COMPRESSION: Lossless compression: Variable length coding – LZW coding – Bit plane coding predictive coding-DPCM. Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards

UNIT V **9 Hrs**

IMAGE SEGMENTATION AND REPRESENTATION: Edge detection – Thresholding - Region Based segmentation – Boundary representation: chair codes- Polygonal approximation –Boundary segments –boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors

Total No of Hrs : 45

TEXT BOOK:

1. Rafael C Gonzalez, Richard E Woods(2003), "*Digital Image Processing*(2nd. ed.), Pearson Education.

REFERENCES:

1. William K Pratt(2001), "*Digital Image Processing*", John Willey (2001) .

Subject Code: CBCA22E08	Subject Name: **CLOUD COMPUTING**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **Rudimentary skill in Cloud concept**	**Ty**	**3**	**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

- The basic ideas behind Cloud Computing, the evolution of the paradigm, cloud based services and its platforms.
- Explore the concept , characteristics, delivery models and benefits of cloud computing and its applicability, scalability & reliability.
- Understand the cloud networking options, basics of python and its characteristics, python for cloud
- Understand the cloud resource management and cloud based services along with application development in python and its key security,key technical compliance.
- Broadly educate to know the impact of cloud benchmarking and tuning on legal and societal issues involved in health care industry and education and addressing it.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Articulate the main concepts, key technologies& terminologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing mainly focusing on compute, storage and database services.
CO2	Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc and its storage approaches.
CO3	Illustrate the fundamental concepts of cloud storage and demonstrate the control flow, modules and functions such as python for windows azure, Amazon and Google cloud services.
CO4	Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application and python web application framework.
CO5	Expose to frontier areas of Cloud Computing using mobile cloud, cloud security, multimedia cloud and information systems, while providing sufficient foundations to enable further study and research.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22E08**	Subject Name: **CLOUD COMPUTING**	**Ty/Lb /ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **Rudimentary skill in Cloud concept**	**Ty**	**3**	**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						

UNIT 1 **9 Hrs**

Introduction and Concepts: Defining cloud computing – Cloud models- Characteristics of Cloud Computing – Cloud based services and Applications - Cloud services and platforms: Compute Services, Storage Services, Database services, Application Services, Content Delivery Services

UNIT II **9 Hrs**

Cloud Application Design: Introduction- Scalibility- Reliability – Reference Architectures for Cliud Applications- Cloud Application Design Methodlogies : Service Oriented Arcitecture, Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications- Data Storage Approches

UNIT III **9 Hrs**

Phython Basics : Introduction – Installing Python – Python Data types and Data Structures- control flow – functions – modules- Python for Cloud : Phthon for Amzon Web Services , Python for Google Cloud Platform – Python for windows Azure

UNIT IV **9 Hrs**

Cloud Application Development in Python : Python Packages of Interest – Python Web Application Framework (Django) – Designing RESTful API - Design Approaches – Image Processing App

UNIT V **9 Hrs**

Advanced Topics : Multimedia Cloud - Using the Mobile Cloud – Cloud Application Benchmarking and Tuning – Cloud Security – Cloud for Industry, Healthcare and Education

Total No of Hrs : 45

TEXT BOOK:

1. Arshdeep Bahga & Vijay Madisetti(2016), "*Cloud Computing A Hands – on Approach*", Universities Press

REFERENCES:

1. Kris Jamsa**(2013), "*Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More",* Jones & Bartlett Learning , Publisher.**
2. Barrie Sosinsky**(2011), "*Cloud Computing Bible* ", Wiley Publishing.**

Subject Code: **CBCA22E09**	Subject Name: **OPEN SOURCE PROGRAMMING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Concept of Information handling**	**Ty**	**3**	**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

- Understand concepts, strategies, and methodologies related to open source software development.
- Impart the business, economy, societal and intellectual property issues of open source software.
- Be familiar with open source software products and development tools currently available on the market.
- To provide knowledge about IoT.
- To understand knowledge about Big Data through case studies.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the basic concepts of Open Source Programming.
CO2	Applying the Principles and Methodologies of Free Open Source Software(FOSS) allow users to freely run, modify and also to freely distribute copies of either the original version or their modified version.
CO3	Implement the case studies like Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office
CO4	Imparting the Definitions, overview, definitions and concepts of IoT, things that are embedded with software, electronics, network, and sensors that allows these objects to collect and exchange data.
CO5	Understand the Introduction to Big Data, Distributed file system gets analytics using the map reduce algorithms.

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	2	3	2	2
CO2	3	3	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	3	3	2	3	2	3	3	2	3

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

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

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

Subject Code: **CBCA22E09**	Subject Name: **OPEN SOURCE PROGRAMMING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Concept of Information handling**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

Introduction to Open Source: Definition, Open Source History, Initiatives , Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. History : BSD, The Free Software Foundation and Open Source GNU Project.

UNIT II **9 Hrs**

Principle and methodologies : Philosophy : Software Freedom, Open Source Development Model Licences and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copylefts, Patents Economics of FOSS : Zero Marginal Cost, Income-generation opportunities

UNIT III **9 Hrs**

Case Studies : Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open Office. Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open source Teaching. and Open source media.

