MANAV RACHNA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

PROGRAM STRUCTURE

&

DETAILED SYLLABUS

B.Tech. Computer Science & Engineering

BATCH: 2016-2020

MANAV RACHNA UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY
B.TECH-CSE (CSU01)

SEMESTER - 1

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
ECH101-T	ELECTRICAL ENGINEERING	EC	HARD	CORE	3	1	0	0	4	4
ECH101-P	ELECTRICAL ENGINEERING LAB	EC	HARD	CORE	0	0	2	0	2	1
CSH101-T	STRUCTURED PROGRAMMING	CS	HARD	CORE	3	1	0	0	4	4
CSH101-P	STRUCTURED PROGRAMMING LAB	CS	HARD	CORE	0	0	2	0	2	1
PHH104-T	PHYSICS OF MATERIALS	PH	HARD	CORE	3	1	0	0	4	4
PHH104-P	PHYSICS OF MATERIALS LAB	PH	HARD	CORE	0	0	2	0	2	1
MAH101-T	APPLIED MATHEMATICS	MA	HARD	CORE	3	1	0	0	4	4
MAH101-P	APPLIED MATHEMATICS LAB	MA	HARD	CORE	0	0	2	0	2	1
HLS101	BUSINESS ENGLISH	HL	SOFT	CORE	1	0	2	0	3	2
CSW102	HTML5 & CSS	CS	WORKSHOP	CORE	0	0	3	0	3	2
FLS103	FRENCH-I	MRCFL	NTCC	UNIVERSITY COMPULSORY(Elective FL-1)	1	1	0	0	2	0
FLS101	SPANISH-I									
FLS102	GERMAN-I									
CHS102	ENVIRONMENTAL SCIENCE	CH	NTCC	UNIVERSITY COMPULSORY	1	0	2	0	3	0
	TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)				15	5	15	0	35	24

SEMESTER - 2

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH103-T	DATA STRUCTURES	CS	HARD	CORE	3	1	0	0	4	4
CSH103-P	DATA STRUCTURES LAB	CS	HARD	CORE	0	0	2	0	2	1
PHH105-T	OPTICS & OPTICAL DEVICES	PH	HARD	CORE	3	1	0	0	4	4

SUBJECT CODES	SUBJECT NAME	OFFERING DEPARTMENT	COURSE NATURE	COURSE TYPE	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
PHH105-P	OPTICS & OPTICAL DEVICES LAB	PH	HARD	CORE	0	0	2	0	2	1
CHH101-T	GREEN CHEMISTRY	CH	HARD	CORE	3	1	0	0	4	4
CHH101-P	GREEN CHEMISTRY LAB	CH	HARD	CORE	0	0	2	0	2	1
MAH106-T	DISCRETE MATHEMATICS	MA	HARD	CORE	3	1	0	0	4	4
MAH106-P	DISCRETE MATHEMATICS LAB	MA	HARD	CORE	0	0	2	0	2	1
HLS102	COMMUNICATIVE ENGLISH	HL	SOFT	CORE	1	0	2	0	3	2
MEW103	ENGINEERING DRAWING	ME	WORKSHOP	ELECTIVE(Workshop Elective-1)	0	0	3	0	3	2
ECW104	ELECTRONIC WORKSHOP	EC								
FLS107	FRENCH-II	MRCFL	NTCC	UNIVERSITY COMPULSORY(Elective FL-2)	1	1	0	0	2	0
FLS105	SPANISH-II									
FLS106	GERMAN-II									
	TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)				**14**	**5**	**13**	**0**	**32**	**24**
CSO104	SUMMER TRAINING POST 2nd SEMESTER									3
	SEMESTER - 3									
SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH205-T	DATABASE MANAGEMENT SYSTEMS	CS	HARD	CORE	3	1	0	0	4	4
CSH205-P	DATABASE MANAGEMENT SYSTEMS LAB	CS	HARD	CORE	0	0	2	1	2	2
CSH206-T	OBJECT ORIENTED PROGRAMMING USING JAVA	CS	HARD	CORE	3	1	0	0	4	4
CSH206-P	OBJECT ORIENTED PROGRAMMING USING JAVA LAB	CS	HARD	CORE	0	0	2	0	2	1
ECH207-T	PRINCIPLES OF DIGITAL ELECTRONICS & CIRCUIT DESIGN	EC	HARD	CORE	3	1	0	0	4	4
ECH207-P	PRINCIPLES OF DIGITAL ELECTRONICS & CIRCUIT DESIGN LAB	EC	HARD	CORE	0	0	2	0	2	1
MAH208-T	STATISTICAL AND NUMERICAL TECHNIQUES	MA	HARD	CORE	3	1	0	0	4	4
MAH208-P	STATISTICAL AND NUMERICAL TECHNIQUES LAB	MA	HARD	CORE	0	0	2	0	2	1

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CHS234	ENVIRONMENT SUSTAINABLE DEVELOPMENT	CH	SOFT	ELECTIVE(Elective Environmental Ethics &	1	0	2	0	3	2
ECS249	E-WASTE MANAGEMENT	EC								
CDO201	PROFESSIONAL COMPETANCY ENHANCEMENT-I	CDC	OUTCOME	CORE	0	0	0	1	1	0.5
RDO201	INTRODUCTION TO RESEARCH	RESEARCH	OUTCOME	CORE	0	0	0	1	1	1
CSW208	SCRIPTING LANGUAGES	CS	WORKSHOP	ELECTIVE(Workshop Elective-2)	0	0	3	0	3	2
CSW207	IMAGE EDITING & ANIMATION	CS	WORKSHOP							
FLS211	FRENCH-III	MRCFL	NTCC	UNIVERSITY COMPULSORY(Elective FL-3)	1	1	0	0	2	0
FLS209	SPANISH-III									
FLS210	GERMAN-III									
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)					14	5	13	3	34	26.5

SEMESTER - 4

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH209-T	THEORY OF COMPUTATION & COMPILER DESIGN	CS	HARD	CORE	3	1	0	0	4	4
CSH209-P	THEORY OF COMPUTATION & COMPILER DESIGN LAB	CS	HARD	CORE	0	0	2	0	2	1
CSH210-T	COMPUTER ARCHITECTURE & ORGANISATION	CS	HARD	CORE	3	1	0	0	4	4
CSH210-P	COMPUTER ARCHITECTURE & ORGANISATION LAB	CS	HARD	CORE	0	0	2	0	2	1
CSH211-T	OPERATING SYSTEMS	CS	HARD	CORE	3	1	0	0	4	4
CSH211-P	OPERATING SYSTEMS LAB	CS	HARD	CORE	0	0	2	0	2	1
ECH434-T	WIRELESS COMMUNICATION	EC	HARD	CORE	3	1	0	0	4	4
ECH434-P	WIRELESS COMMUNICATION LAB	EC	HARD	CORE	0	0	2	0	2	1
EDS288	APPLIED PHILOSOPHY	ALL	SOFT	ELECTIVE (Elective Humanities)	1	0	2	0	3	2
EDS289	APPLIED PSYCHOLOGY									
EDS290	APPLIED SOCIOLOGY									
CDO202	PROFESSIONAL COMPETANCY ENHANCEMENT-II	CDC	OUTCOME	CORE	0	0	0	1	1	0.5

SUBJECT CODES	SUBJECT NAME	OFFERING DEPARTMENT	COURSE NATURE	COURSE TYPE	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
RDO202	TECHNICAL SEMINAR-I	RESEARCH	OUTCOME	CORE	0	0	0	1	1	1
CSW213	UNIX & SHELL PROGRAMMING	CS	WORKSHOP	CORE	0	0	3	0	3	2
FLS215	FRENCH-IV	MRCFL	NTCC	UNIVERSITY COMPULSORY(Elective FL-4)	1	1	0	0	2	0
FLS213	SPANISH-IV									
FLS214	GERMAN-IV									
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)					14	5	13	2	34	25.5
CSO215	SUMMER TRAINING POST 4TH SEMESTER									3

SEMESTER - 5

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH316-T	ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS	CS	HARD	CORE	3	1	0	0	4	4
CSH316-P	ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS LAB	CS	HARD	CORE	0	0	2	0	2	1
CSH317-T	SOFTWARE ENGINEERING	CS	HARD	CORE	3	1	0	0	4	4
CSH317-P	SOFTWARE ENGINEERING LAB	CS	HARD	CORE	0	0	2	0	2	1
CSH318-T	COMPUTER NETWORKS	CS	HARD	CORE	3	1	0	0	4	4
CSH318-P	COMPUTER NETWORKS LAB	CS	HARD	CORE	0	0	2	0	2	1
CSH319-T	MOBILE COMPUTING WITH ANDROID	CS	HARD	ELECTIVE(Domain Elective-1)	3	1	0	0	4	4
CSH320-T	INTERNET STANDARDS & OPEN SOURCE SOFTWARE									
CSH321-T	DATA WAREHOUSING & DATA MINING									
CSH322-T	ADVANCED OPERATING SYSTEMS									
CSH319-P	MOBILE COMPUTING WITH ANDROID LAB	CS	HARD	ELECTIVE(Doma	0	0	2	0	2	1
CSH320-P	INTERNET STANDARDS & OPEN SOURCE SOFTWARE LAB									

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH321-P	DATA WAREHOUSING & DATA MINING LAB	CS	HARD	in Elective-1)	0	0	2	0	2	1
CSH322-P	ADVANCED OPERATING SYSTEMS LAB									
LWS321	CYBER LAW	LW	SOFT	ELECTIVE(Electives Law)	1	0	2	0	3	2
LWS322	LAW OF PATENTS & TRADITIONAL KNOWLEDGE									
RDO303	TECHNICAL SEMINAR-II	RESEARCH	OUTCOME	CORE	0	0	0	1	1	1
CDO305	PROFESSIONAL COMPETANCY ENHANCEMENT-III	CDC	OUTCOME	CORE	0	0	0	1	1	0.5
CSW324	INTRODUCTION TO MATLAB	CS	WORKSHOP	ELECTIVE(Workshop Elective-3)	0	0	3	0	3	2
CSW325	WEB SERVICES									
FLS319	FRENCH-V	MRCFL	NTCC	UNIVERSITY COMPULSORY(Elective FL-5)	1	1	0	0	2	0
FLS317	SPANISH-V									
FLS318	GERMAN-V									
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)					14	5	13	2	34	25.5

SEMESTER - 6

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH326-T	ANALYSIS & DESIGN OF ALGORITHMS	CS	HARD	CORE	3	1	0	0	4	4
CSH326-P	ANALYSIS & DESIGN OF ALGORITHMS LAB	CS	HARD	CORE	0	0	2	0	2	1
CSH327-T	COMPUTER GRAPHICS & MULTIMEDIA	CS	HARD	CORE	3	1	0	0	4	4
CSH327-P	COMPUTER GRAPHICS & MULTIMEDIA LAB	CS	HARD	CORE	0	0	2	1	2	2
CSH328-T	MULTI PLATFORM MOBILE DEVELOPMENT	CS	HARD	ELECTIVE(Doma	3	1	0	0	4	4
CSH329-T	NETWORK SECURITY & CRYPTOGRAPHY									

Code	Course	Dept	Category	Type	L	T	P	O	Contact Hours	Credits
CSH330-T	BUSINESS INTELLIGENCE & ITS APPLICATIONS	CS	HARD	in Elective-2)	3	1	0	0	4	4
CSH331-T	SOFTWARE PROJECT MANAGEMENT									
CSH328-P	MULTI PLATFORM MOBILE DEVELOPMENT LAB	CS	HARD	ELECTIVE(Domain Elective-2)	0	0	2	0	2	1
CSH329-P	NETWORK SECURITY & CRYPTOGRAPHY LAB									
CSH330-P	BUSINESS INTELLIGENCE & ITS APPLICATIONS LAB									
CSH331-P	SOFTWARE PROJECT MANAGEMENT LAB									
ECH326-T	MICROPROCESSORS & INTERFACING	EC	HARD	ELECTIVE(Allied Elective Engineering)	3	1	0	0	4	4
ECH318-T	DIGITAL SYSTEM DESIGN									
RDO304	PROJECT PHASE-I	RESEARCH	OUTCOME	CORE	0	0	0	1	1	1
ECH326-P	MICROPROCESSORS & INTERFACING LAB	EC	HARD	ELECTIVE(Allied Elective Engineering)	0	0	2	0	2	1
ECH318-P	DIGITAL SYSTEM DESIGN LAB									
CDO306	PROFESSIONAL COMPETANCY ENHANCEMENT-IV	CDC	OUTCOME	CORE	0	0	0	1	1	0.5
MCS232	INTRODUCTION TO FINANCE	MC	SOFT	ELECTIVE(Elective Management)	1	0	2	0	3	2
MCS231	BASICS OF ECONOMICS									
CSW332	INTRODUCTION TO .NET	CS	WORKSHOP	ELECTIVE(Workshop Elective-4)	0	0	3	0	3	2
CSW333	SOCKET PROGRAMMING									
CSW334	GAME PROGRAMMING									
FLS322	FRENCH-VI	MRCFL	NTCC	UNIVERSITY COMPULSORY(Elective FL-6)	1	1	0	0	2	0
FLS320	SPANISH-VI									
FLS321	GERMAN-VI									
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)					14	5	13	0	34	26.5
CSO335	SUMMER TRAINING POST 6TH SEMESTER									3
SEMESTER - 7										

SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS
CSH436-T	ADVANCED JAVA	CS	HARD	CORE	3	1	0	0	4	4
CSH436-P	ADVANCED JAVA LAB	CS	HARD	CORE	0	0	2	0	2	1
CSH437-T	IOS APP DEVELOPMENT	CS	HARD	ELECTIVE(Domain Elective-3)	3	1	0	0	4	4
CSH438-T	CLOUD COMPUTING									
CSH439-T	BIG DATA									
CSH440-T	NO SQL DATABASE MODELS									
CSH441-T	INTRODUCTION TO MACHINE LEARNING									
CSH437-P	IOS APP DEVELOPMENT LAB	CS	HARD	ELECTIVE(Domain Elective-3)	0	0	2	0	2	1
CSH438-P	CLOUD COMPUTING LAB									
CSH439-P	BIG DATA LAB									
CSH440-P	NO SQL DATABASE MODELS LAB									
CSH441-P	INTRODUCTION TO MACHINE LEARNING LAB									
	ENTERPRENURSHIP	MC	SOFT	ELECTIVE(Electives Enterprenurship)	1	0	2	0	3	2
CSW443	USER EXPERIENCE	CS	WORKSHOP	ELECTIVE(Workshop Elective-5)	0	0	3	0	3	2
CSW442	SOFTWARE TESTING									
CSN444	MAJOR PROJECT- AGILE (STAGE-I)	CS	NTCC	CORE	0	0	3	0	3	2
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)					7	2	12	0	21	16
SEMESTER - 8										
SUBJECT CODES	SUBJECT NAME	**OFFERING DEPARTMENT	*COURSE NATURE (Hard/Soft/ Workshop/ NTCC)	COURSE TYPE (Core/Elective / University Compulsory)	L	T	P	O	NO. OF CONTACT HOURS PER WEEK	NO. OF CREDITS

Code	Course	Dept	Nature	Type	L	T	P	O	Contact Hours	Credits
CSH445-T	MOBILE APP ANALYTICS	CS	HARD	ELECTIVE(Domain Elective-4)	3	1	0	0	4	4
CSH446-T	INFORMATION RETREIVAL									
CSH447-T	BUSINESS ANALYTICS WITH R PROGRAMMING									
CSH448-T	NEURAL NETWORK & FUZZY LOGIC									
CSH449-T	ADVANCED COMPUTER ARCHITECTURE									
CSH445-P	MOBILE APP ANALYTICS LAB	CS	HARD	ELECTIVE(Domain Elective-4)	0	0	2	0	2	1
CSH446-P	INFORMATION RETREIVAL LAB									
CSH447-P	BUSINESS ANALYTICS WITH R PROGRAMMING LAB									
CSH448-P	NEURAL NETWORK & FUZZY LOGIC LAB									
CSH449-P	ADVANCED COMPUTER ARCHITECTURE LAB									
MAH310-T	OPERATION RESEARCH	MA	HARD	ELECTIVE	3	1	0	0	4	4
PHH401-T	RENEWABLE ENERGY SYSTEMS (ELECTIVE FROM PHYSICS DEPARTMENT)	PH								
	ELECTIVE FROM CHEMISTRY DEPARTMENT	CH								
MAH310-T	OPERATION RESEARCH LAB	MA	HARD	ELECTIVE	0	0	2	0	2	1
PHH401-P	RENEWABLE ENERGY SYSTEMS LAB (ELECTIVE FROM PHYSICS DEPARTMENT)	PH								
	ELECTIVE FROM CHEMISTRY DEPARTMENT LAB	CH								
CSN450	MAJOR PROJECT-AGILE (STAGE-II)	CS	NTCC	CORE	0	0	8	0	8	8
TOTAL (L-T-P-O/CONTACT HOURS/CREDITS)					**6**	**2**	**12**	**0**	**20**	**18**

*COURSE NATURE	
	Hard course (H): A course having L-T-P and/or O component ; L(Lecture), T(Tutorial),
	Soft Course (S): A course aimed at development of a person's emotional, social, ethical,
	Workshop course(W): A completely 'hands on' course conducted in laboratory, aimed at
	Non Teaching Credit Course(N): The course involves no teaching and has P and O component.

OFFERING DEPARTMENT NAMES		A course shall be assigned credits as
EC	DEPARTMENT OF ELECTRONICS & COMMUNICATION	One credit for each lecture hour;
PH	DEPARTMENT OF PHYSICS	One credit for each tutorial hour ;
CS	DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY	One credit for each Outcome hour;
HL	DEPARTMENT OF HUMANITIES & LANGUAGES	Two credits for each workshop/
CH	DEPARTMENT OF CHEMISTRY	laboratory/practical/project session of
MA	DEPARTMENT OF MATHEMATICS	3 hours;
ME	DEPARTMENT OF MECHANICAL ENGINEERING	One credit for each
MC	DEPARTMENT OF MANAGEMENT & COMMERCE	laboratory or practical or project
MRCFL	MANAV RACHNA CENTRE OF FOREIGN LANGUAGES	session of 2 hours

*** Electives are subject to change according to expertise available/ required.

SEMESTER	NO. OF CREDITS
I	24
II	24
POST II SUMMER TRAINING	3
III	26.5
IV	25.5
POST IV SEM SUMMER TRAINING	3
V	25.5
VI	26.5
POST VI SEM SUMMER TRAINING	3
VII	16
VIII	18
TOTAL	195

PROGRAMME BOOKLET
B.Tech. CSE (CSU01)

(2016-20)

(Syllabus)

Department of Computer Science and Technology

Manav Rachna University

MANAV RACHNA UNIVERSITY

Vision

To educate students in frontier areas of knowledge enabling them to take up challenges as ethical and responsible global citizens

Mission

- To impart outcome based holistic education
- To disseminate education in frontier areas
- To produce globally competitive, ethical and socially responsible human resources
- To produce human resources sensitive to issues of Environment and Sustainable Development
- To develop Environment and Sustainable development as a thrust area of research and development.

Quality Policy

To continuously learn from the best practices, study role models and develop transparent procedures for empowerment of stakeholders.

Strategic Objectives

- To facilitate, enhance & promote innovation in curriculum design and delivery and have Outcome-oriented Learning Culture.
- To promote Research Environment and Management Practices.
- To enhance the quality of the student learning experience.
- To provide Resources and Infrastructure for Academic Excellence.

DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY

Vision

To be quality conscious, research-centric, and change-oriented technological leader in the relevant areas.

Mission

- To develop and impart knowledge and skills in the field of Computer Science and Engineering.
- To encourage and support the generation and implementation of innovative ideas.
- To focus on new techniques, tools, and technology, in an ethical and responsible manner.
- To carry out collaborative interdisciplinary Academic and Research activities.
- To create employment-ready human resources.

Program Educational Outcomes

- **Core Competency:** To inculcate analytical, design and implementation skills required to provide software solutions in industry.
- **Breadth:** To groom graduates to innovate, design and develop products to provide sustainable solutions to contemporary societal and business problems.
- **Professionalism:** To instill the ability to work in teams, communicate effectively and lead as ethically and socially responsible professionals and entrepreneurs.
- **Life Long Learning:** To foster the ability of lifelong learning to constantly adapt to emerging technologies , to pursue higher education and instill life skills for a successful career.

Program Outcomes (PO's)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSO's)

1. **PSO1:** Design and develop computer programs and possess acquaintance with emerging technologies and
   open-source platforms in the area of mobile app development, artificial intelligence, machine learning, web development, data analytics, cloud computing , networking , cyber security , gaming and animation to build effective computer-based systems.
2. **PSO2:** Acquire technical competency to deliver computer-based innovative and effective solutions to tackle
   business and societal challenges, for pursuing successful career, entrepreneurship, research and higher studies.

Semester-I

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH101 T & P	Structured Programming	Domain Core	Hard	3	1	2	0	5
CSW102	HTML5&CSS	Domain Core	Workshop	0	0	3	0	2
MAH101 T& P	Applied Mathematics	Allied Core	Hard	3	1	2	0	5
PHH104 T & P	Physics of Materials	Allied Core	Hard	3	1	2	0	5
ECH101 T & P	Electrical Engineering	Allied Core	Hard	3	1	2	0	5
HLS101	Business English (Humanities)	Allied Core	Soft	1	0	2	0	2
FLS103	French-I			1	1	0	0	0
FLS101	Spanish-I	Audit Courses	Audit					
FLS102	German-I							
CHS102	Environmental Sciences	Audit Courses	Soft	1	0	2	0	0

Semester-II

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH103 T & P	Data Structures	Domain Core	Hard	3	1	2	0	5
MAH106 T & P	Discrete Mathematics	Allied Core	Hard	3	1	2	0	5
PHH105 T & P	Optics and Optical Devices	Allied Core	Hard	3	1	2	0	5
CHH101 T & P	Green Chemistry	Allied Core	Hard	3	1	2	0	5
ECW104	Electronics Workshop	Allied Elective	Workshop	0	0	3	0	2
MEW103	Engineering Drawing/Graphics	Allied Elective	Workshop	0	0	3	0	
CSW152	iCarneigie WorkshopSDP02 (CSW152)	Domain Core	Workshop	0	0	3	0	2
HLS102	Communicative English (Humanities)	Allied Core	Soft	1	0	2	0	2
FLS107	French-II	Audit Course	Audit	1	1	0	0	0
FLS105	Spanish-II							
FLS106	German-II							

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC/ Outcome Based	L	T	P	O	
CSH205 T & P	Database Management Systems	Domain Core	Hard	3	1	2	1	6
CSH206 T & P	Object Oriented Programming using Java	Domain Core	Hard	3	1	2	0	5
ECH207 T & P	Principles of Digital Electronics and Circuit Design	Allied Core	Hard	3	1	2	0	5
MAH208 T & P	Statistics and Numerical Techniques	Allied Core	Hard	3	1	2	0	5
CSW207	Image Editing & Animation	Domain Elective	Workshop	0	0	3	0	2
CSW208	Scripting Languages	Domain Elective	Workshop	0	0	3	0	2
CHS234	Environmental Ethics & Sustainable Development (Humanities)/ Sustainability Strategies	Allied Core	Soft	1	0	2	0	2
FLS211	French-III	Audit Courses	Audit	1	1	0	0	0
FLS209	Spanish-III							
FLS210	German-III							
CDO201	Professional Competency Enhancement-1	Allied Core	Outcome Based	0	0	0	1	1
RDO201	Introduction to Research	Allied Core	Outcome Based	0	0	0	1	1

Semester-III

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH209 T & P	Theory Of Computation & Compiler Design	Domain Core	Hard	3	1	2	0	5
CSH210 T & P	Computer Architecture & Organization	Domain Core	Hard	3	1	2	0	5
CSH211	Operating	Domain Core	Hard	3	1	2	0	5

COURSE CODE	COURSE NAME	Course Type	Course Nature	L	T	P	O	CREDITS
T & P	Systems							
ECH434 T & P	Wireless Communication	Domain Core	Hard	3	1	2	0	5
CSW213	Unix & Shell Programming	Domain Core	Workshop	0	0	3	0	2
EDS288	Applied Philosophy	Allied Core	Soft	1	0	2	0	2
EDS289	Applied Psychology							
FLS215	French-IV	Audit Courses	Audit	1	1	0	0	
FLS213	Spanish-IV							
FLS214	German-IV							
RDO202	Technical Seminar-1	Allied Core	Outcome Based	0	0	0	1	1
CDO202	Professional Competency Enhancement-II	Allied Core	Outcome Based	0	0	0	1	1

Semester-IV

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH316 T & P	Artificial Intelligence & Expert Systems	Domain Core	Hard	3	1	2	0	5
CSH317 T & P	Software Engineering	Domain Core	Hard	3	1	2	0	5
CSH318 T & P	Computer Networks	Domain Core	Hard	3	1	2	0	5
CSH319 T & P	Mobile Computing with Android	Domain Elective	Hard	3	1	2	0	5
CSH320 T & P	Internet standards and Open Source Software	Domain Elective	Hard	3	1	2	0	
CSH321 T & P	Data Warehousing & Data Mining	Domain Elective	Hard	3	1	2	0	
CSH322 T & P	Advanced Operating System	Domain Elective	Hard	3	1	2	0	
CSW324	Introduction to Matlab	Domain Elective	Workshop	0	0	3	0	2
CSW325	Web Services	Domain Elective	Workshop	0	0	3	0	
CDO305	Professional Competency Enhancement-III	Allied Core	Soft	1	0	2	0	2
FLS319	French-V	Audit Course	Audit	1	1	0	0	
FLS317	Spanish-V							

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
FLS318	German-V							
RDO303	Technical Seminar-2	Allied Core	Outcome Based	0	0	0	1	1
LWS323	Cyber Law							
LWS321	Law of Patents & Traditional Knowledge	Allied Elective	Soft	1	0	2	0	2

Semester-V

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop / NTCC	L	T	P	O	
CSH326 T & P	Analysis & Design Of Algorithms	Domain Core	Hard	3	1	2	0	5
CSH327 T & P	Computer Graphics & Multimedia	Domain Core	Hard	3	1	2	1	6
ECH326 T & P	Microprocessors & Interfacing	Allied Elective	Hard	3	1	2	0	5
ECH318 T & P	Digital System Design	Allied Elective	Hard	3	1	2	0	
CSH328 T & P	Multi-platform Mobile Development	Domain Elective	Hard	3	1	2	0	5
CSH329 T & P	Network Security & Cryptography	Domain Elective	Hard	3	1	2	0	
CSH330 T & P	Business Intelligence & its Applications	Domain Elective	Hard	3	1	2	0	
CSH331 T & P	Software Project Management	Domain Elective	Hard	3	1	2	0	
CSW332	Introduction to .Net	Domain Elective	Workshop	0	0	3	0	2
CSW333	Socket Programming	Domain Elective	Workshop	0	0	3	0	
CSW 334	Game Programming	Domain Elective	Workshop	0	0	3	0	
FLS222	French-VI	Audit Course	Audit	1	1	0	0	
FLS220	Spanish-VI							
FLS221	German-VI							
RDO304	Project Phase -1	Allied Core	Outcome Based	0	0	0	1	1
MCS232	Introduction to Finance	Allied Elective	Soft	1	0	2	0	2
MCS231	Basics of Economics							

Semester-VI

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH436 T & P	Advanced Java	Domain Core	Hard	3	1	2	0	5
CSH437 T & P	iOS App Development	Domain Elective	Hard	3	1	2	0	5
CSH438 T & P	Cloud Computing	Domain Elective	Hard	3	1	2	0	
CSH439 T & P	Big data	Domain Elective	Hard	3	1	2	0	
CSH440 T & P	NoSQL Database Models	Domain Elective	Hard	3	1	2	0	
CSH441 T&P	Knowledge representation and machine learning	Domain Elective	Hard	3	1	2	0	
CSW442	Software Testing	Domain Elective	Workshop	0	0	3	0	2
CSW443	User Experience (UX)	Domain Elective	Workshop	0	0	3	0	
CSN444	Major Project - Agile (Stage I)	Domain Core	NTCC	0	0	3	0	2

Semester-VII

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH436 T & P	Advanced Java	Domain Core	Hard	3	1	2	0	5
CSH437 T & P	iOS App Development	Domain Elective	Hard	3	1	2	0	5
CSH438 T & P	Cloud Computing	Domain Elective	Hard	3	1	2	0	
CSH439 T & P	Big data	Domain Elective	Hard	3	1	2	0	
CSH440 T & P	NoSQL Database Models	Domain Elective	Hard	3	1	2	0	
CSH441 T&P	Knowledge representation and machine learning	Domain Elective	Hard	3	1	2	0	
CSW442	Software Testing	Domain Elective	Workshop	0	0	3	0	2
CSW443	User Experience (UX)	Domain Elective	Workshop	0	0	3	0	

CSN444	Major Project - Agile (Stage I)	Domain Core	NTCC	0	0	3	0	2

Semester-VIII

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH445 T & P	Mobile App Analytics	Domain Elective	Hard	3	1	2	0	5
CSH446 T & P	Information retreival	Domain Elective	Hard	3	1	2	0	
CSH447 T & P	Business Analytics with R programming	Domain Elective	Hard	3	1	2	0	
CSH448 T & P	Neural Network & Fuzzy Logic	Domain Elective	Hard	3	1	2	0	
CSH449 T & P	Advanced computer architecture	Domain Elective	Hard	3	1	2	0	
CSN450	Major Project -Agile (Stage II)	Domain Core	NTCC	0	0	8	0	8
MAH310 T & P	Operations Research	Allied Elective	Hard	3	1	2	0	5
PHH401 T & P	Renewable Energy Systems	Allied Elective	Hard	3	1	2	0	
	Elective from Chemistry Department	Allied Elective	Hard	3	1	2	0	

Total Credits Scheme

S.No.	Semester	Credits
1	I	24
2	II	24
3	SUMMER TRAINING (POST 2nd SEM)	3
4	III	25
5	IV	24
6	SUMMER TRAINING (POST 4th SEM)	6
7	V	24
8	VI	25
9	SUMMER TRAINING (POST 6th SEM)	6
10	VII	16
11	VIII	18
TOTAL CREDITS FOR B.TECH PROGRAMME		195

Section Weightage Parameters

	Sections	Weightage
	A	25%
	B	25%
Syllabus	C	25%
	D	25%
	TOTAL	100%

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH101 T & P	Structured Programming	Domain Core	Hard	3	1	2	0	5
CSW102	HTML5&CSS	Domain Core	Workshop	0	0	3	0	2
MAH101 T& P	Applied Mathematics	Allied Core	Hard	3	1	2	0	5
PHH104 T & P	Physics of Materials	Allied Core	Hard	3	1	2	0	5
ECH101 T & P	Electrical Engineering	Allied Core	Hard	3	1	2	0	5
HLS101	Business English (Humanities)	Allied Core	Soft	1	0	2	0	2
FLS103	French-I			1	1	0	0	0
FLS101	Spanish-I	Audit Courses	Audit					
FLS102	German-I							
CHS102	Environmental Sciences	Audit Courses	Soft	1	0	2	0	0

Course Title/ Code	Structured Programming (CSH101) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students are able to construct a program of moderate complexity from a specification

Section-A

Programming and UNIX

Students will learn the basics of programming using Scratch, they will learn to use statements, expressions, conditions, selection, iteration, variables, functions, arrays, threads and events. In addition, they will be introduced to basic UNIX commands under Bash. Introduction to Programming, test driven development

Scratch: Introduction, statements, expressions, conditions, selection, iteration, variables, functions, arrays.

UNIX: Basic commands- pwd, ls, cd, rm, cat, less, mkdir, rmdir; permissions, root.

C language: statements, expressions, conditions, selection iteration, variables, functions, arrays.

Section-B

Applying programming constructs

Students will learn how to write programs that satisfy unit tests. The instructor will build the unit tests, demonstrating how to break a problem down into smaller components. In the labs and homework, students will construct programs that satisfy the unit tests. Students become familiar with the constructs of the C programming language.

Types, constants, and variables, Statements, Expressions, Conditions, Selection, iteration, Functions and recursion

Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, structured Programming

One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Null terminated strings as array of characters, Standard library string functions

Introduction to Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions. Students will become familiar with the concepts.

Section-C
Practical programming

During the third quarter of the class, students will begin building their own programs by decomposing problems into smaller tasks and writing unit tests that will check to see that the program accurately accomplishes the task using Test Driven Development. They will then write the program that satisfies their own unit tests. Students will learn to apply the constructs of the C programming language to create programs.

Application of Top-down approach of problem solving, Modular programming and functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive Functions, arrays as function arguments.

Students will learn to apply these programming techniques: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions. Students will be able to use these techniques to develop programs

Concept of Files, File opening in various modes and closing of a file, Reading from a file, writing onto a file

Section-D
Memory Management and Abstraction

During the final quarter, students will be introduced to dynamic memory allocation and dynamic data structures including: dynamic arrays, linked lists, and stacks. They will consolidate their ability to use the C programming techniques they have learned in the earlier sections.

Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation. Linked list

LIST OF EXPERIMENTS:

- Swap two numbers
- Fibonacci series, Factorial
- GCD
- Sieve of Eratosthenes
- Square Root
- Sorting
- Decimal to binary conversion
- Linked lists
- Program to support humans playing chess against each other.
- Stacks and queues

- Manipulating files

Books
- The C Programming Language, Brian Kernighan and Dennis Ritchie
- The Unix Programming Environment
- Pro Git,

Help Pages
- Eclipse C/C++ Development Guide

Wikipedia Pages

- Test-driven development, http://en.wikipedia.org/wiki/Test-driven_development
- Unit testing, http://en.wikipedia.org/wiki/Unit_testing

Tool Web Sites
- Eclipse, https://eclipse.org/users/
- Git, http://git-scm.com/
- GCC, https://gcc.gnu.org/onlinedocs/gcc-4.9.3/gcc/
- Make
- Unix

Web tutorials
- Harvard's CS50, https://courses.edx.org/courses/HarvardX/CS50x3/2015/info

Course Title/ Code	HTML5 & CSS (CSW102) P
Course Type:	**Elective**
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	Student will be able to design a website.

Section-A

INTRODUCTORY CONCEPTS: Internet, Intranet, Extranet, Web Browser and WWW, W3C, HTTP, Cookies, Session, IP Address, Domain Name, Web Server, website and webpage structure. Markup Language, HTML editor: Dreamweaver, Introduction to HTML tags: html, head, body, div, br, hr, p, text formatting, text styles, layouts, marquee, lists: ordered, unordered and definition lists, hyperlinks: http/https/ftp, images, images as hyperlinks, adding graphics, audio and video, table, Frames, iframes, color names, values & shades, HTML entities, symbols, charset, Forms.

Section-B

Intro HTML 5.0: What Is HTML5, History: A Little Retrospective, The WHATWG, Vision and Philosophy behind HTML5, HTML vs HTML5, Getting Started with HTML5: The State Of Browser Support, Structure of a Web Page: HTML5 DOCTYPE, Page Encoding, HTML5 Markup, New And Updated Elements, Structural Elements, New Attributes, Deprecated Elements And Attributes.

Section-C

HTML 5.0 Form, Graphics & Media: HTML5 DOM, Form: new input types & attributes, form validation, HTML canvas and SVG: Drawing shapes, Text & images, working with pixels, Embedding media**:** Audio and Video based On Plug-in, New Audio/Video Markup, Attributes and Methods, Audio/Video Events & Controls, Plug-ins in HTML inserting YouTube videos.

Section-D

CSS & CSS3: Introduction to CSS, Syntax, Selectors, Pseudo classes, Applying CSS to backgrounds, Text, Fonts, Links, Lists, Tables, Box Model: Border, Margin, Padding, Dimension, Display, Positioning, Align, CSS to Images and image Opacity, CSS Media Types, CSS Attr Selectors.
CSS3: Introduction**,** Rounded Corners, Border Images, Backgrounds, Colors, Gradients, Shadows, Fonts and text effects, 2D transforms, 3D Transforms, Transitions & Animations.

LIST OF EXPERIMENTS:

- HTML: Basic Tags
- HTML: Graphics &Tables
- HTML: Frames & Form**s**
- HTML5.0: Basic Tags
- HTML5.0: DOM & Forms
- HTML: Canvas &SVG
- HTML: Media
- HTML: API's
- CSS
- Minor Project

Text Books:
- Pro HTML5 and CSS3 Design Patterns Paperback – 2012 by Dionysios Synodinos, Michael Bowers, Victor Sumner
- Murach's HTML5 and CSS3 Paperback – 2012 by Zak Ruvalcaba
- Dive into HTML5 by Mark Pilgrim.

Reference Book:
- Hello! HTML5 & CSS3: A user-friendly reference guide Paperback by Rob Crowther.
- HTML5 Guidelines for Web Developers by Klaus Förster.

Course Title/ Code	**Applied Mathematics (MAH101) T & P**
Course Type	**Core**
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	The students would be able to apply the mathematical concepts of matrices, integral calculus, differential equations and generating functions required for solving the mathematical problems and their applications**.**

Section A

Matrices & its Applications: Elementary transformations, Elementary matrices, inverse using elementary transformations, Rank of a matrix, normal form of a matrix, Linear dependence and independence of vectors, consistency of linear system of equations, Eigen Values and Eigen vectors, properties of Eigen values, Cayley

Hamilton theorem, Linear Transformation, Orthogonal transformation, Similar matrices, Diagonalisation of a matrix, Quadratic forms, Complex matrices and their properties.

Section B

Multiple integrals & its applications: Double and Triple Integral : Evaluation of double & triple integral, evaluation of double integral over the region, evaluation of double integral by changing the order of integration, evaluation of double & triple integral by changing the variable.

Beta and Gamma functions: Definition, properties of Beta and Gamma functions, Recurrence formula, Relation between Beta and Gamma functions, duplication formula, Dirichlet's Integrals.

Section C

Ordinary Differential Equations & its applications: Existence & uniqueness of Differential equation, Differential equations of first order & first degree, formation of differential equation, Bernoulli's differential equation, Exact differential equation and equations reducible to exact differential equation, Applications(Electric circuits, Newton's law of cooling, Orthogonal trajectories).Differential equations of higher order & first degree , Linear differential equations, Method of Variation of Parameter, Cauchy's linear equation, Legendre's equation, Simultaneous linear Differential equations, Applications of LDE(LCR Circuits, Projectile with Resistance).

Section D

Recurrence relations and Generating Functions: Recurrence relation, linear recurrence relations with constant coefficients (homogeneous and non- homogeneous), total solution, solutions of linear recurrence relations by the method of generating functions.

List of Experiments
- Introduction to MATLAB and use of some simple MATLAB commands.
- Introduction to some of the fundamentals of MATLAB: Variables, operators, expressions and Arrays(including vectors and matrices)
- Introduction to graphics: Basic Two-Dimensional Graphs, Labels, Multiple plots on the same axes, Line styles, Markers and color, Axis limits and Subplots.
- To find the Rank of a matrix, Inverse of a Square matrix and to reduce a matrix into Normal Form.
- To solve the system of simultaneous linear equations. To find the Eigen values and Eigen vectors of a square matrix.
- To find the Surface area and volume of solids of revolution by single integration.
- Evaluation of Double integral and its application.
- Evaluation of Triple integral and its application.
- To solve ODE & LDE & plot the graph of the solution.
- To solve & plot solutions the system of two & three ordinary differential equations.
- To solve the linear differential equations with variable coefficients (Cauchy & Legendre Differential equations) and plot the graph of the solution.

Text Books:
- B.S. Grewal,"Higher Engineering Mathematics", Khanna Publishers, New Delhi.

Reference Books:

- R.K. Jain & S.R.K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, New Delhi.
- Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & sons, New York.
- Shanti Narayan, "Integral Calculus", S. Chand publishers, New Delhi.
- Brian Hahn & Daniel Valentine, "Essential MATLAB for Engineers & Scientists", Academic Press, Oxford, UK.

Course Title/ Code	Physics of Materials(PHH104) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	To introduce the fundamentals of semiconductor Physics that will enable subsequent study of semiconductor devices.

Section-A

Classical and Quantum Statistics: Maxwell-Boltzmann statistics, Bose-Einstein statistics, Fermi-Dirac statistics – Fermi Distribution function, Fermi energy

Section-B

Crystal Structure: Space lattice, unit cell, and translation vector, Miller Indices and planes Simple crystal structures, x-ray diffraction methods (Laue Method, Powder method), Point Defects in solids- Schottky and Frenkel defects, bonding in solids

Section-C

Quantum Physics: Review of basic concepts of quantum physics, Schrödinger equation, Expectation values, Ehrenfest theorem, particle in a box, Tunnel Effect, Bloch theorem and energy bands in solids, metals, insulators and semiconductors, energy band gap, holes and electrons, effective mass, density of states, effective density of states.

Section-D

Semiconductors: Charge carriers in semiconductors: Electrons and Holes, charge carriers density, Fermi Energy, Intrinsic and Extrinsic semiconductors, Fermi level as a function of temperature for intrinsic and extrinsic semiconductors, conductivity of intrinsic and extrinsic semiconductors, mobility, Hall Effect, Diffusion Mechanism, P-N junction diode, Light Emitting Diode, Photo Diode, Tunnel Diode

List of Experiments

- To determine Planck's constant using photoelectric effect.
- To determine energy band gap of a semiconductor using Four-Probe Method.
- To determine the carrier concentration of a semiconductor using Hall Effect setup.
- To study V-I Characteristics of a P-N junction diode.
- To determine lattice parameters of a crystal using PowderX software and experimental data.
- To verify Richardson Equation and hence to find the work function of cathode material of a diode valve.
- To determine the band gap of a semiconductor diode.
- To study and plot the forward and reverse bias characteristics of a Zener diode.

Course Title/ Code	Electrical Engineering (ECH101) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students shall be able to design and construct circuits, take measurement of circuit behavior, compare with predicted circuit models and explain discrepancies. .

Section A

D C Circuit Analysis and Network Theorems: Circuit Concepts, Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Source transformation, Kirchhoff's laws; Loop and nodal methods of analysis; Star-delta transformation, Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Tellegen's Theorem, Millman's Theorem, Compensation Theorem, Reciprocity Theorem

Section B

Steady- State Analysis of Single Phase AC Circuits: AC fundamentals: Sinusoidal, square and triangular waveforms – Average and effective values, Form and peak factors, Concept of phasors, phasors representation of sinusoidal varying voltage and current, Analysis of series, parallel and series-parallel RLC Circuits. Resonance in series and parallel circuits, bandwidth and quality factor; Apparent, active & reactive powers, Power factor, Causes and problems of low power factor, Concept of power factor improvement

Section C

Three Phase AC Circuits: Three phase system-its necessity and advantages, Star and delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power and its measurement.
Measuring Instruments: Types of instruments, Construction and working principles of PMMC and moving iron type voltmeters &ammeters, Single phase dynamometer wattmeter.
Introduction to Earthing and Electrical Safety: Need of Earthing of equipment and devices, Megger, important electrical safety issues.

Section D

Single Phase Transformer: Principle of operation, Construction, EMF equation, Equivalent circuit, Power losses, Short Circuit test, Open Circuit Test, Efficiency, Introduction to auto transformer.
Electrical Machines: Concept of electro mechanical energy conversion, DC machines: Types, EMF equation of generator and torque equation of motor, Characteristics and applications of DC Three Phase Induction Motor: Types, Principle of operation, Slip-torque characteristics, Applications. Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.

List of Experiments

- Familiarization with the components, breadboard, resistor coding and various types of meters.
- To verify KCL and KVL in a circuit.
- To verify Thevenin's Theorem and To verify Norton's Theorem
- To verify Superposition theorem and Maximum Power transfer theorem
- Measurement of various parameters of different AC waveforms (average , RMS, peak value, Form factor, Peak factor)
- Measurement of series Resonance and parallel resonance.
- Single phase AC Power measurement & project allotment.

- 3 phase power measurement using two wattmeter methods.
- Efficiency and voltage regulation of single phase transformer.
- OCC of DC separately Excited shunt Generator
- Open circuit and short circuit test on single phase transformer.

Text Books:

- Basic Electrical Engineering, T.K. Nagsarkar, M S Shukhija; Oxford University Press
- A Textbook of Electrical Technology, Vol- I, B L Theraja, S Chand and Company
- Principles of Electrical Engineering, Del. Toro, PHI Publication.

Reference Books:

- Electrical & Electronics Technology, Edward Hughes, Seventh Edition, Pearson Education
- Elements of Electrical Technology, H Cotton, C B S Publications
- Electric circuits, Nahvi, John Edminister, Schaums series, Tata McGraw Hill
- Theory and problems of Basic Electrical Engineering, Nagrath and Kothari, Prentice-Hall of India

Course Title/ Code	Business English (HLS101) T
Course Type	Core
Course Nature	Soft
L-T-P-O Structure	(1-0-2)
Objectives	Taken directly from Infosys designed Lesson plans of Business English, the paper attempts to execute the modules over the course of a semester, by end of which students will be well-versed in the basics of English Language grammar and communication skills. The lab-activities that go hand-in-hand with the lessons will help in enhancing the interactive aspect of the paper.

SECTION A
GRAMMAR

Introduction to Grammar
Adverbs, Adjectives, Articles, Noun (Compound, Countable, Uncountable) Active -Passive Voice

SECTION B

TENSE and SEMANTICS

Tenses, Subject- Verb Agreement, Introduction to Verbs (Auxiliary and Modals, non-finite), Prepositions, Modifiers, Collocation,
Synonym, Antonym, Phrasal Verbs, Idioms and Phrases.

SECTION C

Oral Communication-I

Speech Pattern-1 (Intonation, Word Stress), Speech Pattern-2 (Indianisms, Sentence Stress, Connected Speech), Link Expressions, Question Tags.

SECTION D

TECHNICAL WRITING-I

ABC of Writing, KISS Concept, Essay Writing, Report Writing, Email Etiquette, Circular Précis Writing, Memos and Notices.

LIST OF PRACTICALS:

- Exercises based on Grammar
- Exercises based on Semantics
- Introduction to Articulation Skills (Conversation: Telephonic and Face-to-Face)
- Listening to Understand (Hearing vs. Listening)
- Listening for Inter-personal Effectiveness
- Techniques & Levels of Reading Comprehension
- Essay Writing Session
- Report Writing and Email Etiquette
- Circular, Memos and Notice Writing
- Business QUIZ &Idioms and Phrases
- Individual Presentation
- Feedback and Poster- Creation

Text Books:

- High School English Grammar and Composition. Wren and Martin: S.Chand and Co.
- A Textbook of English Phonetics for Indian Students. T.Bala Subhrmaniam: Macmillan
- English Vocabulary in use.Macarthy: Foundation Books, Oxford Uni. Press.
- English Grammar, Competition and Correspondence. M.A. Pink and A.C. Thomas: S.Chand & co.

Course Title/ Code	French (FLS103)
Course Type:	**Elective**
Course Nature:	Audit
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Section-A

- Les Salutations & forms of politeness
- Alphabets
- Taking leave expressions

Section-B

- Les pronoms sujets
- Les verbes ER
- Self-introduction

Section-C

- Les noms
- Verbes Avoir, Etre, Aller & Faire
- Les articles define et indefini

Section-D

- Les moin de l'annee
- les jours de la semaine
  Repondez aux questions

Course Title/ Code	Spanish (FLS101)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Section-A

- Presentation on Spanish language
- Greetings and goodbye's
- Spanish letter
- Introduction of VerboSER

Section-B
- Uses of Verbo SER
- Introduction of Nationality
- Professions and vocabulary related to professions.
- Adjectives related to Verbo SER.
- Counting till number 20.

Section-C
- Introduction of Articles and Indefinite articles
- Interrogatives
- Adjectives to describe things and place and Counting till number 90

Section-D
- Introduction of Verbo ESTAR
- Uses of Verbo ESTAR with respect to positioning of objects
- Prepositions related to the positioning of an object

Course Title/ Code	German (FLS102)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Section-A
- Salutations/Greetings
- Introduction

Section-B
- Introduction cntd.
- Alphabets
- Numbers 1-20

Section-C
- Personal pronouns
- Hobbies and professions

Section-D
- Café related vocabulary and dialogues
- Revision personal pronouns
  Common verbs and their conjugations

Course Title/ Code	Environmental Science (CHS102) T
Course Type	Audit
Course Nature	Soft
L-T-P-O Structure	(1-0-2-0)
Objectives	- to make the student identify the areas of environmental degradation - to make the student identify the impact of environmental degradation on the surroundings - to apply the concepts such as sustainable development in real life. - to help the engineering student to correlate his field with various aspects of environment.

SECTION A

SCOPE & IMPORTANCE OF EVS
Definition and Scope of Environmental Sciences, Importance of EVS in Various Branches of Engineering & Sciences: Computer Science and Technology, Mechanical Engineering, Electronics & Communications Engineering, Civil Engineering and Applied Sciences

SECTION B

ECOSYSTEM DYNAMICS STRUCTURE AND FUNCTIONS OF ECOSYSTEM: Trophic Level, Food Chain, Food Web, Ecological Pyramids, Energy Flow, Biogeochemical Cycles, Ecological Succession: Basic Concept, Types, Stages
TYPES OF ECOSYSTEMS: Aquatic Ecosystem (Lake), Terrestrial Ecosystem (Grassland)
BIODIVERSITY: Hot Spots, Threats, In Situ and Ex Situ Conservation,
POPULATION AND ITS CHARACTERISTICS: Population Growth, Age Structure Pyramids

SECTION C

POLLUTION PREVENTION AND SUSTAINABILITY AIR POLLUTION: Sources of Air Pollution, Methods of Monitoring and Control of Air Pollution. Effect of Air Pollution on Human Beings, Plants, Animals, Materials and Atmosphere. Photochemical Smog, Ozone Layer Depletion, Green House Effect, Acid Rain
WATER POLLUTION: Sources and Consequences of Water Pollution, Physio-Chemical and Biological Monitoring of Water Quality (TDS, TSS, BOD, COD). Eutrophication.
SOIL POLLUTION: Control Measures, Over Usage of Chemical Pesticides, Bio- Magnification
SUSTAINABLE DEVELOPMENT: Definition, Energy Conservation In Agriculture And Industrial Sectors, Smart City Concept, Petro-Crops
SECTION D

ENVIRONMENTAL TECHNIQUES & ASSESSMENT: Flame Photometry, Paper Chromatography, Remote Sensing and its Applications, Role of GIS in Disaster Management. Statistical Analysis: Mean, Median, Mode, and Standard Deviation
Environmental Impact Analysis (EIA): Aims & Objectives, ISO- 14000 and ISO- 18000 Standards and Certification, National Green Tribunal Act, Environmental Priorities in India and Environmental Regulations for Small and Large Scale Industries.

UNIT 5: FIELD VISITS & PROJECT WORK

Visit To Waste Water Treatment Plants & Report
Visit To Any Industry for Pollution Control Methods & Report
Vermicomposting & Solid Waste Management Techniques
A Report on Biodiversity in Campus and Their Different Uses

LIST OF PRACTICALS:

- To analyse the tds, tss in given sample of water
- To determine bod in a water sample
- To determine cod in water sample
- To analyse a sample for metal ions using flame photometer
- To separate the components in a mixture using paper chromatography
- To study vegetation abundance and frequency of an ecological sample using quadrant method
- Calculate mean, mode, median of the given data
- Calculate standard deviation of the given data
- To study the various acts: wildlife protection act 1972, the water (prevention and control of pollution) act 1974, prevention and control of air pollution act 1981, forest conservation act 1981, environment (protection) act 1986, hazardous waste (management and handling) rules, 1989, bio-medical waste (management and handling) rules, 1998.
- Case studies of eco-marketing: kfc, coca cola, mc d, tropicana, nestle, ceres fruit juice (methodologies for sustainable environment & advantages)
- Herbarium preparation of biodiversity in a given sample area
- To study the efficacy of different bioadsorbents: saw dust, vegetable waste, fruit peels, tea waste.
- Air sampling and its quality analysis

Reference Books:

- Environmental Studies by Sarita Sachdeva.
- Perspectives in Environmental Studies by Kaushik & Kaushik
- Comprehensive Environmental Studies by JP Sharma

CSU01- Semester-II

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH103 T & P	Data Structures	Domain Core	Hard	3	1	2	0	5
MAH106 T & P	Discrete Mathematics	Allied Core	Hard	3	1	2	0	5
PHH105 T & P	Optics and Optical Devices	Allied Core	Hard	3	1	2	0	5
CHH101 T & P	Green Chemistry	Allied Core	Hard	3	1	2	0	5
ECW104	Electronics Workshop	Allied Elective	Workshop	0	0	3	0	2
MEW103	Engineering Drawing/Graphics	Allied Elective	Workshop	0	0	3	0	
CSW152	iCarneigie WorkshopSDP02 (CSW152)	Domain Core	Workshop	0	0	3	0	2
HLS102	Communicative English (Humanities)	Allied Core	Soft	1	0	2	0	2
FLS107	French-II	Audit Course	Audit	1	1	0	0	0
FLS105	Spanish-II							
FLS106	German-II							

Course Title/ Code	Data Structures (CSH103) T & P
Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	The course should assess how the choice of data structures and algorithm design methods impacts the performance of programs and choose the appropriate data structure and algorithm design method for a specified application.

Section-A

Data structures and Algorithms: Introduction to Data structure: Concept of data structure, choice of right data structures, types of data structures, Abstract Data types, Introduction to algorithms, how to design and develop an algorithm: stepwise refinement, algorithm analysis, complexity of algorithms

Arrays: Introduction, One Dimensional Arrays, two dimensional array, Multidimensional arrays, address calculation of a location in arrays operations defined: traversal, selection, searching, insertion, deletion, and sorting.

Searching: linear search, binary search, Sorting: selection sort, bubble sort, insertion sort, merge sort, quick sort, shell sort, radix sort, bucket sort, heap sort.

Section-B

Pointers: Introduction to pointers, Pointer variables, Pointer and arrays, array of pointers, pointers and structures, Dynamic allocation. **Linked Lists**: Concept of a linked list, circular linked list, doubly linked list, operations on linked lists: traversal, selection, searching, insertion, deletion, and sorting, concepts of header linked lists. Applications of linked lists.

Section-C

Stacks: Introduction to Stacks, array representation of stack, operations on stack: PUSH, POP, Evaluation of Expression: Concept of precedence and associatively in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion, Linked list representation of stack, Applications of stacks.

Queues: Queues, Circular queues, array representation of Queues, priority queues, dequeue, circular queue, operations on queue: insertion and deletion, Sparse Matrices Applications of Queues.

Section-D

Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc, binary tree: different types of binary trees based on distribution of nodes: complete binary tree, binary tree (threaded and unthreaded),operation on binary tree: insertion, deletion, searching and traversal of binary trees, traversing: Preorder, Postorder and Inorder, Introduction to binary search tree, operations and Time complexity on BST: insertion, deletion, searching, Introduction to AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion, Introduction to red-black and splay tree, B and B+ trees, Application of trees, Hashing.

Graphs: Definition, Relation between tree & graph, directed and undirected graph, connected and disconnected graph, Euler graph, Hamiltonian graphs, Representation of graphs using adjacency matrix and list, Depth first and breadth first traversal of graphs, finding connected components and spanning tree, Applications of Graph.

List of Experiments:

- Programs on C language
- Write a program on Linear search and Binary search Using C
- Write a program to implement bubble sort, insertion sort , selection sort
- Write a program to implement Merge sort, Quick sort
- Programs on Link list
- Programs on stack
- Programs on queues
- Programs on binary trees
  - Traversal
  - Insertion
  - Deletion
- Programs on binary search tree:
  - Calculate the height of BST
  - Calculate the number of leaf nodes
  - Insertion
  - Deletion
- Programs on Graphs
  - BFS
  - DFS
- Case studies on Trees and Graphs.

Text Books:

- Data Structures with C by Seymour Lipschutz ,McGraw Hill Education(India) Private Limited.

- Data Structures using C by A. K. Sharma, Pearson Publication.
- Data Structures using C-Yashwant Kanetkar Publication.

Reference Books:

- Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
- Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman Publisher.

Course Title/ Code	**Discrete Mathematics (MAH106) T & P**
Course Type:	**Core**
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	The students would be able to apply the concepts of set theory, logic, Algebraic structure and graph theory required for solving the mathematical problems and their applications.

Section-A

Set Theory: Introduction to the theory of sets, Principle of inclusion and exclusion, Paradoxes in set theory, inductive definition of sets and proof by induction, Peono postulates, Relations, representation of relations by graphs, properties of relations, equivalence relations and partitions, Partial orderings, Posets, Linear and well-ordered, Functions.

Section-B

Logic: Propositional and Predicate logic; Syntax, semantics, resolution principle, soundness, completeness, unification; Logic operators, logic proposition and proof, method of proofs.

Section-C

Algebraic Structure: Introduction to Boolean algebra and Boolean functions, Different representations of Boolean functions, Application of Boolean functions to synthesis of circuits.
Groups, rings, fields, Galois field, Euler's phi function, Fermat's theorem, discrete logarithm, applications.

Section-D

Graph Theory: Graphs, isomorphism, subgraphs, matrix representations, degree, operations on graphs, degree sequences, Directed, undirected, directed acyclic and bipartite graphs; Connected components, Eulerian graphs, Fleury's algorithm, Chinese-postman-problem, Hamiltonian cycles; Shortest path, some fundamental theorems, applications.

List of Experiments

- Introduction to Mupad.
- To find Cartesian product of sets and sub set of a set.
- To find Boolean constant.
- Evaluation of Boolean expressions.
- Creation of graph generates a circle graph and a complete graph.
- Transfers a square matrix in to a directed graph.
- Plots a graph in a bipartite layout, Plot a graph in a grid layout.
- Modification -1: Add edges and vertices to a graph.
- Modification -2: Remove edges and vertices to a graph.
- To find shortest paths from and to all vertices, find shortest paths from one single vertex.

- Create a Minimal Spanning Tree.

Text Books:

- N. Deo, Graph Theory with Applications to Engineering and Computer Science, PHI.
- M. Sethumadhavan, Discrete Mathematics and Its Applications, Narosa Publisher.
- N. Biggs, Discrete Mathematics, Oxford Publisher.

Reference Books:

- G. ShankerRao, Discrete Mathematical Structure, New Age Publ.Lim. **New Delhi.**
- Cristian S. Calude, M. J. Dinneen, Discrete Mathematics and Computer Science, Springer.
- K. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill Education.

Course Title/ Code	Optics and Optical Devices (PHH105) T & P
Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to describe and measure the wave properties of light using different optical devices

Section – A

Interference: Theory of interference, coherent sources, coherence (spatial and temporal), Interference by division of wave front and amplitude, Fresnel biprism, Interference in thin films (uniform and non-uniform thickness), Newton rings, Michelson's interferometer, applications (Resolution of closely spaced spectral lines, determination of wavelength), role of anti-reflection and high reflection dielectric coatings in interference.

Section – B

Diffraction: Diffraction, Difference between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at single slit, double slit and multiple slits, plane transmission diffraction grating (construction, working and applications), absent spectra, dispersive power, resolving power
and Rayleigh criteria, effects of diffraction in optical imaging.

Section – C

Polarization: Polarized and unpolarized light, Different methods to produce polarized light, Double refraction and doubly refracting materials, Nicol prism, Production, detection and analysis of different types of polarized light, Sheet polarizer, Retardation plates (quarter and half wave plates), optical activity, origin of optical activity, specific rotation, Laurent's half shade polarimeter.

Section – D

Laser: Laser, Absorption, spontaneous emission, stimulated emission, Einstein coefficients and possibility of amplification, kinetics of absorption, population inversion, different types of pumping, main components of laser, principle of laser action, characteristics of laser beam, threshold pumping rates for three and four level lasers, different types of lasers (Ruby laser, Helium-Neon laser, CO_2 laser, Semiconductor diode laser, excimer laser (ArF)), applications of laser in various fields: laser welding, laser cutting, laser drilling, laser printing, laser cooling, laser in communication, thin film deposition using laser (pulsed laser deposition).
Fiber Optics: Optical fiber, propagation of light through optical fiber, numerical aperture and acceptance angle, types of optical fibers, optical fiber manufacturing processes, attenuation and signal losses(absorption

losses, scattering losses and bending losses) dispersion (Intermodal and material dispersion), bandwidth, V-number, optical fiber communication system.

List of Experiments

- To determine the Refractive Index of the Material of a given Prism using Sodium Light.
- To determine the Dispersive Power of the Material of a given Prism using Mercury Light.
- To determine the value of Cauchy Constants.
- To determine the Resolving Power of a Prism.
- To determine wavelength of sodium light using Fresnel Biprism.
- To determine wavelength of sodium light using Newton's Rings.
- To determination Wavelength of Sodium Light using Michelson's Interferometer.
- To determine the Diameter of a Thin Wire by studying the Diffraction Produced by it.
- To determine the wavelength of (1) Sodium and (2) Mercury Light using Plane Diffraction Grating.
- To determine the Dispersive Power of a Plane Diffraction Grating.
- To determine the Resolving Power of a Plane Diffraction Grating.
- To study the Polarization of Light by Reflection and to determine the Polarizing Angle for air-glass interface.
- To determine the specific rotation of a given sugar solution using Laurent half shade polarimeter.
- To determine the wavelength of Laser light using Diffraction of Single Slit.
- To determine the refractive index of a liquid using a Laser.
- To study the attenuation coefficient, Numerical Aperture and Power loss of signal when transmitted from transmitter to Receiver end

Text Books:

- Optics, by- Ajoy Ghatak.
- Optics, by- Brijlal and Subramayam Publisher: S. Chand & Company Ltd. New Delhi.

Reference Books:

- A text book of optics, by- Dr. Subrahmanyam, Brijlal and M. N. Avadhanulu.
- Fundamentals of optics, by-Jenkins and white.
- Lasers and Nonlinear optics. By- B. B. Laud
- LASERS- Theory and Applications, by- Thyagarajan and A. K. Ghatak
- Optics and LASER, by- V. K. Sewane

Course Title/ Code	Green Chemistry (CHH101) T & P
Course Type:	Allied Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	The students would be able to focus on the application of innovative technology the development of "greener" routes to improve industrial processes and to produce important products

SECTION-A

Introduction to Green Chemistry: Definition, history, need and goals of green chemistry, Green Chemistry in sustainable development, Importance of Green Chemistry. Limitations/Obstacles in the pursuit of the goals of Green Chemistry.

Basic Principles of Green Chemistry: Twelve Principles in Green Chemistry with their explanations and examples, Prevention of waste/by products, Atom Economy, Prevention/Minimization of hazardous/toxic products, Designing safer chemicals, Selection of safer solvents and auxiliaries, Design for energy efficiency (use of microwave and ultrasonic radiations), Use of renewable Feedstocks, Avoidance of unnecessary derivatization, Use of catalytic reagents in preference to stoichiometric reagents, Designing biodegradable products, Prevention of chemical accidents (including releases, explosions and fires), Strengthening/Development of green techniques to prevent hazardous substances in chemical process.

SECTION-B

Green Lubricants & Polymers: Introduction, Properties and Applications of conventional and green lubricants, Synthesis of Green Lubricants. Introduction & Classification of polymers, Biodegradable and non-biodegradable polymers, Synthesis of Green Polymers, Polymer Composites

SECTION-C

Green Synthesis-Comparison with Conventional Synthesis: Green starting materials, Green reagents, Green solvents and reaction conditions: water as green solvent, Properties of water and their estimation (Hardness, Alkalinity, Dissolved Oxygen), Green catalyst (Biocatalysts, polymer supported & recoverable catalysts, etc.), Synthesis involving basic principles of green chemistry- Synthesis of Biodiesel and other green compounds, Quantitative Solid-solid synthesis.