UNIT IV **9 Hrs**

IoT : Definitions - overview, applications, potential & challenges, and architecture. IoT examples: Case studies, e.g. sensor body-area-network and control of a smart home.

UNIT V **9 Hrs**

INTRODUCTION TO BIG DATA: Distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

Total No of Hrs : 45

TEXT BOOK:

1. https://tavaana.org/sites/default/files/introduction_to_opensource.pdf
2. Chris Eaton, Dirk deroos et al.(2012) , "*Understanding Big data* ", McGraw Hill.

REFERENCES:

1. Greg Elmer, Ganaele Langlois , Dr. Joanna Redden(2015), " *Compromised Data: From Social Media to Big Data*", Bloomsbury Academic Publishing.

Subject Code: **CBCA22E10**	Subject Name: **SOFTWARE TESTING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **OOAD & Programming Knowledge in Software**	**Ty**	**3**	**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

- To introduce the fundamental concept of Software Testing
- To describe the principles, issues and solutions of Black box, White box and various types of Testing
- To illustrate Software Testing Life cycle Model and RAD, Web and Database Testing
- To impart the essential characteristics of Automation Testing Tools
- To discuss the function of quality factors

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understand the fundamental concepts of Software Testing objectives, Software Testing Environment, Process, Criteria and Strategies
CO2	Demonstrate the testing of Software's behavior using Black box testing, testing internal Structure of the Software using White box Testing and finding uncover interaction and compatibility problems as early as possible using Integration testing.
CO3	Design and develop a high quality software using the following stages – planning, defining, designing, building, testing and deployment in SDLC. To make the complete product for faster product delivery using RAD. Before going to Live a complete checking will be done in WEB.
CO4	Implement the Software Testing Automation tools - Load Runner and Win Runner tool from Micro focus to execute the entire test case suit.
CO5	Ensure to produce best possible product and the product meet out our expectations using Quality Assurance and Quality Control Methodology.

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	2	3	2	2
CO2	3	3	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	3	3	2	3	2	3	3	2	3

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

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

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

Subject Code: **CBCA22E10**	Subject Name: **SOFTWARE TESTING**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **OOAD & Programming Knowledge in Software**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

Testiing Environment And Test Processes: Introduction – World Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing : Requirement Specifications (Software, User, market, Business) – Static & Dynamic Testing : Verification & Validation - Analyzing and Reporting Test Results – Post Implementation Analysis

UNIT II **9 Hrs**

Developing the Test Plan : Using White Box Approach to Test design – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing : Functionality Testing - Performance Testing - Unit Testing - Integration Testing - System Testing – User Acceptance Testing - Compatibility Testing

UNIT III **9 Hrs**

Software Testing Life Cycle : Software Testing Life Cycle: SDLC & STLC , Stages – System Study – Test case design, Review, Approval, Execution - Test case Templates: Header - Body & Footer Templates – Traceability Matrix - Defect Tracking Templates – Postmortem Report (Achievements & Comments) – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Web Applications – Web based system – Web Technology Evolution – Testing a Data base

UNIT IV **9 Hrs**

TEST AUTOMATION : Introduction : Software Testing Tools (Win Runner, Load Runner) - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug

UNIT V **9 Hrs**

Quality Assurance & Quality Control : Complexity Metrics and Models – Quality Management Metrics - Defect Removal Effectiveness Quality Function Deployment – Taguchi Quality Loss Function.

Total No of Hrs : 45

TEXT BOOK:

1. Srinivasan Desikan and Gopalaswamy Ramesh(2007) “Software Testing – Principles and Practices”,Pearson Education.

REFERENCES:

1. William Perry(2007), “*Effective Methods of Software Testing*”, Third Edition,Wiley Publishing 2007
2. Naresh Chauhan(2010) , “*Software Testing Principles and Practices* ” Oxford University Press , New Delhi , 2010.

Subject Code: CBCA22E11	Subject Name: **Artificial Intelligence**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Strong knowledge of Mathematics, Good command over programming languages and Good Analytical Skills.**	**Ty**	**3**	**0**	**0**	**3**

L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits 0
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES

- To gain a historical perspective of AI and its foundations
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- To explore the current scope, potential, limitations, and implications of intelligent systems.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3	Demonstrate profciency developing applications in an 'AI language', expert system shell, or data mining tool.
CO4	Demonstrate profciency in applying scientifc method to models of machine learning.
CO5	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

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

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

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

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

Subject Code: **CBCA22E11**	Subject Name: **Artificial Intelligence**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Strong knowledge of Mathematics, Good command over programming languages and Good Analytical Skills.**	**Ty**	**3**	**0**	**0**	**3**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits 0 T/L/ETL : Theory / Lab / Embedded Theory and Lab						

UNIT I **9 Hrs**

Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.

UNIT II **9 Hrs**

Heuristic Search techniques: Generate and Test – Hill Climbing – Best-Fist, Problem Reduction, Constraint Satisfaction, Means-end analysis.