SECTION-D

Green Engineering & Its Applications: Need and scope of green engineering, Basic principles of green engineering, Elimination of hazardous compounds by green compounds, Eco-friendly materials for computing Case studies of Real World/ Indian Cases: Sony Ericsson: Bromine- and Chlorine-Free Mobile Phones, Bio-based composite resins design for electronic materials: Soy Plastics, US Presidential Green Chemistry Challenge Award Winners.

List of Experiments

- Synthesis of Green compounds (Biodiesel from vegetable oil).
- Characterization of Bio-diesel by using Spectrophotometer.
- Determination of Flash and Fire Point & Viscosity Index of Green Liquid Compounds.
- To determine Hardness of water sample.
- To determine Alkalinity & dissolved oxygen of water sample.
- Synthesis of green reagent Tetra butyl ammonium tribromide (TBATB)
- Solvent free Aldol Condensation between 3, 4-dimethoxybenzaldehyde and 1-indanone.
- Preparation of gold nanoparticles using tea.
- Solvent-free and one-pot synthesis of Phthalocyanine Complex of Copper (II).
- Extraction of D-limonene from orange peel using liquid carbon dioxide as a solvent.

Text Books:

- P. T. Anastas, J. C. Warner, Green Chemistry: Theory and Practice, 1998, Oxford University Press
- Concepcion Jimenez Gonzalez, David JC Constable, Green Chemistry and Engineering. 2011, John Wiley & Sons
- EMO Chiellini and Roberto Solaro, Biodegradable Polymers and Plastics. 2002, Kluwer Academic Publishers.

Reference Books:

- Paul T. Anastas, Robert H. Crabtree, Green Catalysis. 2009, Wiley-V, CH.
- James H. Clark, Duncan J. Macquarrie, Handbook of green chemistry and technology. 2002., John Wiley & Sons.
- Roger A. Sheldon, Isabel Arends, Ulf Hanefeld, Green Chemistry and Catalysis. First Edition, 2007, Wiley-VCH

Course Title/Code	Engineering Drawing/Graphics(MEW103) P
Course Type	Allied Elective
Course Nature	Workshop
L-T-P-O Structure	0-0-3
Objectives	To create and interpret sketches of engineering objects

Section-A

Introduction to Engineering Drawing: Concept of Engineering Drawing, drawing instruments, types of projections, first and third angle of orthographic projection, sheet layout, types of scales, types of lines & selection of line thickness, selection of pencils, importance of lettering.

Projection of Points: Introduction, Projection of points in different quadrants.

Projection of Line: Projection of straight line - parallel to one or both reference planes, inclined to the H.P. and/or V.P., the determination of their true lengths, the true inclination to the H.P. and V.P./traces of lines.

Section-B

Projection of Planes: Projection of planes - parallel to one reference plane/inclined to one plane but perpendicular to other/inclined to both reference planes.

Projection of Solids: Types of solids - polyhedral & solids of revolution in simple position with axis perpendicular to a plane/with axis II to both planes/with axis II to one & inclined to other plane.

Section-C

Section of Solids and Development of Solids: Projection of section of polyhedra and solids of revolution, their true shape. Development of surface of polyhedra and solids of revolution, their truncated portions.

Orthographic and Isometric Projections: Orthographic & isometric projections - introduction, isometric scale, isometric view of plane figures, solids. Orthographic projection from Isometric views.

Section-D

Introduction to Computer-Aided Designing: Basic commands - object selection methods, erase, move, copy, offset, fillet, chamfer, trim, extend, mirror; display commands: zoom, pan, redraw, and regenerate; simple dimensioning and text, simple exercises. Basics of 2-D and 3-D solid modeling, orthographic, iso-metric projection drawing and sectional views of simple machine elements.

Text Books:

- Elements of Engineering Drawing, N.D. Bhatt, Charotar Publishing House, Anand
- Engineering Drawing, P.J. Shah, S. Chand, New Delhi
- Engineering Drawing and Drafting, P.S. Gill, Millennium Edition; S.K. Kataria & Sons
- Engineering Drawing using AUTPCAD 2007, T. Jeyapoovanm, Vikas Publishing House

Reference Books:

- Engineering Drawing, M.B. Shah, B.C. Rana, Pearsons

- Fundamentals of Engineering Drawing, French &Vierck, McGraw-Hill
- Autocad 2008 instructor, James A Leach, TMHN New Delhi

Course Title/ Code	Electronic Workshop (ECW104) P
Course Type:	Allied Elective
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	To provide a platform for students for practical implementation of Electronic Circuits and Projects. To develop engineering skills in students up-to the level of industrial standards.

List of Experiments:

- Familiarization with electronic components and measuring instruments.
- Plot the forward and reverse V-I characteristics of a PN junction diode and calculation of cut-in voltage, static and dynamic resistances.
- Implementation of half-wave and full-wave rectifier circuits and measurement of average and r.m.s. values of the rectifier output.
- Plot the forward and reverse V-I characteristics of a Zener diode and calculation of cut-in and Zener Breakdown voltages. Application of Zener diode as a voltage regulator.
- Implementation and analysis of diode circuits as clipper, clamper and voltage multiplier.
- Plot the input/output characteristics of a transistor in common base configuration and calculation of its current amplification factor (α).
- Plot the input/output characteristics of a transistor in common emitter configuration and calculation of its current amplification factor (β).
- Plot the input/output characteristics of a transistor in common collector configuration and calculation of its current amplification factor (γ).
- Study of transistor as a switch and as an amplifier.
- To find the frequency response of single stage RC coupled amplifier and calculation of f_L, f_H and its band width.
- Study of operational amplifier as inverting and non-inverting amplifiers.
- Application of OP-AMP as an integrator and differentiator.
- Implementation of various logic gates using universal gates.
- Implementation and verification of half adder, full adder and subtractor circuits using logic gates.
- Implementation of S-R and J-K flip-flops and verification of their truth tables.
- Project.

Text Books:

- Jacob Millman, Christos C. Halkias, SatyabrataJit "Electronics Devices and Circuits", 3rd Edition, TMH
- Modern Digital Electronics (Edition III): R P Jain; TMH

Reference Book:
- Robert L. Boylestad& Louis Nashelsky "Electronic Devices and Circuit Theory", Tenth Edition, Pearson Education, 2013.
- Digital Design: Morris Mano; PHI.

Course Title/ Code	iCarneigie WorkshopSDP02 (CSW152)P
Course Type:	Domain Core
Course	Workshop

Nature:	
L-T-P-O Structure	(0-0-3-0)
Objectives	To lay a solid foundation for the software development professional. Software development is a blend of analysis, synthesis and the application of less formal rules of thumb.

SECTION A

The Java language up through inheritance and recursion is covered. (Generics are not covered.)Skills with basic UML class charts as well as state, collaboration and sequence charts are developed. String and Scanner classes for text input processing and others for text output processing are covered in detail.

SECTION B

Basics of the Java built-in arrays and linear and binary searching. "While" and "for" loop iteration. (Collections framework, iterators, recursion and reference- based data structures are not covered.) Basics of text file input and output. (Graphical user interface programming, Swing and exceptions are not covered.)

SECTION C

Building upon initial exposure to an Integrated Development Environment from the first course and further exploration of more aspects, including more features of the interactive debugger

SECTION D

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Deeper appreciation of the cost of program creation, the benefits of good documentation and the risks that come from programming without a design or documentation. Further development of the notion of thinking before coding and further expands the coverage of UML.

Prerequisites
• Computing and Problem Solving

Outcomes
Students successfully completing this course will be able to:

Produce:
• Basic dynamic applets

• Basic standalone object-oriented applications from informal specifications using OO principles

• Modest standalone object-oriented applications from correct UML specifications

• A String tokenizer from a state-machine description

• Useful JavaDoc documentation, complete with pre and post conditions

Use:

- Basic UML designs to write modest-sized applications
- Commonly used professional tools (e.g. debuggers and an Integrated Development Environment
- Use Strings and numeric libraries to perform basic operations
- Use Internet sources to find reference materials and relevant discussion groups

Knowledgeably Discuss:
- Object-oriented design basics and how they bring value to software developers
- The role design plays and the reasons and excuses people use to avoid design
- The role of testing and reviews and why both are needed

Course Title/ Code	Communicative English (HLS102) T & P
Course Type:	Allied Core
Course Nature:	Soft
L-T-P-O Structure	(1-0-2-0)
Objectives	This course aims to take off from the threshold of the previous paper dealt in Semester I. Dealing extensively with requirements of Industry, the paper aspires to equip students with the nuances of technical writing, excellent communication flair and presentation skills. Eventually, the agenda is to bridge the gap between college and work-place.

Section-A
LEXIS and SYNTAX
Homonym, Homophones, Words often confused, Foreign Words, s Sentence, Kinds of Sentence, Parts of Sentence, The Phrase, The Clause, Synthesis of Simple Sentence, Spotting the Errors (Articles, Pronoun, Preposition, Adjective, Verb)

Section-B
ORAL COMMUNICATION-II
Importance of Speech Sounds, IPA Symbols (Vowels and Consonants), Phonetic Transcription, Phoneme and Syllables

Section-C
TECHNICAL WRITING-II
Business Letters, Job Application and CV Writing, Paraphrasing, Punctuation, Situation Writing, Paragraph Writing, Developing Outlines.

Section-D
Literature
Goodbye Party for Miss. Pushpa T.S.- Nissim Ezekiel
Why Scientists and Engineers Need Literature- Troy Camplin
The Time-MACHINE- H.G.Wells

List of Experiments:

- Exercise on Lexis.
- Exercise on Syntax
- Exercise on Spotting the Errors
- One- Man Task
- Role-Play Activities
- Mock-Interview
- Paragraph Writing

- Situation Writing
- Slogan Writing
- Phonetic Transcription
- Synthesizing Sentences
- Presentation (Book Review/ Movie Review)

Text Books:

- High School English Grammar and Composition. Wren and Martin: S.Chand and Co.
- A Textbook of English Phonetics for Indian Students. T.Bala Subhrmaniam: Macmillan
- English Vocabulary in Use. MaCarthy: Foundation Books, OUP
- English Grammar, Competition and Correspondenc. M.A. Pink and A.C.Thomas: S.Chand and Co.
- Reading Between the Line: Students Book. MacRae: Foundation Books. CUP, New Delhi
- Goodbye Party for Miss Pushpa T.S. Nissim Ezekiel. Modern Indian Literature; An Anthology, New Delhi.
- Why do Scientists and Engineers Need Literature. Troy Camplin. http://www.popecenter.org/commentaries/article.html?id=2830
- Time Machine. H.G.Wells. Penguin Classics Literature. 2005 edition. Bombay.

Course Title/ Code	French (FLS107)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Recognize numbers and tell their age using numbers. 2. Tell and ask time in 12 hour and 24 hour format 3. Learn Basic vocabulary that can be used to discuss the weather and seasons 4. Identify colors, professions and adjectives in French and describing different people and objects using these three. 5. Describe orally and in writing themselves, their family and their friends. 6. Use reflexive verbs to describe daily routine. 7. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 8. Provide basic information about familiar situations and topics of interest 9. Express or/and justify opinions using equivalents of different verbs 10. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Section-A

- Countings (0-1000)
- Timings
- Seasons & expressions

Section-B

- Colours
- Les pluriels
- Adjectives to describe a person

- Professions

Section-C

- Short essay on family & friend
- Les verbes S'appeler & Se presenter

Section-D

- Prepositions
- Asking & telling the way

Course Title/ Code	Spanish (FLS105)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe colours, clothing, profession, family and marital status in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the Spanish-speaking world and the student's native culture

Section-A

- Introduction of Colours
- Vocabulary related to clothes and wardrobe
- Difference between verbo SER and ESTAR
- Usage of SER and ESTAR with similar adjectives

Section-B

- Introduction of verbo HABER
- Usage of verbo HABER
- Demonstrative adjectives
- Usage of demonstrative adjectives

Section-C

- Type of living and vocabulary related to living
- Counting upto 1000

Section-D

- Introduction of verbo TENER
- Usage of verbo TENER
- Vocabulary related to the family and marital status

Reference Book: Aula internacional 1, Modern Spanish Grammar

Course Title/ Code	German (FLS106)
Course Type:	**Elective**
Course Nature:	**Soft**
L-T-P-O Structure	**(1-1-0-0)**
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the German-speaking world and the student's native culture

SECTION - A

- Ordinal & Cardinal numbers
- Months, days, and Feiertage

SECTION - B

- Verbs: to be and to have
- Vocabulary (Family) short essay on family, friends etc.

SECTION - C

- Vocabulary (classroom)
- Definite and indefinite articles

SECTION - D

- Countries, languages, directions
- Past of the verb 'to be'

Reference Book:
- Studio D A1, Cornelsen Verla
- Tangaram A1

CSU01- Semester-III

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC/ Outcome Based	L	T	P	O	
CSH205 T & P	Database Management Systems	Domain Core	Hard	3	1	2	1	6
CSH206 T & P	Object Oriented Programming using Java	Domain Core	Hard	3	1	2	0	5
ECH207 T & P	Principles of Digital Electronics and Circuit Design	Allied Core	Hard	3	1	2	0	5
MAH208 T & P	Statistics and Numerical Techniques	Allied Core	Hard	3	1	2	0	5
CSW207	Image Editing & Animation	Domain Elective	Workshop	0	0	3	0	2
CSW208	Scripting Languages	Domain Elective	Workshop	0	0	3	0	2
CHS234	Environmental Ethics & Sustainable Development (Humanities)/ Sustainability Strategies	Allied Core	Soft	1	0	2	0	2
FLS211	French-III	Audit Courses	Audit	1	1	0	0	0
FLS209	Spanish-III							
FLS210	German-III							
CDO201	Professional Competency Enhancement-1	Allied Core	Outcome Based	0	0	0	1	1
RDO201	Introduction to Research	Allied Core	Outcome Based	0	0	0	1	1

Course Title/ Code	Database Management System (CSH205) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O	(3-1-2-1)

Structure	
Objectives	To do logical and physical design of data bases and manipulate them.

Section-A

File system & Introduction to DBMS: File, operations on files, file header, Different file organizations - serial, sequential, indexed sequential, direct/hash, Indexing – primary, secondary, single level, multi-level, clustered, Introduction to DBMS – comparison with conventional file processing, ANSI SPARC three level DBMS architecture, data independence, data abstraction, different users of DBMS, Applications of DBMS, SQL(Introduction, Data Types, Constraints, Creation of Tables)

Section-B

Relational model and Algebra: Introduction to SQL(Insertion of Data, Updating in the data, Alternation in the Schema, Data Fetching, Functions), Relational model – Mathematical formulation, Relation and its properties, domain compatibility, Relational algebra – set operations (union, intersect, difference, cross product), relational operations (select, project, division, joins-cross, inner/outer, theta, natural, equivalence), group operations Tuple calculus, Relational Calculus.

Section-C

Relational Database design: SQL (Set Operations, group by, order by, Joins), Relational Database Design and ER Model (Entity, Relationship, Strong Entity, Weak Entity, Type of Attributes and their representation), EER(Generalized and Specialization) , Functional dependency, Armstrong inference axioms, Closure and its algorithm, Minimal set of Functional Dependencies and its algorithm, Keys – super key, minimal super key, candidate keys, primary key, foreign key, Algorithm to find primary key.

Good decomposition properties – dependency preservation and loss less join, Algorithm for checking los less join decomposition, Synthesis Approach, Anomalies – insertion, deletion and updating, I NF, 2 NF, 3 NF, BCNF, Multi - valued dependency, 4 NF, Join dependency, 5 NF.

Section-D

Transaction processing, Concurrency control & recovery: SQL(Sub queries, View, Sequence, DCL(Roll back, commit)), Introduction to transaction, properties of transaction and life cycle of transaction, Schedule – serial, non-serial, serializable (result, conflict and view), strict schedule, Concurrency and problems related, Concurrency control techniques – Locking, two phase locking, strict, rigorous 2PL, Deadlock – detection, prevention, breaking deadlock, Recovery System, Basic Concepts of Recovery, Database Update(update in place, Deferred Update), Undo-Redo Algorithm, No Undo-Redo Algorithm, Undo-No Redo Algorithm, Shadow Paging Technique.

List of Experiments

- File Vs DBMS
- DDL statement
- DML Statement
- DCL Statement
- Project
- Tool related to RDBMS

Text Books:

- Fundamentals of Database Systems by R. Elmasri and S.B. Navathe,6th edition, 2013, Addision-Wesley, Low Priced Edition
- Database system concepts, 6th edition, McGraw-Hill, AviSilberschatz, Henry F. Korth, S. Sudarshan

Reference Book:
- An Introduction to database systems by Bipin C. Desai, Galgolia Publications.
- Modern Database Management by Feffray A. lioffcr, Mary B. Prcscotl, Fred R Mefaddcn, 6th edition. Pearson Education

Course Title/ Code	Object Oriented Programming Using Java(CSH206) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Student will be able to apply the object-oriented programming principles and techniques for solving the real life problems.

Section-A

Overview of Applications: Desktop Based Application like Library Management System in order to understand problem solving skills.

Introduction to OOPS: Paradigms of Programming Languages - Basic concepts of Object Oriented Programming, Differences between Procedure Oriented Programming and Object Oriented Programming, Objects and Classes, Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication, Benefits of OOP, Application of OOPs.

Introduction to Java: History of Java, Java features, Java Environment: JDK API. Types of java program, Creating and Executing a Java program, Java Tokens: Keywords, Character set, Identifiers, Literals, Separator, Java Virtual Machine (JVM), Comments in Java program, Command line input and Arguments, Data Types, Variables, Operators, Control Statements, Arrays, String handling.

Section-B

Class and objects: Defining a class, Methods, Creating objects, Accessing class members. Constructors, Method overloading, Static members, Nesting of Methods, this keyword.

Inheritance: Defining a subclass, Deriving a sub class, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods , super keyword, Final variables and methods, Final classes, Final methods, Abstract methods and classes, Visibility Control, Public access, Private access, protected. Defining interface, Extending interface, Implementing Interface, Accessing interface variables.

Section-C

Packages: Java API Packages: System Packages, Naming Conventions, Creating & Accessing a Package, Adding Class to a Package, Hiding Classes

Exception Handling: Exception Handling Mechanism, using try and catch blocks, nesting try Statements, Multiple catch Block, Throwing Exceptions, using finally clause, creating a Custom Exception.

Multithreading: Getting the main thread, naming a Thread, Pausing a thread, Creating a Thread with the Runnable Interface, Creating a Thread with Thread Class, Creating Multiple Threads, Waiting for (joining) Threads, Checking whether thread is alive, Setting Thread Priority and Stopping Threads, Thread Synchronization, Suspending and Resuming Threads.

Section-D

I/O Streams: I/O Basics Reading Console Input Writing Console Output, Using the File Class, InputStream, OutputStream, FileInputStream, FileOutputStream, Buffered Input Stream, Buffered Output Stream, Random Access File, File Reader, File Writer, Buffered Reader, Buffered Writer, Serialization.

Applets: Introduction: Applet Life cycle, Creating & Executing an Applet, Applet tags in HTML, Parameter tag, Drawing graphics in Applets, Adding controls to Applets: Text Fields, Buttons

List of Experiments

- Basic programs in java, use of if else construct and switch construct.
- Programs on Loops and Arrays.
- Programs on Strings and classes creation in java.
- Programs on constructors and use of keyword this keyword, static keyword, final keyword, finalize method.
- Programs on single inheritance,
- Programs on multilevel inheritance, Hierarchical inheritance.
- Programs on method overriding, super keyword and final method.
- Programs on interfaces
- Programs on Packages
- Programs Exception Handling
- Programs on threads
- Programs on File Handling
- Programs on Applets
- Programs on AWT

Text Books:

- Programming with Java Primer   by E Balagurusamy Tmh Publication

- Java; the complete reference, 7th editon, Herbert schildt, TMH.

- H. M. Deitel and P. J. Deitel, Java How to Program, Prentice Hall, 7th Edition, 2007

Reference Book:

- Java2 Programming Black Book, Steven Holzner (no. of copies: 23)

- C. S. Horstmann and G. Cornell, Core Java 2 (Volume I-Fundamentals), Prentice Hall, 7th Edition, 2004. (no. of copies: 10)

- Head First Java By *Kathy Sierra*

Course Title/ Code	Principles of Digital Electronics & Circuit Design (ECH207) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O Structure	3-1-2-0

Objectives	To introduce the concepts of modeling, analysis and design of simple linear and non-linear dynamic systems.

Section-A

Fundamentals of Digital Techniques: Binary, Octal and Hexadecimal number system, Binary, Octal and Hexadecimal arithmetic, Radix conversion, Signed binary numbers, Fixed and floating point numbers; BCD, Gray, Excess-3, Self-Complimentary codes, Error detecting and correcting codes- Parity check codes, Hamming code, Basic Logic operation and logic gates, Truth Table; Fundamental theorems of Boolean Algebra, Standard representation of logic functions-SOP and POS forms; Simplification of switching functions- K-map and Quine Mc-Clusky methods.

Section-B

Combinational Design using MSI Devices: Design of combinational circuits - Half, full and parallel adder, Half and full sub tractor, BCD adder, BCD Adder as a Subtractor, Multiplexer, Demultiplexer, Decoder/display driver, Encoder, Priority encoder, Magnitude comparator Code converter, Binary Multiplier, Design examples.

Section-C

Sequential Logic Circuits: Latches, Flip-flops- R S, J-K, Master-slave J-K, T, D, Conversion of flip flops.
Registers: SISO, SIPO, PISO, PIPO, Bidirectional and Universal registers.
Counters: Asynchronous, Synchronous counters, designing of counters, Shift register counters: Ring & Johnson Counter, Designing examples of Counters. Arithmetic logic unit

Section-D

Memory and programmable logic devices: RAM ROM, PROM, PLA, PAL, FPGA, and CPLD.
Digital Logic Families: Switching mode operation of p-n junction, Bi-polar and MOS. devices. Bipolar logic families: RTL, DTL, DCTL, HTL, TTL, ECL, MOS, and CMOS logic families. Tristate logic, interfacing of CMOS and TTL families

List of Experiments
- Verification of truth table of logic gates using TTL IC's, designing gates using diodes & resistors.
- Design of AND, OR, NOT gates using Universal Gates.
- Implementation of SOP & POS Boolean Functions.
- Design a function using K-map and verify its performance using SOP and POS form
- Design of Combinational circuits- Adders & Adder as subtractor
- Design of Arithmetic Logic Unit (ALU)
- Design a binary to gray code converter and BCD to Excess-3 Converter
- Design of Combinational circuits- MUX and DEMUX.
- Analysis of Basic Flip-Flops. Design a shift register using flip-flops
- Design a modulus N counter and a ring counter
- Mini Project

Text Books:

- "Digital Design", M. Morris Mano and M. D. Ciletti , 4th Edition, Pearson Education
- "Fundamentals of Digital Circuits", Anand Kumar, PHI Publication

Reference Book:

- "Digital Fundamentals", Floyd, Floyd Thomas L., Pearson Education India

- "Modern digital electronics" , R.P. Jain , 3rd edition , 12th reprint TMH Publication, 2007

Course Title/ Code	**Statistical and Numerical Techniques (MAH208) T & P**
Course Type	**Core**
Course Nature	Hard
L-T-P-O Structure	3-1-2-0
Objectives	The students would be able to apply the concepts of numerical and statistical techniques required for solving the mathematical problems and their applications..

Section A

Zeroes of transcendental and polynomial equation using Bisection method, Regula-Falsi method and Newton-Raphson method, Rate of convergence of these methods. Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals, Numerical differentiation.

Section B

Solution of system of linear equations, Gauss-Jacobi method, Gauss- Seidel method, Crout method, Numerical integration, Trapezoidal, Simpson's one third and three-eight rules, Solution of ordinary differential equations by Euler's and fourth-order Runge- Kutta method, Predictor- Corrector methods (Milne's and Adams-Bashforth).

Section C

 Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non –linear and multiple regression analysis, Time series and forecasting (moving and semi-averages).

Section D

Probability theory, Binomial, Poisson and Normal distributions, sampling theory (small and large), Tests of significance: Chi-square test, t-test, Analysis of variance (one way), Applications to engineering.

List of Experiments

- Solution of Non-linear equation in single variable using secant method.
- Solution of a system of simultaneous algebraic equations using the Gauss-Jacobi iterative method.
- Solution of an ordinary differential equation using the Runge - Kutta 4th order method.
- To find the value of a dependent variable for a given value of an independent variable using Lagrange's interpolation method for a given set of data.
- To find the value of a definite integral using Simpson's 3/8 rule of integration.
- To fit a straight line by the method of Least squares.
- To find correlation coefficient for the given data.
- To find the regression coefficients and equations of regression lines.
- To find the value of t- variate for the given sample.

- To find the value of F- variate for the given sample.
- To find roots of an equation using Newton Raphson method.
- To find the value of a definite integral using Simpson's 1/3 rule of integration.
- To find the solution of an ordinary differential equation of first order by Euler's modified method

Text books:

- B.S.Grewal, "Numerical Methods in Engineering and Science", Khanna publishers.
- S.P.Gupta, "Statistical methods", Sultan Chand and sons.

Reference books:

- M. K. Jain, S. R. K. Iyengar And R. K. Jain, "Numerical Methods For Scientific And Engineering Computation", New Age International (P) Limited.
- S.C .Gupta, V.K.Kapoor, "Fundamentals of mathematical statistics", Sultan Chand and sons

Course Title/ Code	Image Editing & Animation (CSW207) P
Course Type:	Elective
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	The students will learn the skills to edit an image & create animation.

Section-A
Understanding Photoshop: Images & Types of Images, Image Size and Resolution, Creating a Digital Collage, Working with Files, Rulers and Guides, Changing Print Size of an Image.Working with Colors, Selections, Shapes and Painting, Adjusting Monitor Display, Converting between Color Modes, Softening and Refining Selections, Saving, Loading, Deleting, Moving, Copying Pasting and Extracting Selections, Drawing with Pen Tool, Creating Brush, Filling and Stroking Selection and Layers. Transforming and Typing: Rotating, Cropping, and Flipping Images, Transforming Objects, Retouching and Liquefying, Leading and Kerning, Type Selection, Pasteurization, Text Wrapping.

Section-B
Working with Layers: Creating and Deleting Layers, Selecting, Grouping and Linking Layers, Moving Copying and Locking Layers, Merging Layers: Layer Effects and Styles, Adjustment and Fill Layers, Masking Layers. Designing Web Pages: Creating Slices, Image Maps, Rollover and Animation, Creating Slices for Rollovers, Applying and Creating Rollover Styles, Animation Twining, Working with Layers, and Optimizing Images.

Section-C
Flash: Introduction, Overview of tool, symbols, Simple Animation using Shape, Motion, Guided Twining and Frame by Frame Animation, Layers, Text Effect, Fade in- Fade out, Zooming Effect, Alpha Ripple Effect, Photo Effects: Simple photo effect, motion photo masking, Special Effect: outline effect, shape effect, onion peel effect, shading effect, masking. Flash Animation Using Text and Voice.

Section-D

Basics of Flash: Assigning Actions: Working with Actions Toolbox, Working with the Script Navigator, working with the Script Pane, Working with Formatting, Using Code Hinting, Help Panel. Coding, Working with Strings, Numbers and Booleans, Casting Data, Declaring and Naming Variables , Working with Operators, Using Comments: Working with Statements, Control statements, Array, Functions Introduction to Action Script Coding- Variables and its scope in flash, working with data type variables, Arithmetic operations with numbers and string data type, Conditional Logic: If Else, Switch Cases, Loops, Arrays and Functions. Event Handler.

List of Experiments:

- Controlling your image and workflow using Photoshop.
- Implementation of 2-D transformation using Photoshop.
- Design a project using Masking, Image Manipulation and Layer Effects.
- Create a Frame by frame animation.
- Implementing the concept of layers.
- Motion & Shape Tweening.
- Guided Motion Tweening Concept.
- Working with the Flash effects.
- Create a simple animation in Flash with Action script.
- Create a Form using Action Script.
- Design the web page using Action Script.
- Animated Project.

Text Books:

- "Photoshop CS2-In Simple steps" by Shalini Gupta
- "Micromedia Flash 8 Bible" by Robert

Reference Book:

- Vikas Gubta & Kogent Solutions Inc.: Multimedia and Web Design.
- Paul Marino: 3D Animation and Film making Using Game engines.
- Antony Bolante: Adobe After effects 5 for windows After Indian edition 2002 Published by G.C. Jain for Techmedia.
- Arena Animation: Image Editing using Photoshop.
- Arena Animation: Animation using Flash.

Course Title/ Code	**Scripting Languages (CSW208) P**
Course Type:	**Domain Elective**
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	Student will be able to develop a dynamic Website.

Section-A

XML (EXTENSIBLE MARKUP LANGUAGE): Introduction to XML, XML-DTD: Using a DTD in an XML Document, Element Type Declaration, Attribute Declaration, and Entity Declaration. XML-Schema: Schema Structure, Element definition, declaring simple and complex elements.

Section-B

Xpath: Introduction, Xpath Expressions, XSLT: Introduction, XSLT Elements, Conditional Processing, Variables and Parameters. XQuery.

JAVASCRIPT: Advantages of JavaScript; writing JavaScript into HTML; Attaching an External JavaScript File, Working with Data Types and Variables, operators and expressions; arrays and functions in JavaScript: Creating & Calling Functions ,Sending Parameters to a Function; condition checking, loops, If Structure, If Else Structure, For Loop, While Loop, dialogue boxes.

Section-C

HTML Form validation, event handling.

PHP (Hypertext Preprocessor): Installation of LAMP Package, Introduction to PHP, Variable rules, Storing & retrieving information in variables, Decision making in PHP: Comparison operators, if construct, while construct, for construct,

Section-D

PHP (Hypertext Preprocessor): Working with arrays, Functions, Declaring functions, Passing data by reference, Handling HTML forms with PHP, Validating form data, Decisions and Loop:, Functions, Strings, Arrays, Database Connectivity with MySql, Working with Databases and Tables.

List of Experiments:

- Revision of HTML & HTML5.0: Basic Tags.
- XML: Basics & XML-DTD
- XML-DTD
- XML-Schema
- XPATH, XSLT
- Basic Java Script Concept
- Advance Java Script Concept
- PHP Programming
- **Project**

Text Books:

- David Barron, "The World of Scripting Languages", Wiley.
- Green Law, "Internet Fundamentals", Pearson Publication.

Reference Book:

- Uttam K. roy, "Web Technologies", Oxford Publication.
- Zed Shaw, "Learn Python the Hard Way"

Course Title/ Code	French (FLS211)

Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Ask and clearly tell their nationalities and identify the names of different countries in French. 2. Write and read a post card entailing simple information. 3. Learn Basic vocabulary that can be used to discuss about different countries, people, nationalities, countries, etc 4. Express their likes and dislikes. Also will have understanding of simple conversations in restaurants and how to order food and drinks. 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Exchange personal information like name, number, residence, profession, etc 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture.