UNIT III **9 Hrs**

Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.

UNIT IV **9 Hrs**

Using Predicate Logic: Representing simple facts in logic – Representing Instance and Isa relationships - Computable functions and predicates – Resolution – Natural deduction

UNIT V **9 Hrs**

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge Brief explanation of Expert Systems.

Total No of Hrs : 45

TEXT BOOK:

1. Elaine Rich and Kevin Knight, Shiva Shankar Nair, “Artificial Intelligence”, McGraw-Hill Companies, 3rd edition.

REFERENCE BOOKS:

1. Stuart Russell & Peter Norvig , “Artificial Intelligence A Modern Approach”, Perason, 2nd Edition.
2. George F Luger , “Artificial Intelligence”, Pearson 2002, 4th Edition.
3. V S Janaki Raman, K Sarukesi, P Gopalakrishnan, “Foundations of Artificial Intelligent and Expert Systems”, MacMillan India limited.

WEB REFERENCES:

- NPTEL & MOOC courses titled Artificial Intelligence and Expert Systems
- https://nptel.ac.in/courses/106106140/
- https://nptel.ac.in/courses/106106126/

Subject Code: **CBCA22E12**	Subject Name: **Design Thinking**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Understanding the needs, problems, and challenges of the end user.**	**Ty**	**3**	**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

- Understand the concepts of design thinking approaches
- Create design thinking teams and conduct design thinking sessions
- Apply both critical thinking and design thinking in parallel to solve problems
- Apply some design thinking concepts to their daily work

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

CO1	Define the concepts related to design thinking.
CO2	Explain the fundamentals of Design Thinking and innovation.
CO3	Apply the design thinking techniques for solving problems in various sectors.
CO4	Analyse to work in a multidisciplinary environment.
CO5	Evaluate the value of creativity.

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	2	3	2	2
CO2	3	3	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	3	3	2	3	2	3	3	2	3

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

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

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

Subject Code: **CBCA22E12**	Subject Name: **Design Thinking**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Understanding the needs, problems, and challenges of the end user.**	**Ty**	**3**	**0**	**0**	**3**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credit T/L/ETL : Theory / Lab / Embedded Theory and Lab						

Unit One: Introduction to Design Thinking **9 Hrs**

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

Unit Two : Design thinking for innovation **9 Hrs**

Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking -person, costumer, journey map, brain storming, product developmentActivity:Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

Unit Three Design thinking for innovation **9 Hrs**

Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.Activity:Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

Unit Four Design thinking for innovation **9 Hrs**

Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.Activity:Importance of modelling, how to set specifications, Explaining their own product design.

Unit Five : Design thinking for innovation **9 Hrs**

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business –Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs.Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.Activity:How to market our own product, About maintenance, Reliability and plan for startup.

Design thinking for innovation Course Objectives

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Design thinking for innovation Course Outcomes

• Define the concepts related to design thinking
.•Explain the fundamentals of Design Thinking and innovation
•Apply the design thinking techniques for solving problems in various sectors
.•Analyse to work in a multidisciplinary environment
•Evaluate the value of creativity
•Formulate specific problem statements of real time issues

Design thinking for innovation Text Books

1. Change by design, Tim Brown, Harper Bollins (2009) 2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

Design thinking for innovation Reference Books

1. Design Thinking in the Classroom by David Lee, Ulysses press 2. Design the Future, by Shrrutin N Shetty, Norton Press 3. Universal principles of design-William lidwell, kritinaholden, Jill butter. 4. The era of open innovation –chesbrough.H

Total Hrs:45

Subject Code: **CBCA22E13**	Subject Name: **Block Chain Technology**	**Ty/Lb /ETP/ IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Be well versed in concepts such as cryptography, consensus, hash functions, distributed ledgers, smart contracts and any other concepts integral to understanding block chain's inner workings.**	**Ty**	**3**	**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

- To assess blockchain applications in a structured manner
- To impart knowledge in block chain techniques and able to present the concepts clearly and structured.
- To get familiarity with future currencies and to create own crypto token.

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

CO1	Understand the various technologies and its business use.
CO2	Analyse the block chain applications in a structure manner.
CO3	Explain the modern concepts of block chain technology systematically.
CO4	Handle the cryptocurrency.
CO5	Understand the modern currencies and its market usuage

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

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

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

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

Subject Code: **CBCA22E13**	Subject Name: **Block Chain Technology**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Be well versed in concepts such as cryptography, consensus, hash functions, distributed ledgers, smart contracts and any other concepts integral to understanding block chain's inner workings.**	**Ty**	**3**	**0**	**0**	**3**

UNIT - 1 Introduction: **9 Hrs**

Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Nakamoto's concept with Blockchain based cryptocurrency, Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.