Section-A
- Les noms du pays
- Nationalities

Section-B
- Names of the places
- Writing a post card

Section-C

- Talking & expressing liking & dislikings
- Ordering food at a restaurant

Section-D
- Les articles contractes "À" et "De"
- Giving& Asking Personal Informations
  Like-
1. name
2. age
3. residence
4. nationality
5. profession
6. email address
7. languages spoke
8. Telephone

Course Title/ Code	Spanish (FLS209)

Course Type:	**Elective**
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use possessives and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., domestic animals, climate and festivals) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe the weather, talk about birthdays and festivals using the present tense of verbs in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the Spanish-speaking world and the student's native culture

Section-A
- Possessive adjective and its use
- Vocabulary related to home and living
- Vocabulary related to domestic animals

Section-B
- Demonstrative adjective and its use
- Introduction to climate
- Vocabulary related to climate
- Vocabulary related to birthdays and festivals

Section-C
- Introduction of dates
- Days in a week
- Months in a year

Section-D

- Introduction of present form of AR ending verbs
- Introduction of present form of ER ending verbs
- Introduction of present form of IR ending verbs

Reference Book: Aula international 1, Modern Spanish Grammar

Course Title/ Code	**German (FLS210)**
Course Type:	**Elective**

Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the German-speaking world and the student's native culture

Section A
- Types of houses – apartment, bungalows etc.
- Vocabulary (Household)

Section B
- Accusative case
- Possessive pronouns

Section C
- Time, daily routine
- Make appointments

Section D
- Letter writing

Reference Book:

- Studio D A1, Cornelsen Verlag
- Tangaram A1

Subject Name: Introduction to Research

Subject Code: RDO201

Periods/week   Credits   Max. Marks   : 50

T: 1   1   Internal: 50

Pre-requisites: Basic knowledge of Research

Course Type: Research & Training

Course Objective: Students can finalize specific research actions that they plan to carry out in your research project.

Course Outcomes: The students will be able to understand:

CO1. What Research is all about?

CO2. To be in a position to describe the process and the procedure to carry out research

CO3. To understand the research documentation that includes, journals, conferences etc.

CO4. To understand and adopt the ethical practice that is to be followed in the research activities

CO5. To comprehend the benefits obtained by means of systematic research

CO6. To adapt working with group members

Section –A

What is Research? Capturing the current research trend, Insight about scientific research performed by renowned experts in the related field, Exploration and excavation of in-house and commercially available facilities, Model design about framing the research question – A motivational Approach**,** Do's and Don'ts pertaining to research.

Section –B

Insight about Scientific Documentation- Different types of Journals/Conferences**,** Different components of a research paper, Indexing of Journals**,** Parameters involved in publication**,** Scientific/technical writing and ethical practice.

Section- C

Understanding the Literature Survey (LS)- Finding research papers related to a topic**,** Understanding the different aspects of Literature search**,** Usage of different sources like Google scholar, WoS, PubMed, Scopus, ABDC, EBSCO etc.**,** Exploration of online library-Deepdyve for research papers**,** Usage of scholarly networking sites like Research Gate, Mendeley, Academia.edu etc.**,** Demo sessions on the usage of above mentioned sources.

Section-D

Implementation of Process- Understanding and selection of the research domain**,** Finding out the specific research problem in the relevant research area**,** seeking information through published work w.r.t the problem**,** Reading & categorizing the downloaded/referred papers and structuring of the idea.

Report Writing and Presentation skill Development- Report is making on the surveyed literature to cater the basic idea of the author**,** Compiling and analyzing the published results to justify and understand the proposed ideas**,** Usage of MS-PowerPoint and other technical resources for the presentation**,** Development of presentation skills and group addressing.

Evaluation Criteria: The following evaluation parameters shall be considered for internal assessment by both research coordinators and faculty coordinator or research mentors:-

References:

1. http://nptel.ac.in/courses/121106007/
2. http://public.wsu.edu/~taflinge/research.html

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CSU01- Semester-IV

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COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH209 T & P	Theory Of Computation & Compiler Design	Domain Core	Hard	3	1	2	0	5
CSH210 T & P	Computer Architecture & Organization	Domain Core	Hard	3	1	2	0	5
CSH211 T & P	Operating Systems	Domain Core	Hard	3	1	2	0	5
ECH434 T & P	Wireless Communication	Domain Core	Hard	3	1	2	0	5
CSW213	Unix & Shell Programming	Domain Core	Workshop	0	0	3	0	2
EDS288	Applied Philosophy	Allied Core	Soft	1	0	2	0	2
EDS289	Applied Psychology							
FLS215	French-IV	Audit Courses	Audit	1	1	0	0	
FLS213	Spanish-IV							
FLS214	German-IV							
RDO202	Technical Seminar-1	Allied Core	Outcome Based	0	0	0	1	1
CDO202	Professional Competency Enhancement-II	Allied Core	Outcome Based	0	0	0	1	1

Course Title/ Code	Theory of Computation & Compiler Design (CSH209) T & P
Course Type	Core
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)

Objectives	Student will able to understand the principles and techniques of programming language translation.

Section-A

Finite Automaton: Finite State Systems, Representation of finite automaton, Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA. Removals of ε – moves from finite automata, Minimization of finite Automata, Regular Expressions: - regular expression, Equivalence of finite automata and Regular Expressions, Arden's theorem. The Pumping Lemma for Regular Sets, Closure properties of regular sets and regular language.

Section-B

Context free grammar: - Reduced forms, Chomsky Normal Form (CNF), Griebach Normal Form (GNF). Pushdown Automata: - NDPDA, DPDA, Equivalence of PDA and Context free Grammar, LBA. Turing Machines:- Deterministic and Non-Deterministic Turing Machines, universal turing machine, Design of TM Chomsky hierarchy.

Section-C

Compilers and translators, structure of compiler. Lexical Analyser: Lexical Analysis, recognition of tokens, Syntax Analysis: parsing, Parsing Technique: Topdown approach (Recursive Descent, Recursive Predictive and Non Recursive Predictive parsing Techniques). Bottom Up approach: Shift- reduce parsing, operator precedence parsing, LR parsers, SLR, LALR and Canonical LR parser.

Section-D

Syntax Directed Translations: Syntax directed definition, construction of syntax trees, syntax directed translation scheme, implementation of syntax directed translation, three address code, quadruples and triples. Code Optimization & Code Generation: Code generation, forms of objects code, machine dependent code, optimization, register allocation for temporary and user defined variables. Peephole optimization.

List of Experiment:

- Regular expression,
- Finite Automaton,
- Identify and remove Left Recursion
- Pushdown Automaton Lexical Analyzer
- First and Follow
- Parsing algorithm: SLR,CLR, and LALR,
- Optimization: common subexpressions
- dead code elimination
- Create basic block.

Text Books:

- Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi& J.D.Ullman; - 1998 Addison Wesley.
- Compiler Design by O.G. Kakde, 1995, Laxmi Publ.

Reference Books:

- Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc. Graw Hill.

Course Title/ Code	Computer Architecture & Organization (CSH210) T & P
Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to understand the design and working of various components constituting a computer system.

Section-A

Basic Computer Organization: Von Neumann concept - Store program control concept - Flynn's classification of computers (SISD, MISD, MIMD, SIMD) - Multilevel viewpoint of a machine: digital logic, micro architecture, ISA. Boolean algebra and Logic gates - Combinational logic blocks(Adders, Multiplexers, Encoders, de-coder) - Sequential logic blocks(Latches, Flip-Flops, Registers, Counters) - Operating systems - high level language - structured organization - CPU, caches, main memory, secondary memory units & I/O - Performance metrics; MIPS, MFLOPS.

Section-B

Memory Hierarchy & I/O Organization: The need for a Memory Hierarchy - Locality of reference principle - Memory parameters: access/ cycle time, cost per bit - Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types) - Auxiliary Memory - Cache memory (Associative & direct mapped & Set-associative Cache Organizations, Cache CoherenceI/O interface - Modes of transfer - DMA - Types of Interrupts - Input-Output and Interrupt.

Section-C

CPU and Instruction Set Architecture: Basics: Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle - Types of Instructions - Instruction set formats (fixed, variable, hybrid). Processor Organization:General register organization – Stack organization – Instruction formats – Addressing modes – Data transfer and Manipulation – Program control - Instruction set based classification of processors (RISC, CISC, and their comparison) - Design of accumulator logic.

Section-D

Micro programmed Control:Control Memory - Address sequencing - Micro program example – Design of control unit - Microinstruction sequencing - Implementation of control unit.Introduction to Parallelism:Goals of parallelism (Exploitation of concurrency, throughput enhancement) - Enhancing performance with pipelining - Amdahl's law - Instruction level parallelism (pipelining, super scaling –basic features) - Processor level parallelism (Multiprocessor systems overview).

List of Experiments:

● To recognize various components of PC.

- To understand how different components of PC are connected to each other to work properly(cabinet, SMPS, HDD, PROCESSOR,MOTHERBOARD, IDE cable, ROM etc.)
- To study Fault analysis point of H/W training kit.
- To simulate Half adder and Full adder
- To simulate a multiplexer.
- To print factorial of a no and Fibonacci series.
- To print the reverse of a string and check whether it is palindrome or not by using macro.
- To check whether a number is even, odd or prime using assembly code.
- To print square and cube of first n natural numbers using assembly code.
- To design a simple calculator.

Text Books:
- Computer System Architecture by M. Mano, 2001, Prentice-Hall.
- Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.
- Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH.

Reference Book:

- Operating Systems Internals and Design Principles by William Stallings,4th edition, 2001, Prentice-Hall Upper Saddle River, New Jersey
- Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic,2002, SafwatZaky.
- Structured Computer Organisation by A.S. Tanenbaum, 4th edition, Prentice-Hall of India, 1999, Eastern Economic Edition.
- Computer Organisation& Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.
- Computer Architecture- Nicholas Carter, 2002, T.M.H.

Course Title/ Code	**Operating Systems (CSH211) T & P**
Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students shall be able to learn the conceptual design, functional architecture and services of an operating system to use the computer resources efficiently.

Section-A

Introduction: Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems. Processes and Threads : Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Interprocess Communication, Communication in Client-Server Systems, Multithreading Models, Threading Issues, Pthreads Basic Concepts.

Section-B

CPU Scheduling: Scheduling criteria, scheduling algorithms (First Come First Serve (FCFS), Shortest-Job-First (SJF), Priority Scheduling, Round Robin(RR), multi-processor scheduling, Real-time scheduling.Process Synchronization:Co-operating Process, Inter-Process Communication, Critical region, Semaphores.Classical Problems of Synchronization,Deadlocks:Overview, Methods of Handling Deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery.

Section-C

Memory Management: Logical & Physical Address Space, swapping, contiguous and non-contiguous memory allocation, paging and segmentation techniques, segmentation with paging; virtual memory management - Demand Paging & Page- Replacement Algorithms; Demand Segmentation. File System:Types of files and access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, Introduction to distributed file system.

Section-D

Protection : Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Language-Based Protection, Capability-Based Systems, The Security Problem , User Authentication , Program Threats, System Threats, Securing Systemsand Facilities.I/O Systems:Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations, STREAMS, Performance, Disk Structure , Disk Scheduling , Swap-Space Management, RAID Structure, Disk Attachment, Stable-StorageImplementation, Tertiary-Storage Structure.Case study: Window XP, Windows 7 &Linux.

List of Experiments:

- Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait
- Write programs using the following system calls of UNIX operating system:close, stat, opendir, readdir
- Write programs using the I/O System calls of UNIX operating system (open, read, write, etc).
- Write C programs to simulate UNIX commands like ls, grep.
- Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for FCFS and SJF. For each of the Scheduling policies compute and print the average waitingtime and average turnaround time.
- Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for SJF. For each of the
- Scheduling policies compute and print the average waiting time and average turnaround time .
- Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Priority CPU scheduling. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
- Given the list of processes, their CPU burst times and arrival times. Display/print the Gantt chart for Round robin CPU scheduling. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
- Implement some Memory management schemes FIRST FIT

- Implement some Memory management schemes BEST FIT.
- Implement some Memory management schemes WORST FIT.
- Implement any file allocation techniques Contiguous.
- Implement any file allocation techniques Linked.
- Implement any file allocation techniques Indexed.

Text Books:

- Silberschatz, Galvin, and Gagne, "Operating System Concepts with Java," 7th Edition. *John Wiley & Sons*, Inc. 2007. ISBN: 0-471-76907-X
- Harvey M Dietel ,"An Introduction to Operating System", Pearson Education

Reference Book:
- William Stallings, "Operating Systems: Internal and Design Principles," 5th Edition. *Prentice-Hall*, Inc. 2005. ISBN: 9780131479548
- Andrew S. Tanenbaum and Albert S Woodhull, "Operating Systems Design and Implementation," 3rd Edition.*Prentice Hall*, 2006. ISBN: 9780131429383.

Course Title/ Code	WIRELESS COMMUNICATION (ECH434) T & P
Course Type:	Allied Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Having successfully completed this course, the student will be able to demonstrate: 1. An ability to participate in frequency spectrum designing for various wireless communication system in the country based on ITU-R spectrum allotment 2. An ability to understand the mechanism of different operating principles with examples. 3. Analyze cellular mobile communication system like GSM, CDMA and other wireless system

SECTION-A

INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS: Evolution of mobile radio communications Spectrum Allocation, Types of wireless communication systems, Inter Carrier Interference. SMALL SCALE FADING AND MULTIPATH : Small scale multipath propagation, Impulse response model of a multipath channel, parameter of multipath channel (Coherence bandwidth, Coherence Time, Doppler Spread), Types of small scale fading, Rayleigh and Ricean distributions, Statistical Models for multipath fading channels(Clark's model 2 –ray Rayleigh fading model)

SECTION –B

EQUALIZATION & DIVERSITY : Fundamentals of Equalization, Equalizers in a communication receiver, maximum likelihood sequence, Linear and nonlinear equalizer (DFE & MLSE), Adaptive Equalization(zero Forcing and Least Mean Square Algorithm), Interleaving, Maximal Ratio combining improvement, RAKE Receiver

SECTION –C

MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION: Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access (SDMA), packet radio, capacity of a cellular systems. SPREAD SPECTRUM SIGNALS FOR DIGITAL COMMUNICATION: Model of spread spectrum, PN Sequence, digital communication system, Direct sequence spread spectrum signals, frequency hopped spread spectrum Signals, CDMA, Capacity of a CDMA system.

CELLULAR CONCEPTS : Concept of cell ,Frequency Reuse, Channel Assignment Strategies, Handoff Strategies ,interference and system capacity, Improving coverage and capacity in cellular systems(cell splitting and sectoring), 2G, 2.5G, 3G. ADVANCED WIRELESS STANDARDS: OFDMA (Principle, Cyclic Prefix, Basics of channel estimation PEAK TO AVERAGE POWER RATIO), SCFDMA, and Introduction to 4G Standard.

List of Experiments:

- Generate all type of possible noise signal in MATLAB, their respective CDF, PDF, and comment on their behavior.
- Develop a MATLAB program for design a wireless channel, including all effects like, shadowing, fading, path loss with optimum method.
- To study the effect of delay spread on frequency selectivity.
- To study the outage probability, LCR & ADF in SISO for Selection Combining and MR.
- Generation and Detection of Maximum likelihood Codes
- Generation and Detection of Pseudo Random Codes.
- To understand the cellular frequency reuse concept fulfilling the following objectives:
  i. finding the co-channel cells for a particular cell.
  ii. Finding the cell clusters within certain geographic area Verification of truth tables of logic gates.
- To understand the impact of many different parameters influence the downlink C/I ratio.
- To understand the concept of co-channel interference and hence Signal to Interference and Noise Ratio. To calculate & plot SINR vs. distance at the MS for adaptation of shadowing effect.

Textbook:

- Wireless Communications: Theodore S. Rappaport; Pearsons.
- Digital Communication: John G. Proakis and MassoudSalehi, McGrawHill.

Reference books:

- Wireless Communication: UpenaDalal, Oxford University Press.
- Mobile Communication: Jochen Schiller, Pearson Education Ltd.

Course Title/ Code	UNIX & Shell Programming (CSW213) P
Course Type	Core
Course Nature	Workshop
L-T-P-O Structure	0-0-3-0
Objectives	Student shall be able to formulate commands and scripts in UNIX operating system to meet the stated functional requirements of the operating system.

Section-A

Introduction to UNIX: UNIX architecture and command usage, Internal and external commands, Command structure, browsing the manual pages, learning about UNIX file system, file naming, parent-child relationship. Commands for: displaying calendar, system date, using the calculator, Recording the session, knowing logged in

user details, knowing the machine characteristics, knowing the terminal, and displaying terminal characteristics knowing the login name, host name, name of the operating system, version of the operating system.

File and Directory Commands : Knowing about HOME directory, checking for the current directory, learning about absolute and relative pathnames and difference between them, changing the current directory, making and removing directories, conditions for removing directories, listing the directory contents in varied ways, displaying and creating files, copying, deleting and renaming files, paging the output of the file, printing a file, knowing the file types, counting lines, words and characters, displaying data in octal, comparing two files, converting one file to another, compressing and archiving files, listing file attributes, listing directory attributes, Changing Permissions on Files and Directories

Section-B

File statistics: Searching for patterns, Comparing files, Printing files, Rearranging files, sorting files, Splitting files, Translating character, linking files with hard and soft links and understanding the difference between them.

Operating on files: Locating files, applying simple filters on file, paginating files, displaying the beginning and end of a file, splitting a file vertically, pasting files, ordering a file, Locating repeated and non repeated lines, transliteration sorting and searching a file, pattern matching-the wild-cards.

Standard I/O redirection: Standard files, standard output; Standard input, standard error; filters and pipelines, creating a tree.

Process In Unix: Learning about customizing the environment: environment variables, the common environment variables, aliases, Command history, in-line command editing, Process basics, process status, system processes, mechanism of process creation, internal and external commands, process states, running jobs in background, killing processes, Running jobs periodically, timing processes

Section-C

Shell scripts: Types of shells, Shell functionality ,Displaying – using echo, Using Expr Using Test ,Getting input – using read, Writing script & executing basic script ,Debugging script, Making interactive script,Variables (default Variables), Mathematical expressions

Conditional statements: If-else-elif, Test command, Logical operators-AND, OR, NOT, case –esac

Loops: While, For, Until

Command line arguments Positional parameters Set & shift IF, Break & continue

Functions & file manipulations Processing file line by line, Functions

Section-D

AWK programming: Splitting a line into fields, formatting output, variables and expressions, Comparison operators, number processing, variables, storing programs in a file, BEGIN and END sections, built-in variables. Arrays, functions, control flow, loop programming

Text Books:

- UNIX concepts and applications, Fourth Edition, Sumitabha Das, TMH
- Unix Shell Programming-Yashwant Kanetkar

Reference Book:

- Introduction to UNIX & SHELL programming, M.G. Venkatesh Murthy, Pearson Education.
- UNIX and shell Programming –A text book, B.A. Frozen& R.F. Giberg, Thomson

Course Title/ Code	French (FLS215)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Ask and clearly tell their belongings in French. 2. Learn Basic vocabulary that can be used to discuss about different things using regular and irregular verbs 3. Book an appointment and make reservation in hotels, etc 4. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 5. Provide basic information about familiar situations, objects and topics of interest 6. Express or/and justify opinions using equivalents of different verbs 7. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture.

Section-A
● Adjective Demonstrative

Section-B
● Verbs in Present Tense –
  ○ ER Ending verbs
  ○ IR Ending verbs
  ○ RE Ending verbs

Section-C

● Verbs in Present Tense – Irregular Verbs
● Adjective Interrogative (Quel et Quelle)

Section-D
● How to take an appointment
● How to book a reservation in hotel, for a stall in a fair etc

Course Title/ Code	Spanish (FLS213)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)

	At the end of the course, students will be able to
Objectives	1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use possessives and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., describing a person and daily routine,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe a person, daily routine, talk about recreation, movies and sports in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the Spanish-speaking world and the student's native culture

Section-A

- Inroduction of irregular verb in present tense
- Adjectives to describe a person
- Vocabulary related to describe relationships
- Verb Saber and Conocer and their difference

Section-B

- Reflexive verbs
- Vocabulary related to daily routine
- Expressions related to home
- Introduction to Gerund

Section-C

- Introduction of verb Gustar
- Introduction to Gustar like verbs
- Use of Gustar to express opinions
- Introduction to Pronominal verbs

Section-D

- Vocabulary related to recreation
- Vocabulary related to movies and TV programs
- Vocabulary related to sports

Reference Book: Aula international 1, Modern Spanish Grammar

Course Title/ Code	German (FLS214)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)

Objectives	At the end of the course, students will be able to
	1. Exchange greetings and do introductions using formal and informal expressions
	2. Understand and use interrogative and answer simple questions
	3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary
	4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed
	5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed.
	6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary
	7. Provide basic information about familiar situations and topics of interest
	8. Express or/and justify opinions using equivalents of different verbs
	9. Differentiate certain patterns of behavior in the cultures of the German-speaking world and the student's native culture

Section A

- Separable verbs
- Past of verb 'to have

Section B

- Orientation/directions in a building
- Changing prepositions

Section C

- Professions and functions
- Visiting cards vocabulary

Section D

- Berlin
- Orientation/directions in a city

Reference Book:

- Studio D A1, Cornelsen Verlag
- Tangaram A1

Course Title/Code	**APPLIED PHILOSOPHY (EDS 288)**
Course Type	**Elective**
Course Nature	**Soft**
L-T-P-O Structure	**(1-0-2)**

Objectives	To enable students to
	- confront the philosophical problems implicit in the experience of self, others and the society.
	- read critically the philosophy of influential philosophers with respect to society, Science and success in life
	- understand and apply concepts and theories of moral philosophy.
	- reflect philosophically and ethically on their own personal, professional and civic lives.
	-formulate for himself or herself a philosophy of life or world-view consistent with the objectives of liberal society.

Section A

INTRODUCTION TO PHILOSOPHY

• Philosophy: Meaning, Nature and Scope

• Practical uses of Philosophy

• Branches of Philosophy

Section B

THOUGHTS OF PHILOSOPHERS AND THEIR IMPLICATIONS

• General Philosophy of John Dewey, Swami Vivekananda and Rabindra Nath Tagore

• Philosophy of life and success: Steve Jobs, N.R. Narayana Murthi, Dr. A.P.J. Abdul Kalam and Muhammad Yunus

• Philosophy of Science and technology- Francis Bacon and Martin Heidegger.

Section C

PHILOSOPHICAL PERSPECTIVES OF SOCIO-POLITICAL SCENARIO IN INDIA

•Nature of Democracy and its implications.

•Meaning and requirements of National Integration

 •Universal Human Rights

Section D

PHILOSOPHICAL PERSPECTIVES OF RELIGIOUS SCENARIO IN INDIA

•Secularism—its nature and implications, Moral Philosophy of religion with special reference to Hinduism, Jainism, Buddhism, Islam, Christianity, Sikhism.

• Religious pluralism and Religious tolerance.

Reference Books and Readings:

- Bhatia, K. & Bhatia, B. (1974) *The Philosophical and Sociological Foundations of Education*. Delhi: Doaba House.
- Brubacher, John. S. (1969). *Modern Philosophies of Education*, New Delhi: Tata McGraw-Hill
- Dewey, J. (1966). *Democracy in Education*, New York: Macmillan.
- Ferre, F.(1995). *Philosophy of Technology*. University of Georgia Press.
- Gandhi, M. K. (1956). *Basic Education*. Ahmedabad, Navajivan.
- Goel, A. & Goel S. L. (2005). *Human values and Education*. New Delhi: Deep and Deep Publications Pvt. Ltd.
- Palmer, Joy A. et.al. (2001). *Fifty major thinkers on education from confucious to Dewey.* New Delhi: Rutledge.
- Rajput, J.S. (2006). *Human Values and Education*. New Delhi: Paragon Publications.
- Walia, J.S. (2011). *Philosophical, Sociological and Economic Bases of Education.* Jalandhar: Ahim Paul Publishers.

Applied Philosophy Practical (EDS 288-P)

Suggested activities:

•Prepare and present a report on 'philosophy of life' from the perspective of a young adult.

•Quiz and interactive sessions on various philosophical perspectives of contemporary philosophers.

•Organization of and participation in street plays /dramas/ declamation/ debates/ any other suitable activity on any theme of Philosophical perspectives of Socio-Political scenario in India.

•Group discussions on any suitable topics concerning contemporary society like aggression among youth, Over-ambitiousness in young generation, misuse of democracy, implications of secularism etc. and to reflect upon different viewpoints.

•Preparation of quotation boards to display quotes of great philosophers in the college premises.

•Picture interpretation and philosophical reflection on social themes like juvenile crime, begging in India, Social networking etc.

•Readings from the autobiographies and other publications of great philosophers e.g. 'Wings of Fire' followed by discussion session.

•Showing Videos on Unique personalities: life and philosophies followed by reflection exercises.

•Any other suitable activity.

Course Title/Code	Applied Psychology (EDS 289)
Course Type	Elective
Course Nature	Soft
L-T-P-O Structure	(1-0-2-0)

Objectives	-To define psychology and its application across various fields.
	-To understand the conceptual framework of attitude and personality along with cherishing out their attitude and personality development.
	-To conceptualize psychology in social and organizational settings.
	-To maintain and reform group dynamics.

Section A

PSYCHOLOGY: ATTITUDE FORMATION

Psychology: Meaning, nature, and scope, Role of psychology across multi-disciplinary aspects, Introduction: Attitude, Stereotypes, Prejudice, and Discrimination, Formation of attitude and attitude change

Section B

PERSONALITY AND PERSONALITY DEVELOPMENT

Definition of personality and personality development, State/ Trait approach to personality, Bandura's Social-Cognitive theory of personality

Section C

SOCIAL PSYCHOLOGY

Introduction to social identity, social cognition, and social influence, social conflicts and its resolutions, Group dynamics: Introduction, formation, types of groups, cooperation, competition, and conflict in groups

Section D

ORGANIZATIONAL PSYCHOLOGY

Organizational Psychology: Definition, fundamental concepts and importance, Introduction to job satisfaction, work motivation, and organizational commitment
Introduction to participation, empowerment, and team work

References Books and Readings:

- Arrow, K. J. (1995). *Barrier to Conflict Resolution.* NY: W. W. Norton.
- Bandra, A., & Walters, R. H. (1963). *Social Learning and Personality Development.* New York: Holt, Rinehart, & Winston.
- Bandra, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice- Hall, Inc.
- Baron, R. A., Byrne, D. (1997). *Social Psychology* (8th Ed.). Boston, MA: Allyn & Bacon.
- Baron, R. A. (2001). *Psychology* (5th ed.). London: Pearson.
- Cialdini, R. B. (2001). *Influence: Science and Practice* (4th Ed.). Boston, MA: Allyn & Bacon.
- Feldman, R. S. (2008). *Essentials of Understanding Psychology.* New Delhi: Tata McGraw Hill.
- Friedkin, N. (1998). *A structural theory of social influence.* Cambridge: Cambridge University Press.
- Gage, N. L., & Berliner, D. C. (1992). *Educational Psychology* (5th Ed.). Boston, MA: Houghton Mifflin Co.
- Hall, C. S., Lindzey, G. & Campbell, J. B. (2004). *Theories of Personality* (4th Ed.). New York: Wiley.
- Hunt, R. R., & Ellis, H. C. (2006). *Fundamentals of Cognitive Psychology.* New Delhi: Tata McGraw Hill.

- McDavid, J. M., & Harari, H. (1994). *Social Psychology: Individuals, Groups, and Societies*. New Delhi: CBS Publishers.
- Millward, L. (2005). *Understanding Occupational and Organizational Psychology.* London: Sage Publications.
- Morgan, C. T., King, R. A., Weisz, J. R., & Schopler, J. (1993). *Introduction to Psychology*. (7th Ed.). New Delhi: Tata McGraw Hill.
- Woolfork, A. E. (2014). *Educational Psychology* (12th Ed.). Boston: Allyn & Bacon.

Applied Psychology Practical (EDS 289)

- Prepare a story using different pictures in order to understand the personality
- Prepare a SWOT Chart to identify strength and weakness of oneself
- Role of psychology be proved as an asset in professional development
- Give a brief account of your personality before and after the transaction of course content.
- Identify different stereotype present in our Society and present your views on it.
- Collect any five articles on discrimination prevalent in Society
- List out Company incentives provided to their employee for work motivation.
- Prepare a street play on social issues to understand the group dynamics
- Reflection activities to understand the emotions and personality
- List out the Do's and Don'ts of the Interview
- Role of body language in attitude formation.
- Situational Activities: Suppose you are captain of your football team. Draw out inputs to motivate your team, and maintain the team- spirit.
- Write a brief note on any one attitude you want to change in yourself and the strategies to accomplish it.
- The psychometric tests to be conducted by learners:
    - Sociometry test
    - Personality testing (16PF)
    - Vineland Social Maturity Scale
    - Rorschach inkblot test
    - Thematic Appreciation Test
    - Color personality Test

Any other suitable activities.

CD0-202: Professional Competency Enhancement II

Periods/week   Credits   Max. Marks: 100

L:3 T: 0   0.5   Internal   : 50

Duration of Ext. Exam: 1.5 Hours   External   : 50

Internal Assessment Bifurcation (Total Marks – 50)

- Sessional Examinations – 20
- Attendance – 15
- Class Performance – 5
- Assignment – 10

Course Objectives

1. To improve students basic knowledge about Arithmetic Aptitude
2. To make students solve aptitude problems quickly utilizing the short cuts
3. To make students have the ability to 'quickly think on their feet'
4. To strengthen students communication skills

Part A – Quantitative Aptitude

Unit 1: Arithmetic I

1.1 Simplification

1.1.1 Use of BODMAS rule and Formulas for solving equations.

1.1.2 Simple Fractions and Decimal Fractions.

1.1.3 Surds and Indices.

1.2 Ratio and Proportion

1.2.1 Changes in Ratios, Combined Ratio and Continued Proportion.

1.2.2 Application in different questions.

1.2.3 Variations and Partnership.

1.3 Percentage

1.3.1 Basic Conversion, Consumption & Expenditure, Successive changes and Errors.

1.3.2 Application in Areas and Volumes.

1.4 Profit and Loss

1.4.1 Sales and Purchase Transactions.

1.4.2 MRP and Discount, Equivalent discounts.

1.4.3 Errors in weight (Dishonest Dealer).

1.5 Average

1.5.1 Combined and Mistaken Averages.

1.5.2 Changes in Average.

1.5.3 Application in Cricket and others.

1.5.4 Practice Exercise.

1.6 Interest

1.6.1 Simple and Compound Interest Formulae.

1.6.2 Relations and their Applications.

1.6.3 Practice Exercise.

Unit 2: Arithmetic II

2.1 Time and work

2.1.1 Combined work, Work & Wages, Work & Efficiency.

2.1.2 Working Alternatively, Work and Equations.

2.1.3 Pipes and Cisterns, Inlet and Outlet pipes, Capacity of Tank and Leakage.

2.2 Alligations & Mixtures

2.2.1 Formula Based

2.2.2 Successive Displacement

2.2.3 Mixtures

2.2.4 Error in Measurement

2.2.5 Profit on False Weight

2.3 Revision & Practice

2.3.1 Problems on Ages & Numbers

2.3.2 Calendar

2.3.3 Coding & Decoding

2.3.4 Data Sufficiency

<center>Part B – Verbal Ability Test</center>

Unit 3. Communication Skills in English

1.1 Relevance of Verbal Ability AND PREPARATORY GUIDELINES

1.2 Functional Grammar – Subject Verb Agreement

1.3 Tenses – Perfect, Simple , Continuous

1.4 Common Errors and rectification

Unit 4: Word Power Building Skills

2.1 Words: Antonyms, Synonyms, Analogies,

2.2 Compound words: Homophones, Homonyms, Word Families

2.3 Root Word Technique for Prefixes & Suffixes

2.4: Word Power: 7 Tips for Learning New Words

2.5 Practice Vocabulary Exercises

Unit 5: Writing Skills

3.1 Writing: Introduction of Writing Skills, Objectives of enhancing Writing Skills & Types of Writing

3.2 Sentences, Phrases, Types of Sentences, Parts of Sentences

3.3 Paragraph Writing: Construction, Linkage & Cohesion

3.4 Practice Exercises: Writing Skills

Unit 6: Reading Skills

4.1 Objectives of Reading, Definition & Types of Reading & Importance of Reading
4.2 Reading Techniques: SW3R, Active Reading, Detailed, Speed

4.2 Practice Exercises: Short & Medium Passages

Text Books/Reference Books:

1. Quantitative Aptitude : R S Aggarwal, S Chand & Company Pvt Ltd
2. Quantitative Aptitude for CAT: Arun Sharma
3. Verbal Ability and Reading Comprehension: MVN Enterprises

Web links:

http://www.indiabix.com/aptitude/questions-and-answers/

http://www.indiabix.com/non-verbal-reasoning/questions-and-answers/

Instructions for paper setting: Fifty MCQ will be set in total. All questions will be compulsory. Each question will be of 1 marks. There will be no negative marking. Calculator not allowed. Time allotted would be 90 minutes.