UNIT - 2 Basic Distributed Computing & Crypto primitives: **9 Hrs**

Atomic Broadcast, Consensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems

UNIT - 3 Bitcoin basics: **9 Hrs**

Bitcoin blockchain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use

UNIT - 4 Ethereum basics: **9 Hrs**

Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, Writing smart contracts using Solidity & JavaScript

UNIT - 5 Privacy, Security issues in Blockchain: **9 Hrs**

Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains: Sybil attacks, selfish mining, 51% attacks advent of algorand; Sharding based consensus algorithms to prevent these attacks

UNIT - 6 Case Studies:

Block chain in Financial Service, Supply Chain Management and Government Services

Total 45 Hrs

List of References:

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.
2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.
3. Imran Bashir, "Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained", Packt Publishing.
4. Merunas Grincalaitis, "Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols", Packt Publishing.
5. Prof. Sandip Chakraborty, Dr. Praveen Jayachandran, "Blockchain Architecture Design And Use Cases"[MOOC], NPTEL: https://nptel.ac.in/courses/106/105/106105184/

Subject Code: **CBCA22E14**	Subject Name: **INTERNET OF THINGS**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : : **Basic knowledge in Networks and Internet Concepts**	**Ty**	**3**	**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

- To impart the basic design and communication model of Internet of Things.
- To understand State of the Art - Internet of Things Architecture.
- To provide knowledge about protocols used in Internet of Things.
- To introduce about various interfaces applied in Internet of Things.
- To classify the real world Internet of Things Design constraints and its implementation.
- To provide ideas of automation and its applications using Internet of Things.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Apply the basic concepts of Internet of Things, design and communication model that will ensure and render most efficient smart system for any applications.
CO2	Thorough knowledge of Internet of Things Architecture that leads to effective implementation.
CO3	Capacity to analyze and evaluate protocols to be used in any Internet of Things application.
CO4	Design and develop any smart real time application in Internet of Things.
CO5	Identify various technologies and incorporate them in Internet of Things to enhance Industrial Automation that gives a complete solution for stakeholders.

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

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

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

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

Subject Code: **CBCA22E14**	Subject Name: **INTERNET OF THINGS**	**Ty/Lb/ ETP/IE**	**L**	**T / S.L r**	**P/R**	**C**
	Prerequisite : : **Basic knowledge in Networks and Internet Concepts**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

IOT INTRODUCTION: Introduction - Physical Design - Logical Design - IOT Communication Model - IOT Enabling Technologies - IOT Levels and Deployment Templates.

UNIT II **9 Hrs**

IOT NETWORK ARCHITECTURE: One M2M IOT Standardized Network Architecture- IOTWF (IOT World Forum) - IOT Architecture- M2M (Machine to Machine) –SDN (Software Defined Network) –NFV (Network Function Virtualization).

UNIT III **9 Hrs**

IOT PROTOCOLS : NFC (Near Field Communication)- RFID (Radio Frequency Identification System) -ZIGBEE-SPMI (System Power Management Interface)-SPI (Serial Peripheral Interface)-Wireless vs. Wired Communication-GSM-GPRS-LTE (Long Term Evolution).

UNIT IV **9 Hrs**

IOT DESIGN : Design Methodology-Microcontroller- System on Chip (SoC)-IOT System Building Blocks- Arduino-Raspberry-pi

UNIT V **9 Hrs**

DOMAIN SPECIFIC IOT : Home Automation- Cities- Agriculture- Environment-Health and Life Style- Industry

Total No of Hrs : 45

TEXT BOOKS

1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence by Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos and David Boyle
2. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.

REFERENCES

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013

Subject Code: **CBCA22E15**	Subject Name: **Data Analytics**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Knowledge in SQL,Proficient in Microsoft Excel,R or Python,Presentation and critical thinking skills,Data visualization**	**Ty**	**3**	**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

- To apply statistical analysis and technologies on data to find trends and solve problems
- To understand storage, retrieval and processing of big data
- To helps a student to perform a variety of "analytics" on different data sets and to arrive at positive conclusions.

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

CO1	Understand Big Data and its analytics in the real world.
CO2	Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics.
CO3	Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm.
CO4	Design and Implementation of Big Data Analytics using pig and spark to solve data intensive problems and to generate analytics.
CO5	Implement Big Data Activities using Hive

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

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

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

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

Subject Code: **CBCA22E15**	Subject Name: **Data Analytics**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Knowledge in SQL,Proficient in Microsoft Excel,R or Python,Presentation and critical thinking skills,Data visualization**	**Ty**	**3**	**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						

UNIT I INTRODUCTION TO BIG DATA 9 Hrs

Big Data – Definition, Characteristic Features – Big Data Applications - Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools.

UNIT II HADOOP FRAMEWORK 9 Hrs

Distributed File Systems - Large-Scale FileSystem Organization – HDFS concepts - MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication – Hadoop YARN.

UNIT III DATA ANALYSIS 9 Hrs

Statistical Methods:Regression modelling, Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data - Predictive Analytics – Data analysis using R.