Assessment Tools:

Sessional tests
Term end examination scores
Class performance
Home assignments
Online assignments
Class attendance

Subject Name: Technical Seminar-I

Subject Code: RDO202

Periods/week   Credits   Max. Marks   : 50

T: 1   1   Internal : 50

Pre-requisites: Basic knowledge of Research

Course Type: Research & Training

Course Objective: Students can do analysis of the research work in a logical way and draw appropriate conclusions.

Course Outcomes: The students will be able

CO1. To critically evaluate the work done by various researchers relevant to the research topic

CO2. To integrate the relevant theory and practices followed in a logical way and draw appropriate conclusions.

CO3. To understand the research methodologies/approaches/techniques used in the literature

CO4. To structure and organize the collected information or findings through an appropriate abstract, headings, reference citations and smooth transitions between sections

CO5. To learn the structuring of the paper in the form of Power Point Presentation

CO6. To adapt working with group members

Section-A

Literature Survey (LS)- Collection of research papers related to previously identified gap/problem, Comprehend and arrange the literature based on the idea framed, Presenting the collected data and inferring it with the further scope of expansion.

Section-B

Structuring of Review Paper- Analysis of different approach/methodology adopted by various researchers, Listing out the components of the paper w.r.t the problem, Identification of suitable Journal or Conference, Formatting/Styling the paper according to the respective template.

Section-C

Presenting the findings- Structuring and preparation of PPT, Mock presentation, Review on presentation skills and content delivered both, Incorporating the review comments in the slides.

References:

1. http://www.sciencedirect.com/
2. https://www.ncbi.nlm.nih.gov/pubmed
3. https://www.elsevier.com/books-and-journals
4. https://www.plos.org/
5. https://www.deepdyve.com/
6. http://ieeexplore.ieee.org/Xplore/home.jsp
7. https://www.researchgate.net/
8. https://www.science.gov/
9. https://scholar.google.co.in/
10. http://www.popsci.com/

CSU01- Semester-V

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH316	Artificial	Domain Core	Hard	3	1	2	0	5

T & P	**Intelligence & Expert Systems**								
CSH317 T & P	**Software Engineering**	**Domain Core**	**Hard**	**3**	**1**	**2**	**0**	**5**	
CSH318 T & P	**Computer Networks**	**Domain Core**	**Hard**	**3**	**1**	**2**	**0**	**5**	
CSH319 T & P	**Mobile Computing with Android**	**Domain Elective**	**Hard**	**3**	**1**	**2**	**0**	**5**	
CSH320 T & P	**Internet standards and Open Source Software**	**Domain Elective**	**Hard**	**3**	**1**	**2**	**0**		
CSH321 T & P	**Data Warehousing & Data Mining**	**Domain Elective**	**Hard**	**3**	**1**	**2**	**0**		
CSH322 T & P	**Advanced Operating System**	**Domain Elective**	**Hard**	**3**	**1**	**2**	**0**		
CSW324	**Introduction to Matlab**	**Domain Elective**	**Workshop**	**0**	**0**	**3**	**0**	**2**	
CSW325	**Web Services**	**Domain Elective**	**Workshop**	**0**	**0**	**3**	**0**		
CDO305	**Professional Competency Enhancement-III**	**Allied Core**	**Soft**	**1**	**0**	**2**	**0**	**2**	
FLS319	**French-V**	**Audit Course**	**Audit**	**1**	**1**	**0**	**0**		
FLS317	**Spanish-V**								
FLS318	**German-V**								
RDO303	**Technical Seminar-2**	**Allied Core**	**Outcome Based**	**0**	**0**	**0**	**1**	**1**	
LWS323	**Cyber Law**	**Allied Elective**	**Soft**	**1**	**0**	**2**	**0**	**2**	
LWS321	**Law of Patents & Traditional Knowledge**								

Course Title/ Code	Artificial Intelligence and Expert Systems(CSH316) T & P
Course Type:	**Core**
Course Nature:	**Hard**
L-T-P-O	**(3-1-2-0)**

Structure	
Objectives	The student will be able to solve computationally complex problems using artificial intelligence techniques.

Section-A

Intelligent agents and AI Problems: Introduction to AI, Foundation and History of AI, Turing Test, Intelligent Agents: Architectures, Types: reactive, deliberative, goal-driven, utility-driven, and learning agents, Applications and Current Trends of AI.

Problem Representation in AI, State Space Representation and Problem Reduction, Production Systems: Inference Engine, Working Memory, Knowledgebase and Control Strategy using Water Jug Problem and n-Queens Problem.

Section-B

Search Strategies and Knowledge Representation: Search Strategies: Uninformed Search Strategies, Informed Search strategies (Heuristic Search): Generate and Test, Hill Climbing, Best First Search, A*algorithm, AO*Algorithm, Constraint Satisfaction, Means End Analysis.

Game Playing: Minmax Strategy, Alpha-beta Pruning.

Introduction to Knowledge, Types of Knowledge, Issues in Knowledge Representation, Approaches to Knowledge Representation: Logic, Semantic Nets, Partitioned Semantic Nets, Frames and its types, Conceptual Dependency.

Section-C

Reasoning, Planning and Learning: Logical agents: Propositional logic, Inferences, First-order Predicate Logic, Inferences in First-order Predicate Logic, Forward Chaining, Backward chaining, Unification, Resolution.

Reasoning under Uncertainty: Monotonic and Non-Monotonic Reasoning, Statistical Reasoning: Review of probability: Axioms of probability, Probabilistic inference, Probabilistic Reasoning(Bayes Theorem), Bayesian Networks, Inferences in Bayesian networks, Temporal and Spatial Reasoning, Dempster-Shafer Theory, Fuzzy Reasoning, Hidden Markov models. Planning with state-space search, partial-order planning, planning graphs.

Learning from observation, Inductive learning, Deductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Machine Learning and its types: Supervised, Unsupervised and Reinforcement Learning, Natural Language Understanding.

Section-D

Advanced Topics and Applications of AI: Expert Systems: Architecture, Characteristics, Types, Advantages and Drawbacks, Knowledge Acquisition Principles, Study of MYCIN and DENDRAL, Overview of Knowledge Discovery from Databases, Web Intelligence, Robotics.

Semantic Webs, Natural Language Processing, Neural Networks, Genetic Algorithms.

LIST OF EXPERIMENTS:

- Study of PROLOG.
- Implementation of facts and rules with family tree.
- Representing and solving AI problem by performing exercises on lists using PROLOG.
- Representing and solving AI problem by performing exercises on Arithmetic and Relational operations using PROLOG.

- Representing and solving AI problem by performing exercises on Strings using standard String Predicates in PROLOG.
- Representing and solving AI/Gaming problem using searching algorithm in PROLOG.
- Representing and solving AI problem by using sorting techniques in PROLOG.
- Write a program to solve the problem of Tower of Hanoi.
- Write a program to implement Water Jug problem.
- Write a program to solve 8 queens problem.
- Solve traveling salesman problem.
- Solve monkey banana problem
- Solve the classical Missionary Cannibals problem of AI.
- Write a program to implement an Expert System.

Text Books:

- Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair, Third Edition, TMH.
- S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education.

Reference Books:

- G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Pearson Education.

- J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998

- Simon Haykin, "Neural Networks", Pearson Education, Second Edition.

- Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Eastern Economy Edition, PHI

Course Title/ Code	Software Engineering(CSH317) T & P
Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objective	To study software development principles and to focus on the fundamentals of modeling aspects of software project using the Unified Modeling Language.

Section-A

Introduction: Evolving role of software, Software Characteristics, Software crisis, Silver bullet, Software myths, Software process, Personal Software Process (PSP), Team Software Process (TSP), emergence of software engineering, project and product

Software Development Life-cycle: Software life cycle models: Build and fix, Waterfall, incremental and evolutionary process, model, spiral model, Agile methodology, selection of a life cycle model.

Section-B

Software Requirement Analysis and Specifications: Problem Analysis, Requirements engineering: Requirement elicitation, Requirement Analysis, Requirement documentation, Requirement Review, Types of

requirements, Behavioral and non-behavioral requirement, feasibility study, Requirement elicitation: Interviews, Brainstorming, FAST, QFD, Use case Approach; Requirement analysis: DFDs, E-R diagram; Requirement documentation: Software Requirement Specification.

Software Project Planning: Project management concepts, planning the software project, Size Estimation—LOC based, FP based, COCOMO- A Heuristic estimation techniques, staffing level estimation, Putnam Resource Allocation model, risk analysis and management

Section-C

Software Design: Design concepts and principles: the design process, Modularity: Cohesion, Coupling, Strategies of design: bottom up, top down, hybrid design, User interface design, Object Oriented design: Class Diagrams, Interaction Diagrams-State chart Diagrams-Activity Diagrams

Software Metrics: Token Count,Data Structure Metrics, Information Flow Metrics.

Software Quality Models and Standards: Quality concepts, Software quality Assurance, SQA activities, CMM, The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, software reliability

Section-D

Software Testing: Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation

LIST OF EXPERIMENTS: Tool Used: - Rational Rose Software

- To identify the requirements of the project from the Problem statement and conduct Requirement elicitation techniques like Interviews, Brainstorming, FAST, QFD.
- To perform E-R Modeling (E-R diagram, DFD) for the Problem Statement.
- To Model UML Use Case Diagrams and capture Use Case Scenarios.
- To design Software Requirement Specification document.
- To estimate Size Metrics by calculating the number of Unadjusted Function points of the project using programming
- To estimate Size Metrics by calculating the number of total Function point of the project using programming.
- To draw Class Diagram and Interaction Diagrams.
- To draw State Chart and Activity Diagrams.
- To design test cases for the project using Black box testing.
- To design test cases for the project using White box testing.

Text Books:

- R. S. Pressman, "Software Engineering – A practitioner's approach", 3rd ed., McGraw Hill Int. Ed., 1992.
- K.K. Aggarwal&Yogesh Singh, "Software Engineering", New Age International, 2001

Reference Books:

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons
- Sommerville, "Software Engineering", Addison Wesley, 1999.

Course Title/ Code	**Computer Networks (CSH318) T & P**
Course Type:	**Core**
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	To familiarize the students with different protocols, network components, functioning of different layers and IEEE standards employed in computer networking.

Section-A

DATA COMMUNICATION: Components –Transmission Modes, Synchronous and Asynchronous transmission – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – TCP/IP Model

PHYSICAL LAYER: Transmission Media -- Line Configuration -- Line Coding -- Modem -- Interconnection devices: Hub, Repeater, Switch, Bridges, Router, and Gateway

Section-B

DATA LINK LAYER& LOCAL AREA NETWORK: Framing -- Error – detection and correction, Window based – Flow Control and Error control - stop and wait –sliding window- go back-N ARQ – selective repeat ARQ. –Access Techniques: STDM, FDMA, TDMA, Spread Spectrum techniques, and CDMA, DSSS, FHSSS – Media Access Control: Aloha. Pure Aloha, Slotted Aloha, Polling, CSMA, CSMA/CD -- IEEE 802 Standards -LAN - Ethernet IEEE 802.3 - IEEE 802.5 – IEEE 802.6 -- IEEE 802.11 – FDDI--X.25 – HDLC -- Frame Relay – ATM -- SONET/SDH

Section-C

NETWORK LAYER: Internetworks Switching : Circuit Switching, Packet Switching, Virtual Circuit and PVC, Message Switching, Cell Switching – IP addressing – Subnetting–classful and classless– Routing Algorithms – Distance Vector Routing – Link State Routing, Path Vector Routing -- Error control and congestion control—ARP,RARP,ICMP,DHCP --IPV4 and IPV6 – NAT -- Mobile IP

Section-D

TRANSPORT LAYER: Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS).

APPLICATION LAYER: Client Server model -- Network File System -- Remote Login- TELNET, FTP -- EMAIL SYSTEM: SMTP, POP3, IMAP4 -- DNS, DNS Server – HTTP – SNMP, Network Security .Firewalls -- Proxy Servers – VLAN-- VPN -- NETWORK Simulator case Study—Cisco Packet Tracer.

LIST OF EXPERIMENTS:

- Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
- Working of Network Devices in Detail.
- Sharing of Drive or folder over the Network
- Sharing of printer over the network.

- Study of basic network command and Network configuration commands i.e. attributes likeipconfig, ping, Tracert, Pathping, Netstat, Arp, Netstate
- Find the IPAddress using getHostAddress,getByName.
- Configure a Network topology using packet tracer software.
- Track the network using a network management and monitoring tool
- Connect the computers in Local Area Network using hub.
- Find the MAC address using packet tracer software.
- LAN-to-LAN Connections.
- Advanced LAN Switching Configuration - VLANs
- Building Inter-VLAN Network with a Router and Layer-3 Switch
- Basic Router Configuration
- RIP Version 2 and Debugging
- Configure a Network using Distance Vector Routing protocol.
- Configure Network using Link State Vector Routing protocol.

Text Books:

- Data Communications and Networking by ForouzanBehrouz A., TMH Publications
- Computer Networks (3rd edition), Tanenbaum Andrew S., International edition, 1996

Reference Books:

- Data Communications, Computer Networks and Open Systems (4th edition), Halsall Fred, 2000, Addison Wesley, Low Price Edition. -
- Computer Networks – A System Approach, Larry L. Peterson & Bruce S. Davie, 2nd Edition
- Computer Networking – ED Tittel , 2002, T.M.H.

Course Title/ Code	Mobile Computing with Android (CSH319) T & P
Course Type:	Elective
Course Nature:	Hard Course
L-T-P-O Structure	(3-1-2-0)
Objectives	Students would be able To develop Android applications

Section –A

INTRODUCTION TO ANDROID AND ITS CONCEPTS: Overview of Android, Android Internals with its Mobile Apps Development, Environment setup for Android App Development, Framework of Android with SDK and Eclipse, Introduction to Emulator, AVD creation and Setup. Design Criteria for Android Application including Hardware Design Consideration, Design Demands for Android application, Introduction of Android IDE,Activity,Activity life Cycle, Intents: Implicit and Explicit**,** Manifest File. Layouts and Layout Properties. XML introduction to GUI objects: Text/Labels, EditText, Toggle Button, and Paddding.

Section-B

ANDROID UI AND ITS WORKING: Event driven Programming in Android (Text Edit, Button clicked etc.), Exception Handling, Threads, Broadcast Receivers.Working with Menu: Option menu, Context menu, Sub menu, and menu from xml, menu via code, Custom v/s System Menus, Create and Use handset Menu Buttons. Dialog: Creating and Altering Dialogs. List &Adapters:-Array Adapter, Base Adapters. List View and List Activity, Custom List View, Grid View using adapters. Styles and Themes: Applying styles and themes attributes in Layout.

Section-C

DATABASES AND ANIMATIONS: Introducing SQLite, Managing Database of Android using SQLite, and Sharing Data between Applications with Content Providers. Working with cursors: Inserts, Update and delete. Reading and Updating Contacts, Reading Bookmarks. Graphics and animation – custom views, canvas, animation APIs, multimedia –Audio, video formats creation and association in any application.

Section-D

MOBILE COMPUTING: Introduction to Mobile technology and generations of various wireless technology, characteristics and Application of mobile Computing. Architecture and Security Issues, Design considerations for mobile computing .Modes used for Mobile Technology, Services and Architecture of GSM and CDMA, Mobile IP and Mobile Communication Protocol. Middleware and Gateway Required for Mobile Computing. Mobile Communication via Satellite: Low orbit satellite, Medium orbit satellite, Geo stationary satellite, Satellite phones

LIST OF EXPERIMENTS:

- Installation and setup of java development kit(JDK),setup android SDK,setup eclipse IDE,setup android development tools (ADT) plugins,create android virtual device.
- Create "Hello World" application. That will display "Hello World" in the middle of the screen using TextView Widget in the red color.
- Create application for demonstration of android activity life cycle and Scroll View in Android.
- Create an application for demonstration of Relative and Table Layout in android.
- Create Registration page to demonstration of Basic widgets available in android.
- Create sample application with login module.(Check username and password). On successful login, ChangeTextView "Login Successful". And on failing login, alert user using Toast "Login fail.
- Create login application where you will have to validate username and passwords till the username and password is not validated, login button should remain disabled.
- Create an application to run Explicit Activity using Intent.
- Create an application that will get the Text entered in Edit Text and display that text using Toast.
- Create an application that will pass two numbers using TextView to the next screen, and on the next screen display the sum of that number.
- Create an application to Demonstrate Dialog Box Control In Android.
- Create an UI such that one screen have list of all the types of cars. On selecting any car name, next screen should show Car details like: name, launched date, Company name using database connectivity.
- Run audio file in the background of previous application.
- Animate an image view when it is clicked.

Text Books:
- Lauren Darcey and Shane Conder"AndroidWirelessApplicationDevelopment", Pearson Education, 2nd ed. (2011)

Reference Book:

- Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd (2011).
- Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd(2009)
- Marko Gargenta"LearningAndroid"WileyIndiaPvt Ltd.

Course Title/ Code	Internet Standards and Open Source Software (CSH320) T & P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	● Students will be able to understand concepts, strategies, and methodologies related to open source software development and Internet Standards. ● To enable students to utilize LAMP for developing a variety of Web applications

Section-A

Introduction to Open Source Technology: Overview of open source software: Need of Open Source Software, Advantages of Open sources, Applications of Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS usage, Free Software Movement – Commercial Aspects of Open Source Software. History: BSD, The Free Software Foundation and the GNU Project, Initiatives, Principle and methodologies. Software Freedom, Open Source Development Model Licenses and Patents: What Is a License, Important FOSS Licenses (JOOMLA, GNU, Mozilla, Apache, BSD, GPL, Eclipse), copyrights. Patents Economics of FOSS: Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization.

PHP Basic: Building blocks of PHP: Variables, Data Types, Flow control, Arrays. Functions in PHP: Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, Date and time functions, Regular Expressions.

Section-B

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads, Error Handling in PHP, Form Validation.

Introduction to MySQL and Interfacing with Databases through PHP: Learning basic SQL Commands: Learning the MySQL Data types, learning the Table Creation Syntax, Using Insert Command, Using SELECT Command, Using WHERE in your Queries, Selecting from Multiple Tables, Using the UPDATE command to modify records, Using REPLACE Command, Using the DELETE Command, Frequently used string functions in MySQL, Using Date and Time Functions in MySQL. Using Transaction and stored procedures in MySQL: What is Transaction?What are Stored Procedures?

Interacting with MySQL using PHP: Connecting to MySQL with PHP, Working with forms using MySQL and PHP.

Section-C

Introduction to Cookies, Working with Files, Directories Working with Cookies and User Sessions: Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session IDs in the Query String, Destroying Sessions and Unsetting Variables, Using Sessions in an Environment with Registered Users.

Working with Files and Directories: Including Files with inclue(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen(), Running Commands with exec(), Running Commands with system() or passthru().

Section-D

Introduction to Internet Standards: Introduction to Internet, What is standard, Characteristics and Importance of Internet standards, How the standards are developed, Internet Administration, Internet Architecture, Standardization Organizations: ISOC, IAB, IRTF, IANA, ICANN, NIC, IEEE. Nomenclature: The Internet Standards Track, Types of Specifications, Standards Track Maturity Levels, Requirement Levels, Benefits of Standardizing the Internet, Current Standards in Place, Future of Internet standardization, the internet standards process , Review and Approval, Entering the Standards Track , Advancing in the Standards Track , Revising a Standard, Retiring a Standard , Conflict Resolution and Appeals

Classification of Internet Standards and Protocols: Classification based on: Interaction, Logic, Security, Data, Presentation, Export/ Import Interface. Interaction: Data Access, Transport Protocols, Remote Call, Protocols, Remote Control. Logic: Scripting Language, Business Logic, System Specific Logic, Web Innovation Mechanisms.Security: Message, Communication, Authentication. Data: File Formats, Streams Description: Web, Multimedia.Presentation: Presentation Formats. Export/ Import Interface: Export Interface. Platform Software: Browser, HTTP Server, Application Server, Execution Environment, Data Storage, Directories.

LIST OF EXPERIMENTS:

- Linux usage basics: Linux tree structure.
- Installing and Configuring MySQL, Apache and PHP(LAMP)
- PHP basic program using functions and regular expressions
- Form handling and validation using PHP, Error handling
- Database connectivity using MySQL
- Using XML with PHP
- Setting cookies using PHP and perform basic operations
- Installation of JOOMLA and using it.

Text Books:

- Internet Standards and Protocols by Dilip C Nai
- Producing Open Source Software (POSS) by Karl Fogel • O'Reilly Media, Inc.
- Julie C. Meloni, PHP MySQL and Apache, SAMS Teach yourself, Pearson Education (2007)

Reference Book:

- The Open Source Way, Edition 1 (TOSW) by The Red Hat Community Architecture Team

Course Title/ Code	Data Warehousing and Data Mining(CSH321) T & P
Course Type:	ELECTIVE
Course Nature:	HARD
L-T-P-O Structure	(3-1-2-1)
Objectives	The student will be able to design and represent multi-dimensional models and obtain business intelligence from them.

Section-A

Introduction to data ware house and decision making: Need for data warehousing, Escalating Need for strategic information, Decision making, failures of past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution. Applications of Data ware house**:** Operational System and Business Intelligence.

Data ware house: Data warehouse definition, types of data warehouses and data marts, types of data marts, ETL process, 3 – Tier data warehouse architecture, Meta data, role of meta data repository in data warehouse, distributed and virtual data warehouses.

Section-B

Multidimensional Data Model: Difference between Database System and Data Warehouse, Multidimensional data model, Facts, Dimensions, Measures, Data cubes, Schemas for Multidimensional Database (Stars, snowflakes and fact constellations) defining schemas. OLAP Technology: Starnet query model, Concepts Hierarchies, Partitioning strategies, OLAP operations: Slice, Dice. Roll up, Drill down, Pivot etc., Types of OLAP servers: ROLAP, MOLAP, HOLAP. Data warehouse implementation: Computation of data cubes, Partial Materialization, Indexing OLAP data, and Efficient Processing of OLAP queries. Tuning and testing of data warehouse.

Section-C

Data Mining: Data mining definition & task, KDD versus data mining, Data Mining Applications , Data preprocessing, Classification of data mining systems, Data mining task primitives, data mining techniques, Data mining query languages .Data mining techniques: Mining frequent Patterns, Association, and correlation.

Section-D

Classification & Prediction: Decision tree knowledge discovery, Bayesian Classification, Neural Networks (MLP) &Support Victor Machines (SVM). Classification Accuracy and error measures, evaluating the accuracy of Classifier.

Clustering Analysis: K-means and K-Medoids, outlier analysis. Mining complex data object: (Spatial databases, Multimedia databases, Time series and Sequence data mining Text Databases and mining Word Wide Web).

LIST OF EXPERIMENTS:

- To generate a data table in MS Access and perform various tasks on the data.
- To Implement Pivot Table, Report Generation for the table data.
- To study /implementation of various task on data using MS Excel.
- To implement Pivot Chart , Pivot table of a given Data in table using MS Excel.
- Introduction to data mining tool.
- To implement Classification.
- To Implement Association rule.

- To implement Clustering.
- To study PDI(Pentaho Data Integration) IDE.
- To Create new repository in PDI and performing various tasks.

Text Books:

- Data Warehousing In the Real World; Sam Anahory& Dennis Murray; 1997, PearsonNo.of copies in the Library.
- Data Mining- Concepts & Techniques; Jiawei Han &MichelineKamber- 2001, Morgan Kaufmann.No.of copies in the Library.
- Data Mining Techniques; ArunPujari; 2001, University Press; Hyderabad.No.of copies in the Library.

Reference Book:

- Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003.No.of copies in the Library.
- Sam Anahony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley, 2004.
- W. H. Inmon, "Building the operational data store", 2nd Ed., John Wiley, 1999.
- Mattison R., Web Warehousing and Knowledge Management, Tat McGraw-Hill .
- Ponniah P., Data Warehousing, Wiley.

Course Title/ Code	Advanced Operating Systems (CSH322) T & P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	The students will be able to ● Understand the requirement, goals and theoretical as well as practical foundations of Distributed OS ● Compare the different management tasks done by DOS and traditional OS ● Understand the securities measures taken in Distributed OS.

Section-A

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models **Theoretical Foundation for Distributed System**: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's& vectors logical Clocks, Causal ordering of messages, global state, termination detection. **Synchronization in Distributed System:** Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non-token based algorithms, Comparative performance analysis of distributed mutual exclusion algorithms, Atomic Transactions, Election algorithm, the Bully algorithm, a Ring algorithm.

Section-B

Deadlock in Distributed Systems: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms

Processes and Processors in distributed systems: Threads, System models, Processors Allocation, Scheduling in Distributed System, Real Time Distributed Systems

Section-C

Distributed file systems: Distributed file system Design, Centralized v/s Distributed file system, Trends in Distributed file systems.

Security: Types of Threats to OS (Distributed, Network), Overview of security techniques in distributed environment, Cryptographic algorithms (Public key and private key), Digital signatures (Introduction, algorithms for DS), Cryptography pragmatics.

Section-D

CORBA Case Study: Introduction to CORBA, Architecture of CORBA: ORB core, Object Adaptor, CORBA RMI: CORBA object model, CORBA Interface Definition Language, CORBA Naming Service, CORBA pseudo objects, CORBA remote object references, Language Mappings, Integration of CORBA and web services, CORBA services: Event service, Notification Service, Security Service. MACH: Introduction to MACH, Ports, Naming and protection, tasks and threads, communication model and implementation, process management and memory management in MACH.

LIST OF EXPERIMENTS:
- Process control system calls: The demonstration of fork, execve and wait system calls along with zombie and orphan states.
- Thread management using pthread library. Implement matrix multiplication using multithreading. Application should have pthread_create, pthread_join, pthread_exit. In the program, every thread must return the value and must be collected in pthread_join in the main function. Final sum of row-column multiplication must be done by main thread (main function).
- Thread synchronization using counting semaphores and mutual exclusion using mutex. Application to demonstrate: producer consumer problem with counting semaphores and mutex.
- Deadlock Avoidance Using Semaphores: Implement the deadlock free solution to Dining Philosophers problem to illustrate the problem of deadlock and/or starvation that can occur when many synchronized threads are competing for limited resources.
- Inter process communication in Linux
- Linux Kernel configuration, compilation and rebooting from the newly compiled kernel.
- Kernel space programming: Implement and add a loadable kernel module to Linux kernel, demonstrate using insmod, lsmod and rmmod commands. A sample kernel space program should print the "Hello World" while loading the kernel module and "Goodbye World" while unloading the kernel module.
- Implement a new system call, add this new system call in the Linux kernel (any kernel source, any architecture and any Linux kernel distribution) and demonstrate the use of same.
- Implementing a CPU scheduling policy in a Linux OS.
  OR
  Implementing a memory management policy in a Linux OS.

Implementing a file system in a Linux OS.

Text Books:

- Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design",Pearson Ed.
- Distributed Operating System – Andrew S. Tanenbaum, PHI

Reference Book:

- Gerald Tel, "Distributed Algorithms", Cambridge University Press.
- Singhal&Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill.
- PradeepkumarSinha "Distributed Operating system"
- Distributed concepts by Johnson

Course Title/ Code	Introduction To MATLAB(CSW324) P
Course Type:	Elective
Course Nature:	WORKSHOP
L-T-P-O Structure	(0-0-0-3)
Objectives	Practical applications of problem solving techniques in MATLABs and Hands on instruction in MATLAB for developing, debussing and Texting of MATLAB programming Project.

Section A

Introduction to MATLAB Basics: Getting MATLAB to Run, Programming, The Command Prompt, Simple Expressions, Variables and Assignments, Referencing Matrix Elements, Useful Commands. Operation Mode and Operators: Interpreter(Command Promt), Compiler (Create .m file), Background Mode, Logical operators * Scalars: &&, ||, ~ * Element-wise: &, |, ~, xor() * Bit-wise: bitand(), bitor(), bitcmp(), bitxor(), Arithmetic operator, Assignment Operarators, Input & Output Commands.

Section B

Arrays and Vector(1D Array): Array, List and Structures and its use, Overview of Cell Structure, Array, Sorting and Searching a list, Vector(1D Array) multiplication, addition, substraction, division, Vectors manipulations,. Matrices: Accessing Matrix Elements, Assigning into Submatrices, Multiplication of two matrix. Basic Tools:Matrix Concatenations, More Expressions, Logical Constructs, Formatting Text.

Section C

Control Structures &Fuctions: "if" Statement, else-if statement, Switch statement, "for" Loops, "while" Statements, Do-while statements. Functions and Logic: Inline function, Variable Scope in functions, Multiple Input Functions, More on Logic, Programming in Matlab: Addition of two numbers, Swapping of numbers, Fibbonacciseriesetc.Matlab with Windows OS, .NET, Apache, PHP , Install .NET (with c#) , Compile CallMat.vb program.

Section D

Debugging Tools &Visualization Tool: Graph Plots, Generating Web froms, Sound Reply, Load and save. Image processing toolkit (IPT), Simulink based on different Data Sets, Text Manipulation tools, Fuzzy Inferences Systems, Simulink: Mobile Adhoc Networks Simulation kit, Mathematical ToolKit. **GUI Interface**: attaching buttons to actions, getting input, and setting output.

TextBook:

- Matlab And Its Application R.K.Bansal,Pearson Publications.
- MatLab Programming For Engineers,StephenChapmann,Thomson Press.
- Practical Introduction to programming and problem solving, 3rd Edition, Attaway.

Reference Book:

- Getting Started with MatLab by Rudrapratap,Oxford University Press.
- Matlab Practical Introduction to Programming and Problem solving by Stormy attaway ,B.H.Publication.
- MATLAB Programming by Richard Johnson
- Essential MatLab for Scientist and Engineers by Grand D. Hahn, Arnold Publication.

Course Title/ Code	Web Services (CSW325) P
Course Type:	**Elective**
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	Student will be able to develop a Web service.

Section-A

Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

Web Services building blocks: Core building blocks of web services, basic steps of implementing web services. Web Services life cycle web services communication.

Introduction to the tool for implementation of Web Services.

Describing Web Services- WSDL: introduction, non-functional service description, WSDL document, WSDL elements

Section-B

Web Services Architecture – Web services Architecture and its characteristics, standards and technologies available for implementing web services, web services communication models.

Describing Web Services- WSDL binding, WSDL port type, limitations of WSDL.

Core fundamentals of SOAP – SOAP Message Structure, SOAP envelope, SOAP encoding, SOAP message exchange models, SOAP communication and messaging.

Section-C

Developing Web Services using SOAP – Building SOAP Web Services, developing SOAP Web Services, SOAP HTTP binding, SOAP communication model, Error handling in SOAP, limitations of SOAP.

Discovering Web Services –UDDI: UDDI Registries, uses of UDDI Registry, UDDI Architecture, UDDI Data Model.

Discovering Web Services; UDDI data Structures, Programming with UDDI: UDDI with WSDL, limitations of UDDI.
Web Services compositions: WSC-Static & Dynamic, WSC tools-WSFL, XLANG, and BPEL4WS

LIST OF EXPERIMENTS:

● Write a program to implement WSDL Service (Hello Service. WSDL File)
● Write a program the service provider can be implement a single get price (), static bind () and get product operation.
● Write a program to implement the operation can receive request and will return a response in two ways.
  a. One-Way operation
  b. Request - Response
● Write a program to implement to create a simple web service that converts the temperature from Fahrenheit to Celsius (using HTTP Post Protocol)
● Create a web service for currency conversion (at five currencies) with appropriate client program.
● Write a program to implement business UDDI Registry entry.
● Write a program to implement
  a. Web based service consumer
  b. Windows application based web service consumer
● **Mini Project**

TEXT BOOKS:
● Web Services Platform Architecture by SanjivaWeerawarana, et al.
● WebService Faceplates, by Stephen Mohr, Michael Corning, Erik Fuller, Donald Kackman, Michael John.
● Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.