UNIT IV MINING DATA STREAMS 9 Hrs

Streams: Concepts – Stream Data Model and Architecture - Sampling data in a stream - Mining Data Streams and Mining Time-series data - Real Time Analytics Platform (RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT V BIG DATA FRAMEWORKS 9 Hrs

Introduction to NoSQL – Aggregate Data Models – Hbase: Data Model and Implementations – Hbase Clients – Examples – .Cassandra: Data Model – Examples – Cassandra Clients – Hadoop Integration. Pig – Grunt – Pig Data Model – Pig Latin – developing and testing Pig Latin scripts. Hive – Data Types and File Formats – HiveQL Data Definition – HiveQL Data Manipulation – HiveQL Queries.

Total No of Hrs : 45

OUTCOMES:

At the end of this course, the students will be able to:

- ☐ Understand how to leverage the insights from big data analytics
- ☐ Analyze data by utilizing various statistical and data mining approaches
- ☐ Perform analytics on real-time streaming data
- ☐ Understand the various NoSql alternative database models

Subject Code: **CBCA22OE1**	Subject Name: **WEB DESIGN**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Recognize good visual design**	**Ty**	**3**	**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

- Understand the importance of the web as a medium of communication.
- Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Learn the language of the web: HTML and CSS.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Develop an understanding of the formalistic (aesthetic) aspects of design and visual communication
CO2	Demonstrate cross-platform storytelling skills.
CO3	To develop and understanding of information design and usability as it applies to interactive media projects.
CO4	Utilize coding and software tools to analyze and present data in a professional manner that could be translated to web-based or app-based media.
CO5	Become familiar with graphic design and/or game theory and be able to apply this theory to real world projects.

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	2	3	2	2
CO2	3	3	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	3	3	2	3	2	3	3	2	3

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

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

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

Subject Code: **CBCA22OE1**	Subject Name: **WEB DESIGN**	**Ty/Lb/ ETP/IE**	**L**	**T / S.L r**	**P/R**	**C**
	Prerequisite : **Recognize good visual design**	**Ty**	**3**	**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						

UNIT I **9 Hrs**

Web Publishing: Web browser – WWW - Web design process: Implementation, Maintenance Phases of Website - Web Publishing - HTML Documents: Overview, rules guidelines, structure of HTML documents, document types.

UNIT II **9 Hrs**

HTML Tags: <HTML> - <HEAD> - <TITLE> , <BODY>,<Marquee> - Paragraphs - Lists - Text Formatting, <Font>, Text Styles - Adding Graphics to HTML Docuements- Linking Documents.

UNIT III **9 Hrs**

Tables, Frame and Forms: Table tag and its Attributes - Frame: Overview of frame, Frameset - Simple frame, Frame targeting - Forms: Form objects and Methods.

UNIT IV **9 Hrs**

DHTML: Introduction to Dynamic HTML – CSS – Addition Style to a Document : Linking to a Style Sheet - Embedding and Importing Style Sheet.

UNIT V **9 Hrs**

Introduction to PHP : Including PHP in a page - Data types - Arrays -Regular expressions - Functions- Managing Cookies - Maintaining Sessions.

Total No of Hrs: 45

TEXT BOOK:

Thomas A. Powell(1999), *HTML: The Complete Reference*(2nd. ed.), Bpb Publication.

REFERENCES:

Ed. Wilson (2006*), Microsoft VBScript: Step by Step*, Microsoft Press.
Sterling Hughes(2001) *PHP:Developers's Cook book*,BPB publications.
Ivan N Bayross(2000), Web Enabled Commercial Applications Development Using, HTML, DHTML, Java Script, Perl CGI(2nd ed.), BPB Publications.

Subject Code: **CBCA22OE2**	Subject Name: **E-Commerce**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Know the usage of internet.**	**Ty**	**3**	**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

- To obtain knowledge of Internet hardware associated with E-commerce systems.
- Gain knowledge of selected Standard application commonly used in business.
- Ability to design, a fundamental E-Business concept.
- Gain knowledge of the issues of network security and business-tech protocols.
- Introduction to Business graphics – with focus on a dvertising philosophy.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Ability to effectively integrate IT-based solutions into the user environment.
CO2	Demonstrate the ability to perform complex data management and analysis.
CO3	Understand the processes of developing and implementing information systems.
CO4	Be aware of the ethical, social, and security issues of information systems.
CO5	Have the knowledge of the different types of management information systems.

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22OE2**	Subject Name: **E-Commerce**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Know the usage of internet.**	**Ty**	**3**	**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						

UNIT-I: **9 Hrs**

Electronic Commerce Framework - Electronic Commerce and Media Convergence - The anatomy of E-Commerce Applications - Electronic Commerce Consumer Applications - Electronic Commerce Organization Applications. Market forces influencing the I-Way - Components of the I-Way - Net work Access Equipment - The Last Mile: Local Roads and Access Ramps - Global Information Distribution Networks - Public Policy issues shaping the IWay.

UNIT-II **9 Hrs**

Architectural Framework for Electronic Commerce - World Wide Web (WWW) as the Architecture- Web Background: Hypertext Publishing - Technology behind the Web Security and the Web. - Consumer-Oriented Applications – Mercantile models form the consumer's perspective – Mercantile models from the merchant's perspective.

UNIT-III **9 Hrs**

Types of Electronic Payment systems - Digital token based electronic payment systems - Smart Cards and Electronic Payment Systems - Credit card based electronic Payment Systems - Risk and Electronic Payment Systems - Risk and Electronic Payment Systems - Designing Electronic Payment Systems. Electronic Data Interchange - EDI Applications in business - EDI: Legal, Security and Privacy issues - EDI and electronic Commerce.

UNIT-IV **9 Hrs**

Internet information systems - Macroforces and internal commerce - Works flows automation and Co-ordination - Customization and internal commerce - Supply chain commerce system - Making a business case for a document library - Types of digital documents - Issues behind Document infrastructure - Corporate data warehouse.

UNIT-V **9 Hrs**

The new age of information - based marketing - Advertising on the internet - Charting the On-Line Marketing process - Market research - search and resource Discovery Paradigms - Information Search and Retrieval - Electronic Commerce Catalogs or directories - Information Filtering - Consumer Data Internet Emerging Tools.

Total 45 Hrs

TEXT BOOKS

1. Jeffery F.Rayport, Bernard J.Jaworski, "E-Commerc e", TMCH, 2002.
2.P.T. Joseph, "E-commerce – A Managerial Perspecti ve", PHI, 2003.

REFERENCE BOOKS:

1.Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Pearson Edu., 2003

Subject Code: **CBCA22OL1**	Subject Name: **WEB PAGE DESIGNING LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Have the knowledge of the foundations of UX**	**Lb**	**0**	**0**	**4**	**2**

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

OBJECTIVES:

- Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
- Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
- Learn techniques of responsive web design, including media queries.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Discover how does web works really, what makes web sites work.
CO2	Make Forms and validations for your website.
CO3	Writing valid and concise code for webpages.
CO4	Pro level skills in SEO with keyword research and content stratergy for your website.
CO5	Setting up page layout, color schemes, contract, typography in the designs

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22OL1**	Subject Name: **WEB PAGE DESIGNING LABORATORY**	**Ty/Lb/ ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite : **Have the knowledge of the foundations of UX**	**Lb**	**0**	**0**	**4**	**2**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

List of experiments

1.Program to illustrate Text Formatting tags.

2. Create a web page using ordered list and unordered list.

3. A program to illustrate Hyperlink tag(Anchor tag) .

4. Create a webpage which contains table with its Attributes.

5. Create a Web Page using frame tag with its attributes.

6. Create a webpage using img tag..

7. Create a web page using form tag.

8. Use Cascading Style Sheet to create web page.

9. Write a PHP program for Login Validation.

10. Finding page hit count and setting page expiry using PHP.

Total No of Hrs needed to complete the Lab : 60

Subject Code : HBCC22003	Subject Name : Research Methodology	Ty/Lb/ETL	L	T/ SLr	P/R	C
	Prerequisite : None	Ty	2	1/0	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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary /Allied	Skill component	Practical Project/ Internship	others
	□								

Subject Code : HBCC22003	Subject Name : Research Methodology	Ty/Lb/ ETL	L	T/ SLr	P/R	C
	Prerequisite : None	Ty	2	1/0	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 **9 Hrs**

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 **9 Hrs**

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) **9 Hrs**

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 **9 Hrs**

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 **9 Hrs**

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

Total 45 Hrs

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

Subject Code:	Subject Name: **DATA VISUALIZATION**	T/L/ ETL	L	T / S.Lr	P/R	C
CBCA22013	Prerequisite : **Knows Digital Marketing Metrics, Social Media Metrics.**	**Lb**	**3**	**1**	**0**	**4**

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

OBJECTIVES

- To interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- To explore the relationship between two continuous variables using scatter plots and line plots.
- To translate and present data and data correlations in a simple way, data analysts use a wide range of techniques — charts, diagrams, maps, etc.

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

CO1	Demonstrate understanding of Data Visualization and key Terms.
CO2	Design Effective Data Visualization for viual Mapping and Design.
CO3	Will demonstrate skills on creating visual representation of Data.
CO4	Will demonstrate understanding of Visualization classification and its techniques.
CO5	Will demonstrate skills in creating different types of Representation Mapping with Programme Outcomes

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code:	Subject Name: **DATA VISUALIZATION**	T/L/ ETL	L	T / S.Lr	P/R	C
CBCA22013	Prerequisite : **Knows Digital Marketing Metrics, Social Media Metrics.**	**Lb**	**3**	**1**	**0**	**4**
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

OBJECTIVES:

- To interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- To explore the relationship between two continuous variables using scatter plots and line plots.
- To translate and present data and data correlations in a simple way, data analysts use a wide range of techniques — charts, diagrams, maps, etc.

Unit I **12Hrs**

Introduction of visual perception, visual representation of data, Gestalt principles, information overloads.

Unit II **12Hrs**

Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.

Unit III **12Hrs**

Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.

Unit IV **12Hrs**

Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization

Unit V **12Hrs**

Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, evaluating visualizations.