REFERENCE BOOKS:
● Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
● XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
● Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.

Course Title/ Code	French (FLS317)
Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Invite somebody for lunch, dinner, birthday party, anniversary, etc. 2. Learn Basic vocabulary that can be used to discuss about daily routine using pronominal verbs. 3. Accept and refuse invitations. 4. Ask questions by using three forms of interrogation. 5. Provide basic information about activities, likings and disliking. 6. Express or/and justify opinions and give responses using equivalents of different verbs 7. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture.

Section-A
● Inviting somebody for lunch, dinner, movie & how to accept & refuse in different ways

Section-B

- Pronominal verbs

Section-C

- Les trois forms d'Interrogation et « Qu'est-ce que c'est » ; « Qui est ce »
- Les prépositions de lieu et pays

Section-D
- Repondez aux questions (responding the questions)
- Parler de ses gouts et de ses activities

Course Title/ Code	**Spanish (FLS501)**
Course Type:	**Elective**
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use possessives and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., travel, shopping ,diseases) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe travel, shopping and diseases. Also use comparatives and superlatives in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the Spanish-speaking world and the student's native culture

Section-A
- Introduction of verb IR + infinitive
- Vocabulary related to travel
- Vocabulary related to shopping and market
- Prepositions (advanced level)

Section-B
- Introduction to Comparatives and Superlatives
- Indefinite Adjectives and Pronouns
- Ordinal Numbers

Section-C
- Introduction of Present perfect tense
- Difficulties and problems in learning Spanish
- Suggestions to overcome them

Section-D
- Introduction of parts of body
- Vocabulary related to diseases
- Expressions related to parts of body

- Gestures

Reference Book: Aula internacional 1, Modern Spanish Grammar

Course Title/ Code	German (FLS502)
Course Type:	**Elective**
Course Nature:	**Soft**
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Section A
- Describing a route
- Accusative prepositions
- Modal verbs

Section B
- Present perfect
- Describing an incident

Section C
- Vacation vocabulary
- Describing a vacation

Section D
- Vocabulary (fruits and vegetables)
- Market and supermarket (shopping)
- Comparison and superlative
- Question word "Welch_"

Reference Book:
- Studio D A1, Cornelsen Verlag

● Tangaram A1

Course Title/ Code	Law of Patents
Course Type:	Seminar (Optional)
Course Nature:	Basic
L-T-P-O Structure	1-2-0-0
Objectives	The objective of this paper is to orient the students about the basics of patents law and practice for engineering students.

Section A

1. Development of Patent Laws in India:
    1.1. Meaning of Patent
    1.2. Origin of Patent laws in India
2. Characteristics of Patent
3. Laws governing Patent in India

Section B

1. Patentable and Non- Patentable Inventions
2. Procedure for obtaining Patent
3. Rights and Obligations of Patentee

Section C

1. Transfer of Patent
2. Surrender, Revocation and Restoration of Patent
3. Infringement of Patent and Remedies

Section D

1. Offices and Penalties
2. Patent Authorities
3. Miscellaneous issues relating to Patent

Tutorial Exercises (2 hours per week)

● Case studies : Novartis A.G. v. Union Of India & Others, AIR 2012
● Diamond V. Chakrabarty (447 U.S. 303 (1980).
● PPT on Do's and Don'ts of Patent filing
● Patent filing Procedure
● Quiz on topics related to Patent

Textbook:

- Dr. M.K.Bhandari, Law relating to Intellectual Property Rights
- B.L. Wadhera, B.L. Wadhera, Law Relating to Intellectual Property, Universal Publishing Company, 5th Edition.
- Narayanan, P., Patent Law (Kolkata: Eastern Law House, 1998)

Books for reference:

- Elizabeth Verkey, Law of Patents, Eastern Book Company, 2nd Edition, 2012.
- Ahuja V.K., Law Relating to Intellectual Property Rights, 1st Ed. (2007, 3rd Reprint 2010), Lexis Nexis.
- Feroz Ali Khader, The Law of Patents-With a Special Focus on Pharmaceuticals in India, LexisNexis, 2nd Edition, 2011.
- Intellectual Property Laws, Bare Act, (not older Ed. than 2009), Universal Law Publishing Co.
- Gopalakrishnan N.S, Intellectual Property Law, 2008.
- Singh Raghbir, Law Relating to Intellectual Property, 2nd Edi, 2008, Vol, I, II, III, Universal.
- Correa, Carlos M., Intellectual Property Rights, the WTO and Developing Countries: The TRIPS Agreement and Policy Options (Penang: Third World Network, 2000);

Course Title/ Code	Cyber Laws
Course Type:	Seminar (Optional)
Course Nature:	Basic
L-T-P-O Structure	1-2-0-0
Objectives	The objective of this paper is to orient the students about the basics of cyber law and practice for engineering students.

Section A

1. Introduction: Overview of Computer and Web Technology
2. Need for Cyber Law
3. Cyber Jurisprudence at International and Indian Level

Section B

1. Cyber Crimes & Legal Framework: Cyber Crimes against Individuals, Institution and State
1.2. Hacking: Digital Forgery
1.3. Cyber Stalking/Harassment
1.4. Cyber Pornography
1.5. Identity Theft & Fraud
1.6. Cyber Terrorism
1.7. Different offences under IT Act, 2000

Section C

1. Digital signature and Electronic Signature and Data Protection
    1.1. Concept of public key and private key

1.2. Certification authorities and their role

1.3. Creation and authentication of digital signature - Concept of electronic signature certificates, electronic records and electronic signatures

Section D

1. E Contracting: Salient features of E-contract
2. 2. Formation of E-contract and types: E-mail Contracting
3. Indian Approach on E-contracts
4. E-commerce: Salient Features and advantages, Models of E-commerce

Books:

- Vishwanathan Suresh T., "The Indian Cyber Law" Second Edition 2001:- Bharat Law House.
- Prasad T.V.R. Satya, : "Law Relating to Information Technology (Cyber Laws)" 1st edition 2001:- Asia Law House.
- Syed Shakil Ahmed and Reheja Rajiv, " A Guide to Information Technology" (Cyber Laws & Ecommerce) Edition 2001:- Capital Law House
- Kamath Nandan, "Law Relating to Computers Internet & E-commerce (A guide to Cyber Laws & the Information Technology Act, 2000 with Rules & Notification)", 2nd Edition, Reprint : 2002:- Universal Book Traders

Tutorial Exercises (2 hours per week)

Case studies on Cyber Crime.

Subject Name: Technical Seminar-II
Subject Code: RDO303

Periods/week   Credits   Max. Marks   : 50

T: 1   1   Internal   : 50

Pre-requisites: Basic knowledge of Research

Course Type: Research & Training

Course Objective:

Course outcomes- The students will be able

CO1. To compare the various research methodologies and choosing the appropriate one

CO2. To apply the contextual knowledge in designing and conducting the experiments

CO3. To analyze and interpret the research outcomes

CO4. To analyze the further scope of research

CO5. To gain hands on experience in techniques/technologies

CO6. To adapt working with group members

Section –A

Setting up the simulation/experiment environment- Deciding the hypothesis or direction to carry out simulation/experiments**,** Identifying the set of experiments/simulations for designing the model or analysing the data, Finding the resources for performing experiments/simulations, Choosing the appropriate research methodology

Section –B

Planning of experiments- Formulate experimental procedures**,** Procurement of materials, Modification of the experimental set-up, if required

Section-C

Execution of experiments/simulations- Conduct experiments/ build prototype**,** Tabulating and recording data**,** Analysis and interpretation of the data**,** Interpreting convolution between experimental data and hypothesis/simulation**,** Comparison of the results for discrepancies, Listing and analysing the observations to get the further research direction

References:
1. www.originlab.com
2. http://www.cambridgesoft.com/software
3. http://www.synergy.com/
4. www.mathworks.com/products/matlab.html

CSU01- Semester-VI

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop / NTCC	L	T	P	O	
CSH326 T & P	Analysis & Design Of Algorithms	Domain Core	Hard	3	1	2	0	5
CSH327 T & P	Computer Graphics & Multimedia	Domain Core	Hard	3	1	2	1	6

ECH326 T & P	Microprocessors & Interfacing	Allied Elective	Hard	3	1	2	0	5
ECH318 T & P	Digital System Design	Allied Elective	Hard	3	1	2	0	
CSH328 T & P	Multi-platform Mobile Development	Domain Elective	Hard	3	1	2	0	5
CSH329 T & P	Network Security & Cryptography	Domain Elective	Hard	3	1	2	0	
CSH330 T & P	Business Intelligence & its Applications	Domain Elective	Hard	3	1	2	0	
CSH331 T & P	Software Project Management	Domain Elective	Hard	3	1	2	0	
CSW332	Introduction to .Net	Domain Elective	Workshop	0	0	3	0	2
CSW333	Socket Programming	Domain Elective	Workshop	0	0	3	0	
CSW 334	Game Programming	Domain Elective	Workshop	0	0	3	0	
FLS222	French-VI	Audit Course	Audit	1	1	0	0	
FLS220	Spanish-VI							
FLS221	German-VI							
RDO304	Project Phase -1	Allied Core	Outcome Based	0	0	0	1	1
MCS232	Introduction to Finance	Allied Elective	Soft	1	0	2	0	2
MCS231	Basics of Economics							

Course Title/ Code	Analysis and Design of Algorithms(CSH326) T & P
Course Type:	Core
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	To learn the ability to distinguish between the tractability and intractability of a given computational problem. To be able to devise fast and practical algorithms for real-life problems using the algorithm design techniques and principles learned in this course.

Section-A

INTRODUCTORY CONCEPTS: Growth of Functions, Summations, Algorithm Design Paradigms, Comparing the performance of different algorithms for the same problem, asymptotic notation. Polynomial vs. Exponential running time. Disjoint Set operations, Linked List representation of disjoint sets, disjoint set forests.

Section-B

Sorting and Searching: Binary search in an ordered array. Sorting algorithms such as Merge sort, Quick sort, Heap sort, Radix Sort, Counting Sort, Bucket Sort and Bubble sort with analysis of their running times Meians and Order Statistics.
Divide and Conquer method: Strassen's matrix multiplication

Section-C

Basic Algorithm Design Techniques: Greedy Method: Activity Selection Problem, knapsack problem, job sequencing with deadlines, minimum spanning trees, single source shortest paths, all pairs shortest paths
Dynamic Programming: General method, optimal binary search trees, O/I knapsack, the traveling salesperson problem

Section-D

Backtracking and Branch & Bound: General method, 8 queen's problem, graph coloring, Hamiltonian cycles, Vertex Cover Problem, analysis of these problems
Branch and Bound: Method, O/I knapsack and traveling salesperson problem, efficiency considerations

LIST OF EXPERIMENTS:

- Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
- Implement a Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements.
- a. Obtain the Topological ordering of vertices in a given digraph.
  b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
- Implement 0/1 Knapsack problem using Dynamic Programming.
- From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra's algorithm.
- Find Minimum Cost Spanning Tree of a given undirected graph using Kristal's algorithm.
    a. Print all the nodes reachable from a given starting node in a digraph using BFS method.
    b. Check whether a given graph is connected or not using DFS method.
- Find a subset of a given set S = {s₁,s₂,.....,sₙ} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d= 9 there are two solutions {1,2,6}and{1,8}. A suitable message is to be displayed if the given problem instance doesn't have a solution.
- Implement any scheme to find the optimal solution for the Traveling Salesperson problem.
- Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
- Implement All -Pairs Shortest Paths Problem using Floyd's algorithm.
- Implement N Queen's problem using Back Tracking.

Text Books:

- Fundamental of Computer algorithms, Ellis Horowitz and SartajSahni, 1978, Galgotia Publ.,
- Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson And Ronald L Rivest: 1990, TMH

Reference Books:

- The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., 1974, Addison Wesley.
- Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., 1986. Johan Wiley & Sons,
- Writing Efficient Programs, Bentley, J.L., PHI
- Introduction to Design and Analysis of Algorithm, Goodman, S.E. &Hedetnieni, 1997, MGH.

Course Title/ Code	**Computer Graphics and Multimedia(CSH327) T & P**
Course Type:	**CORE**
Course Nature:	HARD
L-T-P-O Structure	3-1-2-1
Objectives	The student will be able to apply the Computer Graphics algorithms and techniques to generate graphical outputs and to examine applications of modeling, design and visualization.

Section-A

Introduction: Concepts and Application of Graphics, Display Devices: CRT, Raster, And Random, Flat Panel displays.

Basics Primitives: Scan conversion, Point representation, Line representation: DDA, Bresenham's Line Algorithm (1st Octant, Integer, General), Circle representation: Generalized Circle generating Algorithm, Bresenham's Circle, Midpoint Circle.

Filled area algorithms: Flood Fill, Boundary Fill, Scan Line Fill, Edge Fill.

Section-B

2-D Transformation: Basic Transformations (Translation, Rotation, Scaling, Reflection, Shearing), Matrix representation and Homogeneous Coordinates, Coordinate transformation, Composite transformations.

3-D Transformation: Basic Transformations, Matrix representation, Coordinate transformation, Composite transformations. **Viewing and clipping**: 2-D Viewing, Pipeline, Window to viewport mapping, Clipping: Point, Line and Polygon Clipping.

Section-C

3-D Projections- Parallel and Perspective. **Hidden Surface removal**: Introduction to hidden surface removal, Z-buffer Algorithm, Scanline Algorithm, Area subdivision method.

Representing Curves & Surfaces: Parametric representation, Bezier curve, B-Spline curve, Interpolation method.**Illumination**: Shading, Image manipulation, Illumination model, shading models for polygons, shadow, and transparency.

Section-D

Multimedia Fundamentals: Concepts**,** Application & Framework of Multimedia system, Multimedia devices. **Multimedia building blocks**: Using Text in Multimedia, Still Images: bitmap, vector drawing & 3-D drawing and rendering, Image file formats. Sound: Audio-Speech recognition, Digital Audio MIDI, Multimedia Authoring Tools.

Compression Techniques:JPEG Compression, MPEG Compression, DVI. **Animation:** Introduction to Animation, Principle of Animation, Animation Types, Animation Tools.

LIST OF EXPERIMENTS:

- Understanding of Basic Graphics Code.
- Understanding of Basic Graphics Functions.
  Line ( ); Cleardevice ( ); Closegraph( ); Getx( ); Gety( ); Getmaxx (); Getmaxy ( ); Getpixel( ); Putpixel( ); Getcolor( ); Getbkcolor( ); Circle( ); Rectangle ( ); Ellipse( ); Arc ( ) ; Setcolor ( ); Setbkcolor( ); Settext( ); Outtext( ); Outtextxy( ).
- Program to draw the shape of hut,flag,car.

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- Implement the DDA and Bresenham algorithm to draw a line.
- Implement the Bresenham and midpoint algorithm to draw Circle.
- Program to Change the Color and Design of Circle.
- Program to implement the Flood Fill and Boundary Fill Algorithm.
- To perform 2D transformations (translation,rotation,scaling,shearing,reflection).
- To implement composite transformations and clipping algorithm.
- To perform animations using C.
- To study the introduction to Flash and Flash tools.
- To apply animations on various objects using Frames.
- To study the implementation of animations using layers and guided layers.
- To implement motion tweening and shape tweening.

Text Books:

- Computer Graphics by Donald Hearn and M.Pauline Baker, 2nd Edition, 1999, PHIedition, 1996.
- An introduction, Villamil & Molina, Multimedia Mc Milan, 1997.

Reference Book:

- Computer Graphics Principles and Practices second edition by James D. Foley, Andeiesvan Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
- Procedural Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition.
- Mathematical Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition.
- Multimedia: Making it work, Tay Vaughan, fifth edition, 1994, TMH.
- Multimedia Systems by John .F. Koegel, 2001, Buford.

Course Title/ Code	MICROPROCESSORS & INTERFACING(ECH326) T& P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-1)
Objectives	Students will be able to build microprocessor based systems using 8085 and 8086.

Section-A

Architecture of 8-Bit Microprocessor: General architecture of microprocessors, Introduction to Intel 8085 microprocessor, Pin description and internal architecture. Instruction Set: Addressing modes, Instruction set of 8085: Data transfer, Arithmetic, Logical, branch, stack and machine control groups of instruction set, Unspecified flags and instructions, Assembly language programming.

Section-B

History and Evolution: Background history of microprocessors, Introduction to basic features, Memory & I/O systems & interfacing: RAM, ROM, EPROM. I/O systems, I/O mapped I/O, Memory mapped I/O, Memory mapping. Interrupts: Interrupt structure of 8085A microprocessor, Processing of vectored and non-vectored interrupts, Latency time and response time, Handling multiple interrupts, Operation and control of microprocessor**:** Timing and control unit, Op-code fetch machine cycle, Memory read/write machine cycles, I/O read/write machine cycles, Interrupt acknowledge machine cycle, State transition diagram.

Section-C

Intel 8086 Microprocessor: Pin Functions, Architecture, Characteristics and basic features of family, Segmented memory, Directives and macros, MIN/MAX Modes of 8086, Clock generator 8284, Interrupt

structure of 8086. DMA Controller: Direct memory access operation, Programmable DMA controller 8257: Features of 8257, Internal block diagram of 8257 programmable DMA controller, Interfacing of 8257 with 8085, Control word register of 8257, Status word register, Types of DMA cycles, Types of DMA transfer, 8237: Functional description, DMA operation, IDLE cycle, Active cycle, Transfer types, Register description, Programming. Programmable keyboard and display controller: Functional diagram and PIN diagram of 8279, Block and signal description of Intel 8279, Interfacing of 8279 with 8085, Operating modes of 8279, Status word of 8279.

Section-D

Programmable Peripheral Interface: Intel 8255, Pin configuration, Internal structure of each port bit, Modes of operation, Bit SET/RESET feature. Programmable Interval Timer: Intel 8253, Pin configuration, Internal block diagram of counter and modes of operation, Counter read methods, Programming, READ-BACK command of Intel 8254. Universal Synchronous and Asynchronous Receiver and Transmitter Intel 8251: Introduction, Data transmission signals, Method of communication-serial vs parallel, Types of serial data transfer, Modes of communication, Data communication terminology, Modems, Format of serial data transfer, Universal synchronous and asynchronous receiver and transmitter (USART) Intel 8251, Operating features of 8251, Detailed operation description.

List of Experiments:

- Demonstration of 8085 kit, interfacing kits and simulators.
- Problems related to data transfer instructions of 8085 microprocessor.
- Problems related to data transfer instructions of 8085 microprocessor.
- Problems related to arithmetic instructions of 8085 microprocessor.
- Problems related to arithmetic instructions of 8085 microprocessor.
- Problems related to logical instructions of 8085 microprocessor.
- Problems related to logical instructions of 8085 microprocessor.
- Problems related to branch instructions of 8085 microprocessor.
- Problems related to branch instructions of 8085 microprocessor.
- Write a program to control the operation of stepper motor using 8085and 8255 PPI.
- Write a program to control the traffic light system using 8085and 8255 PPI.
- Write a program to control the operation of ADC/DAC using 8085 and 8255 PPI.
- Demonstration of 8086 kit.

Text Books:

- Ramesh S Gaonkar, Microprocessor Architecture, Programming & Applications with 8085, Wiley Eastern Ltd.
- Brey, The Intel Microprocessors 8086- Pentium processor, PHI

Reference Books:

- Hall, Microprocessors and interfacing, TMH
- Badri Ram, Advanced Microprocessors and Interfacing, TMH
- A. K. Ray and K. M. Bhurchandi, Advanced Microprocessor and Peripherals, TMH

Course Title/ Code	DIGITAL SYSTEM DESIGN (ECH318) T & P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	To design, synthesize and simulate the complex digital hardware systems using Hardware Description Language.

Section A

Introduction: Introduction to Computer-aided design tools for digital systems, Design flow, Hardware Description Languages, VHDL capabilities and basic terminologies. VHDL Fundamentals**:** Identifiers, Data objects and data types, Operators, Operator overloading, Entity and architecture declaration, Introduction to behavioral, dataflow, structural and mixed modeling.

Section B

VHDL Statements: Behavioral Modeling**:** Process statement, Assignment statements, Delta delay, Wait statement, If statement, Case statement, Null statement, Loop statement, Exit statement, Next statement, Assertion and report statement, Multiple process, Types of delay, Signal drivers and the effect of delays on signal drivers, Dataflow modeling: Conditional signal assignment statement, Selected signal assignment statement, Unaffected value, Block statement, Concurrent assertion statement, Resolution function, Packages and Libraries, Subprograms: Functions, Procedures and Subprogram overloading, Structural Modeling: component declaration and instantiation, generics and configuration.

Section C

Combinational & Sequential Circuit Design: VHDL models and simulation of combinational circuits such as half adder, full adder, multiplexers, demultiplexers, encoders, decoders, code converters, comparators, Implementation of Boolean functions; VHDL models and simulation of sequential circuits: flip flops, shift registers, counters, State diagrams, Implementation of Mealy and Moore FSM using VHDL, Creating test benches.

Section D

Design of Microcomputer & Programmable Devices: Basic components of a computer, Architecture and implementation using VHDL, VHDL Programmable logic devices: ROM, PLA, PAL, GAL, PEEL, CPLD and FPGA, Design implementation using CPLD and FPGA.

List of Experiments:

- Introduction to Xilinx ISE Foundation tool and synthesize and simulate half adder, full adder and half subtractor using schematic capture.
- To model, simulate and synthesize all digital gates in VHDL.
- To model, simulate and synthesize full adder and full subtractor using Dataflow Modeling style in VHDL.
- To model and simulate Multiplexer using Dataflow and Behavioral Modeling, Demultiplexer using Structural Modeling style.
- To model and simulate Encoder and Priority Encoder using Dataflow and Behavioral Modeling, Decoder using structural Modeling and verify using Test Bench.
- To model and simulate Binary to Gray Code converter and BCD to Seven segment using VHDL and verify using Test Bench.
- To model and simulate 3 bit comparator using VHDL and verify using Test Bench.
- To model and simulate all flip flops using VHDL and verify using Test Bench.
- To model and simulate 4 bit register (SIS0, PIPO, shift left and shift right) using VHDL and verify using Test Bench.
- To model and simulate up counter, decade counter and up/down counter using VHDL and verify using Test Bench.
- VHDL synthesis of models in FPGA from lab 3 and 4.
- VHDL modeling and implementation of Project.

Text Books:

- J Bhasker, A VHDL Primmer, Prentice Hall
- Douglas L Perry, VHDL-IV Edition, TMH

Reference Books:

- Volnei A Pedroni, Circuit Design with VHDL, PHI
- Charles H Roth, Digital System Design using VHDL, PWS publishing
- Navabi Z, VHDL-Analysis & Modeling of Digital Systems, McGraw Hill
- Brown and Vranesic, Fundamentals of Digital Logic with VHDL Design, TMH
- R P Jain, Modern Digital Electronics, III Edition, TMH

Course Title/ Code	**Multi-Platform Mobile Development(CSH328) T & P**
Course Type:	Elective
Course Nature:	**Hard**
L-T-P-O Structure	(3-1-2-0)
Objectives	Students would be able To develop cross platform applications.

Section-A

Xamarin platform: Introduction to Mobile Development:Differences between Starter vs. Indie vs. Business licenses, types of mobile apps that can be created with Xamarin Studio vs. Visual Studio on both Windows and OS X, Requirements for creating a Xamarin.iOS application

Cross-Platform: Best practices for developing mobile applications with Xamarin: Introduction to Portable Class Libraries, Differences and approaches to sharing source code files (File Linking vs. SAPs vs. PCLs), Techniques used to switch to the UI thread (platform-specific *and* cross-platform), Basic knowledge of Xamarin.Social component (what it supports), Basic knowledge of the Xamarin.Mobile component (what it supports), Differences between common design patterns used in mobile development (MVVM, IoC/DI, Singleton, etc.), Using the Nuget and Xamarin Component Store, Basic knowledge of .NET libraries you can use in Xamarin.iOS and Xamarin.Android. Using the async / await keywords

Section-B

Memory Management, Techniques for Building Efficient Xamarin Applications: SGen vs. Bohm garbage collection (differences, why choose one over the other), which collector is used by default on each platform and how do you change it, Strong vs. Weak references in GC, Techniques to avoid circular references.

Navigation, Fragments in Android: Navigation patterns used in Android, Navigation patterns used in iOS, How to add items to the Android, Options menu

Section-C

Data in Mobile: Working with the File System: Advantages and restrictions to SQLite, ORM libraries used in the mobile world, How to abstract paths in Xamarin.Android and Xamarin.iOS, Isolated storage on Xamarin.Android, Xamarin.iOS and Windows Phone

Web Services: Web Services in Xamarin: Common architecture and data formats used in Web Services, Approaches you can use to access a web service from a Xamarin application, Available bindings in WCF/SOAP for Xamarin

Section-D

Backgrounding: Backgrounding: Starting and communicating with Android Services, Running a background task while suspended in iOS

Xamarin.Forms: Introduction to Xamarin.Forms: Xamarin.Forms core types - Page types, Layout containers, etc, What is XAML, Basic binding features.

LIST OF EXPERIMENTS:

1. Intro to Mobile/Kickstarter

2. Intro to Android with Xamarin Studio, or AND102 - Intro to Android with Visual Studio
3. Listviews and Adapters in Android
4. Introduction to Cross-platform Development
5. Intro to Xamarin.Forms
6. Working with SQLite and Mobile Data
7. Mobile Navigation Patterns
8. Backgrounding in Android:Running Finite-Length Tasks
9. Publishing an App
10. Advanced Cross-platform Development

Text Books:

1. Professional Cross-Platform Mobile Development in C# By Scott Olson, John Hunter, Ben Horgen, Kenny Goers, Wiley
2. Xamarin Cross-platform Application Development By Jonathan Peppers, Packt Publishing Ltd.

Reference Book:
1. Mobile Design and Development: Practical concepts and techniques for creating mobile sites and web apps By Brian Fling, O'Reilly

Course Title/ Code	**Network Security and Cryptography (CSH329) T & P**
Course Type:	**Elective**
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to understand different security methods and issues and will be able to secure their data from attacks.

Section-A

INTRODUCTION: Need of security, Security approaches, Principles of Security, Types of attacks, Encryption, Decryption, Symmetric and asymmetric key cryptography, Diffie-hellman key exchange algorithm and man in the middle attack, programs that attack, Introduction to Steganography.

Section-B
Cryptographic techniques and authentication: Substitution and transposition techniques, DES (Data Encryption Standard), Double DES and Meet in the middle attack, Tripple DES, AES (Advanced Encryption Standard), IDEA(International Data Encryption Algorithm), RSA algorithm, Digital signature, Knapsack algorithm, Authentication and authorization, Authentication techniques: What you know, What you have, What you are, Mutual authentication, Reflection attack.

Section-C

Message Digest and internet security protocols: Introduction to Message Digest, Requirements of message digest, Birthday attack, MD5, SHA (Secure Hash Algorithm), SSL (Secure Socket layer), TSP (Time Stamping Protocol), SSL (Secure Socket Layer), SET (Secure Electronic Transaction).

Section-D

Advanced security: Firewalls, IP security, VPN (Virtual Private Network), Denial of Service (DOS) attack, Electronic money, Single Sign On (SSO)

Case study of Phishing and Pharming attack, Case study of unbreakable codes.

LIST OF EXPERIMENTS:

- Exercise to perform passive attacks.
- Exercise to perform active attacks.
- Exercise to Encrypt and decrypt a text using DES
- Exercise on substitution techniques.
- Exercise on transformation techniques.
- Exercise on authentication techniques.
- Exercise to create message digest.
- Exercise to break unbreakable codes.

Text Books:

- KahateAtul, "Cryptography and Network Security", Tata McGraw-Hill Education Pvt. Ltd, New Delhi.
- Stallings William, "Cryptography and Network Security", Pearson Education Inc.

Reference Book:

Forouzan Behrouz A.,"Cryptography and Network Security",McGraw Hill Companies Inc., New York.

Course Title/ Code	Business Intelligence & its Applications(CSH330) T & P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	To develop knowledge and expertise on how to select and/or develop, and deploy successful business intelligence systems to assist managers in decision making.

Section-A

Introduction to Business Intelligence: Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities.
Basics of Data Integration: Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches.

Section-B
Data Integration (Extraction Transformation Loading): Data preprocessing, Introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications

Section-C

Introduction to Multi-Dimensional Data Modeling: Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi-dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using SSAS .
Section-D

Basics of Enterprise Reporting: Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS.

LIST OF EXPERIMENTS:

Using SQL Server along with Business Intelligence Development Studio (BIDS):
- SSIS SQL Server Integration Services
- SSAS SQL Server Analysis Services
- SSRS SQL Server Reporting Services

There will be 2 projects

 a. Project 1: Data in disparate data sources such as Excel, text file, databases etc. will be provided to the students. They will be expected to extract, cleanse, integrate and load it into the data-warehouse.

 b. Project 2: Design reports according to given business scenarios. The data for the reports is to be pulled from the data-warehouse built in the earlier project.

Text Books:

- R N Prasad, SeemaAcharya, "Fundamentals of Business Analytics", Wiley

Reference Book:
- David Loshin, "Business Intelligence", Elsevier
- Mike Biere, "Business intelligence for the enterprise", IBM Press
- Larissa Terpeluk Moss, ShakuAtre, "Business intelligence roadmap", Addison-Wesley Professional
- CindiHowson, "Successful Business Intelligence: Secrets to making Killer BI Applications", McGraw Hill
- Brain, Larson, "Delivering business intelligence with Microsoft SQL server 2008", McGraw Hill
- Lynn Langit,"Foundations of SQL Server 2005 Business Intelligence", Apress
- Stephen Few,"Information dashboard design", OReilly

Course Title/ Code	Software Project Management(CSH331) T & P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Student would be able to define and develop a software product from requirement gathering to implementation. The course focuses on the fundamentals of management of a software project.

Section-A

Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control,

requirement specification, information and control in organization, Project Management Tools & Techniques, Project success factors, role of project manager.

Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

Section-B

Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, water fall-, V-process-, spiral- models. Prototyping, delivery.Albrecht function point analysis.

Activity planning & Risk Management: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, activity recourse estimation, activity duration estimation, , Gantt Charts,network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project , precedence networks,Programme evaluation & review technique (PERT) and CPM, concept of slack time, schedule control.
Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values , qualitative risk analysis, using probability impact matrixes, expert judgement, qualitative risk analysis, decision trees & expected monetary value, simulation, sensitivity analysis, risk response planning,, risk monitoring & control.

Section-C

Resource allocation &Monitoring the control: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.
Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, getting the project back to target, change control, cost monitoring,Basis principles of cost management, Cost estimating, type of cost estimate, cost estimate tools & techniques, COCOMO, Putnam/ SLIM model Estimating by Analogy, cost budgeting, cost control, earned value management, project portfolio management.
Managing contracts and people: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Procurement management plans,Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises..

Section-D

Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, Quality Planning, quality Assurance, Quality control,external standards, techniques to help enhance software quality,Tool & techniques for quality control, Pareto Analysis, Six Sigma, CMM, Juran Methodology
Study of Any Software Project Management software: viz Project 2000 or equivalent**.**

LAB: SOFTWARE TOOLS USED:-PROJECT LIBRE (OPEN SOFTWARE)

With the help of this software we will draw
- Product Breakdown Structure
- Product Flow Diagram
- Activity Network for the Product Flow Diagram
- Gantt chart
- PERT chart
- Precedence Network Diagram (Activity on Arrow)
- Precedence Network Diagram (Activity on Node)
- Network after the Forward pass and Backward pass.
- **Calculate** Albrecht function point
- Development costs, Setup costs, Operational costs.