Total 60 Hrs

Reference Books

1) Bateman, S., R. Mandryk, C. Gutwin, A. Genest, D. McDine, and C. Brooks. 2010.
2) Becker, R. A., W. S. Cleveland, and M.-J. Shyu. 1996.
3) Bergstrom, C. T., and J. West. 2016. "The Principle of Proportional Ink." *http://callingbullshit.org/tools/tools_proportional_ink.html*.
4) Brewer, Cynthia A. 2017. "ColorBrewer 2.0. Color Advice for Cartography." *http://www.ColorBrewer.org*.
5) Cleveland, W. S. 1979. "Robust Locally Weighted Regression and Smoothing Scatterplots." ...

Subject Code: **CBCA22014**	Subject Name: **Soft Computing**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite **: BASIC COMPUTER KNOWDEGE & BASIC MATHEMATHICS**	**Ty**	3	1	0	4

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

OBJECTIVES

- To learn the key aspects of Soft computing
- To know about the components and building block hypothesis of Genetic algorithm.
- To understand the features of neural network and its applications
- To study the fuzzy logic components
- To gain insight onto Neuro Fuzzy modeling and control.
- To gain knowledge in machine learning through Support vector machines.

COURSE OUTCOMES (Cos)

Students completing this course were able to

CO1	Understanding the Soft Computing Constituents
CO2	Getting enriched the Building block hypothesis, working principle and the operators
CO3	Understand the Machine Learning using Neural Network, Adaptive Networks
CO4	Capable of performing the Operations on Fuzzy Sets and Fuzzy Relations
CO5	Computing the Fuzzy Inference Systems

Mapping of Course Outcome with Program Outcome (POs)

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

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

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

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

Subject Code: **CBCA22014**	Subject Name: **Soft Computing**	**Ty/Lb/ETP/IE**	**L**	**T / S.Lr**	**P/R**	**C**
	Prerequisite **: BASIC COMPUTER KNOWDEGE & BASIC MATHEMATHICS**	**Ty**	3	1	0	4
L : Lecture T : Tutorial SLr : Supervised Learning P: Project R : Research C : Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						

OBJECTIVES:

- To learn the key aspects of Soft computing
- To know about the components and building block hypothesis of Genetic algorithm.
- To understand the features of neural network and its applications
- To study the fuzzy logic components
- To gain insight onto Neuro Fuzzy modeling and control.
- To gain knowledge in machine learning through Support vector machines.

UNIT I INTRODUCTION TO SOFT COMPUTING **12 Hrs**

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS **12 Hrs**

Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem),Differences & similarities between GA & other traditional methods, Applications of GA.

UNIT III NEURAL NETWORKS **12 Hrs**

Machine Learning using Neural Network, Adaptive Networks – Feed Forward Networks– Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning– Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks.

UNIT IV FUZZY LOGIC **12 Hrs**

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

UNIT V NEURO-FUZZY MODELING **12 Hrs**

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies.

Total no. of Hrs : 60

REFERENCES:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani(2003), *Neuro-Fuzzy and Soft Computing*, Prentice-Hall of India.
2. Kwang H.Lee(2005), *First course on Fuzzy Theory and Applications*, Springer–Verlag Berlin Heidelberg.
3. George J. Klir & Bo Yuan(1995),*Fuzzy Sets and Fuzzy Logic-Theory and Applications*, Prentice Hall.
4. James A. Freeman and David M. Skapura(2003), *Neural Networks Algorithms, Applications, and Programming Techniques*, Pearson Edn.
5. David E. Goldberg(2007), *Genetic Algorithms in Search, Optimization and Machine Learning*, Addison Wesley..
6. Mitsuo Gen & RunweiCheng(2000),*Genetic Algorithms and Engineering Optimization*, Wiley Publishers.

Subject Code: CBCA22015	Subject Name: Machine Learning	Ty/Lb/ETP/IE	L	T / S.Lr	P/R	C
	Prerequisite: Basic Computer Knowledge and Basic Mathematics	Ty	3	1	0	4

L:LectureT:TutorialSLr:SupervisedLearningP:ProjectR:ResearchC:CreditsT/L/ETL:Theory/Lab/EmbeddedTheoryand Lab

OBJECTIVE:

- To introduce students to the basic concepts and techniques of Machine Learning.
- TohaveathoroughunderstandingoftheSupervisedandUnsupervisedlearningtechniques
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms
- To understand GUI optimization for neural networks

COURSEOUTCOMES(COs): (3- 5)

CO1	Distinguishbetween,supervised,unsupervisedandsemi-supervisedlearning
CO2	Apply the apt machine learning strategy for any given problem
CO3	Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
CO4	Design systems that uses the appropriate graph models of machine learning
CO5	ModifyexistingmachinelearningalgorithmstoimproveclassificationefficiencyModifyexistingmachinelearningalgorithmstoimproveclassificationefficiency

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	3	2	2	2	1	1	2
CO2	2	2	3	3	3	2	2	3	3	3	1	2
CO3	3	2	2	2	3	2	2	2	2	1	2	1
CO4	2	3	2	2	3	3	1	2	3	3	2	1
CO5	2	3	2	2	3	3	3	3	2	1	1	2