Text Books:
1. Kathy Schwalbe; Information Technology Project Management fourth edition, Thomson Course Technology.
2. Bob Hughes and Mike Cotterell, Software Project Management, Third Edition, Tata McGraw-Hill.
3. Software Project Management, Walker Royce, 1998, Addison Wesley.

Reference Books:
4. Project Management Body Of Knowledge. [PMBOK].
5. Pankaj Jalote, Software Project Management in Practice, Pearson Education.
6. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH

Course Title/ Code	**Introduction to .NET(CSW332) P**
Course Type:	**Elective**
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3)
Objectives	Students shall be able to learn database driven web application concepts using ASP.NET and Microsoft SQL Server to design and develop the websites.

Section –A

Introduction to .NET Technology & Various Control: Overview of .NET Framework, tools available in tool box of the web form, Simple application using web controls, Simple application using web controls, Simple application using custom controls.

Master Page, Content Pages and Validating User Input: Implementation of the master page and add the same master page in the main project, Create the various form of specific application and embedded the data in the project, Implement various validations for control using scripting language, implementation of various validations for control using scripting language.

Section –B

Concepts of Database Access and Database Handling: Creating tables in the database, database connectivity, Display records by using database, Insertion and deletion of records from the database,View and searching the data on web form.

Server Control and Tracing in ASP.NET : Using server control, Adding Event Procedure to web server control, Tracing in ASP.NET web application, Remote debugging.

Section-C

Creating User Control and Accessing Data: Addion of User Controls to an ASP.NET Web Form ,Creating User Controls ,Displaying a DataSet in a List-Bound Control , Accessing Data with DataReaders and DataSets.

Datagrid Control: Create the datagrid and add data, Fetching of the data from the database to datagrid, Addition data into the datagrid ,Create a master form in datagrid of the project, Embedded the data from the datagrid to the controls on the form.

Section –D

State Management: State management in web applications, Work with Application data, Session data, use of SQL Server and ASP.NETState Server to store Session and Application data.

Deploying a Web Project: Preparing a Website for Deployment,Publishing a Website,Moving database to a remote server, Build real life application with reports.

Text Books:
1. Beginning ASP.NET in C# by Wrox
2. Professional ASP.NET 2.0by BillEvjen

Reference Books:
3. Beginning ASP.NET by ImarSpaanjaars
4. Visual C# 2008: How to ProgrambyPaul J. Deitel, Harvey M. Deitel Prentice Hall, 2009

Course Title/ Code	Socket Programming (CSW333) P
Course Type:	Elective
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	Student will be able to develop the necessary skills for developing robust & scalable network applications and to build necessary basic knowledge for managing computer communication networks.

Section-A

INTRODUCTORY CONCEPTS: Introduction to socket programming – Overview of TCP / IP protocols, Introduction to sockets, Socket address structures , Elementary TCP sockets, Socket, Connect, Bind, Listen ,Accept ,Read, Write ,Close functions , Iterative server, Concurrent server

Section-B

APPLICATION DEVELOPMENT:TCP echo server, TCP echo client, POSIX signal handling, Server with multiple clients,I/O multiplexing, I/O models, Select function, TCP echo server (with multiplexing), Poll function, TCP echo client (with multiplexing)

Section-C

SOCKET OPTIONS, ELEMENTARY UDP SOC SOCKETS: Socket options , Get socket and set socket functions , Generic socket options , IP socket options , ICMP socket options, TCP socket options, Elementary UDP sockets, UDP echo server, UDP echo client, Multiplexing TCP and UDP sockets , Domain Name System , Gethostbyname function , IPV6 support in DNS – Gethostbyadr function ,Getservbyname , getservbyport functions.

Section-D

ADVANCED SOCKETS IPV4 AND IPV6 INTEROPERABILITY: Threaded servers – Thread creation and termination – TCP echo server using threads,FIFO Client Server, RPC application**,** net state , ping , trace route ,ipconfig, figure commands .

LIST OF EXPERIMENTS:

1. Write a program that takes the contents of a text file & copies them into another text file character by character
2. Find the source code of web site over the network
3. TCP Client & Server Converting the given string to upper case
4. TCP Client & Server Reversing the given string
5. TCP echo using client & Server application
6. TCP chat server & client application
7. TCP chat server & Multi client application
8. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"

9. Design a TCP concurrent server to echo given set of sentences using poll functions
10. UDP echo using client & Server
11. UDP Client & Server Reversing the given string
12. UDP Client & Server Converting the given string to upper case
13. UDP chat using client & Server
14. Design a FIFO Client Server Communication.

Text Books:

1. UNIX Network Programming vol-2nd edition,W.Richardstevens
2. W.R. Stevens, "Unix Network Programming, Vol 1", 2nd ed.,Prentice-Hall Inc., 1998

Reference Books:

1. Internet working with TCP/IP vol-1 Doubles e-commer
2. Internetworking TCP/IP Vol III Doubles E Comer ,DavidL.Stevens

Course Title/ Code	**Game Programming (CSW334) P**
Course Type:	**Elective**
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)
Objectives	The Students are able to develop skills required for designing Computer games.

Section A

Construct 2 Basics: Installing Construct 2, Start page, Settings: Basic debugging, Platform basics, dying/respawn/checkpoints, end of level/changing level, scrolling basics. The Interface: File menu and Ribbon tabs.
Setting up the Layout: The Layout view, View tabs, Properties Bar, Project Bar and Layers Bar, Project Bar/Layers Bar tabs, Object Bar, Order Bar, Tilemap Bar, Bookmarks Bar, Status Bar, Top-right buttons, Customising.
Project structure: **Layouts-Adding, modifying and deleting objects, Scrolling and zooming, Selection wrapping, Event Sheets, Image and Animations editor.**

Section B

Dialogs: Add behavior, Add condition/action, Object Types, Events Type, System object, Sounds and Music, Project Files, Common units: **Positions**, **Sizes,Angles**, **Times**, **Speeds**, **Accelerations** , Zero-based indexing.
Debugger: 'Inspector' tab, 'Watch' tab, 'Profile' tab. Saving, sharing and collaborating, Testing and publishing, Exporting.

Section C

Unity Basics-Learning the InterfaceCustomizing Your Workspace, Asset Workflow, Creating Scenes, Publishing Builds, Unity Hotkeys, Building Scenes, Creating Gameplay.

Editor: Editor Overview- Network Emulation, Visual Studio C# Integration, Analytics, IME in Unity;
Graphics: Graphics Overview- Lighting, Cameras, Shaders, Terrain Engine, Tree Creator, Particle Systems, Textures and Videos, Reflection probes, Sprite Editor, Cluster Rendering, Advanced Rendering Features, Procedural Materials ,Procedural Mesh Geometry, Optimizing Graphics Performance, Layers, Graphics HOWTOs, Graphics Tutorials.

Scripting: Creating and Using Scripts, Variables and the Inspector, Controlling, Creating and Destroying GameObjects Using Components, Event Functions, Time and Framerate Management, Coroutines, Namespaces, Attributes, Execution Order of Event Functions, Generic Functions, Script Serialization, UnityEvents, Null Reference; **Physics:** Rigidbodies, Colliders, Joints, Character Controllers.

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Section D

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Audio: Audio Files, Tracker modules, AudioMixer, AudioGroup, AudioInspector and APIs.
Animation: Unity's Animation System, Legacy animation system.
UI: Canvas, Basic Layout, Visual Components, Interaction Components, Animation Integration, Auto Layout, Rich Text.
Navigation and pathfinding: Navigation System in Unity, Inner Workings, Building a NavMesh, Creating a NavMesh Agent & obstacle, Creating an Off-mesh Link, Building Height Mesh for Accurate Character Placement, Navigation Areas and Costs
Architecture: Asset Import and Creation, AssetDatabase, Loading Resources at Runtime, Modifying Source Assets Through Scripting, Reducing the File Size of the Build, Plugins, Textual Scene File Format, Command line arguments, Running Editor Script Code on Launch.

REQUIRED TOOLS
- Construct 2 (Code Free Tool)
- Unity 3D (Code Based Tool)

LIST OF EXPERIMENTS:
1. Getting Started with Construct 2.
2. Inputs and Controls in Construct 2.
3. Use of Variables and Arrays in Construct 2.
4. Making a Simple Shooter Game in Construct 2.
5. Making a Tower Defense Game in Construct 2.
6. Making a Puzzle Physics Game in Construct 2.
7. Design Roll a ball using Unity 3D.
8. Design Space shooter using Unity 3D.
9. Design Survival shooter using Unity 3D.
10. Design Stealth using Unity 3D.
11. Design 2D Rougelike using Unity 3D.

Text Books:
1. "Construct 2 Game Development by Example" by John Bura
2. Construct Game Development Beginners Guide" by Daven Bigelow

Reference Sites:

1. Construct 2 Manual from www.scirra.com.
2. Unity Manual (mostly text and pictures) http://docs.unity3d.com/Manual/
   (http://docs.unity3d.com/Manual/).
3. https://www.packtpub.com/game-development/construct-2-game-development-example.
4. Unity Scripting reference (make sure you choose JavaScript, should be the default language)
   http://docs.unity3d.com/ScriptReference/ (http://docs.unity3d.com/ScriptReference/).
5. Unity Tutorials (lovely British Accent, all very short and very much worth your time)
   http://unity3d.com/learn/tutorials/modules (http://unity3d.com/learn/tutorials/modules).

Course Title/ Code	French (FLS103)
Course Type:	**Elective**
Course	Soft

Nature:	
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange information about various sports activities. 2. Understand and use adjectives and place them correctly. 3. Learn Basic vocabulary that can be used to discuss objects of different quantities. 4. Discuss the weather by using expression of avoir and faire. 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Ask questions by using different adverbs of interrogation. 7. Provide basic information about familiar situations and topics of interest by using savoir and connaitre verbs. 8. Differentiate certain patterns of behavior in the cultures of the French-speaking world and the student's native culture

Section-A
- Talking about sports activity
- Position de adjectifs

Section-B
- L'adverbe de quantite
- L'adjectif possessif

Section-C
- Les expressions avec Avoir et faire
- Les verbes savoir et connaitre

Section-D
- Les adverbs interrogatifs
- Les pronom sujets "ON"

Course Title/ Code	**Spanish (FLS601)**
Course Type:	**Elective**
Course Nature:	Soft
L-T-P-O	(1-1-0-0)

Structure	
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use possessives and answer simple questions 3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary 4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., festivals, food, recipes) with repetition when needed 5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed. 6. Describe festivals of Spain and Latin America, talk about food and recipes in short discourse using sentences and vocabulary 7. Provide basic information about familiar situations and topics of interest 8. Express or/and justify opinions using equivalents of different verbs 9. Differentiate certain patterns of behavior in the cultures of the Spanish-speaking world and the student's native culture

Section-A
- Direct and indirect Pronouns
- Introduction of verbs that express obligations
- Introduction of famous festivals of Spain and Latin America

Section-B
- Introduction of famous dishes of Spain and Latin America
- Vocabulary related to food.
- How to write recipes

Section-C
- Introduction of Simple past tense
- Conjugation of regular and irregular verbs in past tense
- Introduction of Imperfect tense

Section-D
- Use of imperfect tense in story telling
- Difference in use of Simple past tense and Imperfect tense
- Perifrasis

Reference Book: Aula international 1, Modern Spanish Grammar

Course Title/ Code	**German (FLS602)**
Course Type:	**Elective**
Course Nature:	Soft
L-T-P-O Structure	(1-1-0-0)
Objectives	At the end of the course, students will be able to 1. Exchange greetings and do introductions using formal and informal expressions 2. Understand and use interrogative and answer simple questions

	3. Learn Basic vocabulary that can be used to discuss everyday life and daily routines, using simple sentences and familiar vocabulary
	4. Express their likes and dislikes. Also will have understanding of simple conversations about familiar topics (e.g., greetings, weather and daily activities,) with repetition when needed
	5. Identify key details in a short, highly-contextualized audio text dealing with a familiar topic, relying on repetition and extra linguistic support when needed.
	6. Describe themselves, other people, familiar places and objects in short discourse using simple sentences and basic vocabulary
	7. Provide basic information about familiar situations and topics of interest
	8. Express or/and justify opinions using equivalents of different verbs
	9. Differentiate certain patterns of behavior in the cultures of the German-speaking world and the student's native culture

SECTION A

- Clothes
- Shopping (Dialogue)

SECTION B

- Colours
- Adjective endings
- Weather

SECTION C

- Body and body parts
- Sports
- Common Diseases
- Dialogue at the doctors - Appointment (Over phone, formal and informal)

SECTION D

- Imperative
- Personal pronouns (Accusative)
- Modal verb (May/might)

ReferenceBook: 1. Studio D A1, Cornelsen Verlag
                2. Tangaram A1

Periods/week   Credits   Max. Marks: 100

L:2   T: 0   0.5   Internal   : 50

Duration of Ext. Exam: 1.5 Hours   External   : 50

Internal Assessment Bifurcation (Total Marks – 50)

- Sessional Examinations – 20
- Attendance – 15
- Class Performance – 5
- Assignment – 10

Course Objectives

1. To strengthen students Modern Math concepts
2. To help students perform well during placements
3. To help students get proficient with problem solving at various levels like basic, intermediate and advanced
4. To help students with shortcuts to problem solving
5. To improve students communication skills

Part A – Quantitative Aptitude

Unit 1: Modern Math

1.1 Permutation and Combination

1.1.1 Principal of counting and basic formulas

1.1.2 Arrangements, Selection and Selection + Arrangement.

1.1.3 Linear/Circular arrangements, Digits and Alphabetic Problems and Applications.

1.2 Probability

1.2.1 Events and Sample Space, Basic Formulas.

1.2.2 Problems on Coins, Cards and Dices.

1.2.3 Conditional Probability, Bayes' Theorem and their Applications.

Unit 2: Advanced Math

2.1 Mensuration 1- Areas

2.1.1 Different types of Triangles and their area and perimeter.

2.1.2 Different types of Quadrilateral and their area and perimeter.

2.1.3 Circumference and Area of Circle, Area of Sector and length of Sector.

2.1.4 Mixed Figures and their Applications.

2.2 Mensuration 2- Surface Areas and Volumes

2.2.1 Problems on Cubes & Cuboids, Cone, Cylinder and Sphere.

2.2.2 Prism and Pyramid.

2.2.3 Mixed Figures and their Applications.

Part B – Verbal Ability Test

Unit 1 Advanced Vocabulary

Basics of VAT to be discussed which will be the prologue to the seamier teaching

1.1 Spotting Errors
1.2   Ordering of Words
1.3 One Word Substitutes

1.4 Idioms and Phrases

1.1 Vocabulary, COW, Punctuation

Unit 2 Sentence Construction & Syntax

2.1 Sentence Improvement

2.2 Spotting Errors

2.3 Ordering of Words

2.4 Sentence Improvement

2.5 Ordering of Sentences

2.6 Change of Voice

2.7 Completing Statements

Unit 3 Reading Comprehension

3.1 Strategic Reading, Eliminating Poor Reading Habits

3.2 Techniques to increase speed reading, comprehension and recall

3.3 Solving Sample RC Passages (CAT, SAT)

3.4 Closet Test

3.5 Verbal Analogies

Unit 4 Writing Skills

4.1 Professional Writing : KISS Principle, styles of writing: technical & formal, formatting

4.2 Practice Exercises: Formal Letter writing, Report Writing, Essay Writing

Text Books/Reference Books:

4. Quantitative Aptitude : R S Aggarwal, S Chand & Company Pvt Ltd
5. Quantitative Aptitude for CAT: Arun Sharma
6. Verbal Ability and Reading Comprehension: MVN Enterprises

Web links:

http://www.indiabix.com/aptitude/questions-and-answers/

http://www.indiabix.com/non-verbal-reasoning/questions-and-answers/

Instructions for paper setting: Fifty MCQ will be set in total. All questions will be compulsory. Each question will be of 1 marks. There will be no negative marking. Calculator not allowed. Time allotted would be 90 minutes.

Assessment Tools:

Sessional tests
Term end examination scores
Class performance
Home assignments
Online assignments
Class attendance

Course Title/ Code	Basics of Economics (MCS231)

Course Type:	Elective
Course Nature:	Soft
L-T-P-O Structure	(1-0-2-0)

Basics of Economics

Unit I

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve, Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

Unit II

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, degrees of Price elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

Unit III

Meaning of production and factors of production, laws of production, various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost and opportunity cost. Shape of short run cost curves.

Unit IV

Meaning of Market, Types of Market -Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets). Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices.

TEXT BOOKS:

1. Principles of Economics: P.N. Chopra (Kalyani Publishers).
2. Economics for Engineers- T R Jain & O P Khanna
3. Micro Economic Theory – M.L. Jhingan (S.Chand).
4. Micro Economic Theory - H.L. Ahuja (S.Chand).
5. Modern Micro Economics: S.K. Mishra (Pragati Publications).
6. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.).
7. Indian Economy: Rudar Dutt & K.P.M. Sundhram

Course Title/ Code	**Fundamentals of Finance (MCS232)**
Course Type:	**Elective**
Course Nature:	Soft
L-T-P-O Structure	(1-0-2-0)

Unit 1:-

Introduction to Finance ; Forms of Business Organization ; Overview to financial statements , Balance Sheet, Profit and Loss Account , Cash Flow Statement.

Financial Analysis and Planning; Financial Ratios, Break Even Analysis Sources of Long term Finance – Equity Capital, Preference Capital, Terms Loans, Debentures; Raising Long term Finance.

Unit 3:-

Time Value of Money, Capital Budgeting- Techniques of Capital Budgeting, Net Present Value and Payback Period; Capital Structure and Cost of Capital.

Unit 4:-

Working Capital: Introduction, Components of Current Assets and Current Liabilities, Operating Cycle, Estimation of Working Capital; Operating Income , Earning Before Interest and Tax (EBIT).

Suggested Readings:

1. Pandy, I.M., Financial Management, Vikas Publishing House, New Delhi
2. Khan M.Y, and Jain P.K., Financial Management, Tata McGraw Hill, New Delhi
3. Keown, Arthur J., Martin, John D., Petty, J. William and Scott, David F, Financial Management, Pearson Education
4. Chandra, Prasanna, Financial Management, TMH, New Delhi
5. Van Horne, James C., Financial Management and Policy, Prentice Hall of India
6. Brigham & Houston, Fundamentals of Financial Management, Thomson Learning, Bombay.
7. Kishore, R., Financial Management, Taxman's Publishing House, New Delhi

Subject Name: Technical Seminar-III
Subject Code: RDO304

Periods/week   Credits   Max. Marks   : 50

P: 2   1   Internal : 50

Pre-requisites: Basic knowledge of Research

Course Type: Research & Training

Course Objective:

Course outcomes- The students will be able

CO1. To analyze and interpret experiments result and be able to reproduce the same

CO2. To adapt a process to yield the quality output

CO3. To understand the structural convolution of theory and its practical applications

CO4. To get an insight on the follow-up research

CO5. To adapt working with group members

CO6. To learn the structuring of the paper in the form of Power Point Presentation

Section-A

Standardizing the results- Blocking, randomization and replication of experiments to ensure repeatability and reproducibility**,** Interpreting convolution between experimental data and hypothesis/simulation**,** Comparison of the results for discrepancies, Listing of observations, Analysing the observations to get the further research direction**,** Exploring opportunities for future work.

Section-B

Documentation and presentation- Integration of relevant theory, findings in a structured way and draw appropriate conclusions, Review and modification of the draft**,** Mock presentation**,** Identification of journal/conference

References:
1. www.office.com
2. www.adobe.com/Photoshop
3. www.latex-project.org

CSU01- Semester-VII

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH436 T & P	Advanced Java	Domain Core	Hard	3	1	2	0	5
CSH437 T & P	iOS App Development	Domain Elective	Hard	3	1	2	0	5
CSH438 T & P	Cloud Computing	Domain Elective	Hard	3	1	2	0	
CSH439 T & P	Big data	Domain Elective	Hard	3	1	2	0	
CSH440 T & P	NoSQL Database Models	Domain Elective	Hard	3	1	2	0	
CSH441 T&P	Knowledge representation and machine learning	Domain Elective	Hard	3	1	2	0	
CSW442	Software Testing	Domain Elective	Workshop	0	0	3	0	2

CSW443	User Experience (UX)	Domain Elective	Workshop	0	0	3	0	
CSN444	Major Project - Agile (Stage I)	Domain Core	NTCC	0	0	3	0	2

Course Title/ Code	**Advanced Java(CSH436) T & P**
Course Type	**Core**
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to design/Create GUI desktop applications and web applications with database connectivity along with client server architecture and frameworks for solving real life problems.

Section-A

Review of Java Basic Features, Applets, AWT Controls, Event Handling, Multithreading, I/O files. **Swing**: swing vs AWT, swing containers, Introduction to JFC (Java Foundation Classes), Swing, Swing Features, JComponent, JApplet, JFrame, JPanel, JButtons, JCheckboxes, JRadiobuttons, JTextField, Jtable ,Jtree tec. Java Database Connectivity: Connectivity model, Java. SQL package, JDBC Exceptionclasses, Database connectivity, Data manipulation and navigation, creating database applications.

Section-B

Networking: Networking basics, Client/server model, Java and the Net, TCP/IP client sockets, TCP/IP server sockets, Inet Address, URL, Data grams, create networking applications.
Java RMI: Distributed object technologies, RMI architecture, creating RMI applications.
Advantages of Beans, Bean Developer kit (BDK), JAR files, introspection, developing Beans, Using Bound properties, The Java Beans API.

Section-C

Java Servlets: Life cycle of Servlet, Servlets Overview , Servlet Lifecycle: init(), service(), destroy() ,GenericServlet, ServletRequest, and ServletResponse , HttpServletRequest, HttpServletResponse and HttpServlet ,Request-response, headers, GET, POST , HTML Forms .

Section-D

Java Server Pages: Introduction, JSP Architecture, Lifecycle of a JSP , JSP object , JSP tags and JSP expressions , Fixed Template Data , Model View Controller (MVC) , Data Sharing among servlets & JSP , Request, application, session and page scope , JSP implicit objects.
Session Management Hidden form fields, Cookies, session tracking, Http Session, Exception handling and error pages \
Frameworks in Java Struts: Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works? , Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts

ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles

LIST OF EXPERIMENTS:

1. Applet Programming
2. GUI using AWT and Swings
3. Java Database Connectivity (JDBC)
4. Networking and Socket Programming
5. RMI in java
6. Servlet
7. JSP
8. Struts framework

Text Books:
1. Core Java, Volume II: Advanced Features 9th Edition by Cay Horstmann

2. Java: The Complete Reference, Ninth Edition

3. Advanced Java Programming by Uttam K. Roy (Oxford university)

Reference Book:
1. O'Reilly Series for JSP and Servlets

2. O'Reilly Series for Swings and AWT

Course Title/ Code	iOS App Development (CSH437) T& P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students would be able To develop applications for iphones.

Section-A

Introduction: The four pillars of iOS app development**,** Introduction to Xcode 5,C basics, C structure, Creating primitive variables, Using pointers, Messages and methods, Object creation, Object creation, Automatic Reference Counting (ARC), Using existing classes, Creating custom classes, Adding properties.

Section-B

Core iOS Project Skills: Using the Model-View-Controller (MVC) pattern in iOS, Creating basic interaction, Dismissing the keyboard, Dismissing the keyboard with delegation, Understanding delegation, Alerting the user, The iOS application life cycle, Exploring the iOS project templates, Using the multitasking events,
Diagnosing Issues: Troubleshooting UI-to-code connections, Using the Xcode Debugger

Section-C

iOS View Controllers: Creating iOS UI, Designing responsive interfaces with Auto Layout, Adding and troubleshooting Auto Layout constraints, Using a date picker control, Loading data into controls, Responding to selection, Exploring the object library, Using Apple's Human Interface Guidelines
Using Table Views: Introduction to table views, Creating a basic table view and data source, Loading a property list into a table view, Reusing table view cells, Customizing table views, Customizing table view cells

Section-D

Apps with Multiple View Controllers: Introduction to multiple-view applications, Deconstructing a utility app, Using navigation controllers, Deconstructing a master-detail app, Creating a tab-bar-driven app
Using Storyboards: Exploring storyboards, Creating new scenes and segues, Passing data between scenes, Creating the custom classes, Making the connection, Loading the data, Passing objects between scenes
Blocks and Concurrency: Introduction to Objective-C blocks, Using Grand Central Dispatch (GCD) for concurrent code, Adding concurrency to an existing app with GCD

LIST OF EXPERIMENTS:

1. Using Xcode and the iOS Simulator
2. Learning Objective-C basics and structure
3. Creating objects, variables, properties, and custom classes
4. Connecting UI elements to code
5. Using delegation
6. Using the Xcode debugger
7. Creating and customizing table views
8. Exploring storyboards
9. Introducing blocks
10. Saving and loading data
11. Understanding the differences in iPad development
12. Creating iPad apps with popovers and split views
13. Adding application icons and launch images

Text Books:
1. iOS 7 Programming Cookbook, O'Reilly
2. iOS Application Development for Dummies, Jesse Feiler

Reference Book:
1. Sams Teach Yourself iOS App Development ByJohn Ray

Course Title/ Code	Cloud Computing (CSH438) T & P
Course Type:	Elective
Course	Hard

Nature:	
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to learn the concepts, techniques and implementation of clouds.

Section-A

Overview of Cloud Computing: Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing. Why Cloud Computing, Cloud service models (IaaS, PaaS&SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.

Working with Private Cloud: Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing. Business cases for the need of Cloud computing environment, Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Vendors, Private Cloud Building blocks namely Physical Layer, Virtualization Layer, Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud. Implementing private cloud (one out of CloudStack, OpenStack, Eucalyptus, IBM or Microsoft)

Section-B

Hrs. Working with Public Clouds: Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings, IaaSVendors, PaaS offerings, PaaS vendors, Software as a Service. Implementing public cloud (one out of AWS, Windows Azure, IBM or Rackspace).

Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

Section-C

Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud based services.

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds - Layered Cloud Architecture Development –Design Challenges. Inter Cloud Resource Management System – Resource Provisioning and platform Deployment- Global Exchange of Cloud Resources.

Future directions in Cloud Computing: Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security. Migration paths for cloud, Selection criteria for cloud deployment. Current issues in cloud computing leading to future research directions.

Section-D

Business Clouds: Cloud Computing in Business, Various Biz Clouds focused on industry domains (Retail, Banking and Financial sector, Life Sciences, Social networking, Telecom, Education). Cloud Enablers (Business Intelligence on cloud, Big Data Analytics on Cloud)

Programming Cloud IT Model: Parallel and Distributed Programming Paradigms, Twister and Iterative MapReduce, Hadoop Library from Apache- Mapping Applications – Programming Support of Google App Engine, Cloud Software Environments – including Eucalyptus, Open Nebula, OpenStack, Aneka and Cloud Sim.

LIST OF EXPERIMENTS:

1. Creation of EC2 Instance on Amazon.
2. Implementation of Load Balancing.
3. Deployment of various services on Amazon.
4. Design, development and implementation of a given business application.
5. Management of one application using multi-cloud management.

Text Books:
1. A Practical Approach Cloud Computing: By Anthony T Velte, Toby J Velte, Robert C Elsenpeter.
2. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, *Kai Hwang, Jack Dongarra and Geoffrey Fox*, Morgan Kaufmann, 2011.

Reference Book:
1. Cloud computing: Implementation, management and security By Rittinghouse, John, W.
2. Cloud Computing Bible, By Barrie Sosinsky, Wiley, 2011.
3. Cloud Computing Architected: Solution Design Handbook by Rhoton, John.
4. Cloud Security, A comprehensive Guide to Secure Cloud Com puting by Krutz, Ronald L.; Vines, Russell Dean
5. Cloud Computing: Principles and paradigms By Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski, 2011

Course Title/ Code	**BIG DATA(CSH439) T & P**
Course Type:	**ELECTIVE**
Course Nature:	**HARD**
L-T-P-O Structure	3-1-2-1
Objectives	Student will be able to do Big Data Programming and Analytics using Hadoop.

Section-A

Introductory Concepts (Digital Data and Big Data): Digital Data Basics,Types of Digital Data (Structured, Semi-Structured, Unstructured),Introduction to Big Data, Why Big Data? Dimensions of Big Data, Challenges with Big Data, Big Data Stack,ScalingProblems.Big data processing tools(AWS).
Hadoop overview:
Brief history of Hadoop, Hadoop 1.0 vs. Hadoop 2.0,Hadoop Components, High level architecture of Hadoop,HadoopStreaming,Hadoop Compression.

Section-B

Big data programming using Hadoop: Hadoop Distributed File System: Architecture, Daemons related to HDFS, working with HDFS command,Special features of Hadoop, Introduction to functional programming, How Map Reduce Works, Mapreduce on YARN, Map Reduce Joins, Map Reduce Work Flows. HDFS and Hadoop Ecosystem.

Section C

Big Data Analytics : Analytics 1.0, Analytics 2.0, Analytics 3.0,Traditional BI vs. Big Data Environment ,Big Data technology Landscape,NoSQLDatabases,NoSQL Vs. RDBMS, New SQL .

Section-D

Frameworks: APACHE HIVE:History of HIVE,HIVE architecture,Hive Primitive Data Types and Collection Types,Hive File Formats ,Hive Query Language – Statements,DDL DML , Fundamentals of APACHE PIG & HBASE ,Business Intelligence on Hadoop.

LIST OF EXPERIMENTS:
1. To Install and set up of Hadoop along with Start up and shut down process
2. Introduction to (Hadoop Distributed File System) labs
   - Loading data
   - Viewing the cluster contents
   - Getting data out of the cluster
3. To write basic map reduce program
   - Driver code
   - 3Mapper
   - Reducer
4. To Creating Input and Output formats in Map Reduce Jobs
   - Text Input format
   - Key value input format
   - Sequence file input format
5. To implementing Latin commands on pig/ How to use basic pig commands
6. Introduction to processing data with Hive
   - Creating tables with Hive
   - Managing hive table data location and lifetime
   - Loading data into hive tables
   - Partitioning the data
   - Querying tables with Hive QL

Text Books:

1. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
2. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
3. Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author) , Big Data, Big Analytics: Emerging Business Intelligence   and Analytic Trends for Today's Businesses,Wiley Publications,2013.

Reference Book:

1. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill Publishing, 2012.
2. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley &sons, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007.
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

6. Paul Zikopoulos , Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corrigan , Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012.
7. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011.

Course Title/ Code	**NoSQL Database Models(CSH440) T & P**
Course Type:	**Elective**
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to create, design & construct database using NoSQL Database (Graph database).

Section-A

Introduction: Defining NoSQL, What and Why NoSQL?, Relational Database (persistent data, concurrency, integration), Application & Integration databases, cluster attack. NoSQL storage types, Aggregate Data Model: (example, consequences), key-value and document data model, and column-family model, Neo4j- key concepts and characteristics, Neo4j installation process.

Section-B

Data Models: Relationships, Graph & Schema-less Databases, Materialized Views, Modeling for Data Access. **Distribution Models:** (Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication). **Consistency:** Update, Read, Relaxing Consistency, CAP Theorem, Relaxing Durability,Quorums. **Version Stamps:** Business and System Transactions, Version Stamps on Multiple Nodes, Modeling data for Neo4j, Designing Graph databases on Neo4j.

Section-C

Map-Reduce: Basic, Partitioning & Combining, Composing Map-Reduce Calculations (Two Stage & Incremental Map-Reduce). **Key-Value Databases:** features (consistency, transactions, query, structure of data, scaling), Use cases, issue with key-value stores. Importing data into Neo4j, importing small(ish) datasets using Neo4j-shell-tools.

Section-D

Document Databases: introduction, features, use cases (event logging, content management systems, blogging platforms, web analytics or real-time analytics, e-commerce), problem in document databases.
Column-Family Stores: basic, features, use cases (event logging, counters, blog, content management), issues in column family.
Graph Databases: basics, features, use cases (connected data, routing, dispatch & location based services, engines), problem with graph database. **Visualizations for Neo4j**- open source visualization libraries. Other tools related to Neo4j- data integration tools and business intelligence tools.

LIST OF EXPERIMENTS:

1. Create nodes of graph
2. Create relationships between nodes
3. Update the nodes and relationships
4. Queries to fetch the data from the graph created
5. Queries Using the general clause
6. Queries Using the reading clause
7. Queries Using the Writing clause
8. Queries Using the Functions

Text Books:

1. Pramod J. Sadalage, Marting Fowler: NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Addison-Wesley 2012 ISBN: 0321826620 (PS)
2. GauravVaish: Getting Started with NoSQL. PACKT Publishing, ISBN 978-1-84969-4-988.
3. Eric Redmond; Jim R. Wilson. Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement. Pragmatic Bookshelf. 2012. ISBN: 1934356921 (ER)
4. Graph Databases by Dr. Jim Webber

Reference Book:

1. Practical Neo4j - by Gregory Jordan

Course Title/ Code	Knowledge Representation & Machine Learning (CSH441) T & P
Course Type:	Elective
Course Nature:	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	- Students will be able to learn understand the role of knowledge representation, problem solving, and learning in intelligent-system engineering. - Students will be able to learn instance based learning algorithms , Analyze probabilistic methods for learning and Build optimal classifiers using genetic algorithms

Section-A

Introduction: Data, Information and Knowledge, Model of Intelligent System, Models of Knowledge Presentation: Representation and Reasoning in Knowledge. Semantic Representation: Semantic Network, Frames: Frame/Script Systems, Conceptual Dependency and Conceptual Graphs, Ontologies.

Section-B

Knowledge Based System: Software Architecture of Knowledge based system, Rule Based Programming and production system, Rule Chaining and Inference Control, Knowledge Representation and Logic, Interface in

Propositional Logics, First Order Logic, Reasoning Using First Order Logic, Resolution in FOPL, Reasoning with Uncertainty, Reasoning about Knowledge, Temporal Reasoning, Bayesian Techniques, Fuzzy Reasoning, Case Based reasoning .

Section-C
Overview of Machine Learning: What is Machine Learning, Elements of machine learning, Logistic Regression : Naive Bayes - the big picture, Logistic Regression: Maximizing conditional likelihood, Gradient ascent as a general learning/Optimization method , Generative versus Discriminative model, Linear regression, Instance Based Learning, Bias, Variance, Decision Tree Learning: The big picture , Overfitting, Random variables, Probabilities.

Section-D

Model Selection, Clustering and EM, mixture model and Hidden Markov Models(HMM),Graphical Model, Inference and Learning in GM, Active learning, Boosting, Reinforcement Learning, Spectral Clustering, Neural Networks: Non-linear regression , Back-propagation and Gradient descent, Learning hidden layer representations Reinforcement Learning: Value Iteration , Q learning, Markov Decision Processes.

LIST OF EXPERIMENTS:

1. Introduction to Ontology tool
2. Knowledge representation using Semantic Net
3. Knowledge representation using frames
4. Knowledge representation using conceptual dependency
5. Introduction to Matlab
6. Basic operations & algebra of machine learning
7. Vector & Matrices
8. Analyzing and plotting data
9. Linear Regression
10. Machine learning algorithms (logic regression, k-mean clustering, k-nearest neighbor classification, decision tree)

Text Books:
1. Tom. M. Mitcheli. Machine Learning, McGraw-Hill Publishing Company Ltd. (0 Copies)
2. Ethern ALPAYDIN. Introduction to Machine Learning, The MIT Press.   (0 Copies)
3. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar B. Nair, Third Edition, TMH. (43 Copies)

Reference Book:
1. Jaime GuillernoCarbonell and Tom Michael Mitchell, "Machine Learning", Morgan Kaufmann, 1994.

Course Title/ Code	**Software Testing(CSW442) P**
Course Type:	**Domain Elective**
Course Nature:	Workshop
L-T-P-O Structure	(0-0-3-0)

Objectives	Student will be able to implement software testing skills to test any given software based on the requirements specification.

Section-A

INTRODUCTION: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, V Model.

CODE TUNING TECHNIQUES: Use of Correct Data Type, Ordering statements in switch, Stop testing in a loop when result is known, Minimizing array references, Jamming and Un-switching of Loops, Minimizing Computations in loop.

FUNCTIONAL TESTING TECHNIQUES: BLACK BOX TESTING: Exploratory Testing, Logic Coverage: Interface Testing, Boundary Value Analysis, Robustness Testing, Worst Case Testing, Equivalence Class Testing.

Section-B

FUNCTIONAL/STRUCTURAL TESTING TECHNIQUES: Decision Table based Testing, Cause Effect Graphing Technique, and White box testing, Basis Path Testing, DD Paths and Cyclomatic Complexity.

STRUCTURAL TESTING TECHNIQUES: WHITE BOX TESTING: Graph Matrices, Data Flow Testing, Mutation Testing, Unit Testing, Integration Testing.

REDUCING THE NUMBER OF TEST CASES: Regression Testing, Regression Test Process, Selection of Regression Tests, Prioritization Guidelines, Slice based testing.

Section-C

OBJECT ORIENTED TESTING: Issues in OO Testing, Class Testing: Random Testing, Class Testing: Partition based Testing, Object Oriented Integration and System Testing, System Testing.

DEBUGGING AND DEFECT TRACKING REPORT: Debugging Techniques, Debugging through Code Inspection, Debugging using Logs, Debugging using IDE, Creating Defect Tracking Reports.

TEST MANAGEMENT: Test Planning, Test Management, Test Automation, Testing Tools, Static vs. Dynamic Testing Tools.

Section-D

TEST AUTOMATION USING SELENIUM: INTRODUCTION: Why Selenium? , Selenium Vs other tools (HP etc), Selenium Components, Selenium RC vs Web driver, Selenium Core, Selenium IDE, Remote Control (Selenium1), Web driver (Selenium2), Grid, Locators & types, Test Automation, Getting started with Selenium IDE, Useful Tools for Writing Test Cases Firefox Add-ons, Basic Html Theory.

TEST AUTOMATION USING SELENIUM: RECORDING TESTS: Selenium Commands – SELENESE, Pattern Matching, Element Locators, Selenium RC Overview, Install and Run Selenium RC, Recording and Playing Back Test Cases, Test Case Verification, Working with Test Suites, Test Case HTML Reports.

TEST AUTOMATION USING SELENIUM: RECORDING TESTS: The Eclipse IDE, Running a Test Using the JUnit Export from Selenium-IDE, Running a Test Using the TestNG Export from Selenium-IDE, Data Driven Testing using TestNG.

Text Books:
1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.

2. Louise Tamres, "Software Testing", Pearson Education Asia, 2002.
3. CemKaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
4. David Burns, "SELENIUM 2 TESTING TOOLS: BEGINNER'S GUIDE", Packt Publishing.

Reference Books:
1. K.K. Aggarwal&Yogesh Singh, "Software Engineering", 2nd Ed., New Age International Publishers, New Delhi, 2005.
2. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
3. AdityaGarg, "A Practitoner's Guide To Test Automation Using Selenium", 1st Edition, McGraw Hill Education (India) Private Limited.

Course Title/ Code	User Experience(CSW443) T & P
Course Type:	Elective
Course Nature:	Workshop
L-T-P-O Structure	(3-1-2-0)
Objectives	Students will be able to learn the ability to design good interface. To make clear distinction between good design and better design.

Section A

HCI: Introduction to HCI, Goals of System Engineering, Goals of User-Interface Design, Usability of Interactive Systems Motivations for Human Factors in Design, Guidelines, Principles and Theories, Conceptual, Semantic, Syntactic and Lexical Model, GOMS (Goals, Operators, Methods, and Selection) and Keyboard-level model, HCI, Object-Action Interface Model.

Interaction Styles: Introduction to interaction Devices, Keyboards and Function Keys, Pointing Devices, Speech and Auditory Interfaces, Speech Recognition, Image and Video Displays, Printers, Response Time and Display Rate with Respect to Display, Goals of Collaboration, Asynchronous and Synchronous Interfaces, Face-to-Face Interfaces.

Section B

Design Processes: Three Pillars of Design, Development Methodologies, Ethnographic Observation, Participatory Design, Scenario Development, Expert Reviews.

Tools and Testing: Usability Testing and Laboratories, Acceptance Testing, Evaluation during Active Use, Specification Methods, Interface Building Tools, Evaluation Tools.

Section C

Direct Manipulation (examples, explanations), Visual Thinking and Icons, 3D Interfaces, Virtual Reality, Introduction to Menu Selection, Form Fill-in and Dialog Boxes, Task Related Organizations, Fast Movement through Menus, Item Presentation Sequences, Response Time and Display Rate, Data Entry with Menus, Menu Layout, Command-Organizational Strategies, Naming and Abbreviations, Command Menus, Natural language in Computing.

Section D

Presentation Design Issues: Error Messages, Display Design, Individual-Window Design, Multiple Window Design and Coordination by Tightly-coupled Windows, Color.

Information Search & Visualization: Introduction, Search in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Search Interfaces, Information Visualization, OAI Model for Website Design.

LIST OF EXPERIMENTS:

1. Introduction to PENCIL Tools and its Controls.
2. To study the process of creating an animation with 2D objects, motion and sound.
3. To draw the Path and resizable shapes.
4. To draw the images and special constraints for Dimension and Handle.
5. Using external SVG.
6. Drawing sketchy lines.
7. Designing a model for website development.
8. Designing a User Interface.
9. Creating a PENCIL based Presentation with UI Controls.
10. Project based on PENCIL.

Text Books:

1. Schneiderman, Ben and Catherine Plaisant, *Designing the User Interface* (DTUI), Fifth edition, (Addison-Wesley, 2010)
2. Dix, Alan, Janet Finlay, Gregory D Abowd, Russell Beale, *Human-Computer Interaction* (HCI), Third edition (Pearson, 2004)

Reference Book:
1. Bill Buxton, **Sketching User Experiences: Getting the Design Right and the Right Design (Interactive Technologies),** Elsevier, 2007.
2. Bill Moggridge, **Designing Interactions,** MIT Press, 2008.

CSU01- Semester-VIII

COURSE CODE	COURSE NAME	Course Type	Course Nature	PERIODS				CREDITS
		Core(Departmental/Allied)/ Elective (Departmental/ Open) / University Compulsory	Hard/Soft/ Workshop/ NTCC	L	T	P	O	
CSH445 T & P	Mobile App Analytics	Domain Elective	Hard	3	1	2	0	5

CSH446 T & P	Information retreival	Domain Elective	Hard	3	1	2	0	
CSH447 T & P	Business Analytics with R programming	Domain Elective	Hard	3	1	2	0	
CSH448 T & P	Neural Network & Fuzzy Logic	Domain Elective	Hard	3	1	2	0	
CSH449 T & P	Advanced computer architecture	Domain Elective	Hard	3	1	2	0	
CSN450	Major Project -Agile (Stage II)	Domain Core	NTCC	0	0	8	0	8
MAH310 T & P	Operations Research	Allied Elective	Hard	3	1	2	0	5
PHH401 T & P	Renewable Energy Systems	Allied Elective	Hard	3	1	2	0	
	Elective from Chemistry Department	Allied Elective	Hard	3	1	2	0	

Course Title/ Code	Mobile App Analytics(CSH445) T & P
Course Type	**Hard**
Course Nature	Domain Elective
L-T-P-O Structure	(3-1-2-0)
Objectives	Students would be able to analyze market for the mobile application and calculating revenue.

Section-A

Introduction to Mobile App Analytics: Defining Web Analytics :- Quantitative and Qualitative Data ,The Continuous Improvement Process ,Measuring Outcomes ; Marketing and analysis tools, App revenue models, Starting with a measurement plan:- Gather Business Requirements , Analyze and Document Website Architecture, Create an Account and Configure Your Profile , Configure the Tracking Code and Tag Pages ,Tools to set up tracking- The Mobile Tracking Code , App Tracking , The (Very) Old Tracking Code: urchin.js.

Section-B

Attracting New Users: Create Additional User Accounts and Configure Reporting Features, Creating a Google Analytics Account :-Creating Additional Profiles ,Access Levels , All About Profiles :- Basic Profile Settings, Profile Name, Website URL, Time Zone, Default Page; Acquisition channels, Acquisition reports, High-value users, Segmentation and user attributes.

Section-C

Measuring behavior: Behavior reports overview, Reporting and Analysis Tools ,Juice Concentrate , Google Analytics Report Enhancer , Keyword Trends in Google Analytics, Screen tracking, Event tracking:- Getting Started with Event Tracking , Pulling It All Together , Implementation , Reporting ,Tracking a Distributed Object, Tracking Email - Email Messages to Complete Conversion Activities, Custom dimensions and metrics tracking:- Custom Variable Implementation ,Custom Variable Reporting ,Segmenting Members from Nonmembers , Custom Variables for E-Commerce , Custom Variables for Publishers, Enhanced Ecommerce tracking:- How It Works , Implementation , Common E-Commerce Problems ,Using E-Commerce Tracking on Non-E-Commerce Sites.

Section-D

Increasing revenue: Identifying roadblocks to revenue, Re-engaging existing users, Remarketing to new and existing users

List of Experiments

1. Study of various tools for analytics research
2. Introduction to Google Analytics tool
3. Setting up web tracking code.
4. Decide how to add tracking
5. Add tracking using Google Tag Manager
6. Add the tracking code directly to the site

Text Books:

1. Google Analytics by Jerri L. Ledford, Joe Teixeira, Mary E. Tyler, Wiley.
2. Google Analytics by Justin Cutroni, O'Reilly.

Reference Book:

1. Sams Teach Yourself Google Analytics in 10 Minutes by Michael Miller.

Course Title/ Code	Information Retrieval(CSH446) T & P
Course Type	Elective
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Student will be able to Model, Represent and Retrieve the information from web.

Section-A

Knowledge representation - Basics of Prepositional logic- Predicate logic-reasoning using first order logic-unification-forward chaining-backward chaining-resolution- -Production rules-frames-semantic networks-scripts.

Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes

Section-B

Information Retrieval Modeling - Information retrieval – taxonomy-formal characterizationclassic information retrieval-set theoretic model-algebraic model-probabilistic modelstructured text retrieval models-models for browsing-.retrieval performance evaluation keyword based querying-pattern matching-structural queries-Query operations.

Section-C

Index construction : Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes **Index compression:** Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression.

Ontology Development **-** Description logic-taxonomies-Topic maps-Ontology-Definition expressing ontology logically-ontology representations-XML-RDF-RDFS-OWL-OIL ontology development for specific domain-ontology engineering-Semantic web services

Parallel and distributed IR- multimedia IR- data modeling-query languages-.Web Searching Basics-Characterizing the Web-Search Engines-Web crawling and in dexex-link analysis

Section-D

Language models, Finite automata and language models, Types of language models, Multinomial distributions over words, The query likelihood model, Using query likelihood language models in IR, Estimating the query generation probability, Language modelling versus other approaches in IR, Naïve bayes-vector space classification-support vector machines and machine learning on documents-flat clustering hirarchical clustering

List of Experiments:

1. Rapid Miner tool will be explorer in the lab.

Text Books:

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill, 3rd Edition, 2003.

Reference Books:

1. Stuart Russell-Peter Norvig, "Artificial Intelligence – A modern Approach", Pearson Education, 2nd Edition, 2003. (Unit I)
2. Michael c.Daconta,leo J. Obart and Kevin J Smith,"Semantic Web – A guide to the future of XML,Web Services and Knowledge Management",Wiley Publishers 2003.
3. Christopher D. Manning,PrabhakarRaghavan and HinrichSchutze, "Introduction to Information Retrieval", Cambridge University press, 2008.

Course Title/ Code	Business Analytics with R programming(CSH447) T & P
Course Type	Eleteful
Course Nature	Hard
L-T-P-O Structure	(3-1-2-1)
Objectives	Students will be able to perform business analytics with R programming

Section-A

Introduction: Introduction to Business Analytics, Understand the use of 'R' in the industry, Compare R with other software in analytics, Install R and the packages useful for Business Analytics, Using the R console, Getting help, Learning about the environment, Saving your work. Data Structures, Variables: Variables and Assignment, Data types, Indexing, subsetting, Viewing data and summaries, Functions, Namingconventions, Objects, Models, Graphics Control Flow: Branching, Looping, Vectorized calculations

Section-B

Data Import : The various steps involved in Data Cleaning, Functions used in Data Inspection, Tackling the problems faced during Data Cleaning, Uses of the functions like grepl(), grep(), sub(), Coerce the data, Uses of the apply() functions. Import data from spreadsheets and text files into R, Import data from other statistical formats like sas7bdat and spss, Packages installation used for database import, Connect to RDBMS from R using ODBC and basic SQL queries in R.

Section-C

Data Visualization & Data Mining in R: Understanding Data Visualization, Graphical functions present in R, Plot various graphs like tableplot, Scatter Plot, histogram, box plot, Customizing Graphical Parameters to improvise the plots, Understanding GUIs like Deducer and R Commander, Introduction to Spatial Analysis. Introduction to data mining, K-means Clustering, Apriori for association rule mining, Linear Regression (Simple & Multiple), Logistic Regression.

Section-D

Predictive Analysis and Decision tree – Decision Trees, Algorithm for creating Decision Trees, Greedy Approach: Entropy and Information Gain, Classification Rules for Decision Trees, Concepts of Random Forest, Working of Random Forest, Features of Random Forest. Dimensionality reduction of Data: PCA, SVD, Analysis of Variance (Anova) Technique, Predictive Analysis. Time series Decomposition, Time series clustering and classification.

List of Experiments

1. Installation of Revolutionary R studio.
2. Vectors (logical, character) and their operation, Arrary indexing, Outer product of two array

3. Matrix operations
    a. How to name rows and columns of matrix.
    b. Program to transpose matrix
    c. Singular value decomposition,Cbind and rbind.
4. List creations, Concatenations of two lists, Attach () and detach() functions
5. Data Cleaning using apply () and grep()
6. Data import

    a. Load and save data from csv and text file using save and load functions
    b. Load data from R packages
    c. Load data from database using RODBC package
7. Visualize the data set using scatter plot, box plot and graph,heapmap,level plot and contour
8. Draw generalized linear model using glm() function and predict function
9. Decision tree of dataset using ctree() in party package
10. Decision tree of dataset using cforest() in party package
11. Implement k-means clustering,pamk() and Pam() function
12. Generate association rules using apriori on titanic dataset
13. Visualize the association rules using arulesViz
14. Time series dcomposition of AirPassengers dataset
15. Time series Forcasting of AirPassengersdataset usingArima()
    ● How to name rows and columns of matrix.
    ● Program to transpose matrix.
    ● Singular value decomposition,Cbind and rbind.

Text Book:

1. "Data mining and Bussiness analytics with R" by JohannesLadolter Willey Publications

Reference Books:

1. "R for Bussiness Analytics" by Ajay Ohri Springer Publications
2. "Customer and Bussiness Analytics Appled Data Mining for Bussiness Decision Making using R" by DanielS.Putler& Robert E. Krider CRC publications.

Course Title/Code	Neural Networks & Fuzzy Logic(CSH448) T & P
Course Type	Elective
Course Nature	Hard
L-T-P-O Structure	(3-1-2-1)
Objectives	The student will learn and apply the basic concepts of neural networks and fuzzy logic.

Section-A

Biological Neurons: Introduction, working of the neurons relevant to ANN.
Artificial Neural Networks: Model of an Artificial Neuron, Basic Terminology related to ANNs, Models of ANNs: Feedforward& Feedback networks; Types of Learning: Supervised, Unsupervised and Recurrent; Neural

Network learning rules: Hebbian learning rule, Perceptron learning rule, Delta learning rule, Widrow-Hoff learning rule, Correlation learning rule, Winner-take-all learning rule, Outstar learning rule.

Section-B

Perceptron Networks: Single Layer Perceptron Networks: Classification model, Features & Decision regions; training & classification using discrete perceptron, algorithm, single layer continuous perceptron networks for linearly separable classifications.
Multilayer Perceptron Networks: linearly non-separable pattern classification, Delta learning rule for multi-perceptron layer, Generalized delta learning rule, Error back-propagation training, learning factors, Examples.

Section-C

Self Organizing Networks: Basic concepts, unsupervised learning of clusters.
Single layer feedback Networks: Basic Concepts, Hopfield networks, Training & Examples.
Associative memories: Linear Association, Recurrent Autoassociative memory: retrieval algorithm, storage algorithm; Bidirectional associative memory: Architecture, Association encoding & decoding, Stability.

Section-D

Basics of Fuzzy Logic Theory: Crisp and Fuzzy Sets, Basic Set Operations, Fuzzy Relations, properties of membership functions, types of membership functions: triangular, trapezoidal, Gaussian, Composition of Fuzzy Relations, Mathematical Similarities between Neural Networks and Fuzzy Logic Models. Extension Principle, Linguistic Values, Linguistic variables, Fuzzy Rules, Membership Function Formulation and Parameterization, Fuzzy Reasoning.

List of Experiments

1. Simple MATLAB programs to implement Neural Networks and generating activation functions used in neural networks.
2. MATLAB programs to implement
   a. Single Layer Perceptrons for linearly separable classifications
   b. MutilayerPerceptrons for linearly non-separable pattern classification
   c. Problems based on Self Organizing Networks
   d. Problems based on Back Propagation networks.
   e. Problems based on Associative Memory.
   f. Problems based on Hopfield Networks.
3. Given 3 fuzzy sets, A, B and C, write programs in MATLab to implement the following:
   a. $\underline{A}$
   b. $\underline{B}$
   c. $\underline{C}$
   d. A) B
   e. A) C
   f. B) C
   g. A $*$ B
   h. B $*$ C
   i. A $*$ C
   j. A $*$ B) C
   k. A) B) C

4. Write MATLab programs to verify the following for the union operation, where P, Q and R are three given fuzzy sets:
   a.   Commutative Law for the sets P and Q
   b.   Associative Law for the sets P, Q and R
   c.   Distributive Law for the sets P, Q and R

Text Books:

1. Jacek M. Zurada, "Introduction to Artificial Neural Systems", Jaico Publishing House (15 copies available).
2. "Fuzzy Sets and Fuzzy Logic: Theory and Applications", by George J. Klir and Bo Yuan, 1995, Prentice Hall (24 copies available).

Reference Books:

1. Simon Haykin, "Neural Networks…. A comprehensive foundation", Prentice Hall International, 2nd Edition 1999, ISBN 0-13-273350-1 (11 copies available).

Course Title/ Code	Advance Computer Architecture (CSH449) T & P
Course Type	Elective
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	Students shall be able to learn the parallel processing architecture concepts to speedup the processing capabilities efficiently

Section-A

Parallel Computer Models - The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI Models, Architectural Development Tracks. Program and Network properties - Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow mechanisms, System Interconnection Architectures.

Section-B

Principles of Scalable Performance - Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches. Processor and Memory Hierarchy - Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

Section-C

Bus, Cache, and Shared Memory - Backplane Bus Systems, Cache Memory Organizations, The basics of Cache, Measuring and Improving of Cache Performance, Virtual Memory, Common framework for memory

hierarchies, Case study of PIV and AMD opteron memory hierarchiesShared-Memory Organizations, Sequential and Weak Consistency Models. Pipelining and Superscalar Techniques - Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design, superscalar and Superpipeline Design.

Section-D

Multiprocessors and Multicomputers - Multiprocessor System Interconnects, Cache Coherence and Synchronization mechanisms, Three Generations of Multicomputers, Message-Passing Mechanisms. Multivector and SIMD Computers - Vector Processing Principles, Multivector Multiprocessors, Compound Vector Processing, SIMD Computer organizations, The Connection Machine CM-5. Scalable, Multithreaded, and Dataflow Architect architectures - latency-Hiding Techniqies, Principles of Multithreading, Fine-Grain Multicomputers. Scalable and Multithreaded Architectures, Dataflow and Hybrid Architectures.

List of Experiments

1. Review of the different logic design ckts., e.g.
        a) Flip/Flop(RS, JK, D, T),
        b)Register,(4/8 bit Synchronized Data Transfer),
        c)Tri-state logic Gates
2. Familiarity with state of art IC-chips, e.g. a) Multiplexer , b) Decoder, c) Encoder, d) Counter, e)Shift-Register, f)adder Truth Table verification and clarification from Data-book.
3. Design a BCD adder.
4. Design an Adder/Subtracter composite unit .
5. Design a carry-look ahead Adder.
6. Design a ripple counter and carry-look ahead counter and assess the complexity of both the ckts.
7. Use a multiplexer unit to design a composite ALU .
8. Design a multiplex display unit using counter, multiplexer, decoder etc.
9. Design a keyboard Encoder unit in 2 Dimension.
10. Test a RAM chip and cascade two chips for vertical and horizontal expansion. Use wired OR tri-state output interconnection.
11. Use ALU chip for multibit arithmetic operation.
12. Write a program using 8086 for arranging an array of numbers in ascending order and verify.
13. Write a program for finding square of a number using look-up table and verify. .
14. Write a program to interface a two digit number using seven-segment LEDs. Use 8085/8086 microprocessor and 8255 PPI.
15. Write a program to control the operation of stepper motor using 8085/8086 microprocessor and 8255 PPI.

Case Studies
1. Case study of Pentium & power PC addressing modes.
2. Case study of RISC pipelining.
3. Case study of Pentium 4.
4. Case study of Job Sequencing & collision prevention.
5. Case study of Load Balancing – Static & Dynamic.
6. Case study of Parallel search algorithm.

Text Books:

1. Kai Hwang ,"Advanced Computer Architecture: Parallelism, Scalability, Programmability", Tata McGraw-Hill, 2003.
2. Kai Hwang and Faye A. Briggs," Computer Architecture and Parallel Processing", McGraw-Hill International Editions, 1985.

References:

1. J.P.Hayes, "computer Architecture and organization"; MGH. 1998.
2. Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication. 1998.
3. V.Rajaranam&C.S.R.Murthy, "Parallel computer"; PHI. 2002.

4. R.K.Ghose, RajanMoona&Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003.

Course Title/ Code	**Operations Research (MAH310) T & P**
Course Type	**Allied Elective**
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	The students would be able to apply the concepts of operations research required for solving the mathematical problems and their applications.

Section – A

Development – Definition– Characteristics and Phases – Types of models – operation Research models– applications.Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

Section – B

Transportation problem– formulation, optimal solution, unbalanced transportation problem, Degeneracy.
Assignment problem: formulation, optimal solution, variants of Assignment Problem- Traveling Salesman problem.
Replacement: Introduction – Replacement of items that deteriorate with time – when money valueis not counted and counted – Replacement of items that fail completely, group replacement. staffingproblem, equipment renewal problem.

Section – C

Project management-PERT & CPM: significance, phases of project management, PERT /CPM network components and precedence relationship, critical path analysis, forward and backward pass methods, slack of an activity and event, project scheduling with uncertain activity times, estimation of project completion time, project time –cost trade off, updating of the project progress.

Section – D

Game Theory: Introduction, Two-Person zero sum games, Pure strategies, Maximax and minimum principles, mixed strategies, game with saddle point, Principle of Dominance.

Waiting lines: Introduction – Single Channel – Poisson arrivals – exponential service times – withinfinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

TEXT BOOK:

1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Taha/Pearsons

REFERENCES:

1. Operation Research/A.P.VERMA/SK KATARIA AND SONS
2. Operations Research/P.K.GUPTA &D.S.HIRA
3. Software Reliability / John D.musa,Anthony Iannino and KajuzuhiraOkumoto/ Mac-Grawhill

List of Experiments

1. To solve the LPP involving the inequality constraints.
2. To solve the LPP involving the equality constraints.
3. Finding solution of LPP graphically.
4. To solve the LPP using the Simplex method.
5. To solve the LPP using Phase I method.
6. To solve the LPP using Phase II method.
7. To find the dual of given LPP.
8. Solution of dual by simplex method and interpretation
9. Formulating and solving transportation.
10. To find solution of assignment problems.

Course Title/ Code	Renewable Energy Systems (PHH401) T & P
Course Type	Allied Elective
Course Nature	Hard
L-T-P-O Structure	(3-1-2-0)
Objectives	

Section – A

Solar Energy – Sun as Source of Energy, Availability of Solar Energy, Nature of Solar Energy, Solar Energy & Environment, Various Methods to use solar energy –Photo-thermal, Photovoltaic, Photosynthesis, Present & Future Scope of Solar energy, Hybrid wind energy systems - wind + diesel power, wind + conventional grid, wind +Photovoltaic system etc.

Section – B

Bio-mass: Generation and utilization, Properties of biomass, Agriculture Crop & Forestry residues used as fuels. Biochemical and Thermo-chemical Conversion, Combustion, Gasification, Biomass gasifiers and types etc., Applications of Gasifiers to thermal power and Engines, Biomass as a decentralized power generation source for villages, Concept of Bio-energy**:** Photosynthesis process, Bio-fuels, Biomass resources Bio based chemicals and materials Thermo-chemical

Conversion: Pyrolysis, Combustion, Gasification, Liquification, Biochemical Conversion: Aerobic and Anaerobic conversion, Fermentation etc., Bio-fuels: Importance, Production and applications. Bio-fuels: Types of Bio-fuels, Production processes and technologies, Bio fuel applications, Ethanol as a fuel for I.C. engines, Relevance with Indian Economy. Bio-based Chemicals and Materials: Commercial and Industrial Products, Biomass, Feed stocks, Chemicals, Plastics, Fibers etc. Government Policy and Status of Bio fuel technologies in India

Section – C

Biomethanation: Importance of biogas technology, Different Types of Biogas Plants, Aerobic and anaerobic bioconversion processes, various substrates used to produce Biogas (cow dung, human and other agricultural waste, municipal waste etc.), Individual and community biogas operated engines and their use, Removal of CO_2 and H_2O, Application of Biogas in domestic, industry and vehicles, Bio-hydrogen production, Isolation of methane from Biogas, packing and its utilization

Section – D

Wind Energy: Wind Energy: Basics & Power Analysis, Wind resource assessment, Power Conversion Technologies and applications, Wind Power estimation techniques, Principles of Aerodynamics of wind turbine blade, Various aspects of wind turbine design, Wind Turbine Generators: Induction, Synchronous machine, constant V & F and variable V & F generations, Reactive power compensation. Site Selection, Concept of wind form & project cycle, Cost economics & viability of wind farm.

Reference Books :

1. Biomass Renegerable Energy D.O.hall and R.P. Overeed
(John Wiley and Sons, New york, 1987)
2. Biomass for energy in the developing countries – D.O.Hall, G.W.barnard and
P.A.Moss (Pergamon Press Ltd. 1982)
3. Thermo chemical processing of Biomass, Bridgurater A V.
4. Biomass as Fuel – L.P.White (Academic press1981)
5. Biomass Gasification Principles and Technology, Energy technology review No.67, -T.B. Read (Noyes Data Corp. , 1981)
6. Wind energy Conversion Systems – Freris L.L. (Prentice Hall1990)
7. Wind Turbine Technology: Fundamental concepts of wind turbine technology
Spera D.A. (ASME Press, NY, 1994)
8. Wind Energy Systems – G.L. Johnson (Prentice Hall, 1985)
9. Wind Energy Explained – J.F.Manwell, J.G. McGowan and A.L. Rogers
(John Wiley & Sons Ltd.)

List of Experiments

1. Determining efficiency of lighting system/loads
2. Measurement of Intensity of solar radiation
3. Energy Content in Wind. (Prototype Wind Mill of 500W)
4. Bio-gas Production from Kitchen waste.
5. Performance of Gasifire.