COs/PSOs	PSO1	PSO2	PSO3	PSO4	PSO5			
CO1	2	2	2	1	1			
CO2	2	3	3	1	3			
CO3	2	2	2	2	1			
CO4	2	2	2	1	2			
CO5	3	2	1	1	1			

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

Category	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ Internship	others
		□							
Approval									

Subject Code: CBCA22015	Subject Name: Machine Learning	Ty/Lb/ETP/IE	L	T / S.Lr	P/R	C
	Prerequisite: Basic Computer Knowledge and Basic Mathematics	Ty	3	1	0	4
L:LectureT:TutorialSLr:SupervisedLearningP:ProjectR:ResearchC:CreditsT/L/ETL:Theory/Lab/EmbeddedTheoryand Lab						

Unit 1 **12 Hrs**

Introduction to Machine Learning, Examples of Machine Learning applications - Learning associations, Classification, Regression, Unsupervised Learning, Reinforcement Learning. Supervised learning- Input representation, Hypothesis class, Version space, Vapnik-Chervonenkis (VC) Dimension.

Unit 2 **12 Hrs**

Advanced machine learning topics: Bayesian modelling and Gaussian processes, randomized methods,Bayesian neural networks, approximate inference.

Unit 3 **12 Hrs**

Deep learning: regularization, convolutional neural networks, recurrent neural networks, variationalautoencoders, generative models, applications.

Unit 4 **12 Hrs**

Applications of machine learning in natural language processing: recurrent neural networks, backpropagation through time, long short term memory, attention networks, memory networks, neural Turing machines, machine translation, question answering, speech recognition, syntactic and semantic parsing, GPU optimization for neural networks.

Unit 5 **12 Hrs**

Evaluation in ML: metrics, cross-validation, statistics, addressing the multiple comparisons problem.

Total No. of Hrs: 60

Reference Book:

1. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. MIT Press 2012
2. Ian Good fellow, Yoshua Bengio and Aaron Courville. Deep Learning. MIT Press 2016.
3. Bayesian Reasoning and Machine Learning David Barber, Cambridge University Press, 2012.

SubjectCode: CBCA22I03	Subject Name : Mini Project	Ty/Lb/ETP/IE	L	T / S.Lr	P/R	C
	Prerequisite: Nil	IE	0	0/0	4/0	2
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						

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.

SubjectCode: CBCA22I04	Subject Name : Internship	Ty/Lb/ETP/IE	L	T / S.Lr	P/R	C
	Prerequisite: Nil	IE	0	0/0	2/0	1

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

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.

Subject Code:HBCC22004	Subject Name: START UP STRATEGIES	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3

T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits

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

COURSEOUTCOMES(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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary/ Allied	Skill component	Practical Project/ Internship	others
	□								

Subject Code:HBCC22004	Subject Name: START UP STRATEGIES	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3
T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits						

Unit I:

Start-up opportunities:

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:

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-

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:

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:

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

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

Subject Code: **HBCC22005**	Subject Name: **PRINCIPLES OF DIGITAL MARKETING**	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
T/L/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)
Students completing this course were able to

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 Outcome with Program Outcome (POs)

Cos/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**P07**	**PO8**	**P09**
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**

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

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

Subject Code: HBCC22005	Subject Name : **PRINCIPLES OF DIGITAL MARKETING**	**Ty/ Lb/ ETL**	**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.

UNIT I: INTRODUCTION **9 Hrs**

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 Hrs**

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 ENVIRONMENT **9 Hrs**

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 Hrs**

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 Hrs**

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 Hours: 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.

Subject Code: HBCC22006	Subject Name: INTELLECTUAL PROPERTY RIGHTS AND PATENTS.	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3

T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC: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	H&S	Program core	Program Elective	Open elective	Skill enhancing elective	Interdisciplinary /Allied	Skill component	Practical Project/ Internship	others
	√								
Approval									

Subject Code: HBCC22006	Subject Name: INTELLECTUAL PROPERTY RIGHTS AND PATENTS.	Ty/Lb	L	T	P	C
	Prerequisite: Nil	Ty	3	0	0	3
T/L/:Theory/LabL:LectureT:TutorialP:Practical/ProjectR:ResearchC:Credits						

UNIT – I: 9Hrs

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: 9Hrs

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: 9Hrs

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: 9Hrs

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: 9Hrs

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 .

Text book: Total hours:45

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/)

SubjectCode: CBCA22L10	Subject Name : Major Project	Ty/Lb/ETP/IE	L	T / S.Lr	P/R	C
	Prerequisite: Nil	Lb	0	0/0	12/0	6
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						

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 bonofide certificate.

SubjectCode: CBCA22I05	Subject Name : Research Publication	Ty/Lb/ETP/IE	L	T / S.Lr	P/R	C
	Prerequisite: Nil	IE	0	0/0	4/0	2
L : Lecture T:Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab						

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